PACE-IIT & MEDICAL

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FOR 2018 ASPIRANTS **Medical Droppers - Part Test - 03** **DATE: 18-02-2018**

SOLUTIONS

PHYSICS

1. Answer (1)

$$g' = g_p - R\omega^2 \cos^2 \lambda$$

2. Answer (2)

$$\rho = \frac{3M}{4\pi R^3} \Rightarrow \frac{\rho_s}{\rho_e} = 3.3 \times 10^{-4}$$

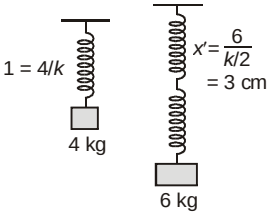
3. Answer (3)
4. Answer (4)

$$\Delta L \propto \frac{1}{D^2}$$

5. Answer (3)

$$F = mg' = mg\left(1 - \frac{d}{R}\right) = \frac{GMmr}{R^3}$$

6. Answer (2)
7. Answer (3)



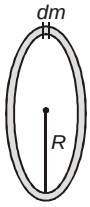
8. Answer (2)

$$v = -\int_{\infty}^{x} E dx = -\int_{\infty}^{x} \frac{c}{x^2} dx = \frac{c}{x}$$

9. Answer (1)
Pressure is independent of area of cross-section.
10. Answer (4)

$$v = \frac{2}{9}\frac{R^2(\rho - \rho_0)g}{\eta}$$

11. Answer (2)
No force due to outer shell.
12. Answer (3)



Field being vector is zero.

$$dV = -\frac{Gdm}{R} \Rightarrow v = \frac{-GM}{R}$$

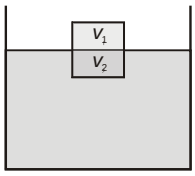
13. Answer (1)

$$\frac{A}{T}=\frac{L}{2m}$$

14. Answer (1)

$$\Delta L=\frac{FL}{AY}\Rightarrow \Delta L\propto \frac{F}{A}\Rightarrow \frac{\text{Load}}{\Delta L}\propto r^2$$

15. Answer (3)



$$\frac{v_1}{v_1+v_2}=\frac{\rho_w-\rho_{ice}}{\rho_w}=10\%$$

16. Answer (1)

$$B=\frac{\Delta P}{\Delta V/V}=\frac{10^7}{\frac{0.4\times10^{-6}}{1000\times10^{-6}}}=2.5\times10^{10}\ \text{N/m}^2$$

17. Answer (2)

V is 8 times $\Rightarrow r'=2r$

$$\therefore\ v_T\propto r^2=4v_0$$

18. Answer (2)

L = 400 cm, r = 0.25 cm,

F = 5 kg wt = 5000 g wt = 5000 × 980 dyne

$$Y=\frac{FL}{\pi r^2\Delta L}\Rightarrow \Delta L=0.0041\,\text{cm}$$

19. Answer (2)

$$B=-\frac{\Delta pv}{\Delta v}$$

$$\Rightarrow \Delta p=-\frac{B\Delta v}{v}=2100\ \text{kPa}\times\frac{0.004}{100}=84\ \text{Pa}$$

20. Answer (1)
21. Answer (2)
22. Answer (3)

$$g'=g-R\omega^2=0$$

$$\omega=\sqrt{\frac{g}{R}}$$

$$\therefore\ K=\frac{1}{2}\times\frac{2}{5}MR^2\times\omega^2=\frac{MgR}{5}$$

23. Answer (4)

$$K=\frac{GMm}{2r},\ U=\frac{-GMm}{r},\ E=\frac{-GMm}{2r}$$

If r is decreased, K will increase but U and E will decrease.

24. Answer (1)

In coal mine and top of mountain, g decreases.

25. Answer (1)

26. Answer (2)

$t_1 = \frac{A}{a}\sqrt{\frac{H}{g}}(\sqrt{2}-1)$ and $t_2 = \frac{A}{a}\sqrt{\frac{H}{g}}$

$\therefore$ Initially the pressure is high and the liquid comes out with greater speed.

27. Answer (4)

Check dimensions else,

$\Delta V = V_w - V_e = \frac{m}{y} - \frac{m}{x}$

28. Answer (1)

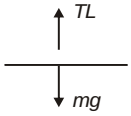
Energy density = $\frac{(\text{Stress})^2}{2Y}$

Energy density $\propto \frac{1}{A^2}$

29. Answer (1)

$h \propto \frac{1}{R}$

30. Answer (2)



A film has two surfaces.

31. Answer (2)

$r = 0.3 \times 10^{-3}$ m, $v = 1$ m/s, $\eta = 18 \times 10^{-6}$ decapoise

$F = 6\pi\eta rv = 6 \times \frac{22}{7} \times 18 \times 10^{-6} \times 0.3 \times 10^{-3} \times 1$

$= 1.018 \times 10^{-7}$ N

32. Answer (3)

Due to buoyont force reading of *A* will decrease and due to its reaction force that of *B* increase.

33. Answer (1)

$g' = \frac{G \times 4m}{R^2} = 4$ g = 40 m/s^2

$\therefore$ $W = mg'h = 160$ J

34. Answer (4)

$v < v_e$ so the object will stop at a definite height.

35. Answer (4)

$Y = \frac{F/A}{\text{Breaking strain}} \Rightarrow A = \frac{F}{Y \times \text{Breaking strain}}$

$= \frac{10^4 \times 100}{7 \times 10 \times 0.2} = 7.1 \times 10^{-4}$ m^2

36. Answer (1)

Weight ot man = weight of water displaced

= volume × density

$= 3 \times 2 \times \frac{1}{100} \times 10^3 = 60$ kg

37. Answer (3)

As inside it gravitational field is zero.

38. Answer (2)

$$B = \frac{p}{\Delta V / V} \Rightarrow \frac{1}{B} = \frac{\Delta V / V}{p} \Rightarrow \sigma = \frac{\Delta V}{pV} \Rightarrow \Delta V = \sigma pV$$

39. Answer (3)

40. Answer (4)

CHEMISTRY

86. (b)

When the temperature is raised, the viscosity of liquid decreases, this is because increase in temperature increases the average kinetic energy of molecules which overcome the attractive force between them.

87. (a)

All substance have average energy and before the reaction occurs energy of the reactant should be higher than the average energy. We also know that catalyst lower the activation energy. Therefore, rate of reaction is increased.

88. (c)

KBr is least effective in causing flocculation of ferric hydroxide sol due to minimum charge at $(KBr)\ Br^-$

89. (d)

Sodium acetate forms cationic micelles in the molecule of soap and detergent the negative ions aggregate to form a micelle of colloidal size. The negative ion has a long hydrocarbon chain and a polar group $(-COO^-)$ at one end.

90. (b)

Surfactant are those which have charge on their tail e.g., cetyltrimethyl ammonium bromide.

$$CH_3-(CH_2)_{15}-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{N^+}}}}-CH_3-Br^-$$

BOTANY

91. (4)

92. (2)

ψ P is positive at limiting stage, ψ is negative at incipient stage.

93. (2)

Translocation of sugars occurs from high T.P to low T.P

94. (3)

Porins are present in the outer membrane of mitochondria, chloroplast and Gram negative bacteria.

95. (3)

Symplastic movement is seen in Endodermis.

96. (3)

97. (4)

98. (1)

Phloem helps in translocation of mainly non reducing sugars like sucrose.

99. (1)

Guttation occurs due to Root Pressure.

100. (1)

101. (4)

Mitosis is involved to form protonema(n) from spores(n).

102. (2)
103. (2)
Smallest cell organelle without membrane is Ribosome.
104. (1)
105. (1)
106. (4)
Histone Proteins are absent in Prokaryotes.
107. (2)
Crossing over is exchange of genetic material between two non sister chromatids of homologous chromosomes.
108. (4)
109. (2)
110. (4)
111. (2)
Guttation is seen in small herbaceous plants.
112. (1)
113. (2)
114. (1)
Tyloses are ingrowths of xylem parenchyma in old wood.
115. (2)
116. (4)
117. (1)
118. (3)
Bivalent is a pair of homologous chromosomes.
119. (1)
120. (1)
121. (3)
Magnesium plays an important role in association and dissociation of ribososomal units.
122. (1)
123. (1)
124. (2)
125. (1)
126. (4)
127. (2)
128. (3)
Nucleolus is ribosomal factory.
129. (3)
130. (1)
131. (3)
132. (3)
133. (2)
134. (3)

Alburnum consists mainly of dead cells.

135. (3)

Mitochondria has circular double stranded Dna