ANSWERS

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

[PHYSICS & CHEMISTRY]

1. Answer (4)

   By principle of homogeneity.

2. Answer (1)

   $$\frac{\Delta A}{A}\% = 2\frac{\Delta L}{L}\%$$

3. Answer (2)

   $$\int dv = \int_0^t a dt$$

4. Answer (3)

   $$v = \sqrt{2gh}$$

5. Answer (2)

   $$\frac{1}{2}m(v\cos\theta)^2 = \frac{E}{2}$$

6. Answer (3)

   $$\sum F = F_1 + F_2 + F_3$$

   $$\sum F = m\vec{a}$$

7. Answer (2)

8. Answer (1)

   $T = m_A g$

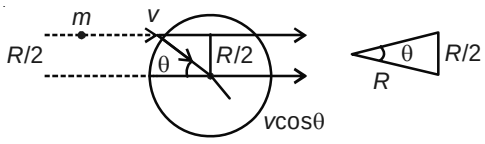
   $T = kx$

   $T + kx = Mg$

   $m_A g = 2T = Mg$

   $$m_A = \frac{M}{2}$$

9. Answer (2)



   $$v\cos\theta = v \times \frac{\sqrt{3}}{2}$$

10. Answer (2)

    $I_m\omega_m = -I_t\omega_t$

    $$\omega_t = -\frac{I_m\omega_m}{I_t}$$

    $$\omega_m = \frac{v}{r} = \frac{1}{2}\text{ rad/s}$$

    $$\omega_t = -(100)(2)^2 \times \frac{\left(\frac{1}{2}\right)}{4000} = -\frac{1}{20}\text{ rad/s}$$

11. Answer (2)

    $$t = \frac{T}{6} = \frac{4}{6} = \frac{2}{3}\text{ s}$$

12. Answer (1)

    $$\frac{1}{2}mv^2 = m(V_1 + V_2)\ \frac{1}{2}mv^2 = m(V_1 + V_2)$$

    $$v^2 = 2\left(\frac{Gm_1}{d/2} + \frac{Gm_2}{d/2}\right)$$

    $$v = 2\sqrt{\frac{G(m_1 + m_2)}{d}}$$

13. Answer (3)

14. Answer (1)

    $$\frac{\Delta\text{ Pressure energy}}{\text{Volume}} = \frac{\text{K.E.}}{\text{Volume}}$$

    $$0.5 \times 10^5 = \frac{1}{2}\rho v^2$$

    v = 10 m/s

15. Answer (4)

    $$V = \frac{120}{600} = \frac{1}{5}$$

    $(120 + x)g = v \times \rho_v \times g$

    $$120 + x = \frac{1}{5} \times 1000 = 200$$

    x = 80 kg

16. Answer (1)

    $$\left(\frac{\Delta l}{l}\right)_1 y_1 = \left(\frac{\Delta l}{l}\right)_2 y_2$$

    $\alpha_1 y_1 = \alpha_2 y_2$

17. Answer (1)

    Under equilibrium

    $T = mg$

    $T = mr\omega^2$

18. Answer (4)

    $Mg - 2T = Ma$

    $$a = \frac{g}{1 + \frac{k^2}{r^2}} = \frac{2}{3}g$$

    $$T = \frac{Mg}{6}$$

19. Answer (3)

$$f' = \left(\frac{v}{v - v_s}\right) f v_s = 6 v_{\text{sound}}$$

$$f'' = \left(\frac{v}{v + v_s}\right) f$$

% change 14.3%

20. Answer (3)

For max $n\lambda$ = Path difference

$\lambda = \pi r - 2r$

21. Answer (4)

22. Answer (2)

$$W = \int P dv = \int \frac{RT}{v} dv$$

$$\frac{dv}{v} = \frac{2}{3}\frac{dT}{T}$$

$$W = \frac{2}{3} R(T_2 - T_1)$$

W = 166.2 J

23. Answer (3)

$P_1V_1 = P_2V_2$

$P_2V_2^r = P_3V_1^r$

$\Rightarrow \quad P_3 > P_1 \quad W < 0$ (compression)

24. Answer (2)

Small layer sphere

$$\frac{q_1}{r_1} = \frac{q_2}{r_2}$$

$r_2 = 2r_1$

$$q_1 = \frac{q_2}{2}$$

$$E_2 = \frac{kq_2}{r_2^2} = \frac{k2q_1}{4r_1^2}$$

$E_2 = \frac{E_1}{2} =$ half of smaller sphere

25. Answer (3)

$$V \propto \frac{1}{C}$$

26. Answer (2)

$$I = \frac{\text{Pot. drop}}{\text{Resistance}} = \frac{5 \times 93}{3} \text{ mA}$$

= 165 mA

27. Answer (2)

$$I = \frac{\varepsilon_1}{R_1 + R_2}$$

$\varepsilon_1 - \varepsilon - IR_1 = 0$

$$\varepsilon = \frac{\varepsilon_1 R_2}{R_1 + R_2}$$

$$\varepsilon_1 = \varepsilon\left(\frac{R_1 + R_2}{R_2}\right)$$

28. Answer (2)

Time $\propto$ Resistance $\propto$ Length

$$\frac{10}{15} = \frac{l_1}{l}$$

$$l_1 = \frac{2}{3} l$$

29. Answer (3)

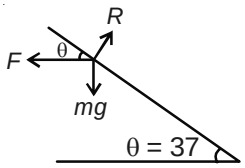
$W = MB\cos 60°$

$MB = 2W$

$\tau = MB\sin\theta$

$$\tau = 2W \times \frac{\sqrt{3}}{2}$$

30. Answer (3)



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

$BIL\cos\theta = mg\sin\theta$

$$B = \frac{mg}{IL}\tan\theta = 0.3T$$

31. Answer (1)

I_g = 16 μA × 30 = 480 μA

$\frac{V}{I_g} = R = \frac{3}{480} \times 10^6 \sim 6\ \text{k}\Omega$ in series

32. Answer (2)

$$\varepsilon = -L\frac{dI}{dt}$$

33. Answer (4)

34. Answer (3)

Resonance frequency is independent of resistance.

35. Answer (1)

$$\sin C = \frac{1}{\mu} = \frac{\mu_w}{\mu_g} = \frac{8}{9} \sin\theta > \frac{8}{9}$$

36. Answer (4)

Condition of achromatism

$$\frac{W_1}{f_1}+\frac{W_2}{f_2}=0$$

37. Answer (3)

By Muler's law

$$I=I_0\cos^2\theta$$

$$I'=\frac{1}{2}I\times\left(\frac{\sqrt{3}}{2}\right)^2$$

$$I'=\frac{3}{8}I$$

38. Answer (3)

$$\lambda=\frac{h}{\sqrt{3mkt}}$$

$$\frac{\lambda_{H_2}}{\lambda_{He}}=\sqrt{\frac{8}{3}}$$

39. Answer (3)

$$E=\frac{hc}{\lambda}=\phi+\frac{1}{2}mv^2$$

$$E(\text{eV})=\frac{12400}{\lambda\,(\text{Å})}$$

40. Answer (2)

$$\frac{N}{N_0}=\left(\frac{9}{10}\right)^n$$

$$n=\frac{t}{T}=4$$

41. Answer (2)

$${}_{88}A^{196}\longrightarrow {}_{78}B^{164}+8{}_2^4\text{He}+6{}_{-1}\beta^0$$

42. Answer (4)

$$\beta=\frac{\alpha}{1-\alpha}$$

$$I_c=\frac{V_c}{R}$$

$$I_b=\frac{I_c}{\beta}$$

43. Answer (2)

Half wave rectifier.

44. Answer (1)

More holes in volume.

45. Answer (3)

OR gate

46. Answer (3)
47. Answer (1)
48. Answer (1)
49. Answer (2)
50. Answer (4)
51. Answer (3)
52. Answer (3)
53. Answer (4)
54. Answer (1)
55. Answer (2)
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83. Answer (1)
84. Answer (2)
85. Answer (3)
86. Answer (4)
87. Answer (1)
88. Answer (2)
89. Answer (3)
90. Answer (3)

[BOTANY & ZOOLOGY]

91. Answer (1)
92. Answer (2)
93. Answer (1)
94. Answer (1)
95. Answer (1)
96. Answer (1)
97. Answer (1)
98. Answer (4)
99. Answer (3)
100. Answer (1)
101. Answer (4)
102. Answer (1)
103. Answer (3)
104. Answer (1)
105. Answer (2)
106. Answer (3)
107. Answer (3)
108. Answer (1)
109. Answer (3)
110. Answer (1)
111. Answer (2)
112. Answer (2)

Pyruate (3C) is product of glucolysis. Acetyl CoA (2C) is link in glycolysis and TCA cycle, α-ketoglutaric acid (5C) and malic acid (4C) are produced in TCA cycle.

113. Answer (1)
114. Answer (1)
115. Answer (3)
116. Answer (3)
117. Answer (3)

Human has 22 pairs of autosomes and one pair of sex chromosome, XX in female and XY in male so everytime the chances of son and daughter is 50-50% depending upon which sex chromosome is contributed by male in sperm.

118. Answer (3)

A gene may have more than two alternative forms at the same locus on a chromosome and such alleles are called multiple allele. ABO blood group has three allels I^0, I^A, I^B.

119. Answer (1)

AaBB × aaBB on crossing gives 50% individual having genotype AaBB and 50% with genotype aaBB.

120. Answer (3)

Colour-blindness is an 'X' chromosome-linked character, controlled by recessive gene and so all the sons will be colour-blind and daughters will be carrier.

121. Answer (4)

Unwindase or helicase takes part in separation of two DNA strands. In prokaryotes helicase/ unwindase is assisted by gyrase.

122. Answer (1)

DNA replication is semiconservative thus, only half of the parental DNA molecule is carried to the next generation.

123. Answer (4)

Termination codons are the stop signals which when encountered cause termination of polypeptide synthesis. These are UAA (Ochre), UAG (Amber) and UGA (Opal).

124. Answer (2)
125. Answer (3)
126. Answer (3)
127. Answer (3)
128. Answer (2)

Symbiosis as mutualism is interaction useful to both organisms (populations).

129. Answer (2)

To escape high temperature or sunlight, some animals make permanent burrows deep into the soils. The cold-blooded animals often like to bask in the sun to warm up their body.

130. Answer (4)

In the graph line 'a' represents 'Regulator', line 'b' conformers and line 'c' represents partial regulators. Regulators are those organisms that are able to maintain homeostasis by physiological means and ensure constant body temperature. Organisms that are not able to maintain a constant internal temperature, are called conformers. Partial regulators are organisms which have ability to regulate but only over a limited range of environment conditions beyond which they simply conform.

131. Answer (3)

For most of ecosystem like grassland, number of organisms decreases at successively higher trophic levels. Energy flows in direction only. According to 10% law of energy transfer given by Lindermann (1972), there is always loss in respiration and other actualites and only 10% of energy is transferred to next trophic level to the amount of energy flow decreases with successive trophic level. In xerophytes sunken stomata are present.

132. Answer (2)

Ex-situ conservation is the conservation of selected organism in places outside their natural homes. This includes offsite collection of gene bank. Eutrophication is often seen in fresh water lakes. Mammals comprises the highest number of endangered species.

133. Answer (2)

Praying mantis is a good example of camouflage the colour of animals enable it to blend in with its surrounding. Large woody vine are more commonly found in tropical rain forests in high humid climatic condition.

134. Answer (4)

Increase in concentration CO_2 do not allow the earth's radiation to go out of earth's atmosphere and contributes in increasing temperature of earth.

135. Answer (3)

- BOD (biological oxygen demand) is the amount of oxygen required to destroy the organic waste by bacteria. More organic waste, more oxygen is required, For industrial and municipal waste it is less than 10 ppm.
- The logistic population growth is expressed by the equation $\frac{dN}{dt} = rN\left[\frac{(K-N}{K}\right]$

136. Answer (2)

137. Answer (3)

138. Answer (3)

139. Answer (1)

140. Answer (1)

141. Answer (3)

142. Answer (3)

143. Answer (1)

144. Answer (2)

145. Answer (3)

146 Answer (4)

147. Answer (4)

148. Answer (2)

149. Answer (2)

150. Answer (4)

151. Answer (2)

152. Answer (4)

153. Answer (3)

154. Answer (1)

155. Answer (4)

156. Answer (4)

157. Answer (4)

158. Answer (1)

159. Answer (4)

160. Answer (4)

161. Answer (4)

162. Answer (3)

163. Answer (2)

164. Answer (4)

165. Answer (3)

166. Answer (3)

167. Answer (3)

168. Answer (3)

169. Answer (3)

170. Answer (4)

171. Answer (4)

172. Answer (4)

173. Answer (3)

174. Answer (2)

175. Answer (1)

176. Answer (4)

177. Answer (3)

178. Answer (1)

179. Answer (1)

180. Answer (2)

❑ ❑ ❑

Topics Covered

Complete Syllabus of Class XI & XII

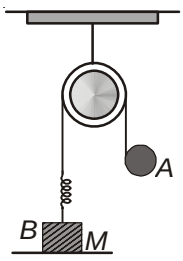
INSTRUCTIONS FOR CANDIDATES:

1. Read each question carefully.
2. Each question carries **4 marks**. **1 mark** will be deducted for every incorrect answer.

[PHYSICS & CHEMISTRY]

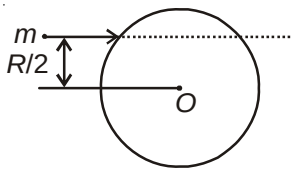
Choose the correct answer :

1. The force is given by $F = \frac{a}{t} + \frac{b}{t^2}$ where t is time. The dimensions of a and b are respectively.
   (1) $[MLT^{-1}]$, $[MLT^{-4}]$
   (2) $[MLT^{-1}]$, $[MLT^{-2}]$
   (3) $[MLT^{-2}]$, $[ML^2T^0]$
   (4) $[MLT^{-1}]$, $[MLT^0]$
2. The percentage error in measurement of length 'L' is 1%. Sides of a park are $2L$ and L. The maximum error in measurement of area of park is
   (1) 2% (2) 3%
   (3) 4% (4) 6%
3. The acceleration 'a' of a body starting from rest varies with time according to relation $a = \alpha t + \beta$. The velocity of body after time t will be
   (1) $\frac{\alpha t^2}{2} + \beta$ (2) $\frac{\alpha t^2}{2} + \beta t$
   (3) $\alpha t^2 + \frac{\beta t}{2}$ (4) $\frac{\alpha t^2 + \beta}{2}$
4. Two stones of masses $2m$ and m respectively are thrown from top of tower, one vertically upwards and other downwards with same speed. Ratio of the speed when they hit the ground is
   (1) 1 : 2 (2) 2 : 1
   (3) 1 : 1 (4) 1 : 4
5. The energy of a projectile at maximum height is half of its initial energy. The angle of projection is
   (1) 60° (2) 45°
   (3) 15° (4) 30°
6. A particle at rest is situated at the origin of a coordinate system. The following forces begin to act on particle simultaneously
   $F_1 = (2\hat{i} + 3\hat{j} + 5\hat{k})$N $F_2 = (3\hat{i} + 2\hat{j} - 4\hat{k})$N
   $F_3 = (-5\hat{i} + 4\hat{j} + \hat{k})$N
   The particle will move :
   (1) Along y-axis (2) Along z-axis
   (3) In y–z-plane (4) In x–y-plane
7. Which of the following statement/s is **incorrect**?
   (1) Kinetic energy of a body is independent of the direction of motion
   (2) In an elastic collision of two bodies the kinetic energy is always conserved
   (3) If two protons are brought towards each other, the potential energy of the system increases
   (4) The momentum of a body can change without change in its kinetic energy
8. In the given diagram, the ball A is released from rest when the spring is at its natural length (neither stretched nor compressed). For the block B of mass 'M' to leave contact with ground at some time, the minimum mass of A must be



   (1) $\frac{M}{2}$
   (2) $2M$
   (3) M
   (4) A function of M and force constant of spring

9. A particle of mass *m* strikes elasticity with a disc of radius *R*, with a velocity '*v*' as shown in diagram. If mass of disc is equal to that of the particle and surface of contact is smooth, find the velocity of the disc just after the collision



(1) $\frac{1}{2}v$ (2) $\frac{\sqrt{3}}{2}v$

(3) $\frac{1}{\sqrt{2}}v$ (4) $\sqrt{\frac{3}{2}}v$

10. A man of mass 100 kg stands at the rim of a turntable of radius 2 m and moment of inertia 4000 kg m^2 mounted on a vertical frictional shaft at its centre. The whole system is initially at rest. The man walks along the outer edge of the turntable with a velocity of 1 m/s relative to earth. With what angular velocity does the turntable rotate?

(1) $\frac{1}{2}$ rad/s (2) $\frac{1}{20}$ rad/s

(3) $\frac{1}{4}$ rad/s (4) 2 rad/s

11. A particle execute SHM of amplitude 4 cm and time period 4 s. What is the time taken by it to move from positive extreme position to half the amplitude?

(1) $\frac{1}{2}$ s (2) $\frac{2}{3}$ s

(3) $\frac{1}{3}$ s (4) $\frac{1}{4}$ s

12. The masses and radii of earth and moon are M_1, R_1 and M_2, R_2 respectively. Their centres are at distance '*d*' apart. What is minimum speed with which a particle of mass *m* should be projected from a point midway between the two centres so as to escape to infinity?

(1) $2\sqrt{\frac{G(M_1+M_2)}{d}}$ (2) $\sqrt{G\frac{(M_1+M_2)}{d}}$

(3) $\sqrt{2G\frac{(M_1+M_2)}{d}}$ (4) $\sqrt{G\frac{(M_1+M_2)}{2d}}$

13. For a satellite moving in an orbit around earth, the ratio of kinetic energy to potential energy is

(1) – 2 (2) 1

(3) $-\frac{1}{2}$ (4) – 1

14. The pressure of water in a water pipe when the tap is closed and open are respectively 3.5 × 10^5 N/m^2 and 3 × 10^5 N/m^2. The velocity of water flowing through the pipe when the tap is open is

(1) 10 m/s (2) 0.5 × 10^6 m/s

(3) 3.5 × 10^3 m/s (4) 10 cm/s

15. A body of mass 120 kg and density 600 kg/m^3 floats in water. What additional mass could be added to the body so that the body will just sink?

(1) 20 kg (2) 100 kg

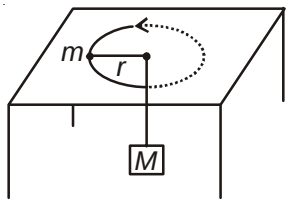
(3) 120 kg (4) 80 kg

16. Two rods of different materials having coefficients of thermal expansion α_1 and α_2 and Young's module Y_1 and Y_2 respectively are fixed between two rigid massive walls. The rods are heated such that they undergo the same increase in temperature. There is no bending of the rods. If α_1 and α_2 are in ratio 1 : 2, the thermal stresses developed in the two rods are equal when $Y_1 : Y_2$ is

(1) 2 : 1 (2) 1 : 2

(3) 1 : 1 (4) 4 : 1

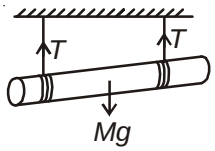
17. A particle of mass '*m*' is attached to *M* via a massless string passing through a hole in horizontal table as shown. Mass *m* is kept stationary whereas mass *m* is rotating in a circle of radius '*r*' with angular speed ω, then



(1) $Mg = mr\omega^2$ (2) $Mg > mr\omega^2$

(3) $Mg < mr\omega^2$ (4) $Mg \geq mr\omega^2$

18. A cylinder of mass '*m*' is suspended by two strings wrapped around it as shown. The acceleration '*a*' and the tension *T*, when the cylinder falls and the string unwinds itself is



(1) $a = g,\ T = \frac{Mg}{2}$ (2) $a = \frac{g}{2},\ T = \frac{Mg}{2}$

(3) $a = \frac{g}{3},\ T = \frac{Mg}{3}$ (4) $a = \frac{2g}{3},\ T = \frac{Mg}{6}$

19. The frequency of a note emitted by a source changes by 20% as it approaches a observer. As it recedes away from him, the apparent frequency will differ from the actual frequency by

(1) 20% (2) 16.6%

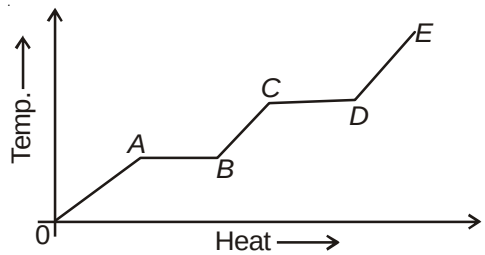
(3) 14.3% (4) 22%

20. A sound wave of 40 cm wavelength enters the tube shown. What must be the smallest radius '*r*' such that a maxima be heard at the detector '*D*'?

(1) 17.5 cm (2) 20 cm

(3) 35 cm (4) 3.5 cm

21. A source of heat supplies heat at a constant rate to a substance. Graph shows the variation of temperature of substance with heat supplied. The slope of segment *DE* represents the



(1) Latent heat of vaporisation

(2) Specific heat of vapour

(3) Thermal capacity of the vapour

(4) Reciprocal of thermal capacity of the vapour

22. One mole of an ideal gas is expanding under the condition $V \propto T^{2/3}$. The amount of work done to increase its temperature by 30°C is

(R = 8.31 J/mole K)

(1) 250 J (2) 166 J

(3) 360 J (4) 120 J

23. An ideal gas expands isothermally from a volume V_1 to V_2 and then compressed to original volume V_1 adiabatically. Initial pressure is P_1 and final pressure is P_3. Total work done is 'w' then

(1) $P_3 > P_1$ $W > 0$ (2) $P_3 < P_1$ $W < 0$

(3) $P_3 > P_1$ $W < 0$ (4) $P_3 = P_1$ $W = 0$

24. Two charged metallic spheres at large separation are joined by a very thin metal wire. If the radius of the larger sphere is twice that of the smaller one, the electric field near the larger sphere is

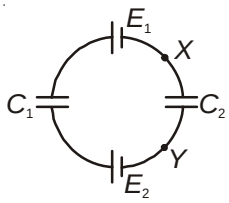
(1) Twice that near the smaller sphere

(2) Half of that near the smaller sphere

(3) The same as that near the smaller sphere

(4) One fourth of that near the smaller sphere

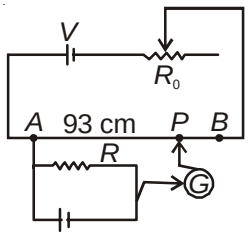
25. The potential difference between points *X* and *Y* of circuit shown in figure below is



(1) $\left(\frac{E_1+E_2}{C_1+C_2}\right)C_2$ (2) $\left(\frac{E_1-E_2}{C_1+C_2}\right)C_2$

(3) $\left(\frac{E_1+E_2}{C_1+C_2}\right)C_1$ (4) $\left(\frac{E_1-E_2}{C_1+C_2}\right)C_1$

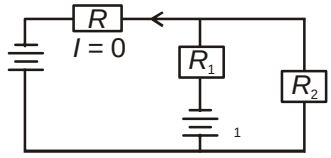
26. In a potentiometer circuit a battery of *V* volt is connected to wire *AB*. The resistance R_0 is adjusted such that a potential gradient of 5 mV/cm get set across wire *AB*. Resistance of wire is 3 ohm and no deflection is seen in galvanometer at point *P* as shown, the current through resistance *R* is



(1) 0.214 A (2) 0.165 A

(3) 0.155 A (4) 0.178 A

27. In given circuit R_1 and R_2 are known resistors. The current flowing through resistor *R* is zero. The magnitude of cell ε_1 in circuit will be



(1) $\varepsilon\frac{R_1}{R_2}$ (2) $\varepsilon\left(\frac{R_1+R_2}{R_2}\right)$

(3) $\varepsilon\frac{R_2}{R_1}$ (4) $\varepsilon\left(\frac{R_1}{R_1+R_2}\right)$

28. The water in an electric kettle begins to boil in 15 minutes. To boil water in 10 minutes using same supply the length of heating element should be made (ℓ - original length)

(1) $\frac{1}{3}\ell$ (2) $\frac{2}{3}\ell$

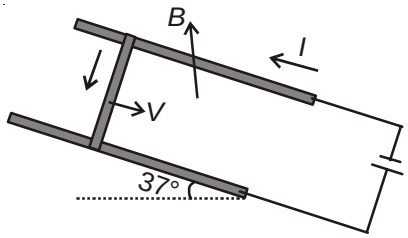
(3) $\frac{3}{2}\ell$ (4) $\frac{1}{2}\ell$

29. A magnetic needle lying parallel to a magnetic field requires '*W*' units of work to turn it through 60°. What is the torque required to maintain the needle in this position?

(1) W (2) $\frac{W}{2}$

(3) $\sqrt{3}W$ (4) $\frac{W}{\sqrt{3}}$

30. Two conducting rails are connected to a source of e.m.f. and form an inclined plane. A bar of mass 50 g slides without friction down the plane through a vertical magnetic field *B*. If length of bar is 50 cm and a current of 2.5 A is provided by the battery, for what value of *B* will the bar slide at a constant velocity?



(1) 0.4 T (2) 0.5 T

(3) 0.3 T (4) 0.1 T

31. A galvanometer has 30 divisions and a sensitivity 16 μA per division. It can be converted into voltmeter to read 3 V by connecting

(1) 6 kΩ in series (2) 6 kΩ in parallel

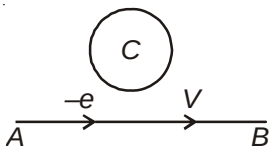
(3) 500 kΩ in series (4) 500 kΩ in parallel

32. The current in an inductor is given by $I = 5 + 16t$, *t* is time in second. The self induced e.m.f. in it is 10 mV. The self induction coefficient is

(1) 0.21 mH (2) 0.62 mH

(3) 2.1 mH (4) 6.2 mH

33. An electron moves along the line *AB* which lies in plane of a circular loop of conducting wire as shown. The direction of current induced in circular loop is



(1) Clockwise

(2) Anticlockwise

(3) No current will be induced

(4) The current will change direction as electron passes by

34. A 10 ohm resistance, 5 mH coil and 10 μF capacitor are joined in series. When a suitable frequency alternating current source is joined to this combination the circuit resonates. If the resistance is halved the resonance frequency

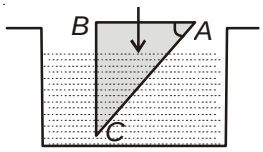
(1) Is halved

(2) Is doubled

(3) Remains unchanged

(4) Is quadrupled

35. A glass prism of refractive index 1.5 is immersed in water $\left(\mu = \frac{4}{3}\right)$. A light beam incident normally on the face *AB* is totally reflected to reach face *BC* if



(1) $\sin\theta > \frac{8}{9}$ (2) $\frac{2}{3} < \sin\theta < \frac{8}{9}$

(3) $\sin\theta \le \frac{2}{3}$ (4) $\cos\theta \ge \frac{8}{9}$

36. A combination is made of two lenses of focal lengths *f* and *f′* in contact. The dispersive powers of materials of the lenses are ω and ω′. The combination is achromatic when

(1) $\omega' = 2\omega$; $f' = 2f$ (2) $\omega' = 2\omega$; $f' = \frac{f}{2}$

(3) $\omega' = \omega$; $f' = -\frac{f}{2}$ (4) $\omega' = 2\omega$; $f' = -2f$

37. Two polaroids are oriented with their planes perpendicular to incident light and transmission axis making an angle 30° with each other. The fraction of incident unpolarised light transmitted is

(1) $\frac{1}{8}$ (2) $\frac{1}{4}$

(3) $\frac{3}{8}$ (4) $\frac{1}{3}$

38. The ratio of de-Broglie wavelength of molecules of hydrogen and helium which are at temperatures 27°C and 127°C respectively is

(1) $\sqrt{\frac{3}{8}}$ (2) $\sqrt{\frac{3}{2}}$

(3) $\sqrt{\frac{8}{3}}$ (4) $\sqrt{\frac{1}{2}}$

39. A metallic surface is illuminated with light of wavelength 3000 Å and 6000 Å one by one. The maximum speeds of photoelectrons under these illuminations are in ratio 3 : 1. The work function of metal is approximately

(1) 2.8 eV (2) 4.1 eV

(3) 1.8 eV (4) 1.4 eV

40. If 10% of a radioactive material decay in 5 days, then the amount of original material left after 20 days is

(1) 60% (2) 65%

(3) 70% (4) 75%

41. The number of α particles and β particles respectively emitted in the reaction $_{88}A^{196} \longrightarrow {}_{78}B^{164}$ are

(1) 8, 8 (2) 8, 6

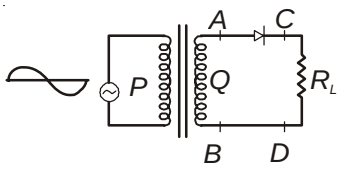
(3) 6, 8 (4) 6, 6

42. A transistor is connected in *CE* configuration. The collector supply is 8 V and the voltage drop across a resistor of 800 Ω in the collector circuit is 0.5V. If current gain factor α is 0.96 the base current is

(1) 20 mA (2) 26 mA

(3) 5 μA (4) 26 μA

43. In the half wave rectifier circuit

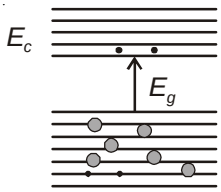


Which of the following wave form is true voltage across *C* and *D*?

(1)  (2) 

(3)  (4) 

44. In the energy band diagram of a material shown, the filled circles and dots denote holes and electrons respectively. The material is



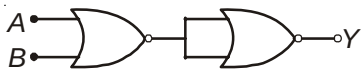
(1) A *p*-type semiconductor

(2) An insulator

(3) Metal

(4) *n*-type semiconductor

45. In the following circuit, the output *Y* for all possible inputs *A* and *B* is expressed by the truth table :



(1)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(2)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

(3)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(4)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

46. The number of moles of oxygen obtained by the electrolytic decomposition of 90 g water is

(1) 3 (2) 5

(3) 2.5 (4) 10

47. Half mole of BaF_2 is treated with one mole of H_2SO_4. To make the resulting mixture neutral NaOH is added. Number of moles of NaOH required in the process is

(1) 2 (2) 4

(3) 1 (4) 3

48. Which quantum number must be same in a hydrogen atom in order that orbitals be degenerate?

(1) Principal

(2) Azimuthal

(3) Principal and Azimuthal both

(4) Magnetic

49. If the velocity of hydrogen molecule is 5×10^4 cms^{-1} then its de-Broglie wavelength is

(1) 20 Å (2) 4 Å

(3) 10 Å (4) 8 Å

50. The correct order of second ionisation energy of carbon, nitrogen, oxygen and fluorine is

(1) C > N > O > F (2) F > O > C > N

(3) O > N > F > C (4) O > F > N > C

51. In $\overset{1}{C}H_2 = \overset{2}{C} = \overset{3}{C}H_2$ molecule, the angle between the plane of hydrogen atoms of carbon 1 and that hydrogen atoms of carbon 3 is

(1) 120° (2) 180°

(3) 90° (4) 110°

52. Which of the following *p*-orbital of phosphorus occupies the axial position in PCl_5?
(1) p_x
(2) p_y
(3) p_z
(4) Any *p*-orbital can occupies

53. Surface tension vanishes at
(1) Boyle's temperature
(2) Inversion temperature
(3) Triple point
(4) Critical point

54. The internal pressure of one mole of a van der Waal's gas is
(1) $\frac{a}{V^2}$ (2) a
(3) b (4) $b-\frac{a}{RT}$

55. In which case of mixing of a strong acid and a base each of 1 N concentration, temperature increase is lowest?
(1) 20 ml acid and 30 ml base
(2) 10 ml acid and 40 ml base
(3) 25 ml acid and 25 ml base
(4) 35 ml acid and 15 ml base

56. Six gram of graphite is burnt in a bomb calorimeter of heat capacity 30 kJ K^{-1} in excess of oxygen at 1 atmospheric pressure. The temperature rises from 298 K to 304 K. What is the enthalpy of combustion of graphite (in kJ $mole^{-1}$)?
(1) 360 (2) 1440
(3) –360 (4) –720

57. The following equilibrium given by
$N_2+3H_2 \rightleftharpoons 2NH_3$; K_1
$N_2+O_2 \rightleftharpoons 2NO_2$; K_2
$H_2+\frac{1}{2}O_2 \rightleftharpoons H_2O$; K_3
The equilibrium constant of the oxidation of NH_3 by oxygen to give
(1) $\frac{K_2K_3^3}{K_1}$ (2) $\frac{K_1K_3^2}{K_2}$
(3) $\frac{K_1K_2^2}{K_3}$ (4) $\frac{K_1K_2^3}{K_3}$

58. The aqueous solution of which of the following salt has the highest pH?
(1) $NaNO_3$ (2) Na_2SO_4
(3) Na_2CO_3 (4) $NaClO_4$

59. Oxidation number of Cl in $NOClO_4$ is
(1) +5 (2) –5
(3) –7 (4) +7

60. A metal crystallises into two cubic phases, face centred cubic and body centred cubic whose unit cell lengths are 4 Å and 2 Å respectively. What is the ratio of densities of fcc and bcc?
(1) 1 : 4 (2) 4 : 1
(3) 2 : 3 (4) 3 : 2

61. If sphere of radius r are arranged in a ccp fashion (ABCABC.....), the vertical distance between any two consecutive A layer is
(1) $\sqrt{4}r$ (2) $\sqrt{6}r$
(3) $4r\sqrt{\frac{2}{3}}$ (4) $4r\sqrt{\frac{3}{2}}$

62. Which of the following on dissolution in water decreases the boiling point of solution?
(1) Methanol (2) Ethanol
(3) Ether (4) All of these

63. The plots of $\frac{1}{x_A}$ vs $\frac{1}{y_A}$ (where x_A and y_A are the mole fraction of liquid A in liquid and vapour phase respectively) is linear with slope and intercepts respectively
(1) $\frac{P_A^\circ}{P_B^\circ}$ and $\frac{(P_A^\circ-P_B^\circ)}{P_B^\circ}$
(2) $\frac{P_A^\circ}{P_B^\circ}$ and $\frac{(P_B^\circ-P_A^\circ)}{P_B^\circ}$
(3) $\frac{P_B^\circ}{P_A^\circ}$ and $\frac{(P_A^\circ-P_B^\circ)}{P_B^\circ}$
(4) $\frac{P_B^\circ}{P_A^\circ}$ and $\frac{(P_B^\circ-P_A^\circ)}{P_B^\circ}$

64. The mass ratio of Ca and Al deposited during the passage of same current through their molten salts
(1) 20 : 9 (2) 9 : 20
(3) 40 : 27 (4) 27 : 40

65. If $E^\circ_{Fe^{2+}/Fe}=-0.441\,V$ and $E^\circ_{Fe^{3+}/Fe^{2+}}=0.771\,V$, the standard emf of the reaction $Fe+2Fe^{3+}\longrightarrow 3Fe^{2+}$ will be
(1) –1.212 V (2) 1.212 V
(3) 0.33 V (4) –0.33 V

66. The activation energies of two reactions are E_a and E_a' with $E_a > E_a'$. If the temperature of the reacting systems is increased from T_1 to T_2, which of the following is true? K and K′ are rate constant at lower and higher temperature.

(1) $\frac{K_1'}{K_1} = \frac{K_2'}{K_2}$

(2) $\frac{K_1'}{K_1} < \frac{K_2'}{K_2}$

(3) $K_1 < K_2$ and $K_1' < K_2'$

(4) $K_1 > K_2$ and $K_1' > K_2'$

67. Half lives of a first order and zero order reaction are same. Then the ratio of the initial rates of the first order reaction to that of zero order reaction is

(1) 2×0.693 (2) $\frac{0.693}{2}$

(3) 0.693 (4) $\frac{1}{0.693}$

68. The Langmuir adsorption isotherm is deduced using the assumption

(1) The adsorption takes place in multilayers

(2) It is reversible in nature

(3) The adsorption sites are equivalent in their ability

(4) The adsorb molecules interact with each other

69. The pH of H_2O_2 solution is 6 when some Cl_2 gas is bubble through it

(1) pH increases (2) pH decreases

(3) pH remains same (4) H_2 gas is liberated

70. Which of the following carbonates decomposes at the highest temperature?

(1) $CaCO_3$ (2) $MgCO_3$

(3) $SrCO_3$ (4) $BaCO_3$

71. One of the following metals forms a volatile compound and this property is taken advantage for its extraction. This metal is

(1) Fe (2) Co

(3) Ni (4) Cs

72. Which of the following substances is soluble in NaOH solution?

(1) $Al(OH)_3$ (2) $Cu(OH)_2$

(3) $Fe(OH)_3$ (4) $Cr(OH)_3$

73. The number of P–O–P and P–O–H bonds present respectively, in pyrophosphoric acid molecule is

(1) 1, 2 (2) 2, 2

(3) 1, 4 (4) 2, 4

74. ClO_3^- ion reacts with I_2 to form

(1) ClO_4^- (2) IO_3^- and Cl_2

(3) ICl and O_2 (4) ICl and O_3

75. Which one of the following characteristics of the transition metal is associated with their catalytic activity?

(1) Paramagnetic behaviour

(2) Variable oxidation state

(3) High enthalpy of atomisation

(4) Vacant *d*-orbital

76. Which of the following is correct value of x in Cr(CO)x?

(1) 6 (2) 4

(3) 2 (4) Both (1) & (2)

77. Dimethyl glyoxime reagent is used as co-ordinating reagent in the quantitative estimation of

(1) Cu (2) Pd

(3) Fe (4) Ni

78. $CH_3Br + \bar{N}u \longrightarrow CH_3 - Nu + Br^-$

The decreasing order of the rate of the above reaction with nucleophiles $(\bar{N}u)$

(1) $CH_3O^- > \bar{O}H > AcO^- > PhO^-$

(2) $CH_3O^- > \bar{O}H > PhO^- > AcO^-$

(3) $PhO^- > AcO^- > \bar{O}H > CH_3O^-$

(4) $AcO^- > CH_3O^- > \bar{O}H > CH_3O^-$

79. Reaction intermediate in E_1 CB reaction is

(1) Free radical (2) Benzyne

(3) Carbanion (4) Carbocation

80. Which one of the following configuration is chiral?

(1) Twist boat (2) Chair

(3) Boat (4) Rigid

81. The reaction of butene with HOCl proceeds via the addition of

(1) H^+ in the first step (2) Cl^+ in the first step

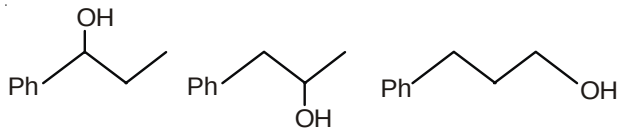
(3) ClO^- in the first step (4) OH^- in the first step

82. Alkyl halides react with dialkyl lithiumcuprate to give

(1) Alkynes (2) Alkenes

(3) Alkanes (4) Alkyl copperhalide

83. Which of the following is correct order of ease of acid dehydration?



(I) (II) (III)

(1) I > II > III (2) II > III > I

(3) III > II > I (4) II > I > III

84. Which of the following does not give Fehling solution test?

(1) Formic acid (2) Benzaldehyde

(3) Formaldehyde (4) Both (1) & (2)

85. The increasing orders of the rate of HCN addition to the following compound

A. Formaldehyde

B. Acetone

C. Acetophenone

D. Benzophenone

(1) A < B < C < D (2) A < C < B < D

(3) D < C < B < A (4) D < B < C < A

86. Which of the following acid has lowest pK_a?

(1) $CH_2 = CH - CH_2 - COOH$

(2) $CH_3 - CH_2 - CH_2 - COOH$

(3) $CH \equiv C - CH_2 - COOH$

(4) $CH \equiv C - COOH$

87. The compound that will react most readily with NaOH to form methanol is

(1) $(CH_3)_4\overset{+}{N}I^-$ (2) $CH_3 - O - CH_3$

(3) $(CH_3)_3Br$ (4) $CH_3 - NH_2$

88. Starch upon hydrolysis produces

(1) Sucrose (2) Glucose

(3) Fructose (4) All of these

89. Which of the following polymers is prepared by condensation polymerisation?

(1) Teflon (2) Polystyrene

(3) Dacron (4) Natural rubber

90. A broad spectrum antibiotic is

(1) Paracetamol (2) Penicillin

(3) Chloramphenicol (4) Aspirin

[BOTANY & ZOOLOGY]

91. Select the wrong statements

i. Lower the taxon, more are the characteristic that the members within the taxon share.

ii. Order is the assemblage of genera which exhibits a few similar characteristics.

iii. Cat and dog are included in the same family felidae

iv. Taxonomical known species ranges between 1.7-1.8 million

(1) (ii) and iii (2) (i) and (ii)

(3) (i) and iv (4) (ii) and (iv)

92. Which of the following is correctly sequenced?

(1) Phylum, order, class, genus

(2) Phylum, class, order, family

(3) Phylum, order, family, class

(4) Phylum, order, class, family

93. Match the following columns and choose the correct combination from the given option

Column I (Kingdom)	**Column II (Class)**
a. Plantae	(i) Archaebacteria
b. Fungi	(ii) Euglenoids
c. Protista	(iii) Phycomycetes
d. Monera	(iv) Algae

(1) a(iv), b(iii), c(ii), d(i) (2) a(i), b(iii), c(ii), d(iv)

(3) a(ii), b(i), c(iv), d(iii) (4) a-(ii), b(iii), c(i), d(iv)

94. Which of the following correctly represents the type of life cycle pattern from the option given below?

A. Zygote → sporophyte → Gametogenesis → Meiosis → Syngamy

B. Zygote → Meiosis → Spores → Gametophyte → Gametogenesis → Syngamy

C. Zygote → Sporophyte → Meiosis → Spores → Gametophyte → Gametogenesis → Syngamy

(1) A-Diplontic, B-Haplontic, C-Haplodiplontic

(2) A-Diplontic, B-Haplodiplontic, C-Haplontic

(3) A-Haplontic, B-Diplontic, C-Haplodiplontic

(4) A-Haplontic, B-Haplodiplontic, C-Diplontic

95. Scutellum in caryopsis represents

(1) A cotyledon

(2) Protective sheath of plumule

(3) Innermost layer of endosperm

(4) The point of attachment of seed to ovary

96. The ––(A)–– in the shoot system are ––(B)–– branched or unbranched structure and help in preventing loss due to —(C)—

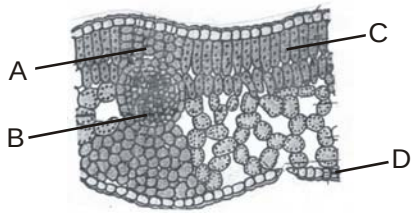
(1) A–Trichomes, B-multicellular, C–transpiration

(2) A–Guard cell, B–unicellular, C–gaseous exchange

(3) A–Guard cell, B–multicellular, C–transpiration

(4) A–Trichome, B–unicellular, C–guttation

97. Examine the figure given below and select the right option for labelling



(1) A-Bundle sheath extensions, B-Phloem, C-Palisade mesophyll, D-Abaxial epidermis

(2) A-Bundle sheath, B-Xylem, C-Spongy mesophyll, D-Abaxial epidermis

(3) A-Phloem, B-Bundle sheath, C-Palisade mesophyll, D-Cuticle

(4) A-Xylem, B,Phloem, C-Palisade mesophyll, D-Adaxial epidermal

98. Read the following statements and find the correct answer

(a) In root, endodermis is single layered of barrel shaped cells with tangential as well as radial walls suberized

(b) Initiation of lateral roots and vascular cambium during secondary growth, both in dicot and monocot root takes place in pericycle

(c) Products of phellogen are suberized cells and parenchymatous cells

(d) Heartwood does not conduct water but gives mechanical support

(e) In isobilateral leaf, bulliform cells are modification of certain abaxial epidermal cell into large, empty and colourless cells

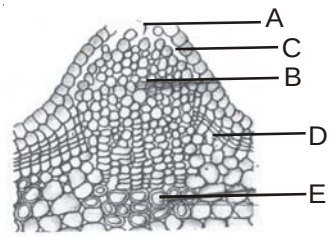
(1) a, b & c are correct

(2) b, c & d are correct

(3) c, d & e are correct

(4) a, c & d are correct

99. Choose the correct combination of labelling in the following diagram



(1) A-Pore, B-Secondary cortex, C-Cork cambium, D-Epidermis, E-Complementary cells

(2) A-Pore, B-Cork cambium, C-Epidermis, D-Secondary cortex, E- Complementary cells

(3) A-Pore, B-Complementary cells, C-Epidermis, D-Cork cambium, E-Secondary cortex

(4) A-Pore B-Cork cambium, C-Epidermis, D-Complementary cell, E-Secondary cortex

100. A. Eukaryotic cells (human cell) undergo division approx every 24 hours

B. Yeast completes its cell cycle in 90 minutes

C. Events of cell cycle are not genetically controlled

D. The Stage between meiotic I and meiotic II is called Interphase and is short duration

(1) A & B are correct but C & D are incorrect

(2) C & D are correct but A & B are incorrect

(3) A & C are correct but B & D are incorrect

(4) A & C are incorrect but B & D are correct

101. Find the **incorrect** statement w.r.t. cell cycle

(1) Cell growth in terms of cytoplasmic increase occurs continuously

(2) DNA synthesis occurs at a specific stage in cell cycle

(3) Replicated DNA are distributed in daughter nuclei by a series of events

(4) The phase of cell cycle in which cells do not undergo division and exit cell cycle is called dormant stage

102. Select **correct** match

(a)	Synaptonemal complex	(i)	Diplotene
(b)	Appearance of recombination nodules	(ii)	Diakinesis
(c)	Chiasmata structure	(iii)	Zygotene
(d)	Terminalization of chiasmata	(iv)	Pachytene

(1) a(iii), b(iv), c(i), d(ii) (2) a(iii), b(iv), c(ii), d(i)

(3) a(iv), b(iii), c(ii), d(i) (4) a(ii), b(iii), c(iv), d(i)

103. Select the **incorrect** statement from the following

(1) The chloroplast are generally much larger than mitochondria

(2) Both chloroplast and mitochondria are semiautonomous organelles

(3) Membraneless cell organelle is/are found only in prokaryotic cell

(4) Peroxiosome is the site of photorespiration

104. Match the following and select correct combination from the option given below

Cell organelles	**Function**
A. Endoplasmic reticulum	(i) Respiration
B. Free ribosome	(ii) Osmoregulation
C. Mitochondria	(iii) Synthesis of lipid
D. Contractile Vacuole	(iv) Synthesis of non secretory protein

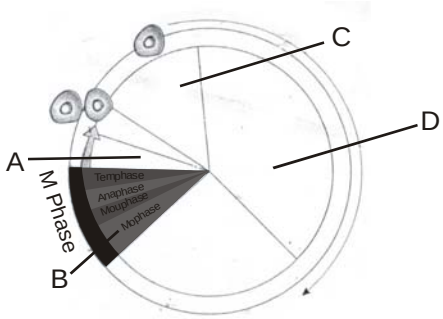
(1) A(iii), B(iv), C(i), D(ii)

(2) A(i), B(ii), C(iv), D(iii)

(3) A(iii), B(ii), C(iv) D (iii)

(4) A(ii), B(ii), C(iii), D(iv)

105. Identify A, B, C and D in given figure of cell cycle.



(1) A-G_0, B-Prophase, C-G_1, D-S

(2) A-Cytokinesis, B-Prophase, C-G_1, D-S

(3) A-Prophase, B-Metaphase, C-G_0, D-G_1

(4) A-G_1, B-Cytokinesis, C-G_1, D-S

106. Which of the following is immobile element?

(1) Nitrogen

(2) Potassium

(3) Calcium

(4) Phosphorus

107. Which statement is **incorrect?z**

A. In fully turgid cell DPD is zero

B. Plasmolysis is a result of endosmosis

C. Transpiration pull and cohesive force theory for ascent of sap was proposed by Munch

D. The water loss in guttation is in liquid form

(1) A and B are correct but C and D are incorrect

(2) A and B are incorrect but B and C are correct

(3) A and D are correct but B and C are incorrect

(4) A and D are incorrect but B and C are correct

108. A. Cyclic photophorylation links to PSI

B. Sunken stomata are found in maize plant

C. The first CO_2 acceptor in C_4 plants is RUBP and the second is PEP

D. Synthesis of one molecule of glucose requires $6CO_2$, 18ATP and 12 $NADPH_2$ in C_3 plants

(1) A and D are correct (2) B and C are correct

(3) A and C are correct (4) B and D are correct

109. Choose the **incorrect** option

(1) Light reaction includes photolysis of water, reduction of NADP and phosphorylation

(2) PS II participates in non cyclic flow of electrons

(3) PS I is associated with photolysis of water

(4) The reaction centre is P700 in PSI

110. A. The classical experiment on coleoptile of canary grass was performed by Charles Darwin

B. Auxin was isolated by F.W. Went

C. Ethylene acts as growth promoter as well as growth inhibitor

D. Cytokinin causes bolting effect

E. Primary growth in plant is due to lateral meristem

(1) A, B & C are correct

(2) A, B & D are correct

(3) B, D & E are incorrect

(4) B, D & A are correct

111. Select the **incorrect** statement

(1) The RQ value for fat is 0.7 and for protein is 0.9

(2) The link in between Kreb's cycle and glycolysis is malic acid

(3) One glucose molecule yields a net gain of 2ATP during fermentation

(4) The scheme of glycolysis is also called E.M.P. palhway

112. Match the items in column A and B and give **correct** answer

Column A	**Column B**
a. 3 C compound	(i) Acetyl CoA
b. 5 C compound	(ii) Pyruvate
c. 2 C compound	(iii) Ketoglutaric acid
d. 4 C compound	(iv) Malic acid

(1) a(i), b(ii), c(iv), d(iii) (2) a(ii), b(iii), c(i), d(iv)

(3) a(iv), b(iii), c(ii), d(i) (4) a(ii), b(i), c(iii) d(iv)

113. A. Maximum amount of energy (ATP) is liberated on oxidation of fat

B. Correct sequence of cytochrome-electron acceptor in mitochondrial ETS is cyt-b, c, a, a_3

C. Glycolysis is related only to fermentation

D. Net gain of ATP in eukaryotes is 38 and in prokaryotic cell is 36ATP

(1) A & B are correct but C & D are incorrect

(2) A & B are incorrect but C & D are correct

(3) A & D are correct but C & B are incorrect

(4) A & C are incorrect but C & D are correct

114. Match the following

Column I	**Column II**
a. Ovule	(i) Megasporangium
b. Embryosac	(ii) Female gametophyte
c. Stamen	(iii) Microsporophyll
d. Carpel	(iv) Megasporophyll

(1) a(i), b(ii), c(iii), d(iv) (2) a(i), b(iii), c(ii), d(iv)

(3) a(ii), b(iii), c(i), d(iv) (4) a(iv), b(i), c(ii), d(iii)

115. What will be ploidy of cell of female gametophyte, megaspore, MMC and nucellus respectively in flowering plant?

(1) n, n, 2n, n (2) 2n, n, n, 2n

(3) n, n, 2n, 2n (4) 2n, 2n, 2n, 2n

116. Pollination occurs in

(1) Few bryophytes and all angiosperms

(2) Pteridophytes and angiosperms

(3) Angiosperms and gymnosperms

(4) Fungi and angiosperm

117. A mother in a family of five daughters is expecting her sixth baby. The chance of its being a son is

(1) Zero (2) 25%

(3) 50% (4) 100%

118. ABO blood group system shows
(1) Quantitative inheritance
(2) Incomplete dominance
(3) Multiple allelism
(4) Epistasis

119. Cross between AaBB and aaBB will form
(1) 1AaBB : 1 aaBB (2) All AaBB
(3) 3AaBB : 1aaBB (4) 1AaBB : 3aaBB

120. If a colour-blind woman marries a normal visioned man, their son will be
(1) One half colour-blind and one half normal
(2) Three forth colour-blind and one fourth normal
(3) All colour-blind
(4) All normal

121. During DNA replication, the strands separate by
(1) DNA polymerase (2) Gyrase
(3) Topoisomerase (4) Helicase/unwindase

122. If a double stranded radioactive DNA molecule undergoes two rounds of replication in a non radioactive medium then
(1) Half the DNA molecules contain no radioactivity
(2) All the four DNA molecules still contain radioactivity
(3) Three out of four contain radioactivity
(4) Radioactivity is lost from all the four molecules

123. Three codons causing chain termination are
(1) TAG, TAA, TGA (2) GAT, AAT, AGT
(3) AGT, TAG, UGA (4) UAG, UGA, UAA

124. Match the following

Column-I	**Column-II**
a. Himgiri	(i) Rice
b. Ratna	(ii) Okra
c. Pusa Komal	(iii) Wheat
d. Parbhani Kranti	(iv) Cow pea

(1) a(i), b(ii), c(iii), d(iv) (2) a(iii), b(i), c(iv), d(ii)
(3) a(iv), b(iii), c(ii), d(i) (4) a(ii), b(iii), c(i), d(iv)

125. Breeding of crops with high levels of minerals, vitamin and protein is called
(1) Biomagnification
(2) Somatic hybridization
(3) Biofortification
(4) Micropropagation

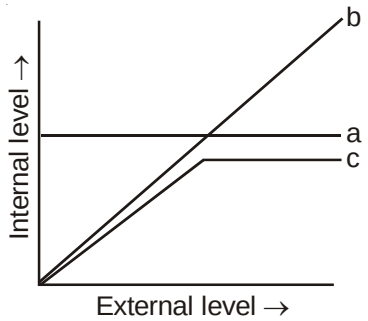
126. Select the **incorrect** pair
(1) Cyclosporin – Immunosuppressive agent
(2) Statins – *Monascus purpureus*
(3) *Aspergillus niger* – Lactic acid
(4) Streptokinase – Clot buster

127. A. The greater the BOD of waste water, more is its polluting potential
B. Fusion of isolated protoplast from two different varieties of plants to form new plant is called microporopagation
(1) Both A & B are correct
(2) Only A is correct
(3) Both A & B are incorrect
(4) Only B is correct

128. Which one is **correct** statement?
(1) In commensalism none of the interacting population affect each other
(2) Symbiosis when the interaction is useful to both the population
(3) Symbiosis when neither population affects each other
(4) Commensalism when the interaction is useful to both the organisms

129. Select the **incorrect** option as adaptation to with cope variation in environment in desert lizards
(1) Burrowing in soil to escape high temperature
(2) Losing heat rapidly from the body during high temperature
(3) Bask in sun when temperature is low
(4) Lack physiological means of temperature regulation

130. The figure represents response of organisms to abiotic factors. What do a, b and c represent respectively?



	a	b	c
1.	Conformer	Regulator	Partial regulator
2.	Regulator	Partial regulator	Conformer
3.	Partial regulators	Regulator	Conformer
4.	Regulator	Conformer	Partial regulator

131. Which statement is **incorrect?**
(1) Pyramid of number in grassland is always upright
(2) Pyramid of numbers in pond is upright
(3) Pyramid of energy can be upright or inverted
(4) Xerophytes have sunken stomata

132. Which of the following statements is **correct**?
(1) Accelerated species loss is observed in biodiversity hotspot
(2) Seed bank is an example of *ex-situ* conservation
(3) Eutrophication is often seen in desert
(4) Fishes comprises the highest number of endangered species

133. Choose the right option for given below statements
A. Praying mantis is a good example of mimicry
B. Large woody vines are more commonly found in mangroves
(1) A and B are correct
(2) A and B are incorrect
(3) Only A is correct
(4) Only B is correct

134. In Greenhouse effect warming is due to
(1) Infra red rays reaching earth
(2) Ozone layer of atmosphere
(3) Moisture layer in atmosphere
(4) Increase in CO_2 concentration in atmosphere

135. Choose the right option from given below statements.
A. Limit of BOD prescribed by central pollution control board for the discharge of Industrial and municipal waste water into natural source of water is < 10 ppm
B. The logistic population growth is expressed by the equation $dt/dN = Nr\left(\frac{K-N}{K}\right)$
(1) A and B both incorrect
(2) A and B both are correct
(3) Only A is correct
(4) Only B is correct

136. The body of an organism is divisible into two equal halves by any plane passing through the central axis. Such type of symmetry is seen in
(1) *Spongilla* (2) *Hydra*
(3) Crab (4) *Pila*

137. Find the **correct** match between the two columns as

	Scientific Name		**Common Name**
(1)	*Euspongia*	-	Fresh water sponge
(2)	*Meandrina*	-	Staghorn coral
(3)	*Nereis*	-	Clamworm
(4)	*Neophron*	-	Parrot

138. Choose the **incorrect** statement from the following w.r.t. animal tissue
(1) The most widely distributed tissue in our body is connective tissue
(2) The structure of cells varies according to their functions
(3) Ligament is a type of dense irregular connective tissue
(4) Blood is a specialised connective tissue

139. Compound epithelium is present in
(1) Pharynx
(2) Walls of blood vessels
(3) Stomach and intestine
(4) Bronchioles and fallopian tubes

140. Consider the following statements w.r.t. muscle tissue and neural tissue. Choose the **correct** option
(A) Skeletal muscle tissue is closely attached to skeletal bones
(B) The smooth muscle fibres taper at both ends and do not show striations
(C) Cardiac muscle tissue is a contractile tissue present only in the heart
(D) Neuroglia make up more than one-half of the volume of neural tissue in our body
(1) (A), (B), (C) & (D) (2) (A), (B) & (C)
(3) (A) & (B) (4) (B), (C) & (D)

141. In *Periplaneta*, abdomen of male and female consists of
(1) 9 & 10 segments respectively
(2) 10 & 9 segments respectively
(3) 10 segments
(4) 9 segments

142. In cockroach, which of the following are 13 in number?
(A) Chambers of heart
(B) Number of moultings
(C) Number of oothecae
(D) Number of Alary muscles
(1) (A), (B), (C) & (D) (2) (A), (B) & (C)
(3) (A) & (B) (4) (B), (C) & (D)

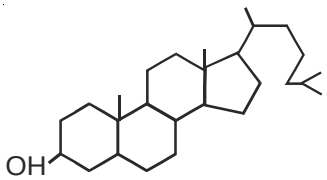
143. The vision in cockroach are

(1) Mosaic vision with less resolution and more sensitivity

(2) Binocular vision with less resolution and more sensitivity

(3) Mosaic vision with less sensitivity and more resolution

(4) Binocular vision with less sensitivity and more resolution

144. 

The above structure represents

(1) Phospholipid (2) Cholesterol

(3) N-base (4) Triglyceride

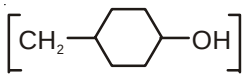
145. Which of the following is a toxic secondary metabolite?

(1) Morphine (2) Vinblastin

(3) Abrin (4) Concanavalin

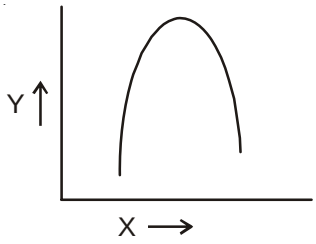
146. Choose the **incorrect** statement w.r.t. the structure of the following biomolecules

(1) Cellulose does not contain complex helices and hence cannot hold I_2

(2)  is the variable group in tyrosine

(3) In nucleic acids a phosphate moiety links the 3′ carbon of one sugar of one nucleotide to the 5′ carbon of the sugar of the succeeding nucleotide

(4) The pitch of B-DNA is 3.4 Å

147. 

The graph given above represents enzyme activity versus

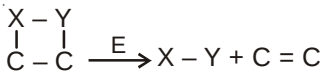
(1) pH

(2) Temperature

(3) Concentration of substrate

(4) Both (1) & (2)

148. The type of enzymes that catalyse removal of groups from substrates by mechanism other than hydrolysis leaving double bonds are



(1) Hydrolases (2) Lyases

(3) Ligases (4) Transferases

149. The condition in which food is not properly digested leading to a feeling of fullness is called

(1) Constipation (2) Indigestion

(3) Vomiting (4) Diarrhoea

150. Which of the following lung volumes or lung capacities cannot be measured by a spirometer?

(1) RV (2) FRC

(3) TLC (4) All of these

151. Sudden stoppage of beating of heart in which ECG waves disappear, leading to the death of a person is called

(1) Myocardial infarction

(2) Cardiac arrest

(3) Heart block

(4) Cardiac failure

152. Which of the following is not the function of kidneys?

(1) pH and ionic balance

(2) Excretion and osmoregulation

(3) Erythropoiesis and maintenance of blood pressure

(4) None of these

153. Choose the **incorrect** statement w.r.t. muscular and skeletal system

(1) Endoplasmic reticulum of the muscle fibres is the store house of calcium ions

(2) In the resting state a subunit of troponin masks the active binding sites for myosin on the actin filaments

(3) Axial skeleton comprises of 126 bones distributed along the main axis of the body

(4) Tetany refers to the rapid spasms in muscle due to low Ca^{2+} in body fluids

154. The limbic system is present in the inner parts of cerebral hemispheres and a group of associated deep structures like amygdala and hippocampus. It is a part of

(1) Fore brain (2) Mid brain

(3) Hind brain (4) Both (1) & (2)

155. Which of the following is/are functions of pineal gland?

(1) 24 hour cycle and menstrual cycle

(2) Pigmentation and metabolism

(3) Defence mechanism

(4) All of these

156. Menstrual cycle occurs in

(1) Monkeys (2) Apes

(3) Humans (4) All of these

157. Choose the **incorrect** statement w.r.t. testes

(1) Each testis is covered by a dense covering and has about 250 compartments called testicular lobules

(2) Each seminiferous tubule is lined by two types of cells called male germ cells and sertoli cells

(3) The regions outside the seminiferous tubules known as the interstitial spaces, contain small blood vessels and interstitial cells or leydig cells

(4) Sertoli cells synthesise and secrete testicular hormones called androgens

158. For normal fertility, at least

(1) 60% sperms must have normal shape and size and at least 40% of them must show vigorous motility

(2) 50% sperms must have normal shape and size and at least 40% of them must show vigorous motility

(3) 60% of sperms must have normal shape and size and at least 50% of them must show vigorous motility

(4) 40% of sperms must have normal shape and size and at least 60% of them must show vigorous motility

159. Choose the **correct** order of stages of embryonic development in human beings.

(a) Formation of limbs and digits

(b) Formation of heart

(c) Formation of external genital organs

(d) External movements of foetus

(e) Body covered by fine hair

(1) (a), (b), (c), (d), (e)

(2) (a), (c), (b), (d), (e)

(3) (b), (c), (d), (e), (a)

(4) (b), (a), (c), (d), (e)

160. "Once a week" pill has very few side effects and a high contraceptive value. It is

(1) A non-steroidal preparation

(2) Commonly called Saheli

(3) It is a minipill

(4) All of these

161. Intentional or voluntary termination of pregnancy before full term is called medical termination of pregnancy (MTP) or induced abortion. Choose the **incorrect** statement w.r.t. MTP.

(1) Nearly 45-50 million MTPs are performed in a year all over the world

(2) Government of India legalised MTP in 1971 with some strict conditions to avoid its misuse

(3) Majority of the MTPs are performed illegally by unqualified quacks

(4) MTP is legalised in India for female foeticide

162. Which of the following is **not** an example of ART?

(1) IVF (2) ZIFT

(3) PID (4) GIFT

163. Which of the following represents conditions conducive for the origin of life?

(1) Low temperature, volcanic storms, reducing atmosphere containing CH_4, NH_3 etc.

(2) High temperature, volcanic storms, reducing atmosphere containing CH_4, NH_3 etc.

(3) High temperature, volcanic storms, oxidizing atmosphere containing CH_4, NH_3 etc.

(4) Low temperature, volcanic storms, oxidizing atmosphere containing CH_4, NH_3 etc.

164. Which of the following is an example of divergent evolution?

(1) Eye of octopus and eye of mammals

(2) Flippers of Penguins and Dolphins

(3) Sweet potato and potato

(4) Thorn of bougainvillea and tendrils of cucurbita

165. Choose the **incorrect** statement w.r.t. the five factors know to affect Hardy Weinberg equilibrium

(1) There would be a gene flow if this gene migration happens multiple times

(2) If the same change occurs by chance, it is called genetic drift

(3) Genetic drift occurs in a large population

(4) Sometimes the change in allele frequency is so different in the new sample of population that they become different species

166. Find the **incorrect** match w.r.t. origin and evolution of man
(1) *Dryopithecus* — More ape-like
(2) *Australopithecus* — East African grassland
(3) *Homo habilis* — Cranial capacity of 900cc
(4) *Homo erectus* — Probably ate meat

167. Choose the **correct** option w.r.t. typhoid fever in human beings
(1) The pathogens generally enter the large intestine through food and water
(2) Sustained low grade fever (356.37°C) with diarrhoea and excessive hunger are some of the symptoms
(3) Intestinal perforation and death may occur in severe cases
(4) *Salmonella typhi* does not enter blood or migrate to internal organs

168. Fertilisation and development of *Plasmodium* takes place in
(1) Human liver
(2) RBC
(3) Stomach of mosquito
(4) Salivary gland of mosquito

169. Choose the **incorrect** option w.r.t. causative organism and site of infection
(1) *Entamoeba* — Large intestine
(2) *Ascaris* — Small intestine
(3) *Wuchereria* — Capillaries of the lower limbs
(4) Ringworm — Skin

170. Choose the **correct** option w.r.t. acquired immunity
(1) Mucus coating of the epithelium lining the respiratory tract
(2) Acid in stomach
(3) PMNL cells
(4) B and T lymphocytes

171. Which of the following statements is **incorrect** about AIDS?
(1) Caused by Human Immunodeficiency Virus
(2) HIV is a retrovirus with RNA genome
(3) Incubation period may vary from a few months to many years
(4) T-lymphocytes act as the factory of HIV

172. Cancer can be caused by
(1) Physical, chemical and biological agents called carcinogens
(2) Ionising radiations like X-rays and gamma rays
(3) Oncogenic viruses
(4) All of these

173. Find the **incorrect** match w.r.t. drugs
(1) Opioids — Morphine
(2) Cannabinoids — Marijuana
(3) Coca alkaloids — Atropine
(4) LSD — *Claviceps purpurea*

174. The practice of mating of animals within the same breed but having no common ancestors on either side of their pedigree upto 4-6 generations is known as
(1) Inbreeding
(2) Outcrossing
(3) Cross-breeding
(4) Interspecific hybridisation

175. In 1972, Stanley Cohen and Herbert Boyer accomplished
(1) The construction of the first recombinant DNA by linking a gene encoding for antibiotic resistance
(2) Discovery of restriction endonuclease
(3) Discovery of bacteriophage in bacteria
(4) Both (1) & (2)

176. Mark the **incorrect** option
(1) *Pst* I — *Providencia stuartii*
(2) *Eco*RI — *Escherichia coli*
(3) *Pvu* II — *Proteus vulgaris*
(4) rop — Restriction of plasmid

177. Which of the following is **true** about PCR?
(1) Denaturation occurs at low temperature
(2) Annealing is the addition of primer to one strand only
(3) Extension is polymerisation with the help of DNA polymerase and deoxyribonucleotides
(4) In 'n' cycles, '2n' molecules of DNA are formed

178. CryZAC provides protection against
(1) Cotton bollworm (2) Corn borer
(3) Armyworm (4) Both (1) & (2)

179. First clinical gene therapy, given in 1990 to a 4 year old girl was for
(1) ADA deficiency (2) Leukemia
(3) Type I-diabetes (4) Phenylketonuria

180. In 1997, the first transgenic cow produced human protein enriched milk. It was called
(1) ANDI (2) Rosie
(3) Dolly (4) Polly