## ANSWER KEY FOR MAJOR TEST- 4 (FOR 2021 ASPIRANTS) 20th June 2020

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1. Correct option is (3)  
   **Solution:**
   \[ y_f - y_i = ut - \frac{1}{2}gt^2 \]
   \[ y_f - 120 = (4 \text{ m/s})(5 \text{ s}) + \frac{1}{2}(-10 \text{ m/s}^2)(25) \]
   \[ y_f = 120 \text{ m} + 20 \text{ m} - 125 \text{ m} \]
   \[ y_f = 15 \text{ m} \]

2. Correct option is (2)  
   **Solution:**
   \[ y = \frac{g}{2}x^2 \]
   \[ 5 \text{ m} = \frac{(10 \text{ m/s}^2)(10 \text{ m})^2}{2u^2} \]
   \[ u = 10 \text{ m/s} \]

3. Correct option is (4)  
   **Solution:**
   \[ v^2 = 2gs\sin\theta \quad \ldots \ldots \quad (1) \]
   \[ \left(\frac{v}{2}\right)^2 = 2g\sin\theta - \mu \cos\theta \]
   \[ \frac{v^2}{4} = 2g\sin\theta - \mu \cos\theta \]
   \[ \sin\theta = \sin\theta - \mu \cos\theta \]
   \[ 4\sin\theta = 4\sin\theta - 4\mu \cos\theta \]
   \[ 4\mu \cos\theta = 3\sin\theta \]
   \[ \mu = \frac{3}{4} \tan\theta \]

4. Correct option is (4)  
   **Solution:**
   \[ W_g + W_i = KE_f - KE_i \]
   \[ mgH + W_i = \frac{1}{2}m(1.44gH) - 0 \]
   \[ mgH + W_i = 0.77mgH \]
   \[ W_i = -0.28 \text{ mgH} \]

5. Correct option is (2)  
   **Solution:**
\[ m_b u_b = (m_b + m_{\text{block}}) v \]
\[ v = \frac{m_b u_b}{m_b + m_{\text{block}}} = \frac{(10 \times 10^{-3} \text{ kg})(400 \text{ m/s})}{0.4 \text{ kg}} = 10 \text{ m/s} \]
\[ \frac{1}{2} (m_b + m_{\text{block}}) v^2 = \mu (m_b + m_{\text{block}}) gS \]
\[ \mu = \frac{v^2}{2gS} = \frac{(10 \text{ m/s})^2}{2(10 \text{ m/s}^2)(10 \text{ m})} = 0.5 \]

6. Correct option is (2)

Solution:
\[ \lambda \propto x \]
\[ \lambda = kx \]
\[ \frac{dm}{dx} = kx \]
\[ dm = kx \, dx \]
\[ x_{\text{cm}} = \int_0^3 x \, dm = \int_0^3 x \, kx \, dx = \frac{\left[ x^3 \right]_0^3}{3} = \frac{2}{3} (3 \text{ m}) = 2 \text{ m} \]

7. Correct option is (3)

Solution:
\[ L_{\text{initial}} = L_{\text{final}} \]
\[ I_{\text{initial}} \omega_{\text{initial}} = I_{\text{final}} \omega_{\text{final}} \]
\[ (MR^2)(\omega) = (MR^2 + 2mR^2) \omega_{\text{final}} \]
\[ \omega_{\text{final}} = \frac{(MR^2)(\omega)}{(M + 2m)R^2} = \frac{M\omega}{M + 2m} \]

8. Correct option is (2)

Solution:
\[ P_{\text{half}} = \frac{2}{3} P_{\text{bottom}} \]
\[ P_{\text{atm}} + \rho g \left( \frac{h}{2} \right) = \frac{2}{3} (P_{\text{atm}} + \rho gh) \]
\[ P_{\text{atm}} + \frac{1}{2} \rho gh = \frac{2}{3} P_{\text{atm}} + \frac{2}{3} \rho gh \]
\[ \frac{1}{3} P_{\text{atm}} = \frac{1}{6} \rho gh \]
\[ \frac{6}{3} (\rho gH) = \rho gh \]
\[ h = 2H = 2(10 \text{ m}) = 20 \text{ m} \]

9. Correct option is (2)

Solution:
P \propto V \\
P = kV \\
PV^{-1} = \text{constant} \\
PV^x = \text{constant} \\
x = -1

In Polytropic process, molar heat capacity is
\[ C = C_v + \frac{R}{1-x} = \frac{3}{2}R + \frac{R}{1-(-1)} = 2R \]

10. Correct option is (3) 
**Solution:**
\[
\frac{dQ}{dt} = k\left(\pi r^2\right)\left(\Delta \theta\right)
\]
\[
\left(\frac{dm}{dt}\right) = \frac{k\left(\pi r^2\right)\left(\Delta \theta\right)}{L}
\]
\[
\frac{dm}{dt} \propto k \frac{r^2}{L}
\]
\[
\left(\frac{dm}{dt}\right)_2 = k_2 \left(\frac{r_2}{r_1}\right)^2 \left(\frac{L_1}{L_2}\right) = \left(\frac{1}{4}\right) 2 = (2)
\]
\[
\left(\frac{dm}{dt}\right)_2 = 2 \left(\frac{dm}{dt}\right)_1 = 2 (0.1 \text{ gm/s}) = 0.2 \text{ gram/sec}
\]

11. Correct option is (1) 
**Solution:**
\[ g = \frac{4}{3}G\rho \pi R \]
\[ g \propto \rho R \]
\[ \frac{g_m}{g_e} = \frac{\rho_m}{\rho_e} \frac{R_m}{R_e} \]
\[ \frac{1}{6} = \frac{3}{5} R_m \]
\[ \frac{5}{R_e} = \frac{5}{18} \]

12. Correct option is (4) 
**Solution:**
Position of null point from mass m is
\[ x = \frac{r}{\sqrt{\frac{4m}{3}}} = \frac{r}{3} \text{ from mass m and } \frac{2r}{3} \text{ from mass 2m} \]

Therefore, resultant gravitational potential at null point location is
\[ V = V_i + V_2 \]
\[ = - \frac{Gm}{\frac{r}{3}} - \frac{G(4m)}{\frac{2r}{3}} \]
\[ = - \frac{3Gm}{r} - \frac{6Gm}{r} \]
\[ = - \frac{9Gm}{r} \]

13. Correct option is (4)
Solution:
\[ K_i + U_i = K_f + U_f \]
\[ \frac{1}{2} mu^2 - \frac{GMm}{R} = 0 - \frac{GM}{\left(\frac{5R}{4}\right)} \]
\[ u^2 = \frac{2GM}{R} - \frac{8GM}{5R} \]
\[ u^2 = \frac{2GM}{R} - \frac{8GM}{5R} = \frac{2GM}{5R} = \frac{2gR}{5} \]
\[ u = \sqrt{\frac{2gR}{5}} \]

14. Correct option is (2)
Solution:
\[ F_{grav} \propto \frac{1}{R} \]
\[ F_{grav} = \frac{k}{R} \]
\[ F_{grav} = F_{cp} \]
\[ k = \frac{mv^2}{R} \]
\[ v \text{ is independent of } R, \text{ so } v \propto R^0 \]

15. Correct option is (4)
Solution:
\[ T^2 \propto r^3 \]
\[ r \propto T^{2/3} \]
\[ KE = \frac{GMm}{2r} \]
\[ KE \propto \frac{1}{r} \]
\[ KE \propto \frac{1}{T^{2/3}} \]
\[ KE \propto T^{-2/3} \]

16. Correct option is (2)
Solution:
\[ K_i + U_i = K_f + U_f \]
\[ 0 + m\left( V_{\text{axis}} \right) = \frac{1}{2} m v_C^2 + m\left( V_{\text{cen}} \right) \]
\[ V_{\text{axis}} = \frac{1}{2} v_C^2 + \left( V_{\text{cen}} \right) \]
\[ -\frac{G M}{\sqrt{R^2 + x^2}} = \frac{1}{2} v_C^2 - \frac{G M}{R} \]
\[ -\frac{G M}{\sqrt{a^2 + a^2}} = \frac{1}{2} v_C^2 - \frac{G M}{a} \]
\[ \frac{G M}{\sqrt{2a}} = \frac{1}{2} v_C^2 - \frac{G M}{a} \]
\[ \frac{1}{2} v_C^2 = \frac{G M}{a} - \frac{G M}{\sqrt{2a}} \]
\[ \frac{1}{2} v_C^2 = \frac{G M}{a} \left( 1 - \frac{1}{\sqrt{2}} \right) \]
\[ v_C^2 = \frac{2G M}{a} \left( 1 - \frac{1}{\sqrt{2}} \right) \]
\[ v_C = \sqrt{\frac{2G M}{a} \left( 1 - \frac{1}{\sqrt{2}} \right)} \]

17. Correct option is (1)

**Solution:**

Magnitude of PE of an object of mass \( m \) on the surface of the earth is

\[ U = \frac{G M m}{R} \]

Magnitude of PE per unit mass of this object at the surface of the earth is \( \frac{U}{m} = \frac{G M}{R} = E \quad \text{.........(1)} \)

Escape velocity of this object is

\[ v_{\text{esc}} = \sqrt{\frac{2G M}{R}} = \sqrt{2 \left( \frac{G M}{R} \right)} = \sqrt{2E} \]

18. Correct option is (1)

**Solution:**

\[ F = \frac{kQ_1 Q_2}{d^2} \quad \text{.........(1)} \]

\[ F' = \frac{kQ_1 Q_2}{\left( d - t + t \sqrt{k} \right)^2} \]

\[ F'' = \frac{kQ_1 Q_2}{\left( d - \frac{d}{2} + \frac{d}{4} \right)^2} = \frac{kQ_1 Q_2}{\left( \frac{3d}{2} \right)^2} = \frac{4}{9} \frac{kQ_1 Q_2}{d^3} \]

\[ F = \frac{4}{9} F' \]

19. Correct option is (2)

20. Correct option is (1)

**Solution:**
\[ (F_{\text{net}})_{on_q} = \frac{kqQ}{(L/2)^2} + \frac{kq(4q)}{L^2} = 0 \]
\[ 4kqQ \frac{4kq^2}{L^2} = 0 \]
\[ Q + q = 0 \]
\[ Q = -q \]

21. Correct option is (1)

Solution:

\[ x = \frac{r}{\sqrt{q_2} + 1} \]
\[ x = \frac{20\text{ cm}}{\sqrt{9} + 1} = \frac{20\text{ cm}}{\frac{5}{2}} = 8\text{ cm from } q_1 \]

22. Correct option is (1)

Solution:

Charge on the element is \( q = \frac{Q}{2\pi a} \)

Electric field at the centre due to remaining wire is

\[ E = \frac{1}{4\pi\varepsilon_0} \frac{q}{a^2} = \frac{1}{4\pi\varepsilon_0} \frac{Q}{a^2} \frac{dL}{2\pi a} = \frac{Q}{8\pi\varepsilon_0 a^3} \]

23. Correct option is (1)

Solution:

Components of initial projected velocity are \( u_x = 0; u_y = v_0 \)

Components of acceleration of the charged particle are

\[ a_x = \frac{qE}{m}; a_y = 0 \]

In X direction:

\[ S_x = u_x t + \frac{1}{2} a_x t^2 \]
\[ x = 0 + \frac{1}{2} \left( \frac{qE}{m} \right) t^2 \]
\[ x = \frac{1}{2} \left( \frac{qE}{m} \right) t^2 \] \[ \ldots \ldots \ldots (1) \]

In Y direction:

\[ S_y = u_y t + \frac{1}{2} a_y t^2 \]
\[ y = v_0 t \]
\[ t = \frac{y}{v_0} \]

From equation (1),
24. Correct option is (2)
Solution:
\[ E_{\text{net}} = \frac{1}{4\pi\varepsilon_0} q \left( \frac{1}{r^2} - \frac{1}{4r^4} + \frac{1}{16r^6} - \frac{1}{64r^8} + \ldots \right) \]
\[ E_{\text{net}} = \frac{q}{4\pi\varepsilon_0} \left[ \frac{1}{1 - \left( \frac{1}{4} \right)} \right] \]
\[ E_{\text{net}} = \frac{q}{4\pi\varepsilon_0} \frac{4}{5} \]

25. Correct option is (3)

26. Correct option is (3)
Solution:
\[ F = qE \]
\[ \frac{mv^2}{r} = q\left( \frac{\lambda}{2\pi\varepsilon_0 r} \right) \]
\[ mv^2 = \frac{q\lambda}{2\pi\varepsilon_0} \]
\[ v^2 = \frac{q\lambda}{2\pi\varepsilon_0 m} \]
\[ v = \sqrt{\frac{q\lambda}{2\pi\varepsilon_0 m}} \]

27. Correct option is (4)
Solution:
\[ \Phi_{\text{max}} = \frac{1}{\varepsilon_0} (q_{\text{enclosed}})_{\text{max}} = \frac{1}{\varepsilon_0} (\lambda \ell)_{\text{max}} = \frac{1}{\varepsilon_0} (\lambda \sqrt{3}a) = \frac{\sqrt{3}\lambda a}{\varepsilon_0} \]

28. Correct option is (4)
Solution:
If dipole momenta are in the same direction, \( F = \frac{1}{4\pi\varepsilon_0} \frac{6p_1p_2}{r^4} \), attractive

If dipole momenta are in the opposite direction, \( F = \frac{1}{4\pi\varepsilon_0} \frac{6p_1p_2}{r^4} \), repulsive

29. Correct option is (4)
Solution:
\[ W = pE(\cos \theta_1 - \cos \theta_2) \]
\[ = pE(\cos 90^\circ - \cos 270^\circ) \]
\[ = 0 \]
30. Correct option is (3)

Solution:
\[ E_x = -\frac{\partial}{\partial x} (6x - 8xy - 8y + 6yz) = -[6 - 8y] = -[6 - 8(1)] = 2 \]
\[ E_y = -\frac{\partial}{\partial y} (6x - 8xy - 8y + 6yz) = -[0 - 8x - 8 + 6z] = -[-8(1) - 8 + 6(1)] = 10 \]
\[ E_z = -\frac{\partial}{\partial z} (6x - 8xy - 8y + 6yz) = -[0 - 0 - 0 + 6y] = -[6(1)] = -6 \]
\[ E = E_x \hat{i} + E_y \hat{j} + E_z \hat{k} = 2\hat{i} + 10\hat{j} - 6\hat{k} \]
\[ E = \sqrt{4 + 100 + 36} = \sqrt{140} = 2\sqrt{35} \text{ N/C} \]
\[ F = qE = 4\sqrt{35} \text{ N} \]
31. Correct option is (4)

Solution:
\[ q_A = q_d = \frac{1}{2} (Q_1 + Q_2) \]
\[ q_B = \frac{1}{2} (Q_1 - Q_2) \]
\[ q_C = -\frac{1}{2} (Q_1 - Q_2) = \frac{1}{2} (Q_2 - Q_1) \]
32. Correct option is (3)

Solution:
\[ E = \frac{1}{4\pi\varepsilon_0} \frac{Q}{R^2} \sin \left( \frac{\theta}{2} \right) = \frac{1}{4\pi\varepsilon_0} \frac{Q}{R^2} \sin \left( \frac{\pi}{2} \right) = \frac{1}{4\pi\varepsilon_0} \frac{Q}{R^2} \]
\[ V = \frac{1}{4\pi\varepsilon_0} \frac{Q}{R} \]
33. Correct option is (3)

Solution:
Electric potential at a distance \( r \) (\( R_2 < r < R_1 \)) is
\[ V = (V_{\text{inner}})_{\text{out}} + (V_{\text{outer}})_{\text{in}} \]
\[ = \frac{kQ_2}{r} + \frac{kQ_1}{R_1} \]
\[ = k \left( \frac{Q_2}{r} + \frac{Q_1}{R_1} \right) \]
34. Correct option is (2)

Solution:
\[ C_{\text{bigger}} = n^{1/3} C_{\text{smaller}} = (1000)^{1/3} \text{ C} = 10 \text{ C} \]
35. Correct option is (4)

Solution:
\[ V_{\text{common}} = \frac{C_1 V_1 + C_2 V_2}{C_1 + C_2} \]
\[ V' = \frac{(kC)(0) + (C)(V)}{kC + C} \]
\[ V' = \frac{V}{k+1} \]
\[ k+1 = \frac{V}{V'} \]
\[ k = \frac{V}{V'} - 1 \]
\[ k = \frac{V - V'}{V'} \]

36. Correct option is (3)
Solution:
\[ k_{23} = \frac{2k_2 k_3}{k_3 + k_2} = \frac{2(3)(6)}{9} = 4 \]
\[ k_{\text{eq}} = \frac{k_1 + k_{23}}{2} = \frac{6 + 4}{2} = 5 \]

37. Correct option is (2)
Solution:
Answer (2)
\[ C_{AB} = \frac{2}{3} \]
\[ \text{Total number of benches} = \frac{4 \times 3}{2} = 6 \]
\[ \text{Total number of capacitors} = 6 \times 3 = 18 \]

38. Correct option is (2)
Solution:
\[ V_A - V_B = kq \left[ \frac{1}{r} - \frac{1}{R} \right] \]
\[ \Delta V \propto q \]

39. Correct option is (1)
Solution:
\[ V_A = \frac{k(100)}{a}, \quad V_B = \frac{k(100)}{b} \]
\[ a < b \]
\[ V_A > V_B \]
Charge flows from A to B.
40. Correct option is (2)
   Solution:
   \[
   q = \int_{0}^{2} idt \\
   = \int_{0}^{2} (3+2t)dt \\
   = (3t + t^2)|_{0}^{2} = 10 \text{ C}
   \]

41. Correct option is (2)
   Solution:
   The wire is as shown
   
   \[
   R = \rho \frac{l}{A} = \frac{\rho l^2}{V} \quad \text{(Here } V = \text{ volume)}
   \]
   \[
   \Rightarrow \frac{dR}{R} = \frac{2 \Delta l}{l} \quad \text{(for small percentage changes)}
   \]
   \[
   \Rightarrow \% \text{ change in resistance} = \% \text{ change in length.}
   \]
   Let \( R_1 \) and \( R_2 \) be the new resistances of the two parts. Then,
   \[
   R_1 = (1.02) \times 0.5 \, R
   \]
   \[
   R_2 = (1.04) \times 0.5 \, R
   \]
   \[
   \Rightarrow \text{ Total resistance} = R_1 + R_2 = 1.03 \, R
   \]

42. Correct option is (3)
   Solution:
   It is a form of Wheatstone bridge.

43. Correct option is (1)
   Solution:
   \[
   \Rightarrow \frac{x}{x+1} + 2 = x \\
   x + 2x + 2 = x^2 + x \\
   x^2 - 2x - 2 = 0 \\
   x = \frac{2 \pm \sqrt{4+8}}{2} \\
   x = 1 + \sqrt{3}
   \]

44. Correct option is (1)
   Solution:
45. Correct option is (1)

Solution:

\[ V_d = \frac{I}{n \cdot \text{A} \cdot e} \]

\[ V_d = \frac{I}{n \left( \frac{\pi r^2}{e} \right)} \]

\[ V_d \propto \frac{1}{r^2} \]

\[ \frac{V_A}{V_B} = \frac{I_A \left( \frac{r_B}{r_A} \right)^2}{I_B} \]

\[ \frac{V_A}{V_B} = \left( \frac{4}{1} \right) \left( \frac{2}{1} \right)^2 = \frac{16}{1} \]

\[ \frac{1}{R_{eq}} = \frac{3}{80} + \frac{1}{20} + \frac{3}{80} \]

\[ \frac{1}{R_{eq}} = \frac{3+4+3}{80} = \frac{10}{80} \]

\[ R_{eq} = 8 \, \Omega \]
66. (B)

\[ A(g) \rightarrow B(g) + C(g) \]

\[ t=0 \quad a \]

\[ t=t \quad a-x \quad x \quad x \]

\[ t=\infty \quad a \quad a \quad a \]

@ \( t = t \)

\[ P_{B+C} = P_t \quad @ \ t = \infty \quad P_{B+C} = P_{o} \]

\[ 2x = P_t \quad 2a = P_{o} \]

\[ k = \frac{3}{t} \ln \left( \frac{a-x}{a} \right) = \frac{1}{t} \ln \left( \frac{P_{o}}{P_{o}-P_t} \right) \]

67. (D)

\[ t_{1/2} = 20 \text{ min} \]

\[ k = \frac{1}{t} \ln \left[ \frac{A_0}{A_t} \right] \]

\[ \frac{t_{1/2}}{2} \quad \frac{t_{1/2}}{4} \quad \frac{t_{1/2}}{8} \quad \frac{t_{1/2}}{16} \quad \frac{t_{1/2}}{32} \quad \frac{t_{1/2}}{64} \quad \frac{t_{1/2}}{128} \quad \frac{t_{1/2}}{256} \quad \frac{t_{1/2}}{512} \quad \frac{t_{1/2}}{1024} \]

\[ t_{1/2} = \frac{A_0}{16} \]

Remaining amount in \( \% \) = \( \frac{100}{16} \times 100 = 6.25\% \)

68. (D)

aq. liq.

\[ 2H_2O + 2e^- \rightarrow H_2 + 2OH^- \]

@ Anode

@ Cathode
69. (b) 
Step 1 is R.D.S.

Rate = \( k [H_2O_2][I^-] \)

70. (a) 
\[ Ag^+ + e^- \rightarrow Ag \]

\( \text{Ag deposit} = 1.05 \times 5 \times 10^{-3} \times 0.42 \]
\[ = 0.42 \]

\( \text{Ag deposit} = \frac{0.42}{108} \)

\( e^- = \frac{0.42}{108} \); Total charge required = \( 0.42 \times \frac{96500C}{108} \)

\( q = 7 \times t \Rightarrow \frac{0.42 \times 96500C}{108} = 3 \times t \)

\( t = 125 \text{ sec} \)

71. (a) 
\[ M_1 = \frac{0.10 \text{ mol} \times 100}{0.10 \text{ mol}} = \frac{49 \times 10 \times 1.8}{98} = 9 \text{ mL} \]

\( M_2 \times V_1 = M_2 \times V_2 \)

\( 9 \times V_1 = 1.5 \times 3 \)

\( V_1 = 0.5 \text{ L or } 500 \text{ mL} \)

72. (b) 
\[ \alpha = \frac{\text{V}}{V_m} = \frac{9.54}{238} = 0.04008 \]

\[ \alpha = \frac{1}{\sqrt{2}} \]

\[ 100 \times (0.04008) \times 100 \]

\[ = 4.008\% \]

73. (b) 
\[ \frac{v_1}{v_2} = R z^2 \left[ \frac{1}{1^2} - \frac{1}{\infty^2} \right] = 9 \]

\[ \frac{v_2}{v_2} = R z^2 \left[ \frac{1}{3^2} - \frac{1}{\infty^2} \right] = 1 \]
74 \( \Delta G^\circ_{i^+} = \Delta G^0_{i^+} + \mu - \Delta G^0_{i^+} + \mu^+ \)

\[ \Delta G^0_{i^+} = -1 \times F \times F_{i^+} \mu = -2 \times F \times (0.057) \]

\[ E_{i^+} \mu = 0.52 \]

75 \( Z \geq 1 \) the gas will show the deviation from ideal behaviour.

76 \( \text{[H}^+] = 10^{-6} \text{ mol/litre} \)

For pure water \( \text{[H}^+] = \text{[OH}^-] = 10^{-6} \)

\[ K_w = [\text{H}^+][\text{OH}^-] = 10^{-12} \]

77 \( \text{(b), (b)} \)

500 mL of 0.2 M Ca(OH)\(_2\) + 500 mL of 0.4 NH\(_3\)OH

It is a mixture of strong base and weak base so we can neglect [OH\(^-\)] which is coming from weak base.

\[ c_1 = \text{concentration of OH}^- \text{from strong base} \]

\[ \frac{0.2 \times 2 \times 500}{500 + 500} = 0.2 \text{M} \]

\[ [\text{OH}^-] = 0.2 \text{M} \]

\[ \text{poh} = 0.7 \Rightarrow \text{pH} = 14 - 0.7 = 13.3 \]

78 \( \text{(c), (d)} \)

It contains all types of bonds.

79 \( \text{(c)} \)

By adding \( O_2 \) reaction will shift to backward.

80 \( \text{(c)} \)

Work done = Area under the p,v curve.

\[ = \frac{1}{2} \times (6p_i - p_f) \times (B_{v_f} - B_{v_i}) \]

\[ = 5p_i v_i \]

Cyclic process is clockwise hence it is \(-5p_i v_i\).
81. (A) lesser the reduction potential \( \Delta E \) will be reducing power

\[ \text{Al} > \text{Fe}^{2+} > \text{Br}^0 \]

82. (D)

\( (7) \) B.P. \( = \frac{\Delta H}{4S} = \frac{45 \times 10^3}{45} = 600^\circ \text{K} \)

83. (2)

84. (4)

\[ \text{O} - \text{S} - \text{O} - \text{S} - \text{O} \]

85. (4)

\[ \text{Fe}_4[\text{Fe} (\text{CN})_6]_3^3- \]

It is Iron (III) hexacyanoferrate

86. (A)

\[ [\text{Cu(N)}]^{3-} \]

Cu\(^{+} \): \([\text{Cu}]^{3d}^{10}\) Hybridisation \( = \text{sp}^3 \), NO.

Empty d orbital is present

87. (E) (3)

\[ \text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}] \]

Sodium nitroprusside [Here NO is in +1 oxidation state \((\text{NO}^{+1})\)]

Sodium hexacyanidonitrosylferrate (III)

88. (C)

\[ \text{Fe}(\text{CO})_5(C) \]

\[ \text{Fe}^{+} \]: \([\text{Fe}]^{3d}^{4s}^{2} \]

C0 is strong field ligand
91. Photosynthesis in higher plants - NCERT Pg – 208 (Easy)
92. Respiration in plants - NCERT Pg – 229,230,232 (Medium)
93. Photosynthesis in higher plants - NCERT Pg – 207 (Medium)
94. Respiration in plants - NCERT Pg – 233 (Medium)
95. Photosynthesis in higher plants - NCERT Pg – 208 (Medium)
96. Respiration in plants - NCERT Pg – 232 (Difficult)
97. Photosynthesis in higher plants - NCERT Pg – 208 (Medium)
98. Respiration in plants - NCERT Pg – 233 (Difficult)
99. Photosynthesis in higher plants - NCERT Pg – 210 (Easy)
100. Respiration in plants - NCERT Pg – 232 (Difficult)
101. Photosynthesis in higher plants - NCERT Pg – 212 (Medium)
102. Respiration in plants - NCERT Pg – 233 (Medium)
103. Photosynthesis in higher plants - NCERT Pg – 212 (Difficult)
104. Respiration in plants - NCERT Pg – 233 (Difficult)
105. Photosynthesis in higher plants - NCERT Pg – 214 (Medium)
106. Cell - NCERT Pg – 134 (Easy)
107. Cell division - NCERT Pg – 168 (Easy)
108. Transport in plants - NCERT Pg – 179,180 (Easy)
109. Plant growth & development NCERT Pg – 244 (Difficult)
110. Mineral Nutrition - NCERT Pg – 197,198 (Medium)
111. Morphology - NCERT Pg – 79,80,81 (Medium)
112. Anatomy - NCERT Pg – 90 (Easy)
113. Biological classification - NCERT Pg – 23,24 (Easy)
114. Plant kingdom - NCERT Pg – 35 (Easy)
115. Photosynthesis in higher plants - NCERT Pg – 213 (Medium)
116. Respiration in plants - NCERT Pg – 233 (Easy)
117. Photosynthesis in higher plants - NCERT Pg – 215,216 (Easy)
118. Respiration in plants - NCERT Pg –233 (Medium)
119. Photosynthesis in higher plants - NCERT Pg –217 (Easy)
120. Respiration in plants - NCERT Pg –230 (Medium)
121. Photosynthesis in higher plants - NCERT Pg –218 (Easy)
122. Respiration in plants - Aldolase enzyme splits F – 1, 6 – Dip (Medium)
123. Photosynthesis in higher plants - NCERT Pg – 219 (Easy)
124. Respiration in plants - NCERT Pg –228 (Medium)
125. Photosynthesis in higher plants - NCERT Pg –219 (Easy)
126. Respiration in plants - NCERT Pg –229 (Difficult)
127. Photosynthesis in higher plants - NCERT Pg –220 (Medium)
128. Respiration in plants - NCERT Pg –229 (Medium)
129. Photosynthesis in higher plants - NCERT Pg –222 (Easy)
130. Respiration in plants - NCERT Pg –229 (Medium)
131. Photosynthesis in higher plants - NCERT Pg –222 (Medium)
132. Respiration in plants - NCERT Pg –229 (Difficult)
133. Photosynthesis in higher plants - NCERT Pg –219 (Medium)
134. Respiration in plants - NCERT Pg –226 (Difficult)
135. Photosynthesis in higher plants - NCERT Pg –223 (Easy)
136. Neural control and coordination , NCERT pg -322 (easy)
137. Neural control and coordination , NCERT pg 324, 3rd para (easy)
138. Neural control and coordination , NCERT , Eustachian canal-middle ear , Cerebellum-Hindbrain ,
Blind spot- No photoreceptors (medium)
139. Neural control and coordination , NCERT Taste buds- Taste , Macullae- Body balancing , Organ of Corti- Hearing (medium)
140. Neural control and coordination , NCERT Sympathetic inhibits digestion and stimulates circulation. ( Difficult)
141. Neural control and coordination , NCERT Facial and Trigeminal are Mixed , Optic And olfactory are Sensory nerves (Difficult )
142. Neural control and coordination , NCERT pg 321, 322 (medium)
143. Neural control and coordination , NCERT pg 319,320 (easy)
144. Excretory products and their elimination , Insects are uricotelic in nature (easy)
145. Neural control and coordination , NCERT pg 324, Ciliary muscles of ciliary body changes shape of lens (medium)
146. Body fluids and circulation , Papillary muscles are conical muscles present in ventricles of heart to which Chordae tendinae are attached (difficult )
147. Neural control and coordination , NCERT pg 320 (figure) , 321 Midbrain (medium)
148. Neural control and coordination , NCERT pg 321, 1st para (easy)
149. Chemical control and coordination , NCERT, Melanocyte stimulating hormone is secreted by Pars intermedia and vasopressin by hypothalamus.(medium)
150. Chemical control and coordination, NCERT, Hormones are always organic and regulates growth and differentiation. (Difficult)

151. Neural control and coordination, NCERT, pg 320, 3rd para (easy)

152. Chemical control and coordination, NCERT, Vasopressin is secreted by Neurosecretory cells of Hypothalamus and hence Neuro peptide hormone. (medium)

153. Chemical control and coordination, NCERT, Since majority of hormones are peptides and hence act via Extra cellular receptors. (medium)

154. Chemical control and coordination, NCERT, Noradrenaline is secreted by Adrenal medulla, rest all are secreted by pituitary. (easy)

155. Chemical control and coordination, NCERT, pg 339 (easy)

156. Neural control and coordination, NCERT, pg 371, 318 (medium)

157. Chemical control and coordination, NCERT, FSH is under negative feedback of Testosterone. (medium)

158. Chemical control and coordination, NCERT, Luteotropin ie Prolactin targets mammary glands. Leydig cells are stimulated by LH. (Medium)

159. Chemical control and coordination, NCERT, pg 333

160. Chemical control and coordination, NCERT, pg 340, Cortisol and glucagon stimulates gluconeogenesis and insulin is antagonistic to them. (difficult)


162. Chemical control and coordination, NCERT, pg 333, second last line(easy)

163. Locomotion and movement, NCERT pg 310, first para, Both Camel and whale being mammals have 7 cervical vertebrae (medium)

164. Animal Kingdom, NCERT pg 52 (easy)

165. Chemical control and coordination, NCERT, pg 333, Squeeze milk in large ducts- Oxytocin. Stimulates maturation of Ova- FSH. Maintenance of pregnancy- Progesterone. (Difficult)

166. Structural organisation in animals, Tendon- Dense con tissue, Adipose tissue- Loose con tissue, Cartilage- Specialised con tissue (easy)

167. Neural control and coordination, (difficult)

168. Chemical control and coordination, NCERT, Aldosterone – steroid hormone (easy)

169. Neural control and coordination, NCERT, pg 324, 2nd para (easy)

170. Breathing and exchange of gases, NCERT pg 272 (easy)

171. Neural control and coordination, NCERT, pg 326, Cochlea has hair cells suspended in fluid endolymph that once stimulated convert mecnhanical energy to electrical energy ie act as biological transducers. (medium)
172. Chemical control and coordination, Pituitary does not secrete any hormone to regulate functioning of parathyroid gland. (easy)

173. Neural control and coordination, NCERT, pg 321 1st para last line, pg 323 1st para last line (easy)

174. Chemical control and coordination, NCERT, pg 335 (medium)

175. Chemical control and coordination, NCERT, pg 339, 340. Cortisol, Testosterone, T3, Progesterone, Oestrogen (medium)

176. Neural control and coordination, NCERT, Abducens ie VIth cranial nerve innervates Lateral rectus extrinsic muscles of eyes to control sideways movements of eyes. (difficult)

177. Chemical control and coordination, NCERT, pg 336 Epinephrine and Norepinephrine are both adrenal medullary hormones that are analogous. (Easy)

178. Structural organisation in animals, NCERT pg 313, 2nd para. Blood of cockroach lacks any respiratory pigment (easy)

179. Chemical control and coordination, NCERT, pg 337, last para. Tumor of beta cells shall cause secretion of more insulin that shall cause severe reduction in blood glucose level ie hypoglycemia. (medium)