

PACE-IIT & MEDICAL

TWT-(NEET 2024 Aspirants) – Answer key & Solutions

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

SOLUTIONS

1. Solution:- Answer (3)

$$x_{cm} = \frac{m_1x_1 + m_2x_2 + m_3x_3}{m_1 + m_2 + m_3}$$

$$y_{cm} = \frac{m_1y_1 + m_2y_2 + m_3y_3}{m_1 + m_2 + m_3}$$

$$x_{cm} = \frac{(1.6)(0) + (2.4)(0) + 2(1.2)}{1.6 + 2.4 + 2} = 0.4m$$

$$y_{cm} = \frac{(1.6)(0) + (2.4)(0) + 2(1.2)}{1.6 + 2.4 + 2} = 0.4m$$

So, $(x_{cm}, y_{cm}) = (0.4, 0.4)m$

2. Solution:- Answer (3)

Centre of mass of the uniform rod will lie at its centre

$$x_{cm} = \frac{m_1x_1 + m_2x_2}{m_1 + m_2}$$

$$x_{cm} = \frac{m(\frac{L}{2}) + 2m(0)}{3m}, y_{cm} = \frac{2m(L) + m(0)}{3m}$$

$$x_{cm} = \frac{L}{6}, y_{cm} = \frac{2L}{3}$$

3. Solution:- Answer (2)

$$x_{cm} = \frac{A_1x_1 + A_2x_2}{A_1 + A_2} \text{ [taking origin at contact point]}$$

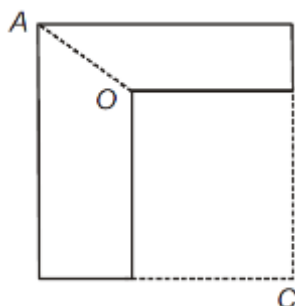
$$= \frac{\frac{\pi a^2}{4}(\frac{-a}{2}) + a^2(\frac{a}{2})}{\frac{\pi a^2}{4} + a^2} \frac{a^2(1 - \frac{\pi}{4})}{2a^2(a + \frac{\pi}{4})}$$

$$= \frac{a(1 - \frac{\pi}{4})}{2(1 + \frac{\pi}{4})} > 0$$

= x_{cm} is inside the square plate

4. Solution:- Answer (2)

Centre of mass will lie on the line of symmetry



OA is the line of symmetry of the remaining part

5. Solution:- Answer (4)

The path of centre of mass will not change due to internal forces

6. Solution:- Answer (4)

If $F_{ext} = 0$
 IV_{ext} is at rest initially so $v_{cm} = 0$
 As $F_{ext} = 0$ $= a_{cm} = 0$

7. Solution:- Answer(2)
 Net external force is zero, and centre of mass of the system is initially at rest. So position of centre of mass will not change. So to have $x_{cm} = \text{constant}$ the balloon will move downwards

8. Solution:-Answer (1)

$$a_{cm} = \frac{m(-g) + m(-g)}{m + m}$$

$$a_{cm} = -g$$

9. Solution:- Answer (4)
 Velocity of man w.r.t plank $v_{MP} = v$, Velocity of plank w.r.t. earth $v_{PE} = v'$
 Velocity of man w.r.t. earth $v_{ME} = v_{MP} + v_{PE} = v + v'$
 Applying conservation of linear momentum w.r.t. earth frame

$$0 = m(v + v') + Mv' = v' \frac{-mv}{M + m}$$

10. Solution:- Answer (2)

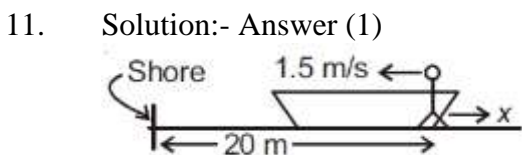
$$= \alpha + \beta x$$

$$dm = (\alpha + \beta x) dx$$

$$x_{cm} = \frac{\int_0^L x(\alpha + \beta x) dx}{\int_0^L (\alpha + \beta x) dx}$$

$$= \frac{\int_0^L x(\alpha + \beta x) dx}{\int_0^L (\alpha + \beta x) dx}$$

$$x_{cm} = \frac{\frac{\alpha L^2}{2} + \frac{\beta L^3}{3}}{\alpha L + \frac{\beta L^2}{3}}$$



Distance travelled by the man on boat in 4 second = $(1.5) \times 4$
 $= 6.0 \text{ m}$
 $140x = 60(6 - x)$
 $140x = 360 - 60x$
 $x = 1.8 \text{ m}$
 So final distance of the man from the shore will be $20 - (6 - 1.8) = 15.8 \text{ m}$

12. Solution:- Answer (4)
 Path of the centre of mass will not change due to internal forces

$$R_{cm} = \frac{v^2 \sin 2\theta}{g}$$

13. Solution:- Answer (4)

$$v_{cm} = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2}$$

$$= \frac{5(7) + 2(0)}{7} = 5m/s$$

14. Solution:- Answer (1)

Net external force on the man and boat is zero and centre of mass is initially at rest. So centre of mass will not move.

15. Solution:- Answer (1)



16. (1)

17. (2)

18. (1)

19. (2)

20. Solution:- Answer (4)

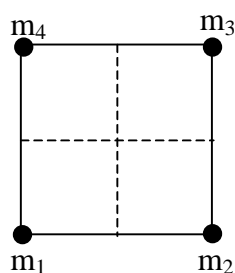
$$X_{cm} = \frac{x_1 A_1 - x_2 A_2 - x_3 A_3}{A_1 - A_2 - A_3} = \frac{0(\pi 16R^2) - 3R(\pi R^2) - 0}{16\pi R^2 - \pi R^2 - \pi R^2} = -\frac{3R}{14}$$

Similarly

$$y_{cm} = -\frac{3R}{14}$$

$$\vec{S}_{cm} = X_{cm} \hat{i} + y_{cm} \hat{j} = -\frac{3R}{14} (\hat{i} + \hat{j})$$

21. Solution:- Answer (4)



22. Solution:- Answer (3)

23. Solution:- Answer (4)

24. Solution:- Answer (3)

Equation for coefficient of restitution we can write along the line of impact i.e. along y-axis(along the impulse direction)

$$e = -\frac{v_2 - v_1}{u_2 - u_1} = -\frac{0 - (-2)}{0 - 4} = \frac{1}{2}$$

25. Solution:- Answer (2)

26. Solution:- Answer (4)

Direction of \bar{v} will be same as that of $(\bar{v}_1 + \bar{v}_2)$.

27. Solution:- Answer (1)

$$2M\left(\frac{3L}{4} - x\right) = M\left(\frac{L}{4} + x\right) + 4Mx$$

28. Solution:- Answer (2)

x_1 = displacement of m_1 along $-x$ direction.

x_2 = displacement of m_2 along $-x$ direction.

x = displacement of m along $+x$ direction.

from momentum conservation of centre of mass,

$$m_1(x_1 - x) + m_2(x_2 - x) = mx$$

$$x = \left(\frac{m_1x_1 + m_2x_2}{m_1 + m_2 + m}\right)$$

from given data we can show that

$$x_1 = y_0 \cot \alpha \quad \text{and} \quad x_2 = y_0.$$

$$\text{Now, } x = \frac{(m_1 \cot \alpha + m_2)y_0}{(m_1 + m_2 + m)}.$$

29. Solution:- Answer (1)

D – Displacement of cabin

d – Displacement of bob

$$D = \frac{m}{(M + m)} 1m = \frac{0.5}{9.5 + 0.5} \times 1 = 0.05m = 5cm$$

30. Solution:- Answer (2)

$\bar{V}_{cm} = 0$, \therefore If $\bar{F}_{ext} = 0$ then displacement of center of mass will be zero,

$$m_1 \Delta \bar{x}_1 + m_2 \Delta \bar{x}_2 = 0$$

$\Delta \bar{x}_1 - \Delta \bar{x}_2 = \Delta \bar{x}$ where $\Delta \bar{x}$ is the displacement of the bead w.r.t. the rod.

31. Solution:- Answer (2)

When string makes maximum angle with vertical. Both masses M and m move with same velocity horizontally

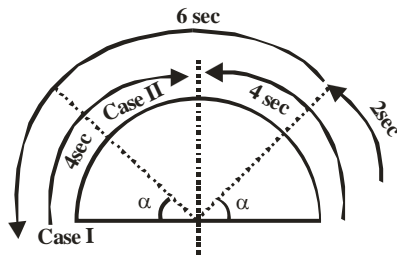
$$\frac{1}{2} \mu v_0^2 = Mg\ell(1 - \cos \theta)$$

$$\mu = \frac{mM}{M + m}$$

$$(1 - \cos \theta) = \frac{Mv_0^2}{M + m} \cdot \frac{1}{2g\ell} = 0.4$$

$$\cos \theta = 0.6$$

32. Solution:- Answer (2)
40. $d = \left(\frac{M}{M+10M} \right) \times 2.2 .$
33. (4)
34. (3)
35. Solution:- Answer (4)
The magnitude of rolling friction is directly proportional to external force acting on a rigid body.
36. (2)
37. Solution:- Answer (2)
 $\frac{dv}{dt} = \frac{dv}{ds} \cdot \frac{ds}{dt}$
 $= 2 \times 10$
 $= 20 m / s^2$
38. Solution:- Answer (2)
Let position vector of the point where the two particles meet is \vec{r}_3 .
For first particle $\vec{r}_3 = \vec{r}_1 + \vec{v}_1 t$, and for the second particle $\vec{r}_3 = \vec{r}_2 + \vec{v}_2 t$.
39. Solution:- Answer (3)
40. Solution:- Answer (3)
41. Solution:- Answer (1)
42. Solution:- Answer (4)
43. Solution:- Answer (2)
 $|V\vec{b}, w| = |2\hat{i} + 2\hat{j}| = 2\sqrt{2}$
 $|V\vec{b}, g| = |V\vec{b}w + Vw, g|$
 $= \sqrt{20} = 2\sqrt{5}$
44. Solution:- Answer (1)
Use $\rightarrow v_2 - v_1 = e(u_1 - u_2)$.
45. Solution:- Answer (1)
Use $v_2 - v_1 = e(u_1 - u_2)$
46. (1)
47. Solution:- Answer (3)
48. Solution:- Answer (2)
Sol. See figure



49. Solution:- Answer (3)
 Since collision is elastic, on the horizontal segment velocity will be interchanged. Therefore after point D ball will become projectile.

$$\therefore \text{Maximum height attained} = h + \frac{v^2 \sin^2 60^\circ}{2g}, \quad v = \sqrt{2g(3h)} = \sqrt{6gh}$$

$$= h + \frac{6gh}{2g} = \frac{13h}{2}$$

$$\therefore \text{required d ratio} = \frac{h}{13/2h} = \frac{2}{13} \text{ or } \frac{13}{2}$$

50. Solution:- Answer (3)

$$V_{cm} = \frac{10}{3} \hat{i} \text{ (m/s)}$$

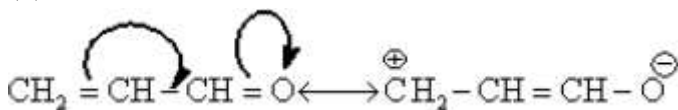
Relative to COM speed of 2kg block = $\frac{8}{3} \text{ m/s}$ before and after collision.

$$\sin \theta_{\max} = \frac{8/3}{10/3} = \frac{4}{5}$$

$$\theta_{\max} = 53^\circ.$$

61. (2)
 Conceptual

64. (4)



65. (1)
 Conceptual

66. (3)
 (i) The molecule in which all the atoms have completed octet is more stable than atom which have in complete octet.
 (ii) More number of resonating structures, more will be the stability.
 (a) and (b) have complete octet but (c) and (d) all atoms dont have complete octet. Hence (c) and (d) are unstable. Number of resonance structures for d) is more than (c).

68. (1)
 Conceptual

69. (2)
more + I effect, more the basicity of amines
70. (4)
More number of EWG groups at alpha position
72. (2)
Order of E.N. of C – along is $sp - sp^2 > sp^3$ therefore order of stability of carbanions is $CH \equiv C^- > CH_2 = \bar{C}H > CH_3 - \bar{C}H_2$
74. (2)
As the distance of halogen atom from $-COOH$ group increases, acidic character decreases. Then order is
 $\alpha, \alpha - dichloro > \alpha, \beta - dichloro > \beta, \beta - dichloro > \beta, \gamma - dichloro > \gamma, \gamma - dichloro$
75. (2)
76. (2)
Conceptual
80. (3)
Conceptual
101. NCERT Pg. 84
102. NCERT Pg. 67, 84
103. NCERT Pg. 85
104. NCERT Pg. 85
105. NCERT Pg. 85
106. NCERT Pg. 86
107. NCERT Pg. 86
108. NCERT Pg. 86
109. NCERT Pg. 86
110. NCERT Pg. 87
111. NCERT Pg. 86, 87
112. NCERT Pg. 87

113. NCERT Pg. 88
114. NCERT Pg. 88
115. NCERT Pg. 90
116. NCERT Pg. 88
- 117.
118. NCERT Pg. 88
119. NCERT Pg. 85
120. NCERT Pg. 85
121. NCERT Pg. 86
122. NCERT Pg. 87
123. NCERT Pg. 87
124. NCERT Pg. 88
- 125.
126. NCERT Pg. 89
127. NCERT Pg. 90
128. NCERT Pg. 85
129. NCERT Pg. 87
130. NCERT Pg. 88
131. NCERT Pg. 90
132. NCERT Pg. 85
133. NCERT Pg. 89
134. NCERT Pg. 89
135. NCERT Pg. 86
136. NCERT Pg. 89
137. NCERT Pg. 89
138. NCERT Pg. 88

139. NCERT Pg. 85
- 140.
141. NCERT Pg. 86, 89
142. NCERT Pg. 86
143. NCERT Pg. 89
144. NCERT Pg. 89
145. NCERT Pg. 88
146. NCERT Pg. 88
147. NCERT Pg. 87
148. NCERT Pg. 85
149. NCERT Pg. 85
150. NCERT Pg. 86
151. NCERT Pg. 57 to 59
Scoliodon (a cartilaginous) fish show internal fertilization
Corvus (Anes), Vipera (Reptile) shows internal fertilization Labeo & clarius (bony) fish shows external fertilization but direct development.
Hyla (an amphibian) shows external and indirect development.
152. NCERT Pg. 58,59,113
Columba (Anes) and periplaneta (arthropods) have two additional chamber that is crop and gizzard.
153. NCERT Pg. 57
Hippocampus (osteichthyes) have anterior terminal mouth whereas pristis (chondrichthyes) have anterior ventral mouth.
154. NCERT Pg. 58
155. NCERT Pg. 57
156. NCERT Pg. 58
157. NCERT Pg. 55
158. NCERT Pg. 56,57,59 & 60
159. NCERT Pg. 56

160. NCERT Pg. 55 to 57,60
Platypus is an oviparous whereas sting ray is ovoviviparous
The body of hagfish is devoid of scales and paired fins.
161. NCERT Pg no. 50
162. NCERT Pg. 59 and 60
Homeothermy characteristic is also shown by Aves.
163. NCERT Pg. 55 and 57
164. NCERT Pg. 55
165. NCERT Pg. 57
Pavo (anes) are homeothermy naja (Reptile) shows pulmonary respiration clarias (pisces) shows branchial respiration ie; thorough gills.
166. NCERT Pg. 56
167. NCERT Pg. 56, 60
168. NCERT Pg. 57
169. NCERT Pg. 57 and 58
170. NCERT Pg. 58 and 59
Struthio (ostrich) is a flightless bird.
171. NCERT Pg no. 47
Porifera have asymmetric body symmetry.
172. NCERT Pg no. 51, 53
Locusta (an arthropoda belong to class insect) shows malpighian tubules as an excretory organ.
173. NCERT Pg no. 51
Ctenophora shows eight external rows of ciliated comb plates and showing tissue level of organization with radial body symmetry.
174. NCERT Pg no. 50,51,52,54
175. NCERT Pg no. 51 to 53
Anopheles (Arthropod)
Wuchereria (Aschelminthes)
Nereis (Annelids)
Are dioecious animals.

176. NCERT Pg no. 49, 54
177. NCERT Pg no. 50 and 54
178. NCERT Pg no. 50, 51 and 54
Flatworms have copulatory organs thus showing internal fertilization whereas metamerism is a characteristic of arthropods, annelids and chordates.
179. NCERT Pg no. 51
180. NCERT Pg no. 53
181. NCERT Pg no. 53
Crustaceans (an aquatic arthropods) have gills for respiration.
Scorpion and spiders (arachnids arthropods)
Have book lungs for respiration
Cockroaches (insecta) have tracheal tubes for respiration.
182. NCERT Pg no. 53 and 54
Chaetopleura being molluscan belongs to 2nd largest phylum of animal kingdom.
183. NCERT Pg no. 52
184. NCERT Pg no. 53
185. NCERT Pg no. 54
186. NCERT Pg no. 52,60
187. NCERT Pg no. 51, 54
188. NCERT Pg. 59 and 60
Ornithorhynchus (a ducked bill platypus) is a protherian mammals which are oviparous having intra-abdominal testis, absent pinna and beak with teeth, nipples absent.
189. NCERT Pg no. 49
190. NCERT Pg no. 52
191. Ncert pg 50, figure 4.7
192. Ncert pg 51, 2nd paragraph, 9th line
193. Ncert pg 54, figure 4.14 (a)
In asterias (Echinoderm)
Upper side (dorsal) is anus and lower side (ventral) is mouth.

194. XI NCERT Pg 54. In Balanoglossus, notochord is absent. Nerve cord is ventrally placed.
195. Ncert pg 51,53
196. Bilateral symmetry started from Platyhelminthes and hence shall include all other clades. Amniotes are only reptiles, aves and mammals.
197. Frog (amphibian) evolved from Fishes, and presence of gills in tadpole is an indication of that.
198. Ncert pg 56 , 57 figure 4.18 ,4.19, 4.20
199. NCERT Pg. 55, 2nd line and figure 4.16
Crocodile, penguin, whale and dogfish all belongs to phylum chordate that shows pharyngeal gill slits at some of their life stages and have dorsal hollow nerve cord dog fish have cartilaginous endoskeleton whale are viviparous.
200. Haversian system is the typical mammalian bone characteristic.