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1. Correct option is (3)
Solution: Time of ascent is 2.5 sec.
Distance travelled in the 3rd second = \(2 \times \frac{1}{2} \times 10 \times (0.5)^2 = 2.5 \text{ m}\)

2. Correct option is (3)
Solution: Impulse = change in momentum = \(\Delta P\)
Rightarrow \(I = m(\bar{v}_f - \bar{v}_i)\)
\[= 1 \times \left[ \frac{25 \sin 30^\circ}{\sqrt{3}} \right] - (-25 \sin 60^\circ)\]
\[= 28.87 \text{ N-S}\]

3. Correct option is (2)
Solution:
\[T = 2\pi \sqrt{\frac{m}{k}} \Rightarrow \frac{1}{k} = \frac{T^2}{4\pi^2 m}\]
For spring 1: \(\frac{1}{k_1} = \frac{T_{1}^2}{4\pi^2 m}\)
For spring 2: \(\frac{1}{k_2} = \frac{T_{2}^2}{4\pi^2 m}\)
For series combination equivalent spring: \(\frac{1}{k_{eq}} = \frac{T_{eq}^2}{4\pi^2 m}\)
\[\text{In series combination,} \quad \frac{1}{k_{eq}} = \frac{1}{k_1} + \frac{1}{k_2}\]
\[\frac{T_{eq}^2}{4\pi^2 m} = \frac{T_{1}^2}{4\pi^2 m} + \frac{T_{2}^2}{4\pi^2 m}\]
\[T^2 = T_{1}^2 + T_{2}^2\]

4. Correct option is (4)
Solution: \(T \propto \sqrt{\ell}\)

5. Correct option is (3)
Solution:
A to B: \(P = \text{constant}, V \text{ is increasing}, T \text{ is increasing}\)
B to C: \(V = \text{constant}, T \text{ is decreasing}, P \text{ is decreasing}\)
C to A: \(T = \text{constant}, V \text{ is decreasing}, P \text{ increases}\)

6. Correct option is (1)
Solution:
For max power in $2\Omega$, $R \to 0$

$I = \frac{12}{2} = 6 \, A$

$P = I^2R = (6 \, A)^2 \times (2\Omega) = 72 \, W$

7. (1)

8. (1)

9. Correct option is (2)

Solution:

\[
\frac{1}{\lambda} = RZ^2 \left[ \frac{1}{n_1^2} - \frac{1}{n_2^2} \right] \\
\frac{1}{\lambda} \propto Z^2 \\
\lambda \propto \frac{1}{Z^2}
\]

10. Correct option is (2)

Solution:

$L = I\omega = \text{constant}$

\[
\frac{2}{5} \pi R^3 \omega = \text{constant} \\
\left[ \frac{2}{5} \left( \frac{4}{3} \pi R^3 \right) R^2 \left( \frac{2\pi}{T} \right) \right] = \text{constant} \\
T \propto R^5 \\
\frac{T_2}{T_1} = \left( \frac{R_2}{R_1} \right)^5 \\
\frac{T_2}{24 \, \text{hrs}} = \frac{1}{n^3} \\
T_2 = \frac{24 \, \text{hrs}}{n^5}
\]

11. Solution:

\[
\rho_{\text{rel}} = \frac{\text{weight in air medium}}{\text{weight loss}} = \frac{W_{\text{air}}}{W_{\text{air}} - W_{\text{water}}} = \frac{210 \, \text{gm}}{210 \, \text{gm} - 180 \, \text{gm}} = 7
\]

12. Correct option is (4)

Solution:
Area = \((1/2)qV\) = Energy stored in the capacitor

13. Correct option is (1)

\[
(a) : \left[ \frac{\alpha Z}{k^2} \right] = [M^0 L^0 T^0]
\]

\[
[\alpha] = \frac{k^2}{Z} \quad [\text{energy/temperature][temperature]}
\]

\[
\text{length} = [M^1 L^{-1} T^{-2}] = [ML^{-1} T^{-2}]
\]

\[
\therefore \left[ \frac{\alpha}{\beta} \right] = [P]
\]

\[
\Rightarrow [\beta] = \left[ \frac{\alpha}{[P]} \right] = \frac{[ML^{-2}]}{[ML^{-1} T^{-2}]} = [L^{-1}]
\]

14. Correct option is (4)

**Solution:**

\[\Delta \Phi = \omega_2 t - \omega_1 t = 2n\pi, \quad n = 0, 1, 2, 3, \ldots\]

\[
(\omega_2 - \omega_1) t = 2\pi
\]

\[
2\pi \left( \frac{1}{T_2} - \frac{1}{T_1} \right) t = 2n\pi
\]

\[
t \left( \frac{T_1 - T_2}{T_1 T_2} \right) = n
\]

\[
t = n \left( \frac{T_1 T_2}{T_1 - T_2} \right) = n \left( \frac{(4 \text{ s})(2 \text{ s})}{4 \text{ s} - 2 \text{ s}} \right) = n \left[ 4 \text{ sec} \right] \quad (n = 0, 1, 2, 3, \ldots)
\]

15. Correct option is (3)

**Solution:**

Amplitude = \(2x_0\)

so time = \(\frac{T}{4} + \frac{T}{12} = \frac{T}{6}\)

\[
\therefore \quad \text{time} = \frac{2\pi}{3} \sqrt{\frac{m}{k}}
\]

16. Correct option is (1)

**Solution:**

In the case of unlike charges, null point will be formed outside the charges.
x = \frac{r}{\sqrt{|q_2|} - 1} \text{ to the left of } q_1

= \frac{r}{\sqrt{3q} - 1} \text{ to the left of } q

= \frac{r}{\sqrt{3} - 1}

= \frac{r}{\sqrt{3} + 1}

= \frac{r}{\sqrt{3} - 1} \cdot \frac{\sqrt{3} + 1}{\sqrt{3} + 1} \text{ to the left of } q

17. Correct option is (1)
Solution:
6 - \frac{q}{2} - \frac{q}{2} - \frac{q}{2} = 0
6 - \frac{3q}{2} = 0
\frac{3q}{2} = 6
q = 4 \mu C
V_A - \frac{q}{2 \mu F} = 0
V_A - \frac{4 \mu C}{2 \mu F} = 0
V_A = 2 \text{ volt}

18. Correct option is (2)
Solution:
The area under acceleration time graph gives change in velocity. As acceleration is zero at the end of 11 sec.
That means, v_{max} = \text{area of } \triangle OAB = \frac{1}{2} (10 \text{ m/s}^2)(11 \text{ s}) = 55 \text{ m/s}

19. Correct option is (2)
Solution:
Initial velocity of the ball = -\sqrt{2gh} = -\sqrt{2(9.8 \text{ m/s}^2)(10 \text{ m})} = -14 \text{ m/s}
Final velocity of the ball = +\sqrt{2gh_i} = +\sqrt{2(9.8 \text{ m/s}^2)(2.5 \text{ m})} = 7 \text{ m/s}
Acceleration of the ball is
\[ a = \frac{7 \text{ m/s} - (-14 \text{ m/s})}{0.01 \text{ s}} = 2100 \text{ m/s}^2, \text{ upwards} \]

20. Correct option is (3)
Solution:
\[
\cot^2 \delta = \cot^2 \delta_1 + \cot^2 \delta_2
\]
\[
= 4 + 12
\]
\[
\delta = \cot^{-1}(4)
\]
21. Correct option is (4)

Solution:

Total electrostatic interaction energy of system of charges is

\[
U = \frac{k(-Q)(q)}{\ell} + \frac{k(-3Q)(q)}{\ell} + \frac{k(-Q)(-3Q)}{2\ell}
\]
\[
= \frac{4kqQ}{\ell} + \frac{3kQ^2}{2\ell}
\]
\[
= \frac{kQ}{\ell} \left( -4q + \frac{3Q}{2} \right)
\]

\[
U > 0, \text{ if } \frac{3Q}{2} > 4q \Rightarrow q < \frac{3Q}{8}
\]

22. Correct option is (2)

Solution:

\[
\frac{bt}{2m}
\]

is dimensionless quantity.

23. Correct option is (2)

Solution:

Limiting frictional force = \( \mu mg = (0.6)(1)(10) = 6 \text{ N} \)

Applied force, \( F = ma = 1 \times 5 = 5 \text{ N} \)

As \( F < f \), so force of friction = 5 N

24. Correct option is (4)

Solution:

\[
a = \frac{g \sin \theta}{1 + \frac{k^2}{R^2}}
\]

For ring: \( a_{\text{ring}} = \frac{g \sin \theta}{1 + \frac{1}{2}} = \frac{1}{2} g \sin \theta \)

For Disc: \( a_{\text{disc}} = \frac{g \sin \theta}{1 + \frac{1}{2}} = \frac{2}{3} g \sin \theta \)

\[
\frac{a_{\text{ring}}}{a_{\text{disc}}} = \frac{3}{4}
\]

25. Correct option is (3)
Solution:
\[ C = C_v + \frac{R}{1 - x} = \frac{3}{2}R + \frac{R}{1 - (-3)} = \frac{3R}{2} + \frac{R}{4} = \frac{7R}{4} \]

26. Correct option is (4)

**Solution:**
Radius of the given charged spherical shell is 5 m.
Distance (r) to the point P from the centre of the spherical shell is
\[ r = \sqrt{1^2 + 1^2 + 2^2} = \sqrt{6} < R \]
So, the given point P is inside the charged spherical shell.
Electric field intensity at a point inside the charged spherical shell is zero.

27. Correct option is (2)

**Solution:**
\[ t = \frac{L}{R} = \frac{60 \text{ hentry}}{30 \text{ ohm}} = 2 \text{ sec} \]

28. Correct option is (4)

**Solution:**
\[ i = 0, \ A = 60^\circ, \ e = 90^\circ \]
\[ \text{if } i = 0 \text{ then } r_1 = 0 \]
\[ A = r_1 + r_2 \]
\[ A = r_2 = 60^\circ \]
\[ \mu \times \sin r_2 = 1 \times \sin e \]
\[ \mu = \frac{\sin e}{\sin r_2} = \frac{\sin 90^\circ}{\sin 60^\circ} = \frac{2}{\sqrt{3}} \]

29. Correct option is (1)

**Solution:**
\[ \mu = 1.5, \ A = 60^\circ \]
\[ i = e = \frac{3}{4}A \]
\[ i = e = 45^\circ \]
\[ \delta = i + e - A = 45^\circ + 45^\circ - 60^\circ = 30^\circ \]

30. Correct option is (1)

**Solution:**
Output = A + B = A + B

31. Correct option is (1)

**Solution:**
Distance = \int v \, dt

= \int_{0}^{2} (4 - 2t) \, dt + \int_{2}^{4} (2t - 4) \, dt

= [4t - t^2]_0^2 + [t^2 - 4t]_2^4

= [8 - 4] + [(16 - 16) - (4 - 8)]

= 8 \text{ m}

32. Correct option is (3)
Solution:
A = \lambda \cdot N

A = \frac{\ln 2 \cdot N_0}{T_{1/2} \cdot \frac{1}{2^{1/T_{1/2}}}}

A_x = \left( T_{1/2} \right)_y \left( \frac{1}{2^{1/T_{1/2}}} \right)_y

A_y = \left( T_{1/2} \right)_x \left( \frac{1}{2^{1/T_{1/2}}} \right)_y

= \left( \frac{2 \text{ hours}}{1 \text{ hours}} \right) \left( \frac{2^2}{2^7} \right)

= 1

33. Correct option is (2)
Solution:
\frac{5}{R} = \frac{\ell_1}{100 - \ell_1}

\frac{5}{(R/2)} = \frac{1.6 \ell_1}{100 - 1.6 \ell_1}

On solving R = 15 \Omega

34. Correct option is (2)
Solution:
(\vec{A} + \vec{B}) \perp (\vec{A} - \vec{B})

(\vec{A} + \vec{B}) \cdot (\vec{A} - \vec{B}) = 0

|\vec{A}| = |\vec{B}|

35. Correct option is (4)

36. Correct option is (2)
Solution:
\[ F_g \propto r^n \]
\[ F_g = k r^n \]
\[ F_g = F_{cp} \]
\[ k r^n = m r \left( \frac{4\pi^2}{T^2} \right) \]
\[ T^2 \propto r^{1-n} \]
\[ T \propto r^2 \]

37. **Correct option is (2)**

**Solution:**
\[ a_{max} = A\omega^2 = \alpha \]
\[ v_{max} = A\omega = \beta \]
\[ \frac{\alpha}{\beta} = \omega = \frac{2\pi}{T} \]
\[ T = 2\pi \left( \frac{\beta}{\alpha} \right) \]

38. **Correct option is (4)**

39. **Correct option is (1)**

40. **Correct option is (1)**

(a) : Total upward force due to surface tension = \( \sigma (2\pi r_1 + 2\pi r_2) \). This supports the weight of the liquid column of height \( h \). Weight of liquid column = \( h[\pi r_2^2 - \pi r_1^2] \rho g \)
Equating, we get \( h\pi (r_2^2 - r_1^2) \rho g = 2\pi \sigma (r_1 + r_2) \)
\[ \text{or } \frac{h(r_2 - r_1) \rho g = 2\sigma}{(r_2 - r_1) \rho g} \]
41. Correct option is (3)

\[ (c) \quad x + u_2 \cos \theta_2 t = u_1 \cos \theta_1 t. \]

\[ \therefore \quad t = \frac{x}{u_1 \cos \theta_1 - u_2 \cos \theta_2} \quad \ldots (i) \]

Also \( u_1 \sin \theta_1 = u_2 \sin \theta_2 \quad \ldots (ii) \)

After solving above equations, we get

\[ t = \frac{x \sin \theta_2}{u_1 \sin (\theta_2 - \theta_1)} \]

42. Correct option is (3)

\( (c) \) : Maximum friction force on 40 kg block is \( (f)_{\text{max}} = \mu(40g) = (0.2) (400) = 80 \text{ N} \)

Since \( F < 80 \), so, tension in string is zero.

Since 10 kg does not try to move so friction force on it is zero.

43. Correct option is (2)

\( (b) \) :

\[ v = \sqrt{2gl(1 - \cos \theta)} \]

\[ a_A = g \sin \theta \text{ (only tangential)} \]

\[ a_B = \frac{v^2}{l} = 2g(1 - \cos \theta) \]

\[ 2g(1 - \cos \theta) = g \sin \theta \]

\[ 2 \left( 2 \sin^2 \frac{\theta}{2} \right) = 2 \sin \frac{\theta}{2} \cos \frac{\theta}{2} \]

\[ \tan \frac{\theta}{2} = \frac{1}{2} \Rightarrow \frac{\theta}{2} = \tan^{-1} \left( \frac{1}{2} \right) \Rightarrow \theta = 2 \tan^{-1} \left( \frac{1}{2} \right) \]
44. d. Acceleration when block $B$ is in the liquid,
\[ a_1 = \frac{m_A g - (m_B g - \text{upthrust})}{(m_A + 3m)} \]
\[ = \frac{m_A g - \left(3mg - \frac{3m\rho g}{2\rho}\right)}{(m_A + 3m)} \]
![Image showing the equation]

Acceleration when block $B$ is outside of the liquid,
\[ a_2 = \frac{3mg - m_A g}{(m_A + 3m)} \]

Given $a_1 = a_2$, we get
\[ m_A g - \frac{3}{2} mg = 3mg - m_A g \]
\[ \Rightarrow 2m_A g - \frac{9}{2} mg \Rightarrow m_A = \left(\frac{9}{4}\right)m \]

45. **Correct option is (2)**

Let $P_1 =$ Pressure of the liquid at surface.

$P_2 =$ Pressure of the liquid at hole.

Then $P_1 = P_0 + \frac{mg}{A}$ and $P_2 = P_0$

By Bernoulli’s equation
\[ P_1 + \rho gh_1 + \frac{1}{2}\rho v_1^2 = P_2 + \rho gh_2 + \frac{1}{2}\rho v_2^2 \]
\[ \Rightarrow P_0 + \frac{mg}{A} + \rho gh + 0 = P_0 + 0 + \frac{1}{2}\rho v^2 \]
\[ \therefore v = \sqrt{2\left(\frac{gh + \frac{mg}{\rho A}}{\rho}\right)} \]

46. (3)

Carbon cannot expand is a valency beyond 4 due to unavailability of d-orbitals.

47. (3)

\[ \text{Na}_2\text{O} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O} \]

48. (1)

\[ \text{Fe (no. of moles)} = \frac{558.5}{55.85} = 10 \text{ moles} \]

\[ \text{C (no. of moles)} = \frac{60}{12} = 5 \text{ moles} \]

\[ \text{(atomic weight of carbon = 12)} \]
49. (1)

Electro negativity difference =3.0-1.2=1.8. If the Electro negativity difference is more than 1.7, then bond will have ionic character. If the Electro negativity difference between 0.4 to 1.7, then the bond will have polar covalent character and if the Electro negativity difference is less than 0.4. Then bond will have non-polar covalent character

50. (2)

>50ppm of nitrate

51. (4)

\[
\text{HO} \xrightarrow{\text{IDO}} \text{O} \xrightarrow{\text{HCCCH}_2\text{CH}_2\text{CH}_2\text{CH}_2}\text{CH}
\]

52. (3)

Teflon (polytetrafluoroethylene), polystyrene and neoprene (polychloroprene) all are homopolymers

53. (2)

\[Zn + Fe^{3+} \rightarrow Fe + Zn^{2+}\]

\[E_{\text{cell}} = E_{\text{cell}}^0 - \frac{0.0591}{n} \log \left[\frac{Zn^{2+}}{Fe^{2+}}\right]\]

Given, \(E_{\text{cell}}^0 = 0.2905\)

\[0.2905 = E_{\text{cell}}^0 - \frac{0.0591}{n} \log \frac{0.01}{0.001}\]

\[\text{or } E_{\text{cell}} = 0.2905 + 0.0295 \log 10 = 0.2905 + 0.0295 = 0.32 \text{V}\]

\[E_{\text{cell}} = -\frac{0.0591}{n} \log K_{eq} (\therefore E_{\text{cell}} = 0 \text{ at equilibrium})\]

\[\text{or } 0.32 = -\frac{0.0591}{2} \log K_{eq} \therefore K_{eq} = 10^{0.32/0.0295}\]

54. (3)

\[\Delta G = \Delta H - T \Delta S \text{ at equilibrium, } \Delta g = 0. \text{ Also } \Delta G \text{ should be negative for a spontaneous reaction. So, } T > T_c \text{ in order to make } \Delta G \text{ negative, because } \Delta H \text{ and } \Delta S \text{ are positive}\]

55. (4)

For an atom \(r_n = \frac{0.529n^2}{Z} \text{A}\). For hydrogen atom, \(r_n = 0.529A (n = 1, Z = 1)\)

For Be\(^{3+}\)(n=2, Z=4), \(r_n = \frac{0.529 \times 2^2}{4} = 0.529A\)

So, the value is same in two cases
56. \( u_{\text{res}} = \sqrt{\frac{3RT}{M}} = \sqrt{\frac{3PV}{M}} \)

\( u_i = \sqrt{\frac{3P_iV}{M}} \).....\((i)\) \( 2u_i = \sqrt{\frac{3PV}{M/2}} \).....\((ii)\)

On dividing eqn. \((i)\) by \((ii)\) \( \frac{1}{2} = \frac{P_i}{2P} \) or \( 2P = 4P_i \)

57. \( N \) and \( B \) belong to p-block and they form hydride by sharing of electrons i.e. forming covalent bond so, they form covalent hydrides

58. the given compound is acetylsalicylic acid, i.e. aspirin which is used as an analgesic

59. cyclic structure of D-glucose

60. Angular momentum of the electron, \( mvr = \frac{nh}{2\pi} \) when \( n = 5 \) (given)

\[ \therefore \text{Angular momentum} = \frac{5h}{2\pi} = 2.5 \frac{h}{\pi} \]

61. anti-Markovnikov's addition of HBr is observed only with unsymmetrical alkenes i.e., propene, 1-butene and pent-2-ene. Since 2-butene is symmetrical, therefore, anti-Markovnikov's addition of HBr is not observed in this case

62. \[ CO_{(g)} + \frac{1}{2} O_{(g)} = CO_{2(g)} \]

\( \Delta n = 1 - \left( \frac{1}{2} \right) = -\frac{1}{2} \)

Since \( K_p = K_c (RT)^{\Delta n} \)

\[ \therefore K_p = K_c (RT)^{-\frac{1}{2}} \]

\[ \frac{K_p}{K_c} = (RT)^{-\frac{1}{2}} \quad ; \quad \frac{K_p}{K_c} = \frac{1}{\sqrt{RT}} \]
63. (3)

\[
\begin{array}{c}
\text{3 lone pairs} \\
\end{array}
\begin{array}{c}
\text{3 lone pairs} \\
\end{array}
\]

64. (2)

For first order reaction rate  
\[ kA_0 = \frac{0.693}{t_{1/2}} A_0 \]

For zero order reaction rate  
\[ kA_0^0 = \frac{A_0}{t_{1/2}} \]

Ratio in rates = 2 \times 0.693

65. (1)

Ionic radii decrease across lanthanide series due to lanthanide contraction. As all ions are in +3 O.S, ionic radii will follow the trend of atomic radii

\[ \therefore La^{3+} > Ce^{3+} > Pr^{3+} > Yb^{3+} \]

66. (2)

Packing efficiency, for sc unit cell = 50% for bcc unit cell = 68%, for fcc unit cell = 74%, thus, the order of packing efficiency is fcc > bcc > simple cubic

67. (1)

NO₂ is the most powerful electron withdrawing group and hence p-nitroaniline is the weakest base

68. (2)

\[ \Delta T_i = iK_i m \Rightarrow i = \frac{\Delta T_i}{K_i m}, i = \frac{0.0054}{1.80 \times 0.001} = 3 \]

It means 3 ions are produced on dissociation hence, formula be \[ [Pt(NH_3)_4Cl_2]Cl_2 \]

69. (4)

\[ KF + HF \rightarrow HF_2^- + K^+ \quad ; \quad HF_2^- \text{ ion is formed due to hydrogen bonding} \]

70. (3)

for a protective colloid, lesser the value of gold number, better is the protective power. Thus, the correct order of protective power is A<C<B<D
71. (4)

\[ 6CH_3 - CH = CH_2 \rightarrow \text{6H}_2 \text{O} \text{c} \rightarrow \]

\[ 2(CH_2CH_2CH_2)_2 B \rightarrow \text{H}_2 \text{O} \rightarrow \]

\[ 6CH_3CH_2CH_2OH + 2H_2BO_3 \]

72. (1)

Fluorspar (CaF₂) is added in small quantity in the electrolytic reduction of alumina dissolved in fused cryolite (Na₃AlF₆) to make the fused mixture more conducting as alumina is a bad conductor of electricity and to lower the m.pt of fused mixture as alumina has very high m.pt.

73. (3)

V₂O₅ is used as catalyst in contact process for the manufacture of SO₃ hence H₂SO₄. In Haber process for the manufacture of NH₃, finely divided Fe+molybdenum are used.

74. (3)

[Image of molecular structure with the label: gauche conformation]

75. (2)

Moles of urca = \( \frac{6.02 \times 10^{20}}{6.02 \times 10^{23}} = 10^{-3} \) moles

Concentration (molarity) of solution =

\[ \frac{\text{No. of moles of solute}}{\text{No. of litres of solution}} = \frac{10^{-3}}{1000} = 0.01M \]

76. (1)

Ionic radii of isoelectronic species decrease with increase in nuclear charge. Thus, the order is \( N^3^- > O^2^- > F^- > Na^+ \)

77. (2)

The structure of \( Cr_2O_7^{2-} \) is

\[
\begin{array}{c}
\text{[Diagram of Cr}_2\text{O}_7^{2-}\text{structure]} \\
\end{array}
\]
78. (3)

\[
\begin{align*}
\text{COOH} \xrightarrow{SOCl_2} & \quad \text{Cl-Cl} \\
\text{Br} & \\
\text{O} \quad \text{NH}_2 & \quad \text{Br} \\
\text{Br} & \quad \text{NH}_2
\end{align*}
\]

\[\text{NH}_3 \xrightarrow{\text{NaOH} + \text{Br}_2} \text{NH}_2\]

79. (4)

According to Faraday’s law of electrolysis,

\[m \propto I t \text{ or } m = Z I t \text{ where } I = \text{current, } t = \text{time and } Z = \text{Equivalent weight of substance}\]

\[\text{Eq. wt. of Cu} = \frac{63.5}{2} \quad (\because \text{Cu}^{2+} + 2e^- \rightarrow \text{Cu})\]

\[Z = \frac{63.5}{2} \times \frac{1}{96500}, \text{ now, } \frac{m}{2} = \frac{63.5 \times I \times t}{2 \times 96500} = \frac{31.75 \times I \times t}{96500}\]

80. (4)

The conditions for geometrical isomerism in alkene is the two atoms or groups which are attached to the particular carbon atom must be different.

81. (3)

Work done in expansion of gas

\[-2.303 \pi R T \log \frac{P_1}{P_2} = -2.303 \times 1 \times 2 \times 273 \log \frac{10}{1} = -1257.43 \text{cal}\]

82. (2)

Molecular weight of NaNO₃ = 85 g/mol

\[\text{Molarity} = \frac{W \times 1000}{M \times V} = \frac{0.85 \times 1000}{85 \times 100} = 0.1 \text{ mol/L}\]

NaNO₃ solution is 90% dissociated

\[\text{NaNO}_3 \rightarrow \text{Na}^+ + \text{NO}_3^-\]

1 - 0.9 = 0.9

Van’t Hoff factor, i = 1 - 0.9 + 0.9 + 0.9 = 1.9

\[\therefore \pi = 1.9 \times 0.1 \times 0.082 \times 300 = 4.674 \text{ atm}\]
83. (1) The order of all photochemical reactions is zero as it does not depend upon the concentration of reactants

84. (1) Wilkinson’s catalyst is \([\text{RhCl(PPh}_3\text{)}_3]\).

oxidation state of Rh in \([\text{RhCl(PPh}_3\text{)}_3]=+1\)

Electronic configuration of Rh = [Kr]4d⁸5s¹:

Electronic configuration of \(\text{Rh}^+=[\text{Kr}]4d^8\)

As Rh(4d) always forms low spin complex, Hence, \([\text{RhCl(PPh}_3\text{)}_3]\):

\[
\text{[Kr]} \begin{array}{cccc}
\uparrow & \uparrow & \uparrow & \uparrow \\
\downarrow & \downarrow & \downarrow & \downarrow \\
\uparrow & \uparrow & \uparrow & \uparrow \\
\text{Cl}^- & \text{PPh}_3 & \text{PPh}_3 & \text{PPh}_3
\end{array}
\]

Thus complex is square planar.

85. (1) for 1 mole of gas, \(P + \frac{a}{V^2} (V - b) = RT\)

At very high pressure, \(P \gg \frac{a}{V^2}\) so, \(\frac{a}{V^2}\) is negligible

\(P(V - b) = RT \Rightarrow PV - Pb = RT\)

\(\therefore Z = 1 + \frac{Pb}{RT}\)

86. (2) More will be the electro negativity of \(X\), lesser will be the bond length of \(X-O\) bond

87. (2) Phenol is known as carbolic acid, \(\text{H}_2\text{CO}_3\) is known as carbonic acid
88. (3)

Number of π-bonds

\[ \text{H}_2\text{SO}_4 = \text{HO} - \text{S} - \text{O} - \text{OH} \text{ (π-bonds = 4)} \]

\[ \text{H}_2\text{SO}_3 = \text{HO} - \text{S} - \text{OH} \text{ (π-bonds = 2)} \]

89. (4)

For d-orbital, radial nodes \( (n - 1 - 1) = (n - 2 - 1) = (n - 3) \), angular nodes \( l = 2 \)
and total number of nodes \( n + l \)

90. (4)

Higher the lattice enthalpy lower will be solubility i.e. lattice enthalpy
\[
\frac{1}{\text{solubility}}
\]
, since the lattice enthalpies of alkali metals follow the order
\[ \text{Li} > \text{Na} > \text{K} > \text{Rb} \]

91. Living World – NCERT Pg – 11 (Easy)
92. Biological classification– NCERT Pg – 21 (Easy)
93. Biological classification– NCERT Pg – 26 (Easy)
94. Plant kingdom – NCERT Pg – 32 (Easy)
95. Plant kingdom – NCERT Pg – 36 (Medium)
96. CELL – NCERT Pg – 127 (Easy)
97. CELL – NCERT Pg – 137 (Medium)
98. Cell division – NCERT Pg – 166 (Easy)
99. Cell division - Mitosis occurs in both haploid & Diploid cell
100. Morphology – NCERT Pg – 68 (Easy)
101. Morphology – NCERT Pg – 78 (Easy)
102. Morphology – NCERT Pg – 74 (Easy)
103. Anatomy – NCERT Pg – 86 (Easy)
104. Anatomy – NCERT Pg – 96 (Easy)
105. Cell division – During ‘S’ phase DNA content doubles (Difficult)
106. Transport in plants – NCERT Pg – 187 (Easy)
107. Mineral nutrition – NCERT Pg – 195 (Easy)
108. Mineral nutrition – NCERT Pg – 199 (Easy)
109. Photosynthesis – NCERT Pg – 214 (Medium)
110. Photosynthesis – NCERT Pg – 217 (Medium)
111. Photosynthesis – NCERT Pg – 217 (Medium)
112. Respiration – NCERT Pg – 232 (Medium)
113. Respiration – NCERT Pg – 236 (Medium)
114. Respiration – NCERT Pg – 230 (Difficult)
115. Plant Growth & development – NCERT Pg – 241
116. Plant Growth & development – NCERT Pg – 243
117. Plant Growth & development – NCERT Pg – 247
118. Reproduction in organism – NCERT (XII) Pg – 7
119. Sexual reproduction in flowering plants - NCERT (XII) Pg – 21
120. Sexual reproduction in flowering plants - NCERT (XII) Pg – 21
121. Sexual reproduction in flowering plants – NCERT (XII) Pg – 23
122. Principles of inheritance and variation
123. Principles of inheritance and variation – NCERT (XII) Pg – 79
124. Principles of inheritance and variation – As Parents seem to be unaffected \( \therefore \) Heterozygous
125. Principles of inheritance and variation – As Parents seem to be unaffected \( \therefore \) Heterozygous
126. Molecular – NCERT (XII) Pg – 96
127. Molecular – NCERT (XII) Pg – 114
128. Molecular – NCERT (XII) Pg – 119
129. Strategies for Enhancement in Food Production – NCERT (XII) Pg – 172
130. Strategies for Enhancement in Food Production – NCERT (XII) Pg – 175
131. Organisms and Populations – NCERT (XII) Pg – 226
132. Organisms and Populations – NCERT (XII) Pg – 234
133. Ecosystem – NCERT (XII) Pg – 253
134. Ecosystem – NCERT (XII) Pg – 255
135. Biodiversity and Conservation – NCERT (XII) Pg – 264
136. Biodiversity and Conservation – NCERT (XII) Pg – 265
137. Environmental Issues – NCERT (XII) Pg – 271
138. Environmental Issues – NCERT (XII) Pg – 279
139. Morphology in flowering plants – NCERT (XII) Pg – 81
140. Cortisol promotes proteolysis ,Posterior lobe of pituitary connected to hypothalamus by infundibulum , calcitonin-Hypocalcemic hormone.
141. Hypoglycemic hormone- Insulin , Pregnancy hormone- Progesterone, Hypercalcemic hormone- PTH
142. Pitocin means Oxytocin, stored in posterior lobe of pituitary.
143. Human reproduction, NCERT XII pg 52, 3rd line
144. Reproductive health, NCERT XII pg 63
145. Evolution NCERT XII pg 137, 2nd para
147. Human health and diseases NCERT XII pg 154, last para
148. Biotechnology principles and processes, NCERT XII, pg 200, 1st para.
149. Evolution , NCERT XII ,pg 137, 2nd para, Selective mating means non- random mating that shall disturb Hardy Weinberg equilibrium.
150. Human health and diseases NCERT XII pg 159 1st line. Heroin-Depressants , Opioids- Pain killers
151. Biotechnology principles and processes, NCERT XII, pg 195, 1st para.
152. Neural control and coordination, Vestibulocochlear nerve means Auditory nerve
153. Human reproduction, NCERT XII pg54.
154. Biotechnology and its applications, NCERT XII, pg208, last line
155. Human health and diseases NCERT XII pg 152, 1st para
156. Human reproduction, NCERT XII, 1-Ampulla of oviduct, 2- Ovary ,3- Cervix, 4- Uterus, 5-Vagina
157. Reproductive health, NCERT XII pg60, last para, IUDs- prevents implantation
158. Human reproduction, NCERT XII pg50, diagram
160. Neural control and coordination, NCERT XI pg 322, figure. Dorsal root ganglion has sensory neurons that brings impulse to spinal cord from receptors.

161. Structural organisation in animals, NCERT XI, pg 114, 1st para.

162. Neural control and coordination, Arbor vitae- distribution of white matter in grey matter of cerebellum.

163. Locomotion and movement, NCERT XI pg 309, figure. Vomer and mandible are unpaired facial bones. Ethmoid-cranial bone.

164. Excretory products and their elimination, NCERT XI pg 298, 1st para, last line.

165. Animal Kingdom, NCERT XI pg 52.

166. Animal Kingdom, NCERT XI pg48, figure.

167. Excretory products and their elimination, NCERT XI pg 294,295. Afferent arteriole- carries blood towards glomerulus, Henle’s loop- Site of min reabsorption, DCT- Secretion of K

168. Locomotion and movement, NCERT XI pg307,308. Signal from CNS to muscles carried by motor nerve, Isotropic band ie I band during contraction is reduced

169. Body fluids and circulation ,NCERT XI, pg 287, figure. Artery carries mostly oxygenated blood away from heart and lacks valves. pulmonary artery carries deoxygenated blood.


171. Animal kingdom, Birds- 12 pairs of cranial nerves, beaks without teeth, right ovary and oviduct reduced or absent, monocondylic skull.

172. Animal kingdom, Frogs- Nucleated RBCs, 3 chambered heart, cold blooded, external fertilization


174. Breathing and exchange of gases, NCERT XI pg figure. As P50 value increases it indicates affinity of Hb for oxygen decreases and when that’s due to high partial pressure of CO2 or low pH, its referred as Bohr’s effect.

175. Digestion and absorption , Albumin is the most abundant blood protein and in kwashiorkar its highly reduced in blood causing oedema.

176. Biomolecules NCERT XI pg 143 last para,144 2nd , 3rd para, Lysine- Basic amino acid , Lecithin-phospholipid

177. Digestion and absorption, NCERT XI pg 262, reaction equation

178. Biomolecules, Phosphoglycerides- Glycerol esterified with 2 molecules of either saturated or unsaturated fatty acid and phosphate group.

179. Body fluids and circulation ,NCERT XI,WBCs show diapedesis. Monocytes differentiate as Macrophages

180. Structural organisation in animals, NCERT XI, pg 103