TEST – 6

ANSWERS

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

Hints to Selected Questions

[PHYSICS]

1. Answer (1)

$F_1 = \frac{1}{4\pi\varepsilon_0}.\frac{q_1q_2}{r^2}$ also $F_2 = \frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r^2}$

$\therefore\ F_1 = F_2$ or $\frac{F_1}{F_2} = 1$

2. Answer (3)

$r_2 = r_1 + \frac{10}{100}r_1 = \frac{11r_1}{10}$

$r_2^2 = \frac{121}{100}r_1^2$

$\frac{F_2}{F_1} = \frac{r_1^2}{r_2^2} = \frac{100}{121}$

$\frac{F_2}{F_1} - 1 = \frac{100}{121} - 1 = \frac{-21}{121}$

$\frac{\Delta F}{F_1} = \frac{-21}{121}$

So, $\frac{\Delta F}{F_1} \times 100 = -17\%$

3. Answer (1)
4. Answer (3)
5. Answer (3)
6. Answer (3)
7. Answer (2)

$\frac{1}{2}mv^2 = qV$

$\frac{1}{2} \times 9.1 \times 10^{-31} \times v^2 = 1.6 \times 10^{-19} \times 1$

$\Rightarrow v^2 = \frac{2 \times 1.6}{9.1} \times 10^{-19+31}$

$\Rightarrow v^2 = \frac{32}{91} \times 10^{12}$

$\Rightarrow v = \sqrt{\frac{32}{91}} \times 10^6$ m/s

$\approx 6 \times 10^5$ m/s

8. Answer (2)

$Q = nq$

9. Answer (4)

$W = qV$

$= q\left(\vec{E}.\vec{r}\right)$

10. Answer (1)

$\rho = \frac{q}{\frac{4}{3}\pi r^3}$

$q = \frac{4}{3}\pi r^3 \rho$

$E = \frac{1}{4\pi\varepsilon_0}.\frac{q}{r^2}$

$= \frac{\rho}{3\varepsilon_0}r$

11. Answer (1)

$\vec{E} = 20\hat{i} + 30\hat{j}$

$V = -\int_0^r \vec{E}.\vec{E}r$

$= -\int_{(0,0)}^{(2,2)} (20\hat{i} + 30\hat{j}).(dx\hat{i} + dy\hat{j})$

$= -(20 \times 2 + 30 \times 2)$

$= -100$ volts

12. Answer (1)

$\phi = \frac{1}{\varepsilon_0}q$

$\therefore\ \phi \propto q$

13. Answer (3)

Heat = $W = \frac{1}{2}CV^2 = \frac{1}{2} \times 4 \times 10^{-6} \times 16 \times 10^4$

$= 32 \times 10^{-2}$

$= 0.32$ J

14. Answer (2)

$C = (4\pi\ \varepsilon_0)R$

$= \frac{1}{9\times10^9}\times(6300\times10^3)$

$= \frac{64}{9}\times10^5\times10^{-9}$

$= 700\ \mu F$

15. Answer (3)

$E_{max} = 10^6 = \frac{1}{4\pi\varepsilon_0}.\frac{q_{max}}{r^2}$

$q_{max} = 10^6 \times 4\pi\varepsilon_0 r^2$

$= \frac{10^6}{9\times10^9}\times 25\ C$

$= 2.8 \times 10^{-3}\ C$

16. Answer (3)

Combination is parallel

$C_{net} = 3C = 3\ \frac{\varepsilon_0 A}{d}$

17. Answer (4)

Capacitors are in parallel

$C_{net} = 3 \times 3 = 9\ \mu F$

18. Answer (4)

No. of capacitors in a row = $n = \frac{1\ kV}{250\ V} = 4$

No. of branches in parallel = $m = \frac{16}{2} = 8$

No. of capacitors = $m \times n = 4 \times 8 = 32$

19. Answer (3)

$i = \frac{V}{3R}$

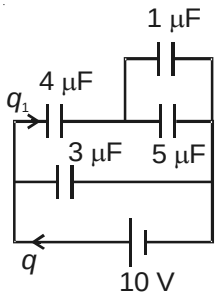
$V_R = iR = \frac{V}{3R}\times R = \frac{V}{3}$

So $V_C = \frac{V}{3}$

20. Answer (4)

$C = \frac{1}{2}nCV^2$

21. Answer (1)



$q = 5.4\ \mu F \times 10 = 54\ \mu C$

$q_1 = \frac{C_1 q}{C_1 + C_2} = \frac{2.4}{5.4}\times 54 = 24\ \mu C$

22. Answer (4)

$i = 3 \times 10^{-3}$ A

$t = 60$ s

$i = \frac{q}{t} = \frac{ne}{t}$

$n = \frac{i\times t}{e} = \frac{3\times10^3\ A\times 60\ s}{1.6\times10^{-19}\ C} \approx 10^{18}$

23. Answer (2)

$\frac{\Delta R}{R} = \frac{\Delta L}{L} - \frac{2\Delta r}{r} = 2\frac{\Delta L}{L} = -4\frac{\Delta r}{r}$

24. Answer (2)

$i = qf = 1.6 \times 10^{-19} \times 6.6 \times 10^{15}$

$= 10.26 \times 10^{-4}$

$= 1.026 \times 10^{-3}$

$\approx 10^{-3}$A

25. Answer (4)

26. Answer (3)

27. Answer (4)

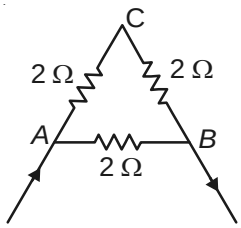
28. Answer (3)

$\frac{20-V}{4} + \frac{16-V}{4} + \frac{0-V}{2} = 0$

$\Rightarrow V = 9$ volt

$\Rightarrow I_3 = \frac{9}{2} = 4.5$ A

29. Answer (2)



$R_{eq} = \frac{4\times 2}{6} = \frac{4}{3}\Omega$

30. Answer (4)

Smallest resistance

= resistance in parallel combination

$= \frac{R}{n}$

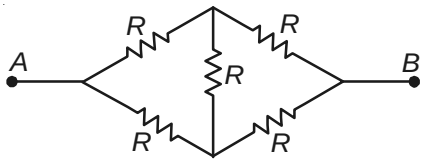
31. Answer (4)

$R_1 = \frac{36}{12} = 3\ \Omega \qquad R_2 = 33\ \Omega$

$R_{eq} = \frac{33\times 3}{33+3} = \frac{99}{36} = \frac{33}{12} = 2.75\ \Omega$

32. Answer (3)

Equivalent diagram is



$R_{eq} = \frac{2R\times 2R}{4R} = R$

33. Answer (1)

$R_{eq} = \frac{5}{6}R$

34. Answer (3)

35. Answer (4)

36. Answer (4)

37. Answer (3)

Bulbs are in series, so current will remain same.

38. Answer (3)

$P' = n^2P$

39. Answer (4)

$I \propto r^{3/2}$

40. Answer (1)

41. Answer (2)

11.2 L of H_2 is liberated by 96500 coulomb

So 22.4. L of H_2 will be liberated by = 2 × 96500 = 193000 coulomb.

42. Answer (3)

43. Answer (1)

44. Answer (4)

45. Answer (2)

46. Answer (4)

47. Answer (3)

48. Answer (1)

49. Answer (1)

50. Answer (2)

[CHEMISTRY]

51. Answer (4)

52. Answer (2)

For bcc $\sqrt{3}a = 4r$

$2r = \frac{\sqrt{3}a}{2}$

53. Answer (1)

54. Answer (2)

55. Answer (2)

For HCP = z = 6, So no. of Q^{-2} is = 6

THV are = 2 × z = 12

But only half of the THV are occupied by P^{+x}

$\Rightarrow$ 6 THV occupied

$\because$ Total +ve charge = total –ve charge

56. Answer (2)

57. Answer (1)

58. Answer (2)

Closed packed array = HCP

OHV = 6, Rank of HCP = 6

so $\frac{2}{3}$OHV is occupied.

59. Answer (4)

60. Answer (2)

	$A(g) \longrightarrow$	$2B(g)$ +	$C(g)$
	p_0	0	0
t = 15 min	$p_0 - x$	2x	x
$t = \infty$	0	$2p_0$	p_0

t = ∞, $3p_0 = 450$

$p_0 = 150$ mm

t = 15 min, $p_0 + 2x = 205$

$150 + 2x = 205$

$x = 27.5$ mm

t = 15 min, $\frac{k}{2.303} = \frac{1}{15}\log\frac{p_0}{p^o - x}$

$\frac{k}{2.303} = \frac{1}{15}\log\frac{150}{150 - 27.5}$

t = 50 min, $\frac{k}{2.303} = \frac{1}{50}\log\frac{p_0}{p^o - p'}$

$\frac{k}{2.303} = \frac{1}{15}\log\frac{150}{150 - p'}$

For 1st order, k remains constant

$p' = 73.63$ mm

Total pressure after 50 min = $p_0 + 2p'$

$= 150 + 2 \times 73.63$

$= 293.26$ mm

61. Answer (1)
62. Answer (1)
63. Answer (4)
64. Answer (1)
65. Answer (2)
66. Answer (2)

$t = \frac{2.303}{k}\log\frac{a}{a_t}$

67. Answer (4)
68. Answer (2)

$t_{1/2} \propto \frac{1}{K}$

Ratio of $t_{1/2}$

$t_A : t_B = 2 : 3$

$3t_{1/2}$ of A = $2t_{1/2}$ of B

69. Answer (2)

$-\Delta T_f = K_f \times \frac{n}{W_{solvent}} \times 1000$

$= 0.52 = 12 \times \frac{0.9}{M \times 180} \times 1000$

M = 115.38

$H_2 + (CH_2)_n$

$M = 2 + n \times 14 = 115.38$

$n = \frac{113.4}{14} = 8$

$H_2 + (CH_2)_8 = C_8H_{18}$

70. Answer (3)

$\Delta T_f = \frac{i \times K_f \times 0.5}{74.5 \times 100} \times 1000$

$i = 1 + \alpha(n - 1)$

$W_{KCl} = 0.5$ gm

$W_{H_2O} = 900$

n = 2

71. Answer (4)
72. Answer (3)
73. Answer (3)
74. Answer (2)
75. Answer (3)
76. Answer (1)

$-\Delta T_f = 1.86(2x + 3y)$

At x = 0, y = 0.1, $-\Delta t_f = 0.558$

x = 0.1, y = 0, $-\Delta t_f = 0.372$

77. Answer (1)

pH = 9, pOH = 5

gm eq. of OH^- = $10^{-5} \times \frac{1}{2} = 5 \times 10^{-6}$

Quantity of current passed = $5 \times 10^{-6} \times 96500$ C = It

$t = \frac{5 \times 10^{-6} \times 96500}{0.5} = 0.965$ sec

78. Answer (4)
79. Answer (2)

$E_{cell} = E_{RHS} - E_{LHS}$

$= 0.0591 \log\frac{(Ag^+)_{RHS}}{(Ag^+)_{LHS}}$

$= 0.0591 \log\frac{\frac{K_{sp}AgBr}{(Br^-)}}{\frac{K_{sp}AgCl}{(Cl^-)}}$

$= 0.0591 \log \frac{3.3 \times 10^{-13}}{0.001} \times \frac{0.2}{2.8 \times 10^{-10}}$

= –0.0371 volt

80. Answer (1)
81. Answer (3)
82. Answer (4)
83. Answer (1)
84. Answer (2)
85. Answer (4)
86. Answer (1)
87. Answer (2)
88. Answer (1)

$\frac{x}{m} = KP^{1/n}$

$\log\frac{x}{m} = \log k + \frac{1}{n}\log P$

log K = 0.3010 intercept

K = 2

Slope $\tan\theta = \frac{1}{n}$

$\tan 45° = 1 = \frac{1}{n}$

$\frac{x}{m} = 2 \times 0.2 = 0.4$

89. Answer (4)
90. Answer (3)
91. Answer (4)
92. Answer (1)
93. Answer (1)
94. Answer (2)

$\alpha = \frac{\wedge}{\wedge^{\infty}} = \frac{176}{405} = 0.43$

For HF, $\underset{C(1-\alpha)}{HF} \rightleftharpoons \underset{C\alpha}{H^+} + \underset{C\alpha}{F^-}$

$K_a = \frac{C\alpha^2}{1-\alpha^2} = \frac{0.002 \times 0.43 \times 0.43}{1-0.43} = 6.48 \times 10^{-4}$

95. Answer (1)
96. Answer (2)
97. Answer (2)
98. Answer (2)
99. Answer (2)
100. Answer (2)

[BIOLOGY]

101. Answer (4)
Central cell is the largest cell of embryo sac.
102. Answer (1)
At the micropylar end.
103. Answer (1)
Zoospores.
104. Answer (4)
Clones are genetically similar to their parent and are developed in vegetative reproduction, not by the zygote.
105. Answer (1)
Each organism has three phases in life cycle *i.e.* vegetative phase, reproductive phase and senescent phase.
106. Answer (1)

Microspore mother cell
↓ Meiosis
4 microspores (pollen grain)
↓ mitosis in generative cell
2 male gametes by one pollen grain

∴ 8 male gametes by 4 pollen grains

∴ For 24 microspores ⟶ 48 male gametes

107. Answer (4)
108. Answer (2)
109. Answer (3)
110. Answer (4)
Water hyacinth or 'terror of Bengal' was introduced in Bengal because of its beautiful flowers and shape of leaves.
111. Answer (1)
These structures are sex organs of *Chara*. (a) is female sex organ called as oogonium or nucule whereas (b) is male sex organ called as antheridium or globule.
112. Answer (3)
113. Answer (4)
114. Answer (1)
Micropropagation is a technique of large-scale plant production *in vitro* using small plant parts (explants).
115. Answer (3)
Monocarpic plants are those which produce flowers and fruits only once in their entire life span. *e.g.* wheat, rice, *Bambusa*. Polycarpic plants produce flowers and fruits several time in their life span. *e.g.* mango, apple, jackfruit, orange etc.

116. Answer (2)

Zygote (2n) ⟶ Embryo.

117. Answer (2)

118. Answer (4)

Male gametes of algae, bryophytes and pteridophytes are motile. They reach to female gamete by swimming through water. This type of sexual reproduction is called as zooidogamy.

119. Answer (3)

Strawberry – False fruit

120. Answer (3)

Conidia are exogenously produced asexual spores.

121. Answer (1)

122. Answer (1)

Asexual reproduction is monoparental.

123. Answer (4)

Diploid structure : Hypocotyl, epicotyl, embryo, oospore, scutellum, zygote.

Triploid structure : Endosperm

124. Answer (3)

Bryophyllum propagate vegetatively by adventitious buds found on leaf margin.

125. Answer (2)

126. Answer (2)

Nuclear endosperm (most common).

127. Answer (1)

128. Answer (1)

During microsporogenesis, microspore tetrad develops by meiosis which separated to produce pollen grains.

129. Answer (1)

130. Answer (3)

In angiosperms, pollen grains are shed mostly at 2-celled stage *i.e.* one vegetative cell and one generative cell.

131. Answer (1)

Sunflower, castor, maize, barley, wheat plants produce endospermic seeds.

132. Answer (1)

133. Answer (2)

Hydrophily ⟶ 30 genus only (mostly monocots)

134. Answer (1)

135. Answer (3)

136. Answer (2)

In angiosperms, an integumented megasporangium is called as ovule whereas embryo sac (haploid) is its female gametophyte.

137. Answer (2)

Monosporic embryo sac : Only one megaspore nucleus forms embryo sac.

Bisporic embryo sac : Two megaspore nuclei take part in development of embryo sac.

Tetrasporic embryo sac : All the four megaspore nuclei take part in development of embryo sac.

138. Answer (3)

A typical angiospermic embryo sac is 8-nucleated and 7-celled structure.

(a) Nuclei – 1 egg cell nuclei + 2 synergid nuclei + 3 antipodals nuclei + 2 polar nuclei.

(b) Cells – 1 egg cell + 2 synergid cells + 3 antipodals cells + 1 central cell

139. Answer (2)

In autogamy, pollination occurs within same flower. In geitonogamy, pollination occurs between flowers of same plant.

140. Answer (3)

141. Answer (2)

Several months for some members of Rosaceae, Leguminosae and Solanaceae.

142. Answer (2)

143. Answer (3)

144. Answer (2)

Grass family is monocotyledonous. It has a single large laterally positioned cotyledon called as scutellum.

145. Answer (2)

Apomixis – formation of seeds or new individuals directly through asexual reproduction without involving the fusion of gametes.

Parthenocarpy – production of fruits without fertilization.

146 Answer (4)

147. Answer (3)

148. Answer (2)

The ovaries release ova alternately each month, and normally a single ovum is produced in one month cycle.

149. Answer (4)

As corpus luteum regresses, the progesterone level drops.

150. Answer (1)

Cleavage begins immediately after fertilization.

151. Answer (2)

The Graafian follicle matures by the end of proliferative phase and then ruptures to release the secondary oocyte.

152. Answer (3)

153. Answer (2)

The mature ovum secretes fertilizin and the sperm antifertilizin.

154. Answer (3)

155. Answer (2)

156. Answer (3)

When the testes descend, the mesorchium forms gubernaculum.

157. Answer (2)

60–70% of the semen is contributed by seminal vesicle and it contains fructose.

158. Answer (3)

Vas deferens is sperm duct. It does not produce semen.

159. Answer (4)

160. Answer (3)

161. Answer (1)

162. Answer (3)

Oogenesis is initiated during the embryonic development stage and no more oogonia are formed and added after birth.

163. Answer (1)

Inhibin is secreted by Sertoli cells in males and by granulosa cells in females.

164. Answer (1)

The blastocyst is formed and then implantation occurs.

165. Answer (2)

High LH levels are needed for ovulation.

166. Answer (4)

In the secretory phase the uterine endometrium becomes secretory due to action of progesterone secreted by Corpus luteum in ovary.

167. Answer (4)

Normal sperm count is 200 to 300 million. Sperms need to be conditioned/capacitated before fertilization. hCG is secreted by fertilized egg.

168. Answer (4)

169. Answer (2)

170. Answer (3)

Seminiferous tubules are in the testes.

171. Answer (3)

GnRH stimulates secretion of FSH and LH.

172. Answer (1)

Gestation period is 280 days from the last menstrual period while it is 266 days (280 – 14) from the day of fertilization.

173. Answer (4)

174. Answer (1)

Number of ova required during the reproductive life of female is 40 × 13 = 520 ova

At puberty ova in ovaries = 400000

So, percentage of these eggs which will ovulate

$$= \frac{520}{400000} \times 100 = 0.13\%$$

175. Answer (3)

176. Answer (2)

177. Answer (4)

The sperms are destroyed in the acidic medium.

178. Answer (3)

179. Answer (3)

180. Answer (4)

In insects, the cleavage is meroblastic and superficial.

181. Answer (2)

182. Answer (2)

183. Answer (2)

184. Answer (3)

In birds and reptiles, the nitrogenous wastes of the developing embryo are collected in the allantois.

185. Answer (3)

During gastrulation there is obliteration of blastocoel and formation of archenteron.

186. Answer (3)

In birds and reptiles the shell is secreted by the glands present in the oviduct.

187. Answer (3)

188. Answer (4)

189. Answer (3)

190. Answer (2)

191. Answer (2)

192. Answer (1)

193. Answer (3)

Haploid plant body $\xrightarrow{\text{Mitosis}}$ Gametes.

194. Answer (1)

195. Answer (1)

196. Answer (4)

Progesterone is also secreted in non-pregnant females also.

197. Answer (1)

198. Answer (1)

199. Answer (2)

200. Answer (2)

❑ ❑ ❑