

SOLUTIONS

PROGRESS TEST-VI

MGZK-1901,1902

NEET PATTERN

Test Date: 03-12-2017



PHYSICS

1. (4)

Because the lift is falling freely, the effective weight and hence the normal reaction on the block is zero. Therefore, the force of friction is also zero

2. (1)

Force of friction, $F = \mu R = \mu mg$

Retardation due to friction, $|a| = \frac{F}{m} = \frac{\mu mg}{m} = \mu g$

Now, $u = 10 \text{ ms}^{-1}$, $s = 50 \text{ m}$, $v = 0$

$$a = -\mu g, \quad g = 10 \text{ ms}^{-2}$$

Now, $v^2 = u^2 + 2as$

$$(0)^2 = (10)^2 + 2(-10\mu)(50)$$

$$\therefore \mu = 0.1$$

3. (2)

$R + P \sin 60^\circ = Mg$

$$\therefore R = Mg - P \sin 60^\circ$$

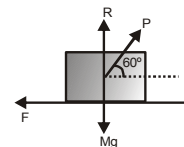
Frictional force,

$$F = \mu R = \mu[Mg - P \sin 60^\circ]$$

The body just moves when $P \cos 60^\circ = F$

$$= \mu[Mg - P \sin 60^\circ]$$

Here, $\mu = 0.5$, $M = 1 \text{ kg}$



$$g = 10 \text{ ms}^{-2}$$

$$\therefore \frac{P}{2} = \frac{1}{2} \left[1 \times 10 - \frac{P\sqrt{3}}{2} \right] \text{ or } P = 10 - \frac{P\sqrt{3}}{2}$$

$$\text{or, } P + P \frac{\sqrt{3}}{2} = 10 \text{ or } P = 5.36 \text{ N}$$

4. (2)

Suppose due to a force R on B , both blocks A and B move together, in this case

$$F = (m_A + m_B) a = (2 + 5) a \text{ or } a = F/7$$

Now, force on $A = ma = (2F/7)$

For no relative motion between A and B , $2F/7$ must not exceed the limiting force of friction between A and B . The limiting force of friction between A and B is given by

$$\mu m_A g = 0.6 \times 2 \times g$$

$$\therefore \frac{2F}{7} = 0.6 \times 2 \times 6 \text{ or } F = 4.2 \text{ gN} = 4 = 4.2 \text{ kgf}$$

5. (1)

During downward motion :

$$F = mg \sin \theta - \mu mg \cos \theta$$

During upward motion :

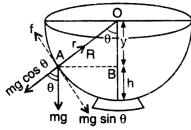
$$2F = mg \sin \theta + \mu mg \cos \theta$$

Solving above two equation, we get

$$\mu = \frac{1}{3} \tan \theta$$

6. (2)

7. (2)



Insect will crawl up the bowl till the component of its weight along the bowl is balanced by the limiting frictional force. So, resolving weight perpendicular and along the bowl, we get

$$R = mg \cos \theta \quad \dots\dots(i)$$

$$f_l = mg \sin \theta \quad \dots\dots(ii)$$

Dividing equation (ii) by equation (i)

$$\tan \theta = (f_l / R) \text{ or } \tan \theta = \mu \quad [\because f_l = \mu R]$$

$$\frac{\sqrt{r^2 - y^2}}{y} = \mu \text{ or } y = \frac{r}{\sqrt{1 + \mu^2}}$$

$$\text{So, } h = r - y = r \left[1 - \frac{1}{\sqrt{1 + \mu^2}} \right]$$

8. (1)

Let l be the desired length. The chain starts moving when net pulling force = maximum force of friction

$$\text{or } g \frac{m}{L} l = \mu \frac{m}{L} (L - l)g$$

$$l = \left(\frac{\mu}{\mu + 1} \right) L$$

9. (2)

Till sliding starts, i.e., $\theta < \tan^{-1} \mu$, contact force (F_c) and force of gravity (mg) are equal and opposite.

Once the body starts sliding,

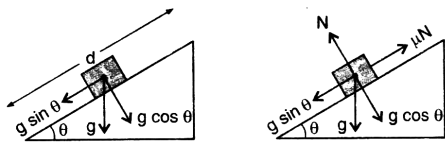
i.e., $\theta > \tan^{-1} \mu$, net contact force becomes

$$F_c = \sqrt{(mg \cos \theta)^2 + (\mu mg \cos \theta)^2}$$

$$= mg \cos \theta \sqrt{1 + \mu^2}$$

Hence, the contact force starts decreasing and finally it becomes zero at $\theta = 90^\circ$

10. (1)



When the body moves on frictionless surface, then

$$d = \frac{1}{2} g \sin \theta t^2$$

When the body moves on rough inclined surface. $d = \frac{1}{2} g (\sin \theta - \mu \cos \theta) (2t)^2$

$$\therefore \frac{1}{2} g \sin \theta t^2 = \frac{1}{2} g (\sin \theta - \mu \cos \theta) (2t)^2$$

$$\text{or } \sin \theta = 4(\sin \theta - \mu \cos \theta) \text{ or } \frac{\sin \theta}{4} = \sin \theta - \mu \cos \theta$$

$$\text{or } \mu \cos \theta = \frac{3}{4} \sin \theta \quad \text{or } \mu = \frac{3}{4} \tan \theta$$

11. (1)

$$\frac{v^2}{Rg} = \left(\frac{\mu_s + \tan \theta}{1 - \mu_s \tan \theta} \right) \Rightarrow v = \sqrt{Rg \left[\frac{\mu_s + \tan \theta}{1 - \mu_s \tan \theta} \right]}$$

12. (4) 13. (1)

14. (3)

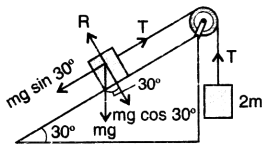
$$T_1 = \frac{(m_2 + m_3 + m_4)F}{m_1 + m_2 + m_3 + m_4}$$

$$\therefore T_1 = \frac{3}{4}F$$

$$\text{Similarly, } T_2 = \frac{(m_3 + m_4)F}{m_1 + m_2 + m_3 + m_4} \quad \text{or } T_2 = \frac{1}{2}F$$

$$T_3 = \frac{(m_4)F}{m_1 + m_2 + m_3 + m_4} \quad \text{or } T_3 = \frac{1}{4}F$$

15. (3)



$$2mg - T = 2ma \quad \dots\dots(i)$$

$$T - mg \sin 30^\circ = ma \quad \dots\dots(ii)$$

On adding equation (i) and (ii), we get

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

$$\text{or } a = \frac{g}{2}$$

16. (2)

From the graph, it is a straight line so, uniform motion. Because of impulse direction of velocity as can be seen from the slope of the graph

$$\text{Initial velocity} = \frac{2}{2} = 1 \text{ m/s}$$

$$\text{Final velocity} = -\frac{2}{2} = -1 \text{ m/s}$$

$$\vec{P}_i = 0.4\text{N} - \text{s}$$

$$\vec{P}_f = -0.4\text{N} - \text{s}$$

$$\vec{j} = \vec{P}_f - \vec{P}_i$$

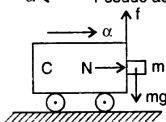
$$= -0.4 - 0.4 = -0.8\text{N} - \text{s} \quad (\vec{j} = \text{impulse})$$

$$|\vec{f}| = 0.8\text{N} - \text{s}$$

17. (3)

Pseudo force of fictitious force, $F_{\text{fic}} = m\alpha$

$\alpha \leftarrow$ Pseudo acceleration



Force of friction, $f = \mu N = \mu m\alpha$

The block of mass m will not fall as long as

$$f \geq mg$$

$$\mu m \alpha \geq mg$$

$$\alpha \geq \frac{g}{\mu}$$

18. (1)
19. (4)

Given that $U = \frac{A}{r^2} - \frac{B}{r}$

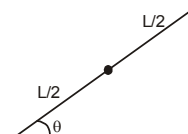
For stable equilibrium, $F = -\frac{dU}{dr} = 0$

or $-\frac{2A}{r^3} + \frac{B}{r} = 0$ or $\frac{2A}{r^3} = \frac{B}{r}$ or $r = \frac{2A}{B}$

20. (3)
21. (3)

As block starts from rest and comes to rest Hence, $\Delta KE = 0$

So, $mg \sin \theta L = \mu mg \cos \theta \frac{L}{2}$



22. $\Rightarrow \mu = \frac{2 \sin \theta}{\cos \theta} = 2 \tan \theta$
(3)

Centripetal acceleration, $a_c = \frac{v^2}{r} = k^2 r t^2$

$\Rightarrow v^2 = k^2 r^2 t^2$

According to work energy theorem, change in kinetic energy equal to work done.

$\therefore W = \frac{1}{2} m k^2 r^2 t^2$

Thus, power delivered to the particle

$$P = \frac{dW}{dt} = m k^2 r^2 t$$

23. (2)

$V = \sqrt{\mu r g} = \sqrt{0.6 \times 150 \times 10} = 30 \text{ m/s}$

24. (3)

Working from gramophone frame, a coin placed at distance r remains at rest till

$F_s(\text{maxi}) \geq F_{\text{centrifugal force}}$

$F_{\text{frictional}} \geq F_{\text{centripetal}}$

$\mu m g \geq m \omega^2 r$

$\frac{\mu g}{r} \geq \omega^2$

25. (2) 26. (1) 27. (3) 28. (2) 29. (2) 30. (4) 31. (3) 32. (2)
33. (2) 34. (2) 35. (1) 36. (4) 37. (1) 38. (2) 39. (4)

40. (2)

Suppose F = upthrust due to buoyancy

Then while descending, we find :

$Mg - F = M\alpha$ (i)

$$F - (M - m)g = (M - m)\alpha \quad \dots\dots(ii)$$

from (i) & (ii)

$$m = \left[\frac{2\alpha}{\alpha + g} \right] M$$

41. (1)

Let T be the tension in the string C. Hence,

$$T \cos 45^\circ = Mg$$

$$T \sin 45^\circ = \text{tension in B}$$

Hence, tension in B = Mg = 100 gN.

42. (1)

43. (3)

44. (2)

No doubt friction opposes the motion of a moving body but in many cases it is also the cause of motion. For example.

(a) In moving, a person or vehicle pushes the ground backwards (action) and the rough surface of ground reacts and exerts a forward force due to friction which causes the motion. If there has been no friction there had been no friction there will be slipping and no motion.

(b) If a body is placed in a vehicle which is accelerating the force of friction is the cause of motion of the body along with the vehicle (i.e., the body will remain at rest in the accelerating vehicle unit $mg < \mu_s mg$). If there had been no friction between the body and the vehicle, the body will not move along with the vehicle.

45. (4)

CHEMISTRY

46. (1) 47. (1) 48. (3) 49. (1)

50. (3) 51. (1) 52. (2) 53. (1)

54. (1) 55. (2) 56. (4) 57. (2)

58. (4) 59. (4) 60. (3)

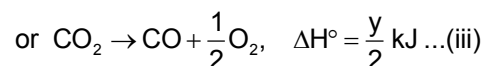
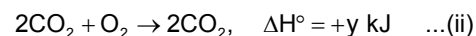
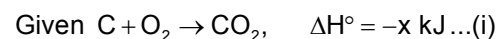
61. (2)

For an isothermal process $\Delta E = 0$

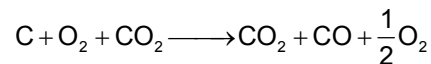
62. (3)

$$W = -P\Delta V = -10^5(1 \times 10^{-2} - 1 \times 10^{-3}) = -900 \text{ J}$$

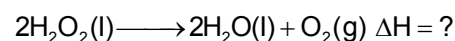
63. (2)



By adding no. (i) and (ii) eq.



64. (1)

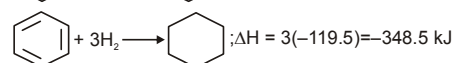
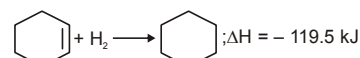


$$\Delta H = [2 \times \Delta H_f \text{ of } H_2O(l) + (\Delta H_f \text{ of } O_2) - (2 \times \Delta H_f \text{ of } H_2O_2(l))]$$

$$= [(2 \times -286) + (0) - (2 \times -188)]$$

$$= [-572 + 376] = -196 \text{ kJ mole}$$

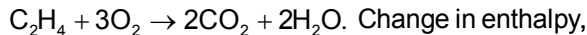
65. (1)



The resonance energy provides extra stability to the benzene molecule so it has to be overcome for hydration to take place.

$$\text{So } \Delta H = -358.5 - (-150.4) = -208.1 \text{ kJ}$$

66. (2)

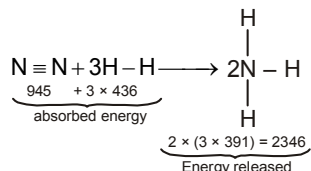


$$\Delta H = \Delta H_{\text{products}} - \Delta H_{\text{reactants}}$$

$$= 2 \times (-394) + 2 \times (-286) - (52 + 0)$$

$$= -1412 \text{ kJ/mol.}$$

67. (1)



$$\Delta H = 2253 - 2346 = -93 \text{ kJ}$$

68. (4)

For isothermal reversible expansion

$$w = q = nRT \times 2.303 \log \frac{V_2}{V_1}$$

$$= 2RT \times 2.303 \log \frac{20}{2}$$

$$= 2 \times 2 \times T \times 2.303 \times 1 = 9.2 T$$

$$\text{Entropy change, } \Delta S = \frac{q}{T} = \frac{9.2T}{T} = 9.2 \text{ cal.}$$

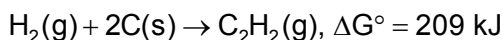
69. (2)

For combustion reaction, ΔH is negative,

$$\Delta n = (16 + 18) - (25 - 2) = +7, \text{ so } \Delta S \text{ is +ve, reaction is spontaneous, hence } \Delta G \text{ is -ve.}$$

70. (4)

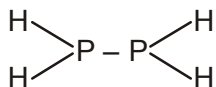
By $2 \times (\text{ii}) - (\text{i}) + (\text{iii})$



71. (2)

Bond dissociation energy of $\text{PH}_3(\text{g}) = 228 \text{ kcal mol}^{-1}$

$$\text{P-H bond energy} = \frac{228}{3} = 76 \text{ kcal mol}^{-1}$$

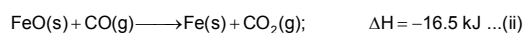
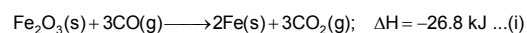


Bond energy of $4(\text{P-H}) + (\text{P-P}) = 355 \text{ kcal mol}^{-1}$

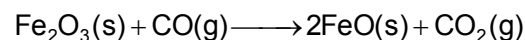
$$\text{or } 4 \times 76 + (\text{P-P}) = 355 \text{ kcal mol}^{-1}$$

$$\text{P-P bond energy} = 51 \text{ kcal mol}^{-1}$$

72. (1)



eq. (i) $-2 \times$ (eq. (ii)), we get



$$\Delta H = -26.8 + 330. = +6.2 \text{ kJ}$$

73. (4)

Let x be the bond dissociation energy of X_2 . Then

$$\Delta H = -400 = \Sigma_{x-x} + \Sigma_{y-y} - 2\Sigma_{x-y}$$

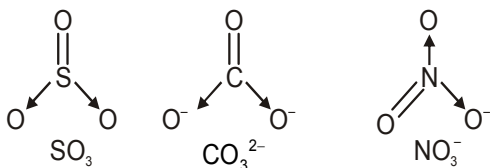
$$= x + 0.5x - 2x = -0.5x$$

$$\text{or } x = \frac{400}{0.5} = 800 \text{ kJ mol}^{-1}$$

74. (2) 75. (2) 76. (3) 77. (3) 78. (3) 79. (1) 80. (4) 81. (4)

82. (1) 83. (3) 84. (1) 85. (2) 86. (3) 87. (3)

88. (2)



89. (2)

90. (1)

BOTANY

91. (3)	92. (1)	93. (4)	94. (4)	95. (4)	96. (1)	97. (2)	98. (2)
99. (4)	100. (2)	101. (2)	102. (1)	103. (2)	104. (2)	105. (3)	106. (4)
107. (3)	108. (1)	109. (3)	110. (4)	111. (2)	112. (3)	113. (2)	114. (3)
115. (1)	116. (2)	117. (2)	118. (4)	119. (1)	120. (2)	121. (4)	122. (2)
123. (2)	124. (2)	125. (1)	126. (3)	127. (2)	128. (4)	129. (3)	130. (4)
131. (1)	132. (3)	133. (3)	134. (1)	135. (2)			

ZOOLOGY

136. (2)	137. (3)	138. (3)	139. (1)	140. (1)	141. (1)	142. (1)	143. (4)
144. (1)	145. (1)	146. (4)	147. (4)	148. (3)	149. (4)	150. (1)	151. (1)
152. (2)	153. (4)	154. (1)	155. (3)	156. (1)	157. (3)	158. (2)	159. (2)
160. (2)	161. (1)	162. (1)	163. (2)	164. (4)	165. (2)	166. (1)	167. (4)
168. (1)	169. (3)	170. (1)	171. (1)	172. (4)	173. (2)	174. (1)	175. (2)
176. (3)	177. (1)	178. (3)	179. (2)	180. (4)			