### ANSWER KEY MEDICAL MAJOR TEST-06

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ANSWER KEY MEDICAL MAJOR TEST-06
PHYSICS

1. \[ \sqrt{x^2 + y^2} = \sqrt{(x+y)^2 + (x-y)^2 + 2(x+y)(x-y)\cos\theta} \]

2. \[ \frac{x+y}{x-y} = \frac{\sqrt{x^2 + y^2}}{\sqrt{x^2 - y^2}} \]

3. \[ \cos\theta = \frac{1}{2}g\cos\theta t^2 \]

For all \( \theta \), \( t \) will be same.

4. \[ \theta = \frac{1}{2} \sin^{-1} \left( \frac{1}{8} \right) \]

5. \[ \frac{(u^2)}{2} \sin 2 \times 15 = \frac{u^2 \sin 20}{g} \]

6. \[ V_{\text{min}} \text{ for complete circle} = \sqrt{5gl} \]

Velocity of top point

\[ \frac{1}{2}mV^2 + 2ml = \frac{1}{2}m(\sqrt{5gl})^2 \]

\[ V = \sqrt{gl} \]

\[ 2l = \frac{1}{2}gt^2 \Rightarrow t = \frac{4l}{\sqrt{g}} \]

Range = \( \sqrt{gl} \times \frac{4l}{\sqrt{g}} = 2L \)

7. \[ T_{\text{max}} = m\omega^2 r \]

\[ 10 = \frac{1}{4} \times \omega^2 \times \frac{10}{100} \]

\[ \omega = 20 \text{ rad/s} \]

8. No friction on wall so, it will not be in equilibrium

9. \[ f = V_{\text{rel}} \frac{dM}{dt} \]

\[ V_{\text{rel}} = 2v \]

\[ a = \frac{2av^2}{M} \]

10. \[ \frac{du}{dx} = 0 \text{ } f_{\text{net}} = 0 \]

11. \[ K, \epsilon = \frac{P^2}{2m} \]

12. \[ W_{\text{net}} = W_{\text{spring}} + W_{\text{gravity}} \]
= \left(0 - \frac{1}{2}kd^2\right) + mg(d + h)

16. \quad I = mk^2

\text{Radius of gyration} = \sqrt{\frac{I}{M}}

I_r = \left(\frac{mr^2}{4} + mr^2\right)

I_r = \left(\frac{mr^2}{2} + mr^2\right)

17. \quad L = \text{constant} \quad \text{fext} = 0

I_0\omega = (I_1 + I_2)\omega_i

\omega_t = \frac{I_0\omega}{I_1 + I_2}

18. \quad y = \frac{\text{stress}}{\text{strain}} = \frac{\text{load}}{\text{extension}}

\text{Slope:}

y_A > y_B

19. \quad f = mg

f = \text{Aldg}

\frac{f}{A} = \text{Idg}

6 \times 10^6 = l \times 8 \times 10^3 \times 10

l = 75m

20. \quad n\pi^2V' = \pi R^2V

V' = \frac{V}{n} \left(\frac{R^2}{r^2}\right)

21. \quad \Delta P = \frac{1}{2}\rho(2v - v)^2 A

22. \quad V = \frac{2r^2g}{9} \left(\rho - \sigma\right)

23. \quad \frac{GM_m}{R} = \frac{GM_n}{r}

24. \quad \frac{\text{GM}}{r^2} = \frac{\text{Gm}}{(d - r)^2}

\text{Find r then find palatial energy at point}

25. \quad \text{acceleration should be} \quad -\omega^2 x

\frac{dy^2}{dt^2} + A^2y = 0

\omega = 200\pi = 2\pi f

\frac{2\pi}{\lambda} = k = \frac{200\pi}{330}

V = fd
36. \( \frac{T_{\text{new}} - T_{\text{old}}}{\Delta t} = -k(T_{\text{old}} - T_{\text{amb}}) \) 
\( \frac{-16}{10} = -k(52 - 20) \) 
\( \frac{T - 36}{10} = -k(36 - 20) \)

37. \( \text{Slope} = \frac{100}{212 - 32} = \frac{5}{9} \)

38. \( \Delta L = L \alpha \Delta T \) 
\( \alpha_A = \frac{4}{T}, \alpha_B = \frac{6}{T} \) 
\( \frac{\alpha_A}{\alpha_B} = \frac{2}{3} \) 

40. \( I_A \alpha_A \Delta T = I_B \alpha_B \Delta T \)

### CHEMISTRY

46. (b) 
47. (c) 
\( \text{CH}_3\text{CH}_2\text{COOH} \xrightarrow{\text{NaOH}} \text{CH}_3\text{CH}_3 + \text{CO}_2 \)

48. (b) 
49. (c) 
Non terminal alkyne does not give white ppt.

50. (a) 
51. (c) 
52. (b) 
3 Cl at 120° cancel dipole moment of each other. Then only 1 is left

53. (c) 
Electrophile adds according to ring activator.

54. (c) 
Net energy is conserved
\( U_i = 0 \) \( U_f = 5\text{eV} \) 
\( K.E_i = 0 \) \( K.E_i = k \) 
\( 5\text{eV} = K.E \) \( \therefore T.E_i = 0 \) 

55. (d) 
56. (d) 
\( V_{\text{rms}} = \sqrt{\frac{3RT}{M}} \)

57. (c) 
58. (a) 
\( \text{Al}_3\text{C}_3 + 12\text{H}_2\text{O} \rightarrow 3\text{CH}_4 + 4\text{Al(OH)}_3 \)

59. (d) 
60. (b) 
61. (a) 
62. (c) 
Process will be non-feasible when \( \Delta G = (+)\text{ve} \) 
\( \Delta G = \Delta H - T\Delta S \) 
\( \therefore \Delta H > 0 \) and \( \Delta S < 0 \)

63. (c) 
\( T \propto \frac{n^3}{z^2} \)

64. (b) 
For isothermal process \( \Delta E = 0 \)

65. (d)
66. (b) 
   Li or Na in liq NH₃ gives trans product.
67. (a) 
   2 most acidic H will get replaced.
68. (c) 
69. (a) 
   Equilibrium constant only depends on temp.
70. (c) 
71. (a) 
   Group which activates ring will increase basic character.
72. (c) 
73. (a) 
   A reaction in which a reactant is both oxidised and reduced is k/a disporportionation rxn.
74. (d) 
75. (c) 
76. (a) 
77. (b) 
78. (c) 
79. (d) 
   For aromatic character no of delocalised electrons should be equal to (4n +2).
80. (d) 
   2 same group (CH₃) is attached to same carbon.
81. (b) 
   \[ \lambda = 100 \] ...(i) 
   \[ \lambda = \frac{h}{mv} \] ...(ii) 
   Form (i) & (ii) 
   \[ \Rightarrow 100 \, V = \frac{h}{mv} \]
   \[ \Rightarrow V = \frac{\sqrt{h}}{10\sqrt{m}} \]
   \[ \lambda = 100 \, V \]
   \[ = 10\sqrt{\frac{h}{m}} \]
82. (a) 
   In (a) transition state is most stable
83. (c) 
   Most stable carbonation forms by rearrangement and then Br⁻ attaches to that.
84. (b) 
   Aromatic character involves cyclic delocalisation of electron.
85. (c) 
86. (c) 
87. (a) 
88. (d) 
89. (b) 
90. (a) 

**BOTANY**

93. Succinic dehydrogenase catalyses the conversion of succinic acid to fumaric acid resulting in the release of FADH₂ from FAD.
94. Excessive fertilizers cause a buildup of fertilizer salts which raises soil salinity thereby altering the pH. This causes root damage which in turn, dehydrates the plant due to lack of absorption of water and minerals.
95. During seed germination, gibberellins enhance α-amylase synthesis which overcomes seed dormancy.
105. Haplodiplontic life cycle in which both gametophytic and sporophytic generations co-exist is seen in Bryophytes and Pteridophytes.
109. $\psi_w = \psi_x + \psi_p$

As water moves from high water potential to low water potential, it will move from cell B to A.

112. In C3 cycle, one molecule of RUBP combines with one molecule of carbon dioxide to form 2 molecules of PGA. So, 5 molecules of RUBP would release 10 molecules of PGA.

118. *Azolla, a pteridophyte*(fern) lives in symbiotic association with a nitrogen fixing cyanobacteria called *Anabaena*. Azolla is planted in rice fields to increase the yield.

121. In monocots leaves, groups of large cells called *Bulliform* or motor cells are present in epidermis.

124. Viroids contain only very low molecules of RNA and no protein coat.

126. High temperature and wind increase the rate of transpiration by drying the external environment.

129. Auxin inhibits the growth of lateral axillary buds. This effect of auxin is called *Apical dominance*.

131. Sporophytes of bryophytes are partially or fully dependent on gametophyte.

133. Sclerenchyma is thickened due to deposition of lignin.

135. Vascular and cork cambiums are examples of lateral meristem.

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**ZOLOGY**

139. Members of phylum Aschelminthes have well developed muscular pharynx with complete alimentary canal.

140. Medulla oblongata has the centres for sweating and respiration also.

142. Glaucoma is due to blockage of canal of Schlemm which drains aqueous humor.

143. Ammonia is most toxic nitrogenous waste material and requires large amount of water for its removal.

144. Peristalsis is involuntary wave of contraction which passes from oral to anal region.

149. Typhlosome is present in earthworm and cercaria is the larva of liver fluke.

152. Most of the mammals have extra abdominal testes but in case of egg laying mammals like Platypus and aquatic mammals like whales and dolphins testes are intra abdominal.

156. Extra ocular muscles of eye ball are supplied by cranial nerves number III, IV, VI i.e oculomotor, trochlear, abducens.

159. Peyer’s patches are masses of lymphoid tissue found in ileum region of small intestine.

165. Foramen ovale is an aperture present in inter atrial septum in foetal heart.

168. Macula lutea has only cones.

171. Lymphatic vessels called lacteals are present inside villi in small intestine.