PACE-IIT & MEDICAL

ANSWER KEY FOR MAJOR TEST- 01 (FOR 2024 ASPIRANTS) 09th Oct 2022

1. (2)	2. (3)	3. (2)	4. (4)	5. (4)
6. (2)	7. (2)	8. (1)	9. (1)	10. (2)
11. (2)	12. (1)	13. (2)	14. (2)	15. (3)
16. (2)	17. (1)	18. (3)	19. (3)	20. (1)
21. (3)	22. (3)	23. (3)	24. (3)	25. (3)
26. (3)	27. (1)	28. (3)	29. (2)	30. (1)
31. (2)	32. (4)	33. (3)	34. (1)	35. (2)
36. (1)	37. (2)	38. (1)	39. (1)	40. (3)
41. (2)	42. (2)	43. (4)	44. (2)	45. (4)
46. (2)	47. (3)	48. (1)	49. (2)	50. (4)
51. (4)	52. (2)	53. (4)	54. (3)	55. (4)
56. (3)	57. (3)	58. (3)	59. (4)	60. (1)
61. (4)	62. (1)	63. (1)	64. (1)	65. (3)
66. (1)	67. (4)	68. (2)	69. (3)	70. (4)
71. (2)	72. (4)	73. (4)	74. (1)	75. (1)
76. (3)	77. (2)	78. (3)	79. (4)	80. (2)
81. (1)	82. (2)	83. (3)	84. (1)	85. (4)
86. (4)	87. (2)	88. (3)	89. (2)	90. (3)
91. (2)	92. (3)	93. (3)	94. (2)	95. (2)
96. (3)	97. (2)	98. (4)	99. (3)	100. (3)
101. (4)	102. (3)	103. (2)	104. (2)	105. (3)
106. (2)	107. (1)	108. (4)	109. (1)	110. (4)
111. (4)	112. (1)	113. (3)	114. (4)	115. (3)
116. (3)	117. (4)	118. (4)	119. (1)	120. (3)
121. (3)	122. (4)	123. (1)	124. (3)	125. (3)
126. (1)	127. (1)	128. (2)	129. (4)	130. (3)
131. (4)	132. (4)	133. (3)	134. (2)	135. (1)
136. (1)	137. (1)	138. (1)	139. (1)	140. (3)
141. (2)	142. (4)	143. (4)	144. (1)	145. (1)
146. (1)	147. (4)	148. (1)	149. (4)	150. (3)
151. (3)	152. (4)	153. (2)	154. (2)	155. (3)
156. (3)	157. (3)	158. (4)	159. (4)	160. (1)
161. (1)	162. (4)	163. (2)	164. (4)	165. (4)
166. (3)	167. (2)	168. (3)	169. (4)	170. (2)
171. (2)	172. (3)	173. (1)	174. (2)	175. (4)
176. (2)	177. (2)	178. (4)	179. (3)	180. (2)
181. (3)	182. (3)	183. (1)	184. (4)	185. (2)
186. (3)	187. (2)	188. (1)	189. (3)	190. (2)
191. (4)	192. (3)	193. (3)	194. (2)	195. (4)
196. (4)	197. (2)	198. (2)	199. (1)	200. (4)

Solutions

1. **(2)**

Let v_w be the velocity of water and v_b be the velocity of motor boat in still water. If x is the distance covered, then as per question

$$x = (v_b + v_w) \times 6 = (v_b - v_w) \times 10$$

On solving, $v_w = \frac{v_b}{4}$

$$\therefore \left[v_b + \frac{v_b}{4} \right] \times 6 = 7.5 v_b$$

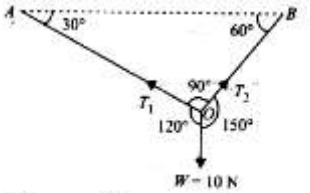
Time taken by motor boat to cross the same distance in still water is

$$t = \frac{x}{v_b} = \frac{7.5 v_b}{v_b} = 7.5 \text{ hours}$$

2. **(3)**

Various forces acting on the ball are shown in figure.

Using Lami's theorlm, according to figure,



$$\frac{T_1}{\sin 150^\circ} = \frac{T_2}{\sin 120^\circ} = \frac{10}{\sin 90^\circ}$$

$$\frac{T_1}{\sin 30^\circ} = \frac{T_2}{\sin 60^\circ} = \frac{10}{1}$$

$T_1 = 10 \sin 30^\circ = 10 \times 0.5 = 5$ N

and $T_2 = 10 \sin 60^\circ = 10 \times \frac{\sqrt{3}}{2} = 5\sqrt{3}$ N

3. (2)

For constant velocity, no force is required so $\vec{F} = 0$

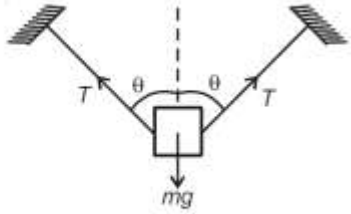
4. (4)

5. (4)

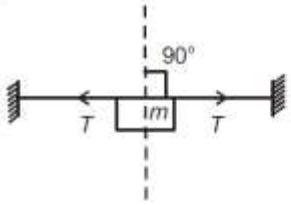
Answer (4)

$2T\cos\theta = mg$

$$T = \frac{mg}{2\cos\theta} \quad \ldots(i)$$



To make this string completely straight

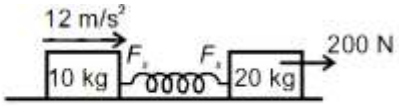


$\theta = 90°$

in (i) put $\theta = 90°$

$$T = \frac{mg}{2\cos 90°} \approx \infty$$

6. (2)



F_s is spring force

$F_s = 10 \times 12 = 120$ N

for 20 kg block

$200 - 120 = 20a$

$$a = \frac{80}{20} = 4 \text{ m/s}^2$$

7. (2)

$[\Delta KE] = [W]$

$$\Rightarrow \left[\frac{1}{2}mv^2\right] = [FD]$$

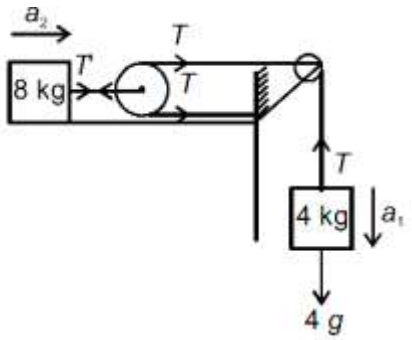
$[M] = [FV^{-2}D]$

8. (1)

$$\frac{\Delta P}{P} = 3\frac{\Delta a}{a} + \frac{1}{2}\frac{\Delta b}{b} + 2\frac{\Delta c}{c} + \frac{\Delta d}{d}$$

9. (1)

10. (2)



For 8 kg $T' = 8a_1$ ...(i)

for 4 kg

$4g - T = 4a_2$ ...(ii)

for pulley

$T^1 = 2T$ ...(iii)

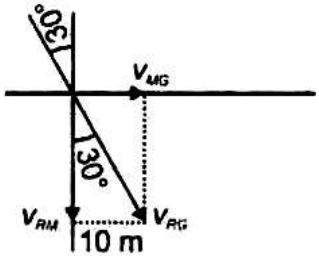
Using (i), (ii) and (iii)

$$a_2 = \frac{a_1}{2}$$

11. (2)

$$v = \sqrt{\frac{0^2 + 10^2}{2}} = 5\sqrt{2}\,m/s$$

12. (1)



v_{MG} = velocity of man w.r.t. ground
v_{RG} = velocity of rain w.r.t. ground
v_{RM} = velocity of rain w.r.t. man

$$\sin 30° = \frac{10}{v_{RG}}$$

13. (2)

14. (2)

15. (3)

$\vec{b} + \overrightarrow{RP} = \vec{a}$ $\qquad\qquad$ $\overrightarrow{RP} = -\overrightarrow{RQ}$

$\vec{b} + \overrightarrow{RQ} = \vec{c}$

16. (2)

17. (1)

$$T_1 = \frac{2u\sin\theta}{g}$$

$$T_2 = \frac{2u\cos\theta}{g}$$

$$T_1T_2 = 2\frac{(2\sin\theta\cos\theta)}{g}\frac{u^2}{g} = \frac{2R}{g}$$

18. (3)

$$\Delta v = a\Delta t = g\frac{v\sin\theta}{g} = v\sin\theta$$

19. (3) Percentage error in g = (%error in l) + 2(% error in T)= 1% + 2(3%) = 7%

20. (1) The coin falls behind him it means the velocity of train was increasing otherwise the coin fall directly into the hands of thrower.

21. (3)

$$8N = 8a$$

$$\Rightarrow a = 1m/s^2$$

$$\Rightarrow F = 10\times1 = 10N$$

22. (3)

$1200 = mg + ma$

$$\frac{400}{80} - a$$

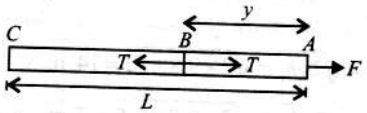
$\Rightarrow$ $a = 5\ m/s^2$

23. (3)

To cross the river in shortest time, man has to swim perpendicular to the river flow.

24. **(3)**

Acceleration of the rope, $a = (F/M)$ ... (i)

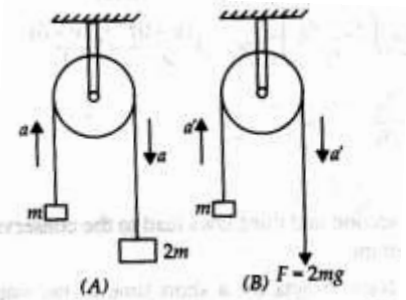


Now, considering the motion of the part AB of the rope [which has mass $(M/L)y$ and acceleration given by eq.(i)] assuming that tension at B is T.

$$F - T = \left(\frac{M}{L}y\right)\times a \quad \text{or} \quad F - T = \frac{M}{L}y\times\frac{F}{M} = \frac{Fy}{L}$$

or $$T = F - F\frac{y}{L} = F\left(1-\frac{y}{L}\right)$$

25. **(3)**



In case A, the acceleration of mass m is

$$a = \frac{(2m-m)g}{m+2m} = \frac{g}{3}$$

In case B, the acceleration of mass m is

$$a' = \frac{2mg - mg}{m} = g$$

$$\therefore \quad \frac{a}{a'} = \frac{1}{3}$$

26. **(3)**

$P+\frac{1}{2}\rho v^2+\rho gh=K$

K has the same dimension as each one of the factors on the L.H.S. *i.e.* P, $\frac{1}{2}\rho v^2$ and ρgh.

$\therefore \frac{[K]}{[P]}=[\theta]$

27. (1)

$\frac{dp}{dt}=0+3\times 2t=6t$

at $t=3s,$

$\frac{dp}{dt}=6\times 3=18N$

28. (3)

For the single pulley system $a=\left(\frac{m_1-m_2}{m_1+m_2}\right)g$

take $2m$ and $3m$ as a system (*i.e.*, single block of $5m$ mass)

$m_1 = 5m$

$m_2 = m$

$a=\left(\frac{5m-m}{5m+m}\right)g=\frac{2g}{3}$

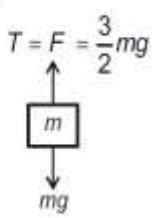
29. (2)

Answer (2)

$F_{net} = ma$

$\frac{3}{2}mg - mg = ma$

$a = g/2$



30. (1)

At t = 5 s, the particle is at maximum height

u = 50 m/s, h = $\frac{u^2}{2g}$

31. (2)

v^2 versus x graph is linear.

$v^2 = u^2 + 2ax$ is valid

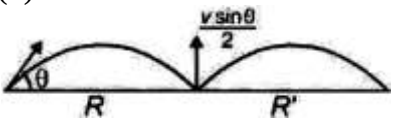
Slope = $\frac{dv^2}{dx} = 0 + 2a = -2$

$\Rightarrow \quad a=-1m/s^2$

32. (4)
Time of flight = 3 + 5 = 8 s
Time in which it falls from maximum height to ground is 4 s.
$v = 10 \times 4 = 40\,m/s$

33. (3)
Vertical component of velocity is same for both.

34. (1)



$$R = \frac{2(v\cos\theta)(v\sin\theta)}{g}$$

$$R' = \frac{2(v\cos\theta)\left(\frac{v\sin\theta}{2}\right)}{g} = \frac{R}{2}$$

35. (2)

$$v^2 = \alpha x \Rightarrow a = \frac{\sigma}{2}$$

$$\Rightarrow S = \frac{1}{2}at^2 = \frac{\alpha t^2}{4}$$

36. (1)

$$v^2 = u^2 - 2gh$$

$$\Rightarrow \frac{1}{2}mv^2 = \frac{1}{2}mu^2 - mgh$$

$$\Rightarrow E = E_0 - mgh$$

37. (2)
At ground

$$K = \frac{1}{2}mu^2$$

At maximum height

$$K' = \frac{1}{2}mu^2\cos^2\theta$$

$$= \frac{K}{4}$$

38. (1)
$v = 2x + 10$

$a = v\,\frac{dv}{dx} = 2\,(2x + 10)$

39. (1)
At range x = R

$y = 0 \Rightarrow R = \frac{\alpha}{\beta}$

40. (3)

$$y = 8\left(\frac{x}{6}\right) - 5\left(\frac{x}{6}\right)^2$$

$x = R,\ y = 0$

$$0 = \frac{4}{3}R - 5\frac{R^2}{36}$$

$$\Rightarrow R = \frac{48}{5} = 9.6\,m$$

41. **(2)**

$v = \alpha\sqrt{x}$

or $\frac{dx}{dt} = \alpha\sqrt{x}$ or $\frac{dx}{\sqrt{x}} = \alpha dt$

or $\int \frac{dx}{\sqrt{x}} = \alpha\int dt$ or $2x^{1/2} = \alpha t + C_1 2$

where C_1 is the constant of integration

Given : $x = 0,\ t = 0$

$\therefore C_1 = 0$

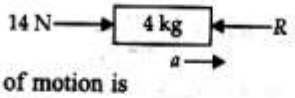
$$\therefore 2x^{1/2} = \alpha t \text{ or } x = \left(\frac{\alpha}{2}\right)^2 t^2 \text{ or } x \propto t^2$$

42. **(2)**

Common acceleration of the system,

$$a = \frac{14\ N}{4\ kg + 2\ kg + 1\ kg} = \frac{14}{7}\ ms^{-2} = 2\ ms^{-2}$$

Let R be the contact force between 4 kg and 2 kg blocks. The free body diagram of 4 kg block is as shown in the figure.



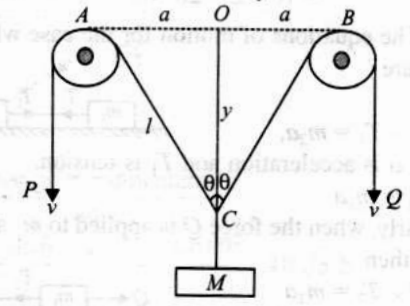
The equation of motion is

$14 - R = 4a$

$R = 14 - 4 \times 2 = 6\ N$

43. **(4)**

Let $AC = l$, $AO = a$ and $OC = y$



As shown in figure

$l^2 = a^2 + y^2$

Differentating it with respect to time, we have

$$2l\frac{dl}{dt} = 2y\frac{dy}{dt} \qquad (\because a = \text{constant})$$

or $$\frac{dy}{dt} = \frac{l}{y}\frac{dl}{dt} = \frac{1}{\cos\theta}\frac{dl}{dt} = \frac{v}{\cos\theta} \qquad \left[\because \frac{dl}{dt} = v\right]$$

44. (2)

$$N\cos\theta = mg \quad \Rightarrow N = \frac{mg}{\cos\theta}$$

45. (4)

In the condition of free fall apparent weight becomes zero.

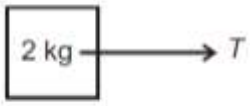
46. (2)

$$F_{net} = Ma$$

$$(10\cos 60°) = (3 + 2)\,a$$

$$a = 1\ m/s^2$$

$$T = 2(1) = 2\ N$$



47. (3) From the principle of dimensional homogenity $[v]=[at]\Rightarrow[a]=[LT^{-2}]$. Similarly $[b]=[L]$ and $[c]=[T]$

48. (1)

$x = 2t^2+5t + 6$

$$v = \frac{dx}{dt} = 4t+5$$

$$a = \frac{dv}{dt} = 4$$

49. (2)

Slope of speed-time graph will increase from 0 to t_1 then decrease from t_1 to t_2.

50. (4)

$$\vec{S} = \vec{u}t + \frac{1}{2}\vec{a}t^2$$

51. (4)

$Be = 1s^2, 2s^2$ [Be has stable configuration therefore it has more IP than B]

$B = 1s^2, 2s^2, 2p^1$

i.e., [9.32eV for Be; 8.29eV for B]

52. (2)

He has more size than 'H' because of $(1s^2)$ completely filled s-subshell

53. (4)

Similarly 27.6% of O = 4 mol of O 30% of O $= \frac{4}{27.6} \times 3 = 4.34$ atom of O X : O 2.9 : 4.34 *i.e.*, 2 : 3 Formula will be : X_2O_3	∴ [Atomic mass = eq. mass × Valency] Eq. mass of X $= \frac{70}{30} \times 8 = 18.66$ Atomic mass of X = 56g Calculate from 1st oxide ∴ Valency $= \frac{\text{Atomic mass}}{\text{Eq. mass}} = \frac{56}{18.6} = 3$ Formula will be : X_2O_3

Method I			Method II
	Oxide I	Oxide II	Formula of 1st X_3O_4
X_3O_4	O = 27.6%	O = 30%	Eq. mass of X $= \frac{\text{wt of X}}{\text{wt of O}} \times 8$
	X = 72.4%	X = 70%	$= \frac{72.4}{27.6} \times 8 = 20.9 = 21$
	O = 27.6%	X = 70%	Positive charge of X $= 2 \times \frac{4}{3} = \frac{8}{3}$
72.4% of X = 3 mol of X			∴ Atomic mass of X $= \frac{8}{3} \times 21 = 56$ g
70% of X $= \frac{3}{72.4} \times 70 = 2.90$ mol of X			

54. (3)

$$\text{Moles of NaOH} = \frac{M \times V(mL)}{1000} = \frac{2 \times 250}{1000} = 0.5 \text{moles of NaOH}$$

$$\text{Moles} = \frac{\text{given mass}}{\text{mol.mass}} \therefore 0.5\text{mole} = \frac{x}{40} \text{ mol.} \qquad \text{given mass} = 40 \times 0.5 = 20\text{g}$$

55. (4)

$$\text{Volume of } N_2 \text{ in 1Li.e., 1000ml of } N_2 = \frac{10}{1000} \times 1000 = 100\text{ml}$$

22400 ml at STP = 1 mol.

$$\therefore 100\text{ml at STP} = \frac{1}{22400} \times 100 = \frac{1}{224} = 4.46 \times 10^{-3} \text{mol}$$

68. (2)

$$\text{K.E.} = h(\nu - \nu_0)$$

$$\text{K.E. of photoelectrons when } \nu = 3.2 \times 10^{16} \text{ Hz}$$

$$\text{K.E}_1 = h(3.2 \times 10^{16} - \nu_0)$$

$$\text{K.E. of photoelectron when } \nu = 2.0 \times 10^{16} \text{ Hz}$$

$$\text{K.E}_2 = h(2.0 \times 10^{16} - \nu_0)$$

$$\text{According to question K.E}_1 = 2\text{K.E}_2$$

$$\therefore h(3.2 \times 10^{16} - \nu_0) = 2h(2.0 \times 10^{16} - \nu_0)$$

$$3.2 \times 10^{16} - \nu_0 = 4.0 \times 10^{16} - 2\nu_0$$

$$\nu_0 = 4.0 \times 10^{16} - 3.2 \times 10^{16} = 0.8 \times 10^{16} \text{ Hz} = 8 \times 10^{15} \text{ Hz} = 8 \times 10^{15} \text{ Hz}$$

69. (3)

$mvr = \frac{nh}{2\pi}$ (n = number of shell)

Angular momentum

for 6^{th} shell $= \frac{6h}{2\pi} = \frac{3h}{\pi}$

70. (4)

$\Delta x \times \Delta P = \frac{h}{4\pi}$ if $\Delta x = 0$

$\Delta P = \frac{h}{4\pi \times \Delta x} = \frac{h}{4\pi \times 0} = \infty$

71. (2)

Larger the value of (n + 1); larger will be the energy

72. (4)

As 1^{st} excited state means $n_1 = 2$

For 5^{th} excited state means $n_2 = 6$

$\therefore e^-$ will transit between 6^{th} level to 2^{nd} level

No transition will be upto 1^{st} level. Because no line will appear in Lyman series i.e. UV region.

73. (4)

Gd have exceptional configuration e– will enter in 5d because 4f have 7 electrons and have half filled stability

Gd = $[Xe]^{54}\ 4f^7\ 5d^1\ 6s^2$

101. NCERT Pg no. 38

102. NCERT Pg no. 16

103. NCERT Pg no. 4

104. NCERT Pg no. 33

105. NCERT Pg no. 17

106. NCERT Pg no. 8

107. NCERT Pg no. 32

108. NCERT Pg no. 19

109. NCERT Pg no. 43

110. NCERT Pg no. 9 and 10

111. NCERT Pg no. 37

112. NCERT Pg no. 18

113. NCERT Pg no. 10

114. NCERT Pg no. 31

115. NCERT Pg no. 20

116. NCERT Pg no. 32

117. NCERT Pg no. 12

118. NCERT Pg no. 31

119. NCERT Pg no. 21 and 22

120. NCERT Pg no. 12

121. NCERT Pg no. 22

122. NCERT Pg no. 30

123. NCERT Pg no. 21 and 22

124. NCERT Pg no. 29 and 30

125. NCERT Pg no. 21

126. NCERT Pg no. 29 and 30

127. NCERT Pg no. 20

128. NCERT Pg no. 39

129. NCERT Pg no. 38

130. NCERT Pg no. 22 and 23

131. NCERT Pg no. 31

132. NCERT Pg no. 22

133. NCERT Pg no. 32

134. NCERT Pg no. 23

135. NCERT Pg no. 41

136. NCERT Pg no. 23

137. NCERT Pg no. 34

138. NCERT Pg no. 27

139. NCERT Pg no. 33 and 34

140. NCERT Pg no. 23

141. NCERT Pg no. 40

142. NCERT Pg no. 23

143. NCERT Pg no. 34

144. NCERT Pg no. 42

145. NCERT Pg no. 23 and 24

146. NCERT Pg no. 30

147. NCERT Pg no. 25 and 26

148. NCERT Pg no. 32 & 33

149. NCERT Pg no. 27

150. NCERT Pg no. 43

151. XI NCERT pg 114, 3rd para. Supra – oesophageal ganglion present dorsally in head and hence covers head parts that are dorsally present like eyes, antennae.,

152. XI NCERT pg 53, Seate as organ of locomotion are found in Annelids.

153. Stratified or compound epithelium being exposed to environment is subjected to maximum wear and tear.All others are simple epithelium and hence not exposed .

154. Sting ray is marine fish.

155. Female cockroach has a pair of spermathecae to store sperms.

156. XI NCERT pg 54. In *Balanoglossus*, notochord is absent. Nerve cord is ventrally placed.

157. XI NCERT pg 112, figure

158. XI NCERT pg 55, table. Heart in chordates is present ventrally.

159. Uric acid being water insoluble does not require water for its elimination.

160. XI NCERT pg 47, 1st para, When the animal shows digestive cavity with only one opening to function as mouth or anus, the digestive system is incomplete and animal is at blind sac body plan.

161. XI NCERT pg 113, 1st para

162. XI NCERT pg 56. *Petromyzon* being a cyclostome has unpaired fins for locomotion.

163. Both skeletal and smooth muscles (unstriped muscles) are unbranched, only cardiac muscles are branched.

164. Platyhelminthes to Chordates , all animals are triploblastic, only annelids to chordates are coelomates. Platyhelminthes lack coelom and with tube within tube body plan.Only Cnidarians,

Ctenophores and adult echinoderms are radially symmetrical. Larval stages of echinoderms show bilateral symmetry and hence they too are included in bilateria.

165. XI NCERT pg 54. Most characteristic feature of echinoderms is water vascular system to compensate for other reduced organs systems.

166. XI NCERT pg 54, Antedon-Echinoderm, Aplysia-Mollusc

167. XI NCERT pg 48,2nd para.

168. Anal cerci is sensory organs present dorsally on 10th abdominal segments in both male and female cockroaches.

169. XI NCERT pg 53. Arthropods usually show open circulation.

170. (2)

171. XI NCERT pg 49

172. Both birds and mammals are Warm blooded and have 4-chambered heart. Most tetrapods have limbs with 5 digits.

173. XI NCERT pg 112, Mandible is paired and chews food. Cockroach has 10 pairs of spiracles for entry and exit of air, diffusion takes place at tracheoles and not spiracles. Each Ootheca stores 14-16 fertilised eggs.

174. The goblet cells are unicellular glands and secretes mucus.

175. The cilia of the respiratory tract traps the mucus coated dust particles and moves them upwards and outwards by coughing action.

176. XI NCERT pg 56. *Petromyzon* being cyclostome is marine. They are marine organisms but migrate for spawning to fresh water

177. Fibrous cartilage is rich with collagen and hence is toughest.

178. XI NCERT pg 113,2nd para. The blood inside cockroach heart always moves from posterior to anterior chambers and hence blood comes out of anterior aorta and never enter through aorta. Blood enters each chamber of heart only through ostia.

179. Birds- Females are only oviparous

180. Bipolar neurons are found in sense organs like retina of eye, cochlea of ear etc. Olfactory epithelium is sensory epithelium and epidermis is compound epithelium of skin.

181. Grey matter comprises of layer of cyton of neurons . It appears grey due to concentration of Nissl's granules in them. Neurons are surrounded by glial cells like astrocytes. So both grey and white matter involves glial cells. White matter comprises of myelinated fibres, appears white due to myelin sheath.

182. Troponin – Contractile protein in muscle.

183. XI NCERT pg 57. Amphibians show external fertilization.Amphibians show indirect development and hence Metamorphosis is present .Adult ampbibians have lungs and a pair of eyelids.

184. XI NCERT pg 113. Entire foregut ie from mouth to gizzard is lined with chitinous cuticle.

185. The nodes of Ranvier are gaps between myelin sheath of axon and hence are part of only Myelinated nerve fibre

186. XI NCERT pg 111, last line.

187. XI NCERT pg 112, 1st para.

188. Tendons and ligaments are dense regular connective tissue.

189. Only Humans are bipedal.Even birds show 4-chambered heart. All reptiles and birds also show internal fertilization and not just mammals.

190. Cartilage, Bone, Blood etc are the various types of specialized connective tissue

191. Ascaris- Unisexual being a Aschelminthes. Rat- unisexual being a mammal. Toad and Starfish, both are unisexual.

192. Epithelial tissue shows max capacity of self renewal and repair. Epithelial tissue lacks its own blood supply to reduce blood loss during injury. Simple Epithelial tissue is found on inner and compound in outer body surface.

193. XI NCERT pg 50

194. The cyton of neurons has Nissl granules and hence cytoplasm is not clear.

195. XI NCERT pg 58. Columba (pigeon) is a bird.

196. XI NCERT pg 115

197. Freshwater mussel is a mollusk, bivalve, and hence has only exoskeleton.Frog being an amphibian has only endoskeleton but exoskeleton is absent. Jelly fish , both forms of skeleton are absent.Tortoise being a reptile has bony endoskeleton and exoskeleton of scales and hard shell .

198. XI NCERT pg 114, 3rd para. Both maxilla and labium has chemoreceptors as maxillary palps and labial palps to sense food and later helps to pick food. Mandible, organ of mastication and antenna, sense organ. Wings ,for flying and anal cerci, sense organ. Anal style, male external genitilia and labrum, upper lip.

199. XI NCERT pg 55,last para.

200. XI NCERT pg 57,58. (a) means Scoliodon and (b) Labeo. Scoliodon has placoid scales, operculum absent Labeo has ctenoid scales, operculum present and lacks claspers. Tail in Scoliodon is with unequal lobes hence heterocercal whereas tail in Labeo has lobes that are identical, hence homocercal.