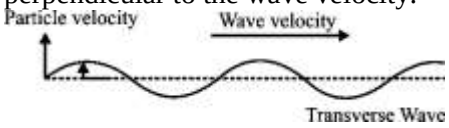
HINT AND SOLUTIONS

PHYSICS

1. (C)

In transverse waves the particles vibrate perpendicular to the wave velocity.



2. (D)

The frequency of beats $|v_a - v_b| = 4$

Hence, the frequency of one fork is either 4 Hz more i.e. 254 Hz or 4 Hz less i.e. 246 Hz than the other one i.e. 250 Hz.

Since, the number of beats i.e. the frequency difference between two forks is 4, hence the frequency of another fork cannot be more than 254 Hz.

3. (D)

Beats cannot be heard due to persistence of sound if the beat frequency is more than 10Hz.

4. (A)

Here phase difference is π. And when this is the case, the resultant amplitude will be $A_1 - A_2 = a$.

5. (A)

Here as the equation represents, the displacement of medium at x is in y direction, therefore the wave is transverse. Term kx-ωt represents wave to be traveling along positive x-axis.

6. (C)

Compare with standard equation

$$y = A\sin(\omega t \pm kx + \phi)$$

Here, amplitude A = 3m

Wavelength, $\lambda = \frac{2\pi}{k} = \frac{2\pi}{2} = \pi m$

Frequency, $f = \frac{\omega}{2\pi} = \frac{60}{2\pi} = \frac{30}{\pi} Hz$

and wave velocity, $v = \frac{\omega}{k} = \frac{60}{2} = 30 m/s$

Hence, option (C) is the wrong statement.

7. (A)

As long as temperature of gas does not change, pressure has no effect on the velocity of sound in the gas. So velocity of sound remains unchanged.

$$v = \sqrt{\frac{\gamma P}{\rho}} = \sqrt{\frac{\gamma RT}{M}} = \text{constant}$$

8. (A)

Frequency $f \propto \sqrt{T}$

$$\therefore \quad \frac{f_1}{f_2} = \sqrt{\frac{T_1}{T_2}}$$

$$\frac{1}{2} = \sqrt{\frac{9}{T_2}}$$

$T_2 = 4 \times 9 = 36$

9. (D)

$$\Delta\phi = \frac{2\pi}{\lambda} \times \Delta x \qquad \text{.....(i)}$$

Here, $\lambda = \frac{2\pi}{k}$ ....(ii)

From (i) and (ii)

$$\Delta\phi = k\Delta x$$

$$= \frac{\pi}{7} \times 3.5 = \frac{\pi}{2}$$

10. (D)

Let I represents the intensity of sound.

Loudness of sound $L = 10\log_{10}\frac{I}{I_0}$

$$\Rightarrow \quad L_2 - L_1 = 10\log_{10}\frac{I_2}{I_1}$$

$$90 - 40 = 10\log_{10}\frac{I_2}{I_1}$$

$$5 = \log_{10}\frac{I_2}{I_1} \Rightarrow \frac{I_2}{I_1} = 10^5$$

11. (D)

As given the source is moving toward the observer

So apparent frequency is

$$f' = f\left(\frac{v}{v - v_s}\right) \ldots \text{(i)}$$

f ′ = apparent frequency

f = frequency

v = velocity of sound

v_s = velocity of source

As given that source is moving toward the observer to increase the apparent frequency by 50%.

$$f' = f + \frac{50}{100} f$$

$$f' = \frac{3}{2}f \qquad \ldots.(ii)$$

From equation (i) and (ii)

$$\frac{3}{2}f = f\left(\frac{v}{v - v_s}\right) \qquad \Rightarrow \qquad \frac{3}{2} = \frac{v}{v - v_s}$$

$\Rightarrow$ $3v - 3v_s = 2v$

$\Rightarrow$ $v = 3\,v_s$

$\Rightarrow$ $v_s = \frac{v}{3}$

$\Rightarrow$ $v_s = \frac{330}{3}$ ($v = 330\ ms^{-1}$ given)

$= 110\ ms^{-1}$

12. (D)

For sonometer wire in fundamental mode

$$f = \frac{v}{2L}$$

$\Rightarrow$ $n = \frac{1}{2L}\sqrt{\frac{T}{\mu}}$

$\Rightarrow$ $n = \frac{1}{2L}\sqrt{\frac{T}{\rho A}}$ ….(i)

When length, diameter and tension in wire are doubled, let fundamental frequency be n'.

Then,

$$n' = \frac{1}{2(2L)}\sqrt{\frac{2T}{\rho \times 4A}}$$

$$n' = \frac{1}{2\sqrt{2}}\left(\frac{1}{2L}\sqrt{\frac{T}{\rho A}}\right) \quad \ldots\ldots(ii)$$

From Equation (i) & (ii)

$$n' = \frac{n}{2\sqrt{2}}$$

$$f = \frac{1}{D} \times \left[\frac{F}{\rho}\right]^{\frac{1}{2}}$$

13. (B)

Let L and L′ be the lengths of open organ pipe and closed pipe respectively.

Frequency of first overtone of open pipe,

$n_2 = v/L$

Frequency of first overtone of closed pipe,

$n_2' = 3v / 4L'$,

Given $n_2 = n_2'$

Therefore, $v/L = 3V/4L'$

or $L'/L = 3/4$

or $L' : L = 3 : 4$

14. (A)

$$c = \sqrt{\frac{T}{\mu}}, \quad \text{Here } T = \left(\frac{M}{l}x\right)g \text{ and } \mu = \frac{M}{l}$$

Hence $c = \sqrt{gx}$

15. (B)

Let v be the velocity of sound.

Closed organ pipe P_1 of length L_1 :

Frequency of different modes of vibration

$$f'_n = \frac{(2n-1)v}{4L_1}$$

First harmonic i.e. $n = 1$, $f'_1 = \frac{v}{4L_1}$

Open organ pipe P_2 of length L_2:

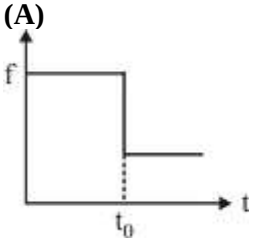
Frequency of m^{th} harmonic $f_m = \frac{mv}{4L_2}$

For third harmonic i.e. $m = 3$ $f_3 = \frac{3v}{2L_2}$

But $f'_1 = f_3$

$$\frac{v}{4L_1} = \frac{3v}{2L_2} \Rightarrow \frac{L_1}{L_2} = \frac{1}{6}$$

16. (A)



When the pain is approaching the stationary observer

Frequency, $\eta' = \frac{v + v_0}{v}\eta$

When the pain is away from the observer

$\eta'' = \frac{v - v_0}{v}\eta$

& η' & η'' an independent of time.

& $\eta' > \eta''$

So only option – (A).

17. (B)

Frequency of n^{th} harmonic vibration in closed pipe

$$f_n = \frac{2n-1}{4L} = 220$$

Frequency of $n + 1^{th}$ harmonic vibration

$$f_{n+1} = \frac{[2(n+1)-1]}{4L} = \frac{(2n+1)v}{4L} = 260Hz$$

But $f_{n+1} - f_n = 260 - 220$

$$\frac{[(2n+1)-(2n-1)]v}{4L} = 40$$

$$\frac{2v}{4L} = 40$$

$$\frac{v}{4L} = 20Hz$$

So the fundamental frequency of the system is 20 Hz.

Hence (B) is the correct answer.

18. (C)

Given, Amplitude, a = 0.2

Velocity, v = 360 m/s

Wavelength, λ = 60 m.

Equation of wave travelling along positive x-axis is $y = a \sin(kx - \omega t)$

$$k = \frac{2\pi}{\lambda}$$

$$k = \frac{2\pi}{60} = \frac{\pi}{30}$$

$\because \omega = 2\pi f$

and $v = \lambda f$

$$f = \frac{v}{\lambda} = \frac{360}{60} = 6\text{Hz}$$

So, $\omega = 2\pi \times 6$

$\omega = 12\pi$

So, equation of wave is $y = 0.2\sin\left[2\pi\left(6t - \frac{x}{60}\right)\right]$

19. (D)

It is a damped oscillation, where amplitude of oscillation at time t is given by $A = a_0 e^{-\gamma t}$

Where a_0 = initial amplitude of oscillation

γ = damping constant

As per question, $\frac{a_0}{3} = a_0 e^{-\gamma \times 100/v}$ ….(i)

(where v is the frequency of oscillation)

and $A = a_0 e^{-\gamma \times 200/v}$ …..(ii)

From (i): $\frac{a_0}{3} = a_0 e^{-\gamma \times 100/v}$ ….(iii)

Dividing equation (ii) by (iii), we have

$$\frac{A}{a_0(1/3)} = \frac{e^{-\gamma \times 200/v}}{e^{-\gamma \times 100/v}} = e^{-\gamma \times 100/v} = \frac{1}{3}$$

or $A = a_0 \times \frac{1}{3} \times \frac{1}{3} = \frac{1}{9} a_0$

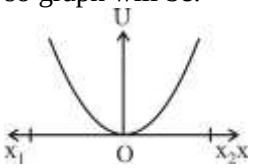
20. (A)

$\because$ We know that for a particle in SHM

Potential energy: $U = \frac{1}{2} k x^2$

Which is of the form $y = x^2$

so graph will be:



21. (A)

Time period of pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$

Error in time period $\frac{\Delta T}{T} \times 100 = \frac{1}{2} \times \frac{\Delta 1}{1} \times 100$

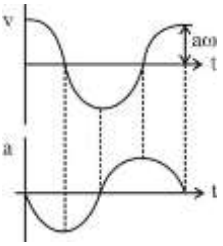
Given: $\frac{\Delta 1}{1} \times 100 = 2\%$

$\Rightarrow \frac{\Delta 1}{T} \times 100 = \frac{1}{2} \times 2 = 1\%$

Hence the time period increases by 1% if the length of pendulum is increased by 2%.

22. (D)

In simple harmonic motion velocity $= A\omega \sin(\omega t + \pi/2)$



Acceleration $= A\omega^2 \sin(\omega t + \pi)$ from this we can easily find out that when v is maximum, then a is zero.

23. (A)

For SHM, maximum acceleration, $a_{max} = \omega^2 a = \alpha$ where a is the amplitude of SHM and maximum velocity, $v_{max} = \omega a = \beta$

so, $\frac{\alpha}{\beta} = \frac{\omega^2 a}{\omega a} = \omega$ or $\frac{\alpha}{\beta} = \frac{2\pi}{T}$

or $T = \frac{2\pi\beta}{\alpha}$

24. (B)

Number of significant figures-

(1) 23.023 = 5
[All non zero digits are significant and zeroes between two significant digits are also significant]

(2) 0.0003 = 1
[All leading zeroes before the first non-zero digit are insignificant]

(3) $2.1 \times 10^{-3} = 2$
[In scientific notation, all digits in decimal number are significant whereas all digits in exponent power are insignificant]

$\therefore$ Ans. = 5, 1, 2

25. (B)

$$\frac{1}{k_{eq}} = \frac{1}{2k} + \frac{1}{k} \qquad \Rightarrow \quad \frac{1}{k_{eq}} = \frac{3}{2k}$$

$$\Rightarrow \quad k_{eq} = \frac{2k}{3} \qquad \Rightarrow \quad T = 2\pi\sqrt{\frac{m}{k_{eq}}}$$

$$= 2\pi\sqrt{\frac{3m}{2k}}$$

26. (D)

Time period of simple pendulum, $T = 2\pi\sqrt{\frac{l}{g}}$

$$\Rightarrow g = \frac{4\pi^2 l}{T^2}$$

Now, $\frac{\Delta g}{g} = \pm\left[\frac{\Delta l}{l} + 2\frac{\Delta T}{T}\right]$ $\quad \left\{\begin{matrix} y = x^n \\ \frac{\Delta y}{y} = \pm n\frac{\Delta x}{x} \end{matrix}\right\}$

$= \pm [2\% + 2 \times 3\%]$

$$\frac{\Delta g}{g} = \pm 8\%$$

27. (C)

$$4\frac{d^2x}{dt^2}+320x=0$$

$$a=\frac{d^2x}{dt^2}=-80x$$

Now $a=-\omega^2x$

$\therefore \omega^2=80;\quad \omega=\sqrt{80}$

$$T=\frac{2\pi}{\omega}\Rightarrow T=\frac{2\pi}{\sqrt{80}}$$

$$=\frac{\pi}{2\sqrt{5}}s$$

28. (C)

Given, $A=\frac{\sqrt{pq}}{r^2s^3}$

We know, for y = xn

$$\frac{\Delta y}{y}=\pm n\frac{\Delta x}{x}$$

$$\Rightarrow \quad \frac{\Delta A}{A}=\pm\left[\frac{1}{2}\frac{\Delta p}{p}+\frac{1}{2}\frac{\Delta q}{q}+2\frac{\Delta r}{r}+3\frac{\Delta S}{S}\right]$$

$$=\pm\left[\frac{1}{2}\times1\%+\frac{1}{2}\times3\%+2\times0.5\%+3\times\frac{1}{3}\%\right]$$

$= \pm 4\ \%$

29. (D)

$$\text{Random error}\propto\frac{1}{\text{Number of observations}}$$

$\Rightarrow$ If no. of observations are made four times, random error will become

One-fourth i.e. $\frac{x}{4}$

30. (D)

Out of the given 4 option $y = Ae^{kT}$ does not represent simple harmonic motion. It is also not periodic.

31. (C)

Given:

$y = 2 + 10 \sin 5\pi t$ ….(1)

we know,

$y = A \sin \omega t + B$ ….(2)

where, A is the amplitude and B is the mean position comparing equation (1) & (2)

A = 10

Correct answer is option C

32. (A)

$A = -\omega^2 x$ …(1)

Given $a = -4x$ …(2)

Comparing (1) and (2)

$\omega^2 = 4 \Rightarrow \omega = 2$

$$T=\frac{2\pi}{\omega}\Rightarrow T=\frac{2\pi}{2}=\pi\text{sec.}$$

33. (A)

The maximum velocity achieved by a pendulum is independent of the phase difference between two pendulums.

It is mentioned that the two pendulum under observation are of the same type and even have the same amplitude.

As a result, it can be concluded that they should both share the same numerical value for maximum velocity.

The other pendulum will also have the same maximum velocity.

34. (B)

According to question

Potential energy $=\frac{1}{4}$ (total energy)

$$\Rightarrow \quad \frac{1}{2}m\omega^2y^2=\frac{1}{4}\left(\frac{1}{2}m\omega^2A^2\right)$$

$$\Rightarrow \quad y=\frac{A}{2}$$

Hence, the option B is the correct answer.

35. (C)

Maximum velocity of the particle executing SHM is given by $v = A\omega$

where A is the amplitude and $\omega=\sqrt{\frac{k}{m}}$

Let the amplitude of the particle A and B be A_1 and A_2 respectively.

Given : $v_1 = v_2$

$$A_1\times\sqrt{\frac{k_1}{m_1}}=A_2\times\sqrt{\frac{k_2}{m_2}}$$

$$\therefore \quad m_1=m_2\Rightarrow\frac{A_1}{A_2}=\sqrt{\frac{k_2}{k_1}}$$

36. (A)

We are given that the simple pendulum of length L is hanging from the roof of a vehicle which is moving down the frictionless inclined plane.

So, its acceleration is g sin θ. Since vehicle is accelerating a pseudo force m (g sin θ) will act on bob of pendulum which cancel the sin θ component of weight of the bob.

Hence we can say that the effective acceleration would be equal to $g_{eff} = g \cos \theta$

Now the time period of oscillation is given by

$$T=2\pi\sqrt{\frac{L}{g_{eff}}}=2\pi\sqrt{\frac{L}{g\cos\alpha}}$$

37. (C)

If the zero of vernier scale does not coincide with the zero of main scale then the vernier callipers has zero error.

It is positive when zero of vernier sclale to the right of zero of main scale and negative when zero of vernier scale lies to the left of zero of main scale.

To correct the zero error.

Correction = –(zero error)

$\therefore$ Incorrect statement is (C)

38. (B)

Here, $P = P_0 e^{(-\alpha t^2)}$

In $y = e^x$, $[x] = [M^\circ L^\circ T^\circ]$

$\therefore \quad [\alpha t^2] = [M^\circ L^\circ T^\circ]$

$\Rightarrow \quad [\alpha] = [T^{-2}]$

$\Rightarrow$ The constant α has dimension T^{-2}

39. (C)

From mean position of extreme position body is decelerated and from extreme position to mean position the body is accelerated.

40. (C)

$y = 0.25 \sin (200t)$

$y = A \sin (\omega t)$

Amplitude A, 0.25 cm

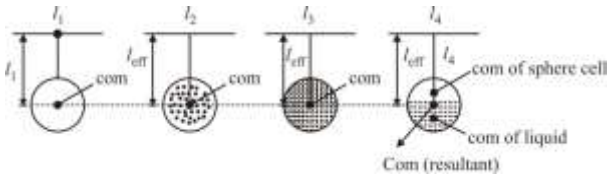
Max. speed = $A\omega$

$$= \frac{0.25}{100} \times 200$$

= 50 cm/sec

41. (D)

$$T = 2\pi\sqrt{\frac{\ell_{eff}}{g}} \qquad \ell_{eff} = \ell_{com}$$



You can see $\ell_1 = \ell_2 = \ell_3 < \ell_4$

$$T \alpha \sqrt{\ell_{eff}}$$

So, $T_1 = T_2 = T_3 < T_4$

(Given) $T = T_1 = T_2 < T_3$

42. (B)

Wavelength remains same during approaches and recede.

43. (B)

Velocity of source whistle = Vs = rw

= 10 m/s

$$\int a = \int s\left(\frac{V}{V + V_s}\right)$$

$$= 385\left[\frac{340}{340 + 10}\right]$$

= 374 Hz

Hence (B) is correct answer

44. (A)

$T = P^a D^b S^c$

We know, $[P] = [ML^{-1} T^{-2}]$

$[D] = [ML^{-3}]$

$[S] = [MT^{-2}]$

As only physical quantities having same dimension can be compared

$\therefore \quad [T] = [P]^a [D]^b [S]^c$

$\Rightarrow \quad [T] = [ML^{-1} T^{-2}]^a [ML^{-3}]^b [MT^{-2}]^c$

$\Rightarrow \quad [M^\circ L^\circ T] = [M^{a+b+c} L^{-a-3b} T^{-2a-2c}]$

$\Rightarrow \quad a + b + c = 0 \qquad \ldots.(1)$

$$-a - 3b = 0 \quad \Rightarrow \quad b = -\frac{a}{3} \quad \ldots..(2)$$

$$-2a - 2c = 1 \quad \Rightarrow \quad c = \frac{1 - 2a}{2} \quad \ldots..(3)$$

Solving eq. (1), (2) and (3)

$$a - \frac{a}{3} + \frac{1 - 2a}{2} = 0$$

$$\Rightarrow \quad \frac{2a}{3} + \frac{1}{2} - a = 0$$

$$\Rightarrow \quad \frac{a}{3} = \frac{1}{2} \qquad \Rightarrow \quad a = \frac{3}{2}$$

As $b = -\frac{a}{3}$

$$\Rightarrow \quad b = -\frac{1}{2}$$

$$c = \frac{1 - 2a}{2}$$

$\Rightarrow \quad c = -1$

45. (B)

Let the unit of length and mass in new system of units be denoted by cm' and g' respectively.

Then, 1 cm' = 10 cm $\quad \Rightarrow \quad 1\text{cm} = \frac{1}{10}\text{cm}'$

$1\text{g}' = 100\text{g} \quad \Rightarrow \quad 1\text{g} = \frac{1}{100}\text{g}'$

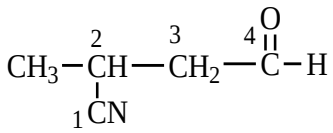
Now, Density $= 4\frac{\text{g}}{\text{cm}^2}$

$$= 4 \times \frac{\left(\frac{1}{100}\text{g}'\right)}{\left(\frac{1}{10}\text{cm}'\right)^3}$$

$$= 40\frac{\text{g}'}{\text{cm}'^3}$$

or 40 units

46. (B)



2- Methyl-4-oxobutanenitrile

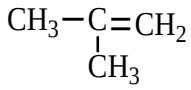
47. (A)

$CH_3-\overset{\ominus}{C}H_2$ is maximum stable due to hyperconjugation

48. (C)

Reactivity α stability of carbocation

49. (B)



Isobutene

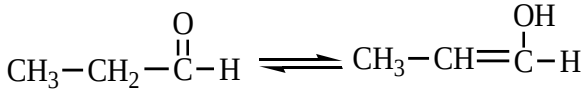
50. (A)

Theory based

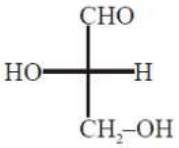
51. (C)

Benzyl alcohol and phenols are functional isomers.

52. (B)



53. (A)



is optically active

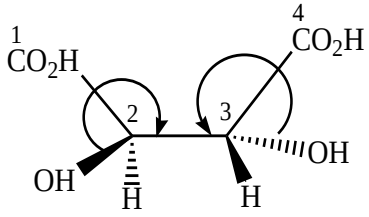
54. (D)

Stability of carbanion α resonance

55. (D)

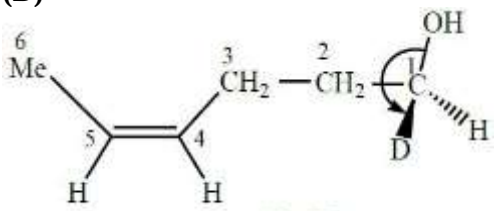
Ph – CH_2 – $\ddot{N}H_3$ has localised electron pair

56. (A)



2R 3R

57. (D)



1S, 4Z

58. (D)

Addition of HBr in presence of peroxide at alkene is free radical addition reaction.

59. (A)

Stability of conjugate anion α acidity α – M α – I

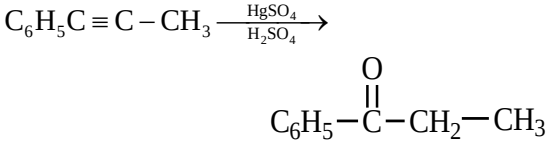
60. (A)

Theory based

61. (B)

More No. of bonds, More stability and negative charge on more E.N. atom structure are more stable than negative charge on less E. N. atom.

62. (A)



63. (A)

Reactivity α stability of free radical

64. (C)

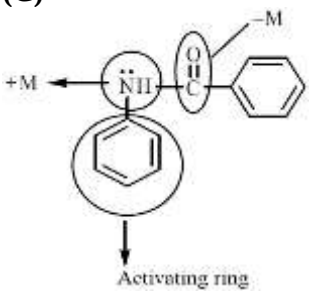
Nitrogen cannot exceed its covalancy more than 4.

65. (D)

Basicity α tendency to donate lone pair

Basicity α stability of conjugate cation

66. (C)



67. (B)

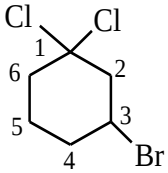
Stability of carbocation $\alpha \frac{+M}{-I}$

+M order — $-NH_2$ > –OH> – OR > – Cl

68. (A)

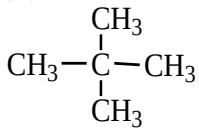
Potential energy is minimum of mean position and maximum at extreme Position

69. (B)



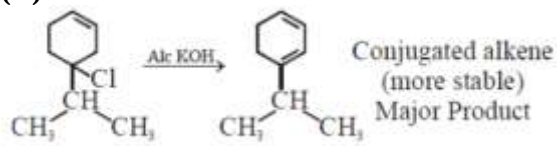
3-Bromo-1,1-dichlorocyclohexane

70. (B)



Only have one type of hydrogens.

71. (A)



72. (B)

Theory

73. (C)

(A) is antiaromatic, (B) and (D) are non-aromatic compounds

74. (C)

Stability of Carbocation α No. of α-hydrogen (C has 6 α hydrogen)

75. (B)

Acidity – sulphonic acid > benzoic acid > phenol

Also Acidity α electron withdrawing groups (–M)

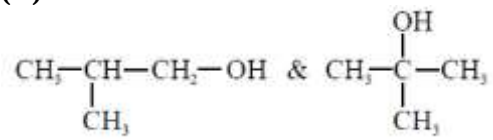
76. (D)

I → Conjugation

II → Aromatic

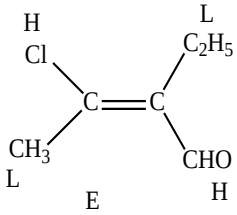
III → No Conjugation of positive charge

77. (A)



Isobutyl alcohol t-butyl alcohol

78. (B)



79. (D)

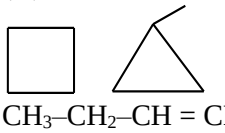
Basicity α tendency to donate lone pair

80. (A)

Triple bond — 2π + 1σ

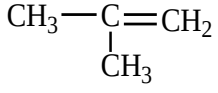
Double bond — 1π + 1σ

81. (D)



$CH_3–CH_2–CH = CH_2$

$CH_3– CH = CH–CH_3$



82. (D)

$T_{sp} = 2\pi\sqrt{\frac{\ell}{g}} = \sqrt{\frac{k}{g}}$

$g = \cos t^n$

83. (C)

B.P. increases with increase in molecular mass. For molecules with same molecular mass. Branching matters.

84. (D)

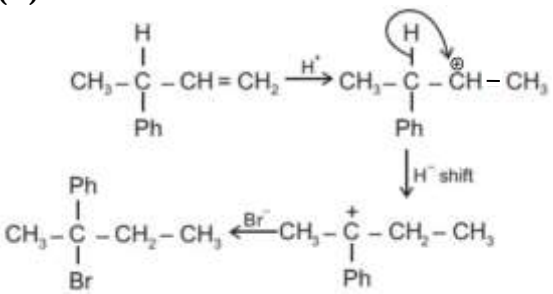
Hydrogenation of alkynes give selectively trans alkene with Na/liquid NH_3.

85. (A)

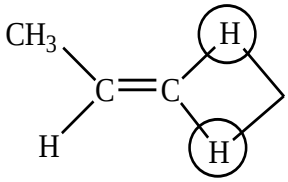
Theory based

76. (D)

87. (C)

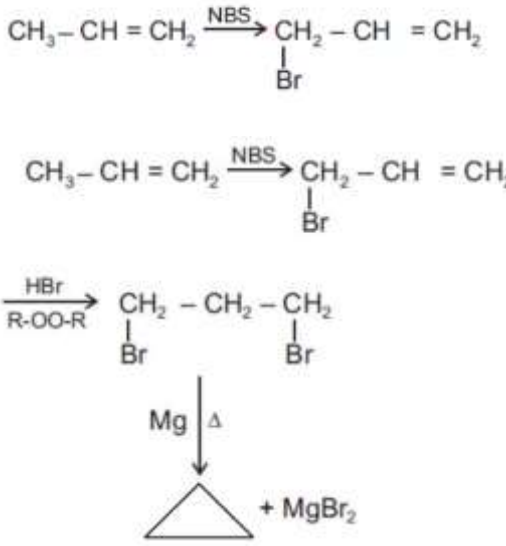


88. (D)



both valencies are same

89. (A)



90. (A)

$\frac{1^o\text{ product}}{3^o\text{ product}} = \frac{9\times1}{1\times5} = 9:5$

BIOLOGY

91. (D)
(Microbodies are small single membrane bound organelles which are present in both plant cells and animal cells)

92. (B)
(Lysosome is formed in Golgi body by the process of packaging. After formation primary lysosome is released from trans face of Golgi body)

93. (B)
(Centriole has 9 triplet peripheral microtubules but no Central microtubule)

94. (D)
(Schwann studied both animal cells and plant tissues. In human RBC the plasma, membrane has 52% protein and 40% lipid. SER is involved in detoxification of metabolic wastes or drugs)

95. (B)
(Ramachandran discovered triple helical structure of collagen and published it in nature in 1954)

96. (C)
(Nissls granules are formed by RER not Golgi complex)

97. (A)
(Flemming coined the term chromatin)

98. (B)
(Nucleolus is spherical in shape)

99. (D)
(Glycoprotein is released from trans face of Golgi cisternae)

100. (C)
(In sub-metacentric chromosome one arm is shorter while the other is longer)

101. (D)
(Satellite does not get stained)

102. (C)
Quasi fluid nature of lipid enables protein to move within overall lipid bilayer

103. (A)
(Primary wall is capable of growth which diminishes as cell mature)

104. (A)
Human RBC is used to study plasmamembrane

105. (D)
(Plasma membrane contains of the lipids like phospholipid, glycolipid and cholesterol. Phospholipid is major lipid of plasma membrane)

106. (A)
(The fluid nature of plasma membrane is essential for various functions like cell growth, cell division, endocytosis, formation of intercellular junctions and secretion, etc)

107. (C)
(Middle lamella glues/ holds two adjacent cells)

108. (A)
(Flagella are responsible for movement of cell while cilia can move either surrounding fluid or cell)

109. (D)
(In both mitochondria and plastids the DNA is double stranded circular, and ribosomes are of 70S type)

110. (D)
(Except in parthenogenesis, the gametes of animals do not undergo mitosis rather they undergo fertilization and then the zygote thus formed undergoes mitosis.)

111. (D)
(Go phase is quiescent phase)

112. (A)
(The replicated centrioles start to move towards opposite poles of the cell in prophase)

113. (A)
(The chromatids of chromosome become visible in prophase of M phase.)

114. (B)
(The best phase to study chromosome is metaphase as by metaphase chromosome condensation completes)

115. (A)
(In plants spindle formation is anastral)

116. (D)
(Chromatin condensation takes place in M phase not in interphase)

117. (C)
(Some enzyme synthesis take place throughout interphase.)

118. (D)
(At the end of cytokinesis two daughter cells are formed in animal cells)

119. (C)
(Sister chromatids are genetically same in mitosis)

120. (A)
(In anaphase I homologous chromosomes separate)

121. (C)
(One pollen mother cell undergoes meiosis to produce four microspores)

122. (D)
(Both vegetative cell of pollen grain and antipodal cell of embryo sac are haploid cells, hence, both of them contain C amount of DNA)

123. (B)
(Endodermis, epidermis, cortex are formed due to differentiation.)

124. (C)
(In dicot stem vascular bundle is conjoint collateral and open. Endodermis is made of parenchyma. The vascular bundle contains protoxylem and metaxylem)

125. (D)
(All the tissues or components except epidermis and vascular tissue form ground tissue system.)

126. (D)
(Meristematic cells have abundant plasmodesmatal connection. They have thin primary cell wall.)

127. (D)
(In monocot stem hypodermis is sclerenchymatous)

128. (A)
(Age of a tree can be calculated by counting the number of rings of secondary xyelm [wood] i.e., called as annual ring)

129. (B)
(In dicot stem interfascicular cambium is formed between the vascular bundles to form cells of medullary rays and large number of vascular bundles are arranged in a ring)

130. (D)
(phloem parenchyma, phloem fibre, interfascicular cambium are absent in monocot stem)

131. (D)
(Spring wood- lower density)

132. (A)
(Epidermis is formed by differentiation.)

133. (D)
(Stomatal apparatus in dicot leaf contains guard cells, subsidiary cells and stomatal pore)

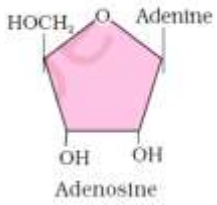
134. (A)
(Bulliform cells are present in monocot leaf. Maize is a monocot)

135. (A)
(In root endodermal cells are suberized)

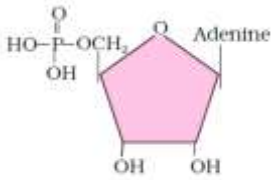
136. (D)
NCERT 11, Pg-144
There are aromatic amino acids (tyrosine, phenylalanine, tryptophan).

137. (B)
NCERT 11, Pg-145

Adenine (Purine)



Adenosine



Adenylic acid

138. (D)
NCERT 11, Pg-146
The molecules in the acid insoluble fraction with the exception of lipids are polymeric substances i.e., lipids, molecular weights do not exceed 800 Da, come under acid insoluble fraction.

139. (C)
NCERT 11, Pg-147

Component	% of the total cellular mass
Water	70-90
Proteins	10-15
Carbohydrates	3
Lipids	2
Nucleic acids	5-7
Ions	1

140. (A)

NCERT 11, Pg-146

Pigments	Carotenoids, Anthocyanins, etc.
Alkaloids	Morphine, Codeine, etc.
Terpenoides	Monoterpenes, Diterpenes etc.
Essential oils	Lemon grass oil, etc.
Toxins	Abrin, Ricin
Lectins	Concanavalin A
Drugs	Vinblastin, curcumin, etc.
Polymeric substances	Rubber, gums, cellulose

141. (B)

NCERT 11, Pg-147

Protein	Functions
Collagen	Intercellular ground substance
Trypsin	Enzyme
Insulin	Hormone
Antibody	Fights infectious agents
Receptor	Sensory reception (smell, taste, hormone, etc.)
GLUT-4	Enables glucose transport into cells

142. (B)

NCERT 11, Pg-153

The blood concentration of glucose in a normal healthy individual is 4.2 m mol/L^{-6}, 1 m mol/L.

143. (A)

NCERT 11, Pg-153

The living state is a non-equilibrium steady state to be able to perform work.

144. (D)

NCERT 11, Pg-157

Low temperature preserves the enzyme in a temporarily inactive state whereas high temperature destroys enzymatic activity because proteins are denatured by heat.

145. (A)

NCERT 11, Pg-152

Pitch (complete turn of the helix) of B-DNA is 34Å.

146. (A)

NCERT 11, Pg-149

The sequence of amino acids i.e., the positional information in a protein – which is the first amino acid, which is second, and so on – is called the primary structure of a protein.

147. (B)

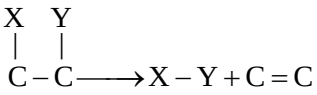
NCERT 11, Pg-154

A general rule of thumb is that rate doubles or decreases by half for every 10°C change in either direction.

148. (C)

NCERT 11, Pg-158

Lyases: Enzymes that catalyse removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds.



149. (B)

NCERT 11, Pg-148

Starch can hold I2 molecules in the helical portion. The starch-I2 is blue in colour.

150. (B)

NCERT 11, Pg-159

A number of enzymes require metal ions for their activity which form coordination bonds with side chains at the active site and at the same time form one or more cordination bonds with the substrate.

151. (C)

NCERT 11, Pg-159

Ligases: Enzymes catalysing the linking together of 2 compounds, e.g., enzymes which catalyse joining of C-O, C-S, C-N, P-O etc. bonds.

152. (B)

NCERT 11, Pg-158

Inhibition of succinic dehydrogenase by malonate which closely resembles the substrate succinate in structure is an example of competitive inhibition.

153. (B)

NCERT 11, Pg-153

Catabolic pathway leads to a simpler structure from a complex structure (for example, glucose becomes lactic acid in our skeletal muscle).

154. (B)

NCERT 11, Pg-151

The two nucleotides are joined via phosphodiester bond. There are two hydrogen bonds between A and T and three hydrogen bonds between G and C.

155. (A)

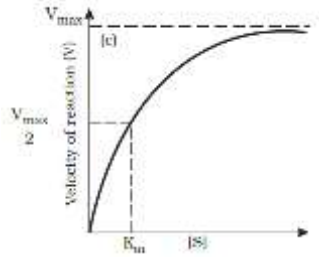
NCERT 11, Pg-145

$C_5H_{10}O_5$ (Ribose)

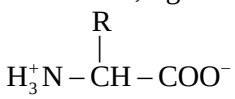
156. (A)
NCERT 11, Pg-150
Tertiary structure is absolutely necessary for the many biological activities of proteins.

157. (B)
NCERT 11, Pg-151
The backbone of DNA is formed by the sugar-phosphate-sugar chain.

158. (D)
NCERT 11, Pg-157
Here, [S] = Substrate Concentration



159. (B)
NCERT 11, Pg-144



160. (D)
NCERT 11, Pg-50
Cnidoblasts are used for anchorage, defense and for the capture of prey.

161. (B)
NCERT 11, Pg-52
Annelids body surface is distinctly marked out into segments or metameres.

162. (C)
NCERT 11, Pg-52
Nereis possess lateral appendages-parapodia, closed circulatory system, double ventral nerve cord. Nereis is dioecious.

163. (D)
NCERT 11, Pg-53
In molluscs, the space between the hump and the mantle is called the mantle cavity in which feather like gills are present.

164. (D)
NCERT 11, Pg-54
Echinoderms are marine and have an endoskeleton of calcareous ossicles. The adult echinoderms are radially symmetrical but larvae are bilaterally symmetrical.

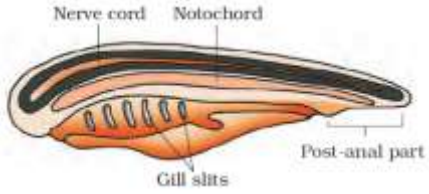
165. (C)
NCERT 11, Pg-54
Hemichordates have a rudimentary structure in the collar region called stomochord, a structure similar to notochord.

166. (A)
NCERT 11, Pg-56
Cyclostomes are marine but migrate for spawning to fresh water. After spawning, within a few days, they die.

167. (A)
NCERT 11,
Aschelminthes are pseudocoelomates. Metamerism is present in annelids. Sponges do not have ectoderm, mesoderm and endoderm.

168. (D)
NCERT 11, Pg-49
The body of sponges is supported by a skeleton made up of spicules or spongin fibres.

169. (B)
NCERT 11, Pg-55



170. (C)
NCERT 11,
Asterias (Star fish), *Octopus* (Devil fish), *Sepia* (Cuttlefish) and *Aurelia* (Jelly fish).

171. (B)
NCERT 11, Pg-51
In Ctenophores, Fertilisation is external with indirect development.

172. (A)
NCERT 11, Pg-57
Osteichthyes have four pairs of gills which are covered by an operculum on each side. Skin is covered with cycloid/ctenoid scales. Air bladder is present which regulates buoyancy. Development is direct.

173. (D)
NCERT 11, Pg-56
In Chondrichthyes, skin is tough, containing minute placoid scales.

174. (A)
NCERT 11, Pg-52
The body of the aschelminthes is circular in cross-section, hence, the name roundworms. Alimentary canal is complete with a well developed muscular pharynx.

175. (C)
NCERT 11, Pg-59
Ornithorhynchus (duck billed platypus) is an example of oviparous mammal.

176. (C)
NCERT 11, Pg-58
Reptiles show internal fertilization.

177. (C)
NCERT 11, Pg-57
Ichthyophis (Limbless amphibia).

178. (D)
NCERT 11, Pg-58
Aves are warm-blooded (homoiothermous) animals, i.e., they are able to maintain a constant body temperature.

179. (A)
NCERT 11, Pg-55
In Urochordata, notochord is present only in larval tail, while in Cephalochordata, it extends from head to tail region and is persistent throughout their life.

180. (C)
NCERT 11, Pg-48
The body cavity, which is lined by mesoderm is called coelom.