PACE-IIT & MEDICAL

ANDHERI / BORIVALI / DADAR / CHEMBUR / THANE / NERUL / KHARGHAR / POWAI

FOR 2018 ASPIRANTS　　　Medical Droppers - Part Test - 4　　　**DATE: 25-02-2018**

SOLUTIONS

PHYSICS

1.　　**[1]**

For $B \rightarrow A : \Delta Q = \Delta V + \Delta W$

$\Rightarrow O = (U_A - U_B) + (-30J)$

$\Rightarrow U_B - U_A = -30J$

2.　　[1]

It is a isobaric process. In isobaric process, $\Delta Q = nC_p \Delta T$ and $\Delta W = nR\Delta T$

Hence $\dfrac{\Delta Q}{\Delta W} = \dfrac{C_p}{R} = \dfrac{5}{2}$

3.　　[3]

$P_0 V_0^{5/3} = \left(\dfrac{243}{82}\right) P_0 V_R^{5/3} \Rightarrow V_R = \dfrac{8V_0}{27}$

$\therefore V_L = 2V_0 - \dfrac{8V_0}{27} = \dfrac{46V_0}{27}$

From ideal gas equation $\Rightarrow T_L = 13T_0$

4.　　[1]

Equation of Straight line AB is

$P = mV + c$　　…[1]

Where $m \rightarrow$ slope

　　　　$c \rightarrow$ Intercept

　　　　$2P_0 = mV_0 + c$　and　$P_0 = m(2V_0) + c$

　　　　there $m = \dfrac{-P_0}{V_0}$ and $C = 3P_0$

$\because PV = \dfrac{nRT}{q} \Rightarrow P = \dfrac{nRT}{V}$

Putting P in equation [1]

$T = \dfrac{1}{nR}(mV^2 + cV)$　　…[2]

T will be maximum is $\dfrac{dT}{dV} = 0$ & $\dfrac{d^2T}{dV^2} < 0$

Putting $\dfrac{dT}{dV} = 0$

　　　$\Rightarrow V = -\dfrac{C}{2m}$

　　　$T_{max} = -\dfrac{C^2}{4nRm} = -\dfrac{1}{4nR} \times \dfrac{(3P_0)^2}{-P_0/V_0} = \dfrac{9P_0V_0}{4nR}$

5.　　[4]

Heat given to gas $A = \theta_A = n_{C_P} \Delta T_A$

Heat given to gas $B = \theta_B = n_{C_V} \Delta T_B$

$\because \theta_A = \theta_B$

$n_{C_p} \Delta T_A = n_{C_V \Delta T_B}$

$\Rightarrow \Delta T_B = \dfrac{C_P}{C_V} \Delta T_A = \dfrac{7}{5} \times 30K = 42K$

6.   [3]

$pV^{1/n} = \text{const}$

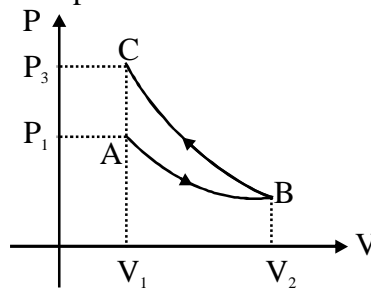Differentating we get, $-\dfrac{\Delta p}{\Delta v / v} = \dfrac{1}{n}.p$

$\Rightarrow B = p/n$

7.   [4]

At high temperatures, di-atomic molecules starts vibrating

8.   [3]

Slope of adiabatic process at a given state (P,V,T) is more than the slope of isothermal process. The corresponding P-V graph for the two processes is as shown in fig.

In the graph, AB is isothermal and BC is adiabatic.

W_{AB} = positive (as volume is increasing)

and W_{BC} = negative (as volume is decreasing) plus,

$|W_{BC}| > |W_{AB}|$, as area under P-V graph gives the work done.

Hence, $W_{AB} + W_{BC} = W < 0$

From the graph itself. it is clear that $P_3 > P_1$

9   [2]
10   [3]
11   [4]
12   [4]
13   [3]
14   [1]
15   [1]
16   [2]
17   [4]
18   [4]
19   [3]
20   [3]
21   [4]
22   [3]
23   [3]
24   [4]
25   [1]

26   [3]
27   [1]
28   [1]
29   [1]
30   [4]
31   [2]
32   [3]
33   [3]
34   [1]
35   [3]
36   [1]
37   [4]
38   [4]
39   [3]
40   [1]
41.   [1]
42.   [4]
43.   [1]
44.   [1]
45.   [2]

ZOOLOGY

136. **[4]**

Sol. Myosin is structural as well as enzymatic protein

137. **[3]**

Sol. Myosin and actin filaments are arranged in a specific manner to form light and dark bands.

138. **[2]**

139. **[3]**

Total number of bones in human skeleton is 206, out of which axial skeleton has 80 bones and appendicular skeleton has 126 bones.

140. **[2]**

Sol. Pivot join is present between atlas & axis vertebra of vertebral column

141. **[4]**

142. **[4]**

Sol. Red muscle fibres are highly vascular and have abundant mitochondria

143. **[1]**

144. **[2]**

145. **[4]**

146. **[2]**

147. **[4]**

148. **[3]**

149. **[2]**

150. **[4]**

151. **[3]**

152. **[1]**

153. **[2]**

154. **[2]**

155. **[3]**

156. [2]
157. [4]
158. [3]
159. [3]
160. [2]
161. [2]
162. [2]
163. [3]
164. [2]
165. [4]
166. [3]
167. [1]
168. [4]
169. [1]
170. [4]
171. [3]
172. [3]
173. [4]
174. [1]
175. [3]
176. [1]
177. [2]
178. [3]
179. [2]
180. [3]