



All India Test Series (2023-24)

AIMS TEST - 01

ARJUNA NEET

DURATION: 200 Minutes

DATE: 29/10/2023

M. MARKS: 720

ANSWER KEY

PHYSICS

SECTION-A

1. (1)	8. (2)	15. (1)	22. (4)	29. (4)
2. (4)	9. (2)	16. (3)	23. (2)	30. (4)
3. (4)	10. (2)	17. (3)	24. (3)	31. (3)
4. (2)	11. (1)	18. (4)	25. (3)	32. (1)
5. (2)	12. (3)	19. (2)	26. (2)	33. (2)
6. (2)	13. (3)	20. (2)	27. (2)	34. (1)
7. (3)	14. (3)	21. (2)	28. (3)	35. (1)

SECTION-B

36. (4)	39. (1)	42. (1)	45. (2)	48. (2)
37. (3)	40. (3)	43. (2)	46. (4)	49. (3)
38. (1)	41. (2)	44. (2)	47. (2)	50. (2)

CHEMISTRY

SECTION-A

51. (4)	58. (3)	65. (3)	72. (2)	79. (2)
52. (4)	59. (2)	66. (1)	73. (4)	80. (2)
53. (3)	60. (4)	67. (3)	74. (1)	81. (4)
54. (4)	61. (1)	68. (4)	75. (3)	82. (1)
55. (4)	62. (2)	69. (2)	76. (1)	83. (1)
56. (3)	63. (1)	70. (1)	77. (2)	84. (1)
57. (3)	64. (4)	71. (4)	78. (2)	85. (3)

SECTION-B

86. (4)	89. (3)	92. (3)	95. (4)	98. (1)
87. (1)	90. (1)	93. (2)	96. (1)	99. (2)
88. (3)	91. (2)	94. (4)	97. (2)	100. (1)

BOTANY

SECTION-A

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

SECTION-B

136. (4)	139. (2)	142. (3)	145. (1)	148. (2)
137. (1)	140. (3)	143. (1)	146. (3)	149. (3)
138. (1)	141. (1)	144. (1)	147. (2)	150. (4)

ZOOLOGY

SECTION-A

151. (4)	158. (3)	165. (2)	172. (2)	179. (1)
152. (1)	159. (4)	166. (3)	173. (2)	180. (3)
153. (2)	160. (3)	167. (4)	174. (1)	181. (2)
154. (1)	161. (2)	168. (2)	175. (1)	182. (3)
155. (2)	162. (2)	169. (4)	176. (3)	183. (2)
156. (2)	163. (2)	170. (2)	177. (2)	184. (2)
157. (3)	164. (1)	171. (2)	178. (2)	185. (3)

SECTION-B

186. (4)	189. (4)	192. (2)	195. (1)	198. (2)
187. (4)	190. (2)	193. (3)	196. (2)	199. (4)
188. (3)	191. (2)	194. (1)	197. (4)	200. (4)

Hints and Solution

PHYSICS

SECTION-A

1. (1)

$$F_{\text{net}} = \sqrt{F^2 + F^2 + 2F^2 \cos(240^\circ)} = F$$

Magnitude of the resultant will be F .

$$\text{So, } \frac{xF}{2} = F \Rightarrow x = 2$$

(NEW NCERT; Class 11th; Page No.-34)

2. (4)

$$y = x - \frac{x^2}{25}$$

$$\text{as, } y = x \tan \theta \left[1 - \frac{x}{R} \right] \dots (1)$$

$$y = x \left(1 - \frac{x}{25} \right) \dots (2)$$

From eqn (1) and (2)

$$\tan \theta = 1, R = 25$$

$$\theta = 45^\circ$$

$$\text{Now, } \frac{u^2 \sin 2\theta}{g} = 25$$

$$u = 5\sqrt{10} \text{ m/s}$$

$$\text{And } H_{\text{max}} = \frac{u^2 \sin^2 \theta}{2g}$$

$$= \frac{250 \times \sin^2 45}{20}$$

$$= \frac{25}{4} \text{ m.}$$

(NEW NCERT; Class 11th; Page No.-39)

3. (4)

$$\text{Area} = lb = (40.4)(20.25) = 818.10 \text{ m}^2$$

After rounding off to correct significant figure
= 818 m²

(NEW NCERT; Class 11th; Page No.-5)

4. (2)

L.C of main scale of screw gauge = 1 mm

$$\text{L.C} = \frac{\text{Pitch}}{\text{number of divisions on circular scale}}$$

$$\text{L.C} = \frac{P}{N} \Rightarrow N = \frac{P}{\text{L.C}}$$

$$P = 1 \text{ mm} = 1 \times 10^{-3} \text{ m}$$

$$\text{L.C} = 5 \times 10^{-6} \text{ m}$$

$$\Rightarrow N = 200$$

$$\Rightarrow N = 2x^2 = 200$$

$$x = 10$$

5. (2)

Two forces are perpendicular to each other therefore resultant of the two forces is

$$R = \sqrt{T^2 + T^2} \text{ and } T = F$$

$$= T\sqrt{2} = F\sqrt{2}$$

(NEW NCERT; Class 11th; Page No.-58)

6. (2)

$$\text{Given } v = 2\sqrt{x}$$

We know that $\frac{dx}{dt} = v$

$$\therefore \frac{dx}{dt} = 2\sqrt{x} \Rightarrow \int_0^x \frac{dx}{\sqrt{x}} = \int_0^t 2dt$$

$$\left. \frac{x^{-\frac{1}{2}+1}}{-\frac{1}{2}+1} \right|_0^x = 2t \Rightarrow 2(\sqrt{x} - \sqrt{0}) = 2t$$

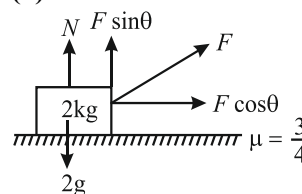
$$\sqrt{x} = t \Rightarrow x = t^2$$

$$v = \frac{dx}{dt} = \frac{d}{dt} t^2$$

$$\therefore v = 2t$$

(NEW NCERT; Class 11th; Page No.-14)

7. (3)



From F.B.D of Block we get $N = mg - F \sin \theta$

$$\text{and } F \cos \theta = \mu N$$

$$\text{So, } F = \frac{\mu mg}{\cos \theta + \mu \sin \theta} \dots (1)$$

$$\text{For F to be minimum } \frac{dF}{d\theta} = 0$$

$$\text{Which gives } \tan \theta = \mu \dots (2)$$

From eqn (1) and (2) we get

$$F_{\text{min}} = \frac{\mu mg}{\sqrt{1 + \mu^2}}$$

$$F_{\text{min}} = \frac{\frac{3}{4} \times 2 \times 10}{\sqrt{1 + \left(\frac{3}{4}\right)^2}} = 12 \text{ N}$$

(NEW NCERT; Class 11th; Page No.-60)

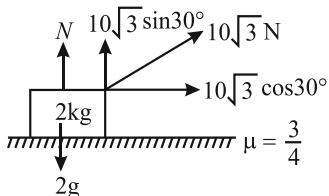
8. (2)
Initial velocity
$$v = \frac{dx}{dt} = 2 + (3 \times 2(t-2)) = 2 + 6t - 12$$
$$v = 6t - 10$$
At $t = 0 \Rightarrow v = -10 \text{ m/s}$
Acceleration:
$$a = \frac{dv}{dt} = 6 \text{ m/s}^2$$

Position of particle at $t = 0$:
$$x = 2(0-1) + 3(0-2)^2$$
$$x = -2 + 3 \times 4 = 10 \text{ m}$$

(NEW NCERT; Class 11th; Page No.-15)

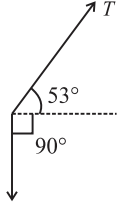
9. (2)
$$v_x = 2t$$
$$v_y = 4$$
$$\tan \theta = \frac{v_y}{v_x} = \frac{4}{2t} \Rightarrow \tan 30^\circ = \frac{4}{2t} \Rightarrow \frac{1}{\sqrt{3}} = \frac{4}{2t}$$
$$t = 2\sqrt{3} \text{ s}$$

(NEW NCERT; Class 11th; Page No.-28)

10. (2)

$$(fr)_l = \mu N = \mu (mg - 10\sqrt{3} \sin 30^\circ)$$
$$= \sqrt{3} (20 - 5\sqrt{3}) = 19.64 \text{ N}$$
$$(fr)_l \geq 10\sqrt{3} \cos 30^\circ$$

So, $fr = 10\sqrt{3} \times \frac{\sqrt{3}}{2} = 15 \text{ N}$
(NEW NCERT; Class 11th; Page No.-60)

11. (1)
$$T = mg$$
$$|\vec{R}| = \sqrt{(mg)^2 + (mg)^2 + 2m^2 g^2 \cos(90^\circ + 53^\circ)}$$
$$= \sqrt{2m^2 g^2 - \frac{8m^2 g^2}{5}}$$
$$= \sqrt{\frac{2m^2 g^2}{5}}$$
$$= \sqrt{\frac{2}{5}} mg$$


(NEW NCERT; Class 11th; Page No.-58)

12. (3)
Equation of motion for the man
$$x_1 = \frac{1}{2} \times 4 \times t^2 \quad \dots(i)$$

Equation of motion for the bus
$$x_2 = 8 \times t \quad \dots(ii)$$
$$x_2 + 200 = x_1$$
$$8t + 200 = \frac{1}{2} \times 4 \times t^2$$
$$2t^2 - 8t - 200 = 0$$
$$t^2 - 4t - 100 = 0$$
$$t = \frac{4 \pm \sqrt{4^2 + 4 \times 100}}{2}$$
$$t_1 = 2(1 + \sqrt{26}), t_2 = 2(1 - \sqrt{26})$$

Negative time is not possible.
So, the answer is $t_1 = 2(1 + \sqrt{26})$
(NEW NCERT; Class 11th; Page No.-17)

13. (3)
$$v_x = \int_0^2 3t dt = \left| \frac{3t^2}{2} \right|_0^2 = 6 \text{ m/s}$$
$$v_y = \int_0^2 2t^2 dt = \left| \frac{2t^3}{3} \right|_0^2 = \frac{16}{3} \text{ m/s}$$
$$\frac{v_x}{v_y} = \frac{6}{\frac{16}{3}} = \frac{18}{16} = \frac{9}{8}$$

(NEW NCERT; Class 11th; Page No.-15)

14. (3)
$$M \propto P^a A^b T^c$$
$$M = K (MLT^{-1})^a (L^2)^b (T)^c$$
$$= K [M^a L^{(a+2b)} T^{(-a+c)}]$$
$$\Rightarrow a = 1$$
$$\text{and } a + 2b = 0$$
$$b = -\frac{1}{2}$$
$$\text{also, } -a + c = 0$$
$$c = 1$$
$$M \propto P^1 A^{-\frac{1}{2}} T^1$$

(NEW NCERT; Class 11th; Page No.-9)

15. (1)

$$(A) \quad v = 8t \text{ m/s} \Rightarrow a = 8 \text{ m/s}^2$$

$$\text{and at } t = 1 \text{ s} \quad v = 8 \text{ m/s}$$

So, R and S is matching.

$$(B) \quad v = 6t - 3t^2$$

After some time v will be negative, so particle will change its direction.

$$a = \frac{dv}{dt} = 6 - 6t$$

So, P and Q is matching.

$$(C) \quad x = 3t^2 + 2t$$

$$v = \frac{dx}{dt} = 6t + 2, \text{ at } t = 1 \text{ s}, v = 8 \text{ m/s}$$

$$\text{and } a = \frac{dv}{dt} = 6 \text{ m/s}^2 \text{ so } a \text{ is constant.}$$

Hence, R and S is matching.

$$(D) \quad a = 16t$$

$a \rightarrow$ variable

$$a = \frac{dv}{dt}$$

$$\int dv = \int 16t dt$$

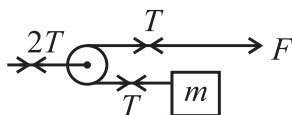
$$v = 8t^2 \text{ at } t = 1 \text{ s}, v = 8 \text{ m/s}$$

So, Q and R is matching.

(NEW NCERT; Class 11th; Page No.-15)

16. (3)

FBD:



$$F = T,$$

$$T_2 = 2T = 2F$$

(NEW NCERT; Class 11th; Page No.-58)

17. (3)

$$a_t = 3 \text{ m/s}^2, \quad a_c = \frac{v^2}{r} = \frac{40 \times 40}{400} = 4 \text{ m/s}^2$$

$$a_{\text{total}} = \sqrt{a_t^2 + a_c^2} = \sqrt{3^2 + 4^2} = 5 \text{ m/s}^2$$

$$\text{So, } x^{\frac{1}{3}} = 5$$

$$x = 125$$

(NEW NCERT; Class 11th; Page No.-42)

18. (4)

Action and reaction pair should act on different bodies and should be of same nature.

(NEW NCERT; Class 11th; Page No.-56)

19. (2)

Change in momentum

$$= m(v_2 - v_1) = \text{area under } F - t \text{ curve}$$

$$\Rightarrow mv - 0 = \text{Area of } F - t \text{ graph}$$

$$= \left(\frac{1}{2} \times 2 \times 20 \right) + (8 - 2) \times (20) + \frac{1}{2} (12 - 8) \times 20$$

$$\Rightarrow 18v = 20 + 120 + 40 = 180$$

$$\Rightarrow 18 \times v = 180$$

$$\therefore v = 10 \text{ m/s}$$

(NEW NCERT; Class 11th; Page No.-55)

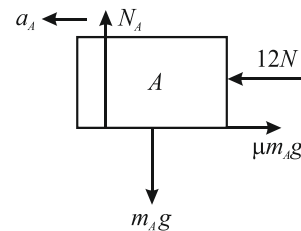
20. (2)

- In region A, slope is increasing i.e velocity is increasing, acceleration is positive
- In region B, slope is decreasing, i.e velocity is decreasing, acceleration is negative
- In region C and D, slope is constant, acceleration is zero.

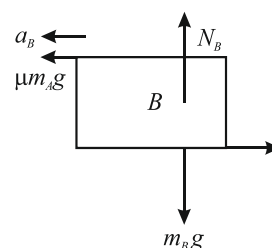
(NEW NCERT; Class 11th; Page No.-16)

21. (2)

FBD for block A



FBD for block B



Net force on A

$$(12 - \mu m_A g) = m_A \times a_A$$

$$(12 - 0.3 \times 2 \times 10) = 2 \times a_A$$

$$\therefore a_A = 3 \text{ ms}^{-2}$$

For Block B:

$$\mu m_A g = m_B \times a_B$$

$$a_B = \frac{\mu \times m_A \times g}{m_B} = \frac{0.3 \times 2 \times 10}{3} = 2 \text{ ms}^{-2}$$

Acceleration of A relative to B:

$$a = a_A - a_B = 3 - 2 = 1 \text{ ms}^{-2}$$

Initial relative velocity is zero,

$$s = ut + \frac{1}{2} at^2$$

$$4.5 \times 10^{-2} = 0 + \frac{1}{2} \times 1 \times t^2$$

$$t = \sqrt{\frac{9}{100}}$$

$$t = 0.3 \text{ s}$$

(NEW NCERT; Class 11th; Page No.-60)

22. (4)

Time period of simple pendulum is related with 'g'

$$\text{as } T = 2\pi \sqrt{\frac{L}{g}}$$

$$\Rightarrow g = 4\pi^2 \left(\frac{L}{T^2} \right)$$

$$\frac{\Delta g}{g} \times 100 = \left[\frac{\Delta L}{L} + 2 \frac{\Delta T}{T} \right] \times 100$$

$$\%g = e_2 + 2e_1$$

(NEW NCERT; Class 11th; Page No.-6)

23. (2)

$$[a] = \frac{[v]}{[t^2]} = [LT^{-3}]$$

$$[b] = \frac{[v]}{[t]} = [LT^{-2}]$$

$$[d] = [t^2] = [T^2]$$

$$[c] = [v][d] = [LT]$$

$$\left[\frac{ab}{cd} \right] = \frac{[LT^{-3}][LT^{-2}]}{[T^2][LT]} = [LT^{-8}]$$

(NEW NCERT; Class 11th; Page No.-8)

24. (3)

$$v_x = \frac{dx}{dt} = 6t^2 + 3$$

$$\text{at } t = 1 \text{ s, } v_x = 9 \text{ m/s}$$

$$v_y = \frac{dy}{dt} = 2t + 4$$

$$\text{at } t = 1 \text{ s, } v_y = 6 \text{ m/s}$$

$$v_z = \frac{dz}{dt} = 2\pi \cos(\pi t)$$

$$\text{at } t = 1 \text{ s, } v_z = -2\pi \text{ m/s}$$

(NEW NCERT; Class 11th; Page No.-14)

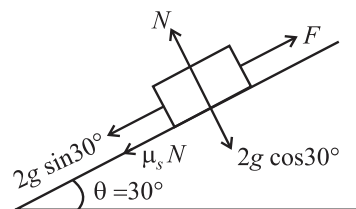
25. (3)

From FBD of body

To just move up

$$F = (2g \sin 30^\circ + \mu_s N)$$

$$N = (2g \cos 30^\circ)$$



$$F_{\min} = \left(2 \times 10 \times \frac{1}{2} \right) + \left(\frac{3}{10} \times 2 \times 10 \times \frac{\sqrt{3}}{2} \right)$$

$$= (10 + 3\sqrt{3})N$$

(NEW NCERT; Class 11th; Page No.-60)

26. (2)

$$a = a_o \sin \frac{\pi}{2} t$$

$$\int dv = \int a dt$$

$$v = \int a_o \sin \left(\frac{\pi t}{2} \right) dt$$

$$v = \frac{-2a_o}{\pi} \cos \left(\frac{\pi t}{2} \right)$$

$$\text{at } t = 0 \text{ s}$$

$$|v| = \frac{2a_o}{\pi}$$

$$\text{at } t = 1 \text{ s, } |v| = 0$$

$$\text{at } t = 2 \text{ s, } |v| = \frac{2a_o}{\pi}$$

$$\text{at } t = 3 \text{ s, } |v| = 0$$

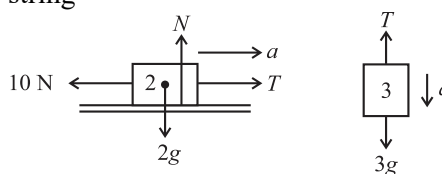
$$\text{at } t = 4 \text{ s, } |v| = \frac{2a_o}{\pi}$$

So, the speed will be minimum at $t = 1 \text{ s}$ & $t = 3 \text{ s}$.

(NEW NCERT; Class 11th; Page No.-16)

27. (2)

Let acceleration of block be a & T is tension in the string



For 2 kg block

$$T - 10 = 2 \times a \quad \dots(1)$$

For 3 kg block

$$3g - T = 3 \times a \quad \dots(2)$$

Adding equations: $3g - 10 = (3+2)a$

$$\therefore a = \frac{30 - 10}{5} = \frac{20}{5} = 4 \text{ ms}^{-2}$$

For motion of 3 kg block

$$s = ut + \frac{1}{2} at^2$$

$$4 = 0 + \frac{1}{2} \times 4 \times t^2$$

$$t^2 = \frac{4 \times 2}{4} = \frac{8}{4} = 2$$

$$t = \sqrt{2} \text{ s}$$

(NEW NCERT; Class 11th; Page No.-65)

28. (3)
Since $7.1+7.3+9.1 = 23.5$
Hence, the result 23.5 have three significant figures.
(NEW NCERT; Class 11th; Page No.-5)

29. (4)
$$\therefore (\text{Height})_{\max} = \frac{u^2 \sin^2(90^\circ - \theta)}{2g}$$
$$\Rightarrow (\text{Height})_{\max} \propto \cos^2 \theta$$
$$\therefore (H_{\max})_1 = (H_{\max})_2$$
$$\Rightarrow \cos^2(\theta_1) = \cos^2(\theta_2)$$
$$\Rightarrow \theta_1 = \theta_2$$
$$\therefore T = \frac{2u \sin(90^\circ - \theta)}{g} \Rightarrow T \propto \cos \theta$$
$$\therefore \theta_1 = \theta_2 \Rightarrow T_1 = T_2$$

(NEW NCERT; Class 11th; Page No.-39)

30. (4)
Given, $Z = \frac{\sqrt{AB}}{C^4}$
$$\frac{\Delta Z}{Z} = \frac{1}{2} \frac{\Delta A}{A} + \frac{1}{2} \frac{\Delta B}{B} + 4 \frac{\Delta C}{C}$$
$$= \frac{1}{2} \times 0.01 + \frac{1}{2} \times 0.02 + 4 \times 0.005$$
$$= \frac{0.01}{2} + 0.01 + 0.02 = 0.035$$

(NEW NCERT; Class 11th; Page No.-6)

31. (3)
$$s = ut + \frac{1}{2}at^2$$

For first 2 seconds
$$h = \frac{1}{2}gt^2 = \frac{1}{2}g \times 4 = 2g \quad \dots(1)$$

Distance travelled in 4th second
$$s = s_4 - s_3 = \frac{1}{2} \times g \times 4^2 - \frac{1}{2} \times g \times 3^2$$
$$s = 8g - \frac{9}{2}g = \frac{7g}{2} \quad \dots(2)$$

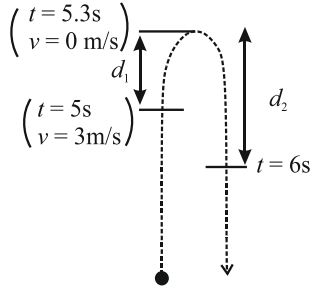
From eqn (1) and (2)
$$s = 1.75h$$

(NEW NCERT; Class 11th; Page No.-18)

32. (1)
$$T = 2\pi \sqrt{\frac{l}{g_{\text{eff}}}}$$

- Case 1 : $T = 2\pi \sqrt{\frac{l}{g}}$
Case 2 : $T' = 2\pi \sqrt{\frac{l}{g - g/4}} = \frac{2}{\sqrt{3}} \left(2\pi \sqrt{\frac{l}{g}} \right)$
$$T' = \frac{2}{\sqrt{3}} \times 6 = 6.928 \text{ s}$$

(NEW NCERT; Class 11th; Page No.-64)

33. (2)
Motion under gravity

$$d_{\text{net}} = d_1 + d_2$$
$$= 3 \times (.3) - \frac{1}{2} \times g \times (.3)^2 + \frac{1}{2} \times g \times (.7)^2$$
$$= 0.9 + \frac{1}{2} \times g \times ((.7)^2 - (.3)^2) = 2.9 \text{ m}$$

(NEW NCERT; Class 11th; Page No.-18)

34. (1)
$$v = \frac{dx}{dt}, a = \frac{dv}{dt}$$
$$F = ma$$

Sol. $v = \frac{dx}{dt} = 3t^2 - 24$
Now, $a = \frac{dv}{dt} = 6t$
$$F = ma = 4 \times 6t = 24t$$

At $t = 2 \text{ s}$
$$F = 24 \times 2 = 48 \text{ N}$$

(NEW NCERT; Class 11th; Page No.-54)

35. (1)
 $\Delta v = \text{area of } a - t \text{ graph}$
$$v - 0 = \frac{1}{2} \times 20 \times 2$$
$$v = 20 \text{ m/s}$$

(NEW NCERT; Class 11th; Page No.-16)

SECTION-B

36. (4)
[Strain] = $[M^0 L^0 T^0]$
[Stress] = $[ML^{-1} T^{-2}]$
[Force] = $[MLT^{-2}]$
[Surface Tension] = $[ML^0 T^{-2}]$
(NEW NCERT; Class 11th; Page No.-8)

37. (3)

$$\rho = \frac{M}{V} = \frac{M}{a^3}$$

$$\frac{\Delta \rho}{\rho} \times 100 = \frac{\Delta M}{M} \times 100 + 3 \times \left[\frac{\Delta a}{a} \times 100 \right]$$

$$= .6\% + 3 \times .1\% = .9\%$$

(NEW NCERT; Class 11th; Page No.-6)

38. (1)

$$v = \frac{dx}{dt}$$

$$v = -2t^{-3} + 4$$

$$v \text{ at } t = 1 \text{ s}$$

$$v = -2 \times 1 + 4 = 2 \text{ m/s}$$

(NEW NCERT; Class 11th; Page No.-14)

39. (1)

$$[P] = \frac{[ML^{-3}][LT^{-1}][L]}{[ML^{-1}T^{-1}]} = [M^0L^0T^0]$$

Hence the dimensions of quantity P is $[M^0L^0T^0]$

(NEW NCERT; Class 11th; Page No.-9)

40. (3)

$$a = \frac{v dv}{dx}$$

$$a = v \frac{dv}{dx}$$

$$\frac{dv}{dx} = 10x \Rightarrow a = [5x^2 + 9] \times 10x \Rightarrow a = 50x^3 + 90x$$

$$\text{At } x = 1 \text{ m, } a = 50 \times 1^3 + 90 \times 1$$

$$\Rightarrow a = 50 + 90 = 140 \text{ m/s}^2$$

(NEW NCERT; Class 11th; Page No.-15)

41. (2)

The particle touches the ground with same speed with which it was projected with same angle but in negative direction.

$$\vec{v}_{\text{projection}} = 40 \cos 60^\circ \hat{i} + 40 \sin 60^\circ \hat{j}$$

$$\vec{v}_{\text{impact}} = 40 \cos 60^\circ \hat{i} - 40 \sin 60^\circ \hat{j}$$

$$\Delta \vec{v} = 40 \cos 60^\circ \hat{i} - 40 \sin 60^\circ \hat{j} - 40 \cos 60^\circ \hat{i}$$

$$-40 \sin 60^\circ \hat{j}$$

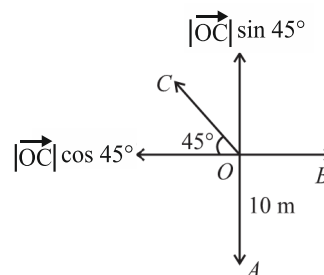
$$\Delta \vec{v} = -2 \times 40 \times \sin 60^\circ \hat{j}$$

$$\Delta \vec{v} = -40 \times \sqrt{3} \hat{j}$$

(NEW NCERT; Class 11th; Page No.-39)

42. (1)

Resolve the components along x-and y-axis



$$\text{Given } |\overline{OA}| = 10 \text{ m}$$

$$|\overline{OC}| \sin 45^\circ = |\overline{OA}|$$

$$|\overline{OC}| = 10\sqrt{2}$$

$$|\overline{OB}| = |\overline{OC}| \cos 45^\circ$$

$$= 10\sqrt{2} \times \frac{1}{\sqrt{2}}$$

$$= 10 \text{ m}$$

(NEW NCERT; Class 11th; Page No.-32)

43. (2)

A unitless quantity is dimensionless too.

(NEW NCERT; Class 11th; Page No.-2)

44. (2)

Use principle of homogeneity

$$[h] = [L], [v] = [LT^{-1}], [V] = [L^3], [f] = [T^{-1}]$$

$$\left[\frac{2T^2 \cos \theta}{\rho R g} \right] = \left[\frac{[MT^{-2}]^2}{[ML^{-3} \times L \times LT^{-2}]} \right] = [MLT^{-2}]$$

$$\sqrt{\frac{P}{\rho}} = \sqrt{\frac{MLT^{-2}}{L^2 \times ML^{-3}}} = [LT^{-1}]$$

$$\left[\frac{P \pi R^3 t}{8 \eta L} \right] = \left[\frac{ML^{-1}T^{-2} \times L^3 \times T}{ML^{-1}T^{-1} \times L} \right] = [L^2]$$

$$\left[2\pi \sqrt{\frac{I^2}{MgL}} \right] = \sqrt{\left[\frac{(ML^2)^2}{MLT^{-2}L} \right]} = [M^{1/2}LT]$$

So, the second option only follows the principle of homogeneity.

(NEW NCERT; Class 11th; Page No.-8)

45. (2)

$$ML^{-1} T^{-2} = F^a v^b T^c$$

$$= (MLT^{-2})^a \times (LT^{-1})^b \times (T)^c$$

$$= M^a L^{a+b} T^{-2a-b+c}$$

$$a = 1, b = -2, c = -2$$

(NEW NCERT; Class 11th; Page No.-9)

46. (4)

$$v = \frac{dx}{dt} \text{ and } a = \frac{d^2x}{dt^2}$$

$$x = 5t^3 + 4t + 8$$

$$x(t = 2\text{ s}) = (5 \times 2^3) + (4 \times 2) + 8$$

$$= 56 \text{ m}$$

$$v = 15t^2 + 4$$

$$v(t = 0) = 4 \text{ m/s}$$

$$v(t = 3 \text{ s}) = 15 \times 9 + 4 = 139 \text{ m/s}$$

$$a = \frac{dv}{dt} = 30t \text{ m/s}^2$$

$$\text{at } t = 0, a = 0 \text{ m/s}^2$$

(NEW NCERT; Class 11th; Page No.-15)

47. (2)

$$|\vec{v}_{\text{avg}}| = \frac{\text{Net displacement}}{\text{Total time}}$$

Displacement = area under $v - t$ curve

$$\Delta x = 20 \times \frac{2}{2} + 20 \times \frac{4-2}{2} + (-20) \times \frac{(6-4)}{2}$$

$$= 20 + 20 - 20 = 20 \text{ m}$$

$$|\vec{v}_{\text{avg}}| = \frac{20}{6} = \frac{10}{3} \text{ m/s}$$

(NEW NCERT; Class 11th; Page No.-16)

48. (2)

Value of Main scale division = 0.1 cm

Reading = Main Scale Reading + (Least Count \times Vernier Scale Reading)

$$= 4.7 + (0.02 \times 4) = 4.78 \text{ cm}$$

(NEW NCERT; Class 11th; Page No.-15)

49. (3)

$$a = \sqrt{a_x^2 + a_z^2} \text{ and } a_x = \frac{d^2x}{dt^2}, a_z = \frac{d^2z}{dt^2}$$

$$x = 2 + 7t + 4t^3$$

$$v_x = 7 + 12t^2 \text{ m/s}$$

$$a_x = 24t \text{ m/s}^2$$

$$z = 5t$$

$$v_z = 5 \text{ m/s}$$

$$a_z = 0$$

$$\therefore a = \sqrt{(24t)^2 + 0^2}$$

$$\Rightarrow a = 24t \text{ m/s}^2$$

$$a(t = 2\text{ s}) = 48 \text{ m/s}^2$$

(NEW NCERT; Class 11th; Page No.-?)

50. (2)

$$y = x \tan \theta - \frac{gx^2}{2u^2 \cos^2 \theta}$$

$$y = \sqrt{3}x - 10x^2$$

Comparing with standard equation of trajectory

$$\tan \theta = \sqrt{3} \Rightarrow \theta = 60^\circ$$

$$2u^2 \cos^2 \theta = 1$$

$$2u^2 \left(\frac{1}{4} \right) = 1$$

$$u = \sqrt{2} \text{ m/s}$$

(NEW NCERT; Class 11th; Page No.-39)

CHEMISTRY

SECTION-A

51. (4)

$$\text{N} : \text{H} :: \frac{87.5}{14} : \frac{12.5}{1} :: 6.25 : 12.5 :: 1 : 2$$

Empirical Formula: NH_2

Molar empirical formula mass = 16 g/mol

$$\text{Molecular formula} = (\text{NH}_2) \times \frac{\text{Molecular weight}}{\text{empirical formula weight}}$$

The molecular formula of the compound is N_2H_4 .

(NCERT 11th Page No. 19)

52. (4)

For 4s, $l = 0$

$$\text{Hence, angular momentum} = \sqrt{l(l+1)} \frac{h}{2\pi} = 0.$$

(NCERT 11th Page No. 57)

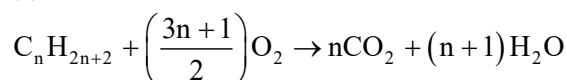
53. (3)

$$\text{Moles of urea} = \frac{1.204 \times 10^{20}}{6.02 \times 10^{23}} = 0.0002$$

$$\text{Molarity of solution} = \frac{0.0002}{100} \times 1000 = 0.002\text{M}$$

(NCERT 11th Page No. 23)

54. (4)



5L

25L

Since volume are measured at constant T and P.

Therefore, volume is directly proportional mole.

Since,

$$n_{\text{alkane}} = \left(\frac{2}{3n+1} \right) \times n_{\text{O}_2}$$

Implies that,

$$5 = \frac{2}{3n+1} \times 25$$

$$n = 3.$$

Hence the alkane is propane (C_3H_8).

(NCERT 11th Page No. 19)

55. (4)

In the plot of $r^2\Psi^2$ versus r for 1s orbital of hydrogen atom, maximum occurs at $r = a_0$. Here a_0 is the Bohr's radius.

(NCERT 11th Page No. 47)

56. (3)

As we know,

$$c = v\lambda \Rightarrow v = \frac{c}{\lambda}$$

By Planck's theory,

$$E = hv \Rightarrow E = \frac{hc}{\lambda}$$

Now, using the law of conservation of energy:

Absorbed Energy = Emitted Energy

$$\frac{hc}{\lambda} = \frac{hc}{\lambda_1} + \frac{hc}{\lambda_2} \Rightarrow \frac{1}{\lambda} = \frac{1}{\lambda_1} + \frac{1}{\lambda_2}$$

$$\Rightarrow \frac{1}{355} = \frac{1}{680} + \frac{1}{\lambda_2}$$

$$\Rightarrow \frac{1}{\lambda_2} = \frac{1}{355} - \frac{1}{680}$$

$$\Rightarrow \lambda_2 = 743 \text{ nm}$$

(NCERT 11th Page No. 39)

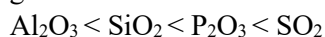
57. (3)

Energy of orbital $\propto (n + l)$

(NCERT 11th Page No. 57)

58. (3)

As non-metallic character increases across the period, the acidic character of their oxides increases. Thus the correct order of acidic strength can be given as:



(NCERT 11th Page No. 94)

59. (2)

ψ is a wave function and refers to the amplitude of electron wave i.e. probability amplitude. It has got no physical significance. The wave function ψ may be positive, negative or imaginary.

$|\psi|^2$ is known as probability density and determines the probability of finding an electron at a point within the atom.

(NCERT 11th Page No. 54)

60. (4)

Number of atoms = mole of atoms $\times N_A$

Number of carbon atoms = $0.6 \times 6 \times N_A = 3.6 N_A$

(NCERT 11th Page No. 17)

61. (1)

De-Broglie wavelength $(\lambda) = \frac{h}{mv}$

$$(\lambda) = \frac{h}{mv} = \frac{6.6 \times 10^{-34}}{66 \times 10^{-6}} = \frac{10^{-34}}{10^{-5}} = 10^{-29} \text{ m}$$

(NCERT 11th Page No. 50)

62. (2)

Penetration power increases in the order:

$$f < d < p < s$$

(NCERT 11th Page No. 89)

63. (1)

No. of atoms = No. of mole $\times N_A \times$ atomicity.

(NCERT 11th Page No. 17)

64. (4)

In modern periodic table, elements are arranged in increasing order of atomic number.

(NCERT 11th Page No. 78)

65. (3)

1.20 has three significant figures. All zeros that are on the right of a decimal point are significant.

So, assertion is true and reason is wrong.

(NCERT 11th Page No. 12)

66. (1)

R^2 is always +ve and there is one node in 2s-orbital.

(NCERT 11th Page No. 57)

67. (3)

$$\text{Radius, } r_n = \frac{n^2 h^2}{4\pi^2 K e^2 m Z} = \frac{n^2}{Z} \times 0.529 \text{ \AA}.$$

(NCERT 11th Page No. 48)

68. (4)

Refer theory.

(NCERT 11th Page No. 48)

69. (2)

Average atomic weight

$$= \frac{R.A.(1) \times \text{At.mass}(1) + R.A.(2) \times \text{At.mass}(2)}{R.A.(1) + R.A.(2)}$$

$$\text{Average atomic weight} = \frac{75 \times 87 + 25 \times 85}{100}$$

$$= \frac{8650}{100} = 86.50$$

(NCERT 11th Page No. 19)

70. (1)
Effective nuclear charge depends upon nuclear charge and shielding effect.
(NCERT 11th Page No. 89)
71. (4)
Refer theory
(NCERT 11th Page No. 75)
72. (2)
De-Broglie equation is $\lambda = \frac{h}{mv}$
(NCERT 11th Page No. 87)
73. (4)
Solubility of sulphates of alkaline earth metal decreases from BeSO₄ to BaSO₄.
(NCERT 11th Page No. 88)
74. (1)
NO(Nitric oxide) and CO(Carbon monoxide) are examples of neutral oxides.
(NCERT 11th Page No. 88)
75. (3)
Principal, azimuthal magnetic and spin quantum number are related to size of atomic orbital, shape of the subshell, orientation of the orbital and electron spin respectively.
(NCERT 11th Page No. 55)
76. (1)
The mass of water per 100 g of medicinal alcohol is 55.71 g. Its volume will be 55.71 cm³. Thus, density of alcohol = 44.29 g/55.71 cm³ = 0.795 g cm⁻³.
(NCERT 11th Page No. 19)
77. (2)
Angular momentum (mvr) = $\frac{nh}{2\pi}$
(NCERT 11th Page No. 48)
78. (2)
Noble gases have fully filled electronic configuration thus electronegativity is assigned to be zero.
(NCERT 11th Page No. 90)

79. (2)
One atomic mass unit is defined as one-twelfth of the mass of one carbon-12 atom. The carbon-12 isotope is the most abundant isotope of carbon and has been chosen as the standard. Atomic masses of the elements obtained by scientists by comparing with the mass of carbon comes out to be close to whole number value.
(NCERT 11th Page No. 18)
80. (2)
Mass = Molarity \times Volume \times Molar mass
= 0.275 M \times $\frac{400}{1000}$ mL \times 106 g/mol
= 11.66 g
(NCERT 11th Page No. 19)
81. (4)
$$\begin{array}{rcccl} & 3A & + & 2B & \rightarrow C \\ \text{Initial} & 2 & & 3 & \\ \text{Final} & 0 & & 3 - \frac{4}{3} & \frac{2}{3} \\ & & & = \frac{5}{3} & \frac{2}{3} \end{array}$$

(NCERT 11th Page No. 20)
82. (1)
Electrons in an orbital cannot have spin in the same direction (Pauli's exclusion principle). p-orbitals must contain 1e⁻ each before pairing starts (Hund's rule).
(NCERT 11th Page No. 62)
83. (1)
The element belong to group 14, so it has four electrons in its valence shell. Since it is present in 2nd period it has two shells. Therefore, the electronic configuration of the element will be 2, 4. Hence, atomic number of the element is six.
(NCERT 11th Page No. 80)
84. (1)
Lyman series : UV region
Balmer series : Visible region
Paschen series : IR region
Brackett : IR region
(NCERT 11th Page No. 45)
85. (3)
Halogen are smallest in size along the period. They tend to accept one electron to get their octet configuration. Their first electron affinity is higher because of the greater effective nuclear charge.
(NCERT 11th Page No. 91)

SECTION-B

86. (4)

$$E_{\text{total}} = \frac{nhc}{\lambda}$$

Energy of one photon

$$E = \frac{hc}{\lambda} = \frac{6.626 \times 10^{-34} \times 3 \times 10^8}{100 \times 10^{-12}}$$

$$= 6.626 \times 3 \times 10^{-16} \text{ J}$$

Let n photons provide 6.626 J energy.

$$\text{So, } E_{\text{total}} = nE$$

$$6.626 = n \times 6.626 \times 3 \times 10^{-16}$$

$$n = 3.33 \times 10^{15}$$

(NCERT 11th Page No. 41)

87. (1)

$$Z = 56$$

\therefore Electronic configuration = [Xe] 6s².

This element belongs to s-block (alkaline earth metal)

(NCERT 11th Page No. 82)

88. (3)

Refer electronic configuration.

(NCERT 11th Page No. 83)

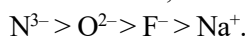
89. (3)

Boron has a high melting point of 2352 K because of its small atomic size, it forms strong covalent bonds with the adjacent atoms.

(NCERT 11th Page No. 91)

90. (1)

Ionic radii of isoelectronic species increases with decrease in nuclear charge or decrease in atomic number. Thus, order is



(NCERT 11th Page No. 87)

91. (2)

Element	%	At. Wt.	Number of Moles	Molar Ratio
X	50	10	50/10=5	2
Y	50	20	50/20=2.5	1

Simplest formula = X₂Y.

(NCERT 11th Page No. 19)

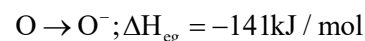
92. (3)

Ionisation energy increases from left to right in a period. But oxygen after removal of first electron gets stable half-filled electronic configuration and thus its second ionisation energy is higher than that of fluorine. Thus, order of 2nd ionisation energy is C < N < F < O.

(NCERT 11th Page No. 91)

93. (2)

In case of oxygen, the second electron gain enthalpy is always positive.



(NCERT 11th Page No. 91)

94. (4)

Due to similar ionic radii, most of the properties of Li and Mg are same thus, these two show diagonal relationship.

(NCERT 11th Page No. 83)

95. (4)

For d_{yz} orbital, l = azimuthal quantum number = 2.

So, d_{yz} orbital has 2 nodal planes

(NCERT 11th Page No. 121)

96. (1)

In case of diatomic molecules (X₂) of halogens the bond dissociation energy decreases in the order: Cl₂ > Br₂ > F₂ > I₂

The oxidising power, electronegativity and reactivity decreases in the order: F₂ > Cl₂ > Br₂ > I₂

Electron gain enthalpy of halogens follows the given order: Cl > F > Br > I

The low value of electron gain enthalpy (electron enthalpy) of fluorine is probably due to small size of fluorine atom.

(NCERT 11th Page No. 91)

97. (2)

$$\text{Concentration (ppm)} = \frac{0.1}{500} \times 10^6 = 200 \text{ ppm.}$$

(NCERT 11th Page No. 20)

98. (1)

$$E \propto \frac{1}{\lambda} \Rightarrow \frac{E_1}{E_2} = \frac{\lambda_2}{\lambda_1}$$

$$\therefore E_1 = E, E_2 = 2E, \lambda_1 = 4000, \lambda_2 = ?$$

$$\therefore \frac{E}{2E} = \frac{\lambda_2}{4000} \Rightarrow \lambda_2 = \frac{4000}{2} = 2000 \text{ \AA}$$

(NCERT 11th Page No. 49)

99. (2)

Energy of '(n - 1)d' subshell is slightly greater than 'ns' subshell, hence "ns" orbital is filled first then (n - 1) d orbitals.

(NCERT 11th Page No. 61)

100. (1)

Refer theory.

(NCERT 11th Page No. 85)

SECTION-A

101. (3)

The cell organelle which is double membrane bound, site of aerobic respiration, and produces cellular energy in the form of ATP is mitochondria.

(11th NCERT P-96, 97)

102. (2)

The first word in a biological name represents the genus while the second component denotes the specific epithet.

(11th NCERT P-4)

103. (2)

Nomenclature or naming is only possible when the organism is described correctly and we know to what organism the name is attached to. This is identification.

(11th old NCERT P-4)

104. (3)

Meiosis is the mechanism by which conservation of specific chromosome number of each species is achieved across generations in sexually reproducing organisms

(11th NCERT P-129)

105. (3)

The similar characters are less in number as compared to different genera included in a family in order.

(11th NCERT P-7)

106. (2)

The chloroplasts contain chlorophyll and carotenoid pigments which are responsible for trapping light energy essential for photosynthesis. In the chromoplasts fat soluble carotenoid pigments like carotene, xanthophylls and others are present. This gives the part of the plant a yellow, orange or red colour. The leucoplasts are the colourless plastids of varied shapes and sizes with stored nutrients: Amyloplasts store carbohydrates (starch), e.g., potato; elaioplasts store oils and fats whereas the aleuroplasts store proteins.

(11th NCERT P-97, 98)

107. (4)

Synapsis occurs during meiosis.

(11th NCERT P-13)

108. (2)

The scientific names ensure that each organism has only one name. Description of any organism should enable the people (in any part of the world) to arrive at the same name. They also ensure that such a name has not been used for any other known organism.

(11th NCERT P-4)

109. (4)

Anton Von Leeuwenhoek first saw and described a live cell. Robert Brown later discovered the nucleus.

(11th NCERT P-87)

110. (1)

Bacterial flagellum is composed of three parts – filament, hook and basal body. The filament is the longest portion and extends from the cell surface to the outside.

(11th NCERT P-90)

111. (1)

Cats belong to family Felidae.

(11th NCERT P-9)

112. (1)

During leptotene stage the chromosomes become gradually visible under the light microscope. The compaction of chromosomes continues throughout leptotene. This is followed by the second stage of prophase I called zygotene. During this stage chromosomes start pairing together and this process of association is called synapsis. During pachytene, the four chromatids of each bivalent chromosomes becomes distinct and clearly appears as tetrads. This stage is characterised by the appearance of recombination nodules, the sites at which crossing over occurs between non-sister chromatids of the homologous chromosomes. The beginning of diplotene is recognised by the dissolution of the synaptonemal complex and the tendency of the recombined homologous chromosomes of the bivalents to separate from each other except at the sites of crossovers. These X-shaped structures, are called chiasmata. In oocytes of some vertebrates, diplotene can last for months or years.

(11th NCERT P-126)

113. (4)

A special membranous structure is the mesosome which is formed by the extensions of plasma membrane into the cell. These extensions are in the form of vesicles, tubules and lamellae. They help in cell wall formation, DNA replication and distribution to daughter cells. They also help in respiration, secretion processes, to increase the surface area of the plasma membrane and enzymatic content. In some prokaryotes like cyanobacteria, there are other membranous extensions into the cytoplasm called chromatophores which contain pigments

(11th NCERT P-90, 91)

114. (1)

Both the given statements are correct.

(11th NCERT P-5,6)

115. (4)

The smooth endoplasmic reticulum is the major site for synthesis of lipid. In animal cells lipid-like steroidal hormones are synthesised in SER.

(11th NCERT P-95)

116. (3)

Meiosis involves pairing of homologous chromosomes and recombination between non-sister chromatids of homologous chromosomes.

(11th NCERT P-126)

117. (3)

In case of plants, classes with a few similar characters are aligned to a higher category called Division.

(11th NCERT P-10)

118. (4)

Mitosis is essential for the cell to divide to restore the nucleo-cytoplasmic ratio.

(11th NCERT P-125)

119. (1)

Groups represent category. Category further denotes rank. Each rank or taxon, in fact, represents a unit of classification. All categories together constitute the taxonomic hierarchy.

(11th NCERT P-6)

120. (2)

Rudolf Virchow (1855) first explained that cells divided and new cells are formed from pre-existing cells (*Omnis cellula-e cellula*).

(11th NCERT P-88)

121. (1)

Prophase	Formation of compact mitotic chromosomes
Metaphase	Morphology of chromosomes can be studied easily
Anaphase	Splitting of centromere
Telophase	Chromosomes lose their individuality

(11th NCERT P-122, 123, 124)

122. (4)

Self-consciousness is the property of only human beings.

(11th old NCERT P-5)

123. (3)

Sister chromatids separate in anaphase II.

(11th NCERT P-127)

124. (1)

The sum total of chemical reactions occurring in our body is called metabolism.

(11th old NCERT P-5)

125. (1)

The cell wall of a young plant cell, the primary wall is capable of growth, which gradually diminishes as the cell matures and the secondary wall is formed on the inner (towards membrane) side of the cell. The middle lamella is a layer mainly of calcium pectate which holds or glues the different neighbouring cells together.

(11th NCERT P-94)

126. (4)

During pachytene, the four chromatids of each bivalent chromosomes becomes distinct and clearly appears as tetrads. This stage is characterised by the appearance of recombination nodules, the sites at which crossing over occurs between non-sister chromatids of the homologous chromosomes.

(11th NCERT P-126)

127. (1)

The beginning of diplotene is recognised by the dissolution of the synaptonemal complex and the tendency of the recombined homologous chromosomes of the bivalents to separate from each other except at the sites of crossovers. These X-shaped structures, are called chiasmata. In oocytes of some vertebrates, diplotene can last for months or years.

(11th NCERT P-126)

128. (3)

The correct sequence of phases in a mitotic cell cycle is:

$G_1 \rightarrow S \rightarrow G_2 \rightarrow M$

(11th NCERT P-121)

129. (2)

Interphase is the longest phase of cell cycle which lasts for more than 95% of the duration of cell cycle. It includes G_1 , S and G_2 phases.

(11th NCERT P-121)

130. (2)

Both statements are true but the reason is not the correct explanation of the assertion.

(11th NCERT P-97)

131. (3)

The peripheral doublets are also interconnected by linkers.

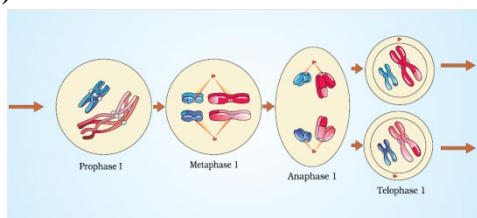
(11th NCERT P-99)

132. (4)

The cell wall and middle lamellae may be traversed by plasmodesmata which connect the cytoplasm of neighbouring cells.

(11th NCERT P-94)

133. (3)



(11th NCERT P-127)

134. (4)

Mitochondria is not a part of endomembrane system.

(11th NCERT P-94, 95, 96)

135. (2)

G_1 Phase	Cell grows and organelle duplication
S Phase	DNA replication and chromosomes duplication
G_2 Phase	Cytoplasmic growth
M- Phase	Alignment of chromosomes on equatorial plate

(11th NCERT P-121)

SECTION-B

136. (4)

No organelles, like the ones in eukaryotes, are found in prokaryotic cells except for the ribosomes.

(11th NCERT P-90)

137. (1)

Both statements are correct.

(11th NCERT P-8)

138. (1)

The nuclear matrix or the nucleoplasm contains nucleolus and chromatin.

(11th NCERT P-100)

139. (2)

Both statements are true but the reason is not the correct explanation of the assertion.

(11th NCERT P-125)

140. (3)

Housefly belongs to family Muscidae.

(11th NCERT P-11)

141. (1)

S or synthesis phase marks the period during which DNA synthesis or replication takes place. During this time the amount of DNA per cell doubles. If the initial amount of DNA is denoted as $2C$ then it increases to $4C$. However, there is no increase in the chromosome number; if the cell had diploid or $2n$ number of chromosomes at G_1 , even after S phase the number of chromosomes remains the same, i.e., $2n$.

(11th NCERT P-121)

142. (3)

The metacentric chromosome has middle centromere forming two equal arms of the chromosome. The sub-metacentric chromosome has centromere slightly away from the middle of the chromosome resulting into one shorter arm and one longer arm. In case of acrocentric chromosome the centromere is situated close to its end forming one extremely short and one very long arm, whereas the telocentric chromosome has a terminal centromere.

(11th NCERT P-101)

143. (1)

Synapsis occurs in zygotene. Crossing over occurs in pachytene. Terminalisation of chiasmata occurs in diakinesis. Disappearance of nucleolus occurs by the end of diakinesis.

(11th NCERT P-126)

144. (1)

The content of nucleolus is continuous with the rest of the nucleoplasm as it is not a membrane bound structure. It is a site for active ribosomal RNA synthesis. Larger and more numerous nucleoli are present in cells actively carrying out protein synthesis.

(11th NCERT P-100)

145. (1)

The stage between the two meiotic divisions is called interkinesis and is generally short lived.

(11th NCERT P-127)

146. (3)

Some cells in the adult animals do not appear to exhibit division (e.g., heart cells) and many other cells divide only occasionally, as needed to replace cells that have been lost because of injury or cell death. These cells that do not divide further exit G₁ phase to enter an inactive stage called quiescent stage (G₀) of the cell cycle.

(11th NCERT P-122)

147. (2)

In plant cells, wall formation starts in the centre of the cell and grows outward to meet the existing lateral walls. The formation of the new cell wall begins with the formation of a simple precursor, called the cell-plate that represents the middle lamella between the walls of two adjacent cells.

(11th NCERT P-124)

148. (2)

As we go higher from species to kingdom, the number of common characteristics goes on decreasing.

(11th NCERT P-10)

149. (3)

Cristae	Infoldings in mitochondria
Thylakoids	Flat membranous sacs in stroma of chloroplast
Cisternae	Disc shaped sacs in Golgi apparatus
Chromatin	Condensed structure of DNA

(11th NCERT P-96, 97, 98, 100)

150. (4)

Growth is exhibited by both living organisms and non-living things.

(11th old NCERT P-4)

ZOOLOGY

SECTION-A

151. (4)

During cardiac cycle, the ventricular systole starts about 0.1sec after the atrial systole, allowing the atria to empty their blood into ventricles. The reason for this delay is that the speed of conduction of action potential is the slowest in AV node. The SAN can generate the maximum number of action potentials, i.e., 70-75 min⁻¹, and is responsible for initiating and maintaining the rhythmic contractile activity of the heart. Therefore, it is called the pacemaker.

(NEW NCERT; Class11th; Page No.-284)

152. (1)

Coronary Artery Disease, often referred to as atherosclerosis, affects the vessels that supply blood to the heart muscle. It is caused by deposits of calcium, fat, cholesterol and fibrous tissues, which makes the lumen of arteries narrower. It causes heart

attack due to damage of heart muscle by an inadequate blood supply.

(NEW NCERT; Class11th; Page No.-203)

153. (2)

Trachea is a straight tube extending up to the mid-thoracic cavity, which divides at the level of 5th thoracic vertebra into a right and left primary bronchi. Each bronchi undergoes repeated divisions to form the secondary and tertiary bronchi and bronchioles ending up in very thin terminal bronchioles. The tracheae, primary, secondary and tertiary bronchi, and initial bronchioles are supported by incomplete cartilaginous rings which prevent it from collapse.

(NEW NCERT; Class11th; Page No.-184)

154. (1)

Coronary Artery Disease, often referred to as atherosclerosis, affects the vessels that supply blood to the heart muscle. It is caused by deposits of calcium, fat, cholesterol and fibrous tissues, which makes the lumen of arteries narrower.

(NEW NCERT; Class11th; Page No.-203)

155. (2)

The T-wave represents the return of the ventricles from excited to normal state (repolarisation). The end of the T-wave marks the end of systole.

(NEW NCERT; Class11th; Page No.-201)

156. (2)

Tidal Volume (TV): Volume of air inspired or expired during a normal respiration. It is approx. 500 mL., i.e., a healthy man can inspire or expire approximately 6000 to 8000 mL of air per minute.

(NEW NCERT; Class11th; Page No.-186)

157. (3)

As the solubility of CO₂ is 20-25 times higher than that of O₂, the amount of CO₂ that can diffuse through the diffusion membrane per unit difference in partial pressure is much higher compared to that of O₂.

(NEW NCERT; Class11th; Page No.-188)

158. (3)

Vital Capacity (VC) is the maximum volume of air a person can breathe in after a forced expiration. This includes ERV, TV and IRV or the maximum volume of air a person can breathe out after a forced inspiration.

(NEW NCERT; Class11th; Page No.-187)

159. (4)

We have the ability to increase the strength of inspiration and expiration with the help of additional muscles in the abdomen. The contraction of internal intercostal muscles in man causes forced expiration.

(NEW NCERT; Class11th; Page No.-186)

160. (3)

A unique vascular connection exists between the digestive tract and liver called hepatic portal system. The hepatic portal vein carries blood from intestine to the liver before it is delivered to the systemic circulation.

(NEW NCERT; Class11th; Page No.-201, 202)

161. (2)

The valves of the heart are attached to papillary muscles by chordae tendinae.

(NEW NCERT; Class11th; Page No.- 198)

162. (2)

The lungs are situated in the thoracic chamber which is anatomically an air-tight chamber. The thoracic chamber is formed dorsally by the vertebral column, ventrally by the sternum, laterally by the ribs and on the lower side by the dome-shaped diaphragm.

(NEW NCERT; Class11th; Page No.-185)

163. (2)

The oxygenated blood entering the aorta is carried by a network of arteries, arterioles and capillaries to the tissues from where the deoxygenated blood is collected by a system of venules, veins and vena cava and emptied into the right atrium. This is the systemic circulation.

(NEW NCERT; Class11th; Page No.-201)

164. (1)

Neural signals through the sympathetic nerves (part of ANS) can increase the rate of heart beat, the strength of ventricular contraction and thereby the cardiac output. Adrenal medullary hormones can also increase the cardiac output.

(NEW NCERT; Class11th; Page No.-202)

165. (2)

A bundle of nodal fibres, atrioventricular bundle (AV bundle) continues from the AVN which passes through the atrio-ventricular septa to emerge on the top of the inter-ventricular septum and immediately divides into a right and left bundle.

(NEW NCERT; Class11th; Page No.-199)

166. (3)

As the blood passes through the capillaries in tissues, some water along with many small water-soluble substances move out into the spaces between the cells of tissues leaving the larger proteins and most of the formed elements in the blood vessels. This is called lymph. Coagulation of lymph is slower than blood, because of small amount of clotting factors.

(NEW NCERT; Class11th; Page No.-197)

167. (4)

Monocytes are the largest corpuscles. Nucleus of monocyte is large and kidney shaped.

(NEW NCERT; Class11th; Page No.-194)

168. (2)

The first heart sound (lub) is associated with the closure of the tricuspid and bicuspid valves whereas the second heart sound (dub) is associated with the closure of the semilunar valves. This happens during ventricular systole when blood from ventricles is drained into aorta and pulmonary artery. The time interval between the closure of these two valves is approx. 0.3 sec.

(NEW NCERT; Class11th; Page No.-200)

169. (4)

Respiratory rhythm is maintained by the respiratory rhythm centre in the medulla region of brain. A pneumotaxic centre in the pons region of the brain and a chemosensitive area in the medulla can alter respiratory mechanism.

(NEW NCERT; Class 11th; Page No.-190)

170. (2)

At the tissue site where partial pressure of CO_2 is high due to catabolism, CO_2 diffuses into blood (RBCs and plasma) and forms HCO_3^- and H^+ . At the alveolar site where pCO_2 is low, the reaction proceeds in the opposite direction leading to the formation of CO_2 and H_2O . Thus, CO_2 trapped as bicarbonate at the tissue level and transported to the alveoli is released out as CO_2 . Every 100 ml of deoxygenated blood delivers approximately 4 ml of CO_2 to the alveoli.

(NEW NCERT; Class 11th; Page No.-190)

171. (2)

The diffusion membrane is made up of three major layers (Figure 14.4) namely, the thin squamous epithelium of alveoli, the endothelium of alveolar capillaries and the basement substance (composed of a thin basement membrane supporting the squamous epithelium and the basement membrane surrounding the single layer endothelial cells of capillaries) in between them.

(NEW NCERT; Class11th; Page No.-188)

172. (2)

'C' represents bronchus.

(NEW NCERT; Class11th; Page No.-184)

173. (2)

Cascade process is the enzyme linked reactions involved in clotting of blood. Blood platelets (Thrombocytes) helps in coagulation of blood.

(NEW NCERT; Class11th; Page No.-196)

174. (1)

'PQ' represents atrial contraction i.e atrial systole. This increases the flow of blood into the ventricles by about 30 per cent.

(NEW NCERT; Class11th; Page No.- 199, 201)

175. (1)

List-I		List-II	
A	Tunica intima	I	Squamous layer
B	Tunica media	II	Elastin fibre
C	Tunica externa	III	Collagen fibre

(NEW NCERT; Class11th; Page No.-201)

176. (3)

Open circulatory system is present in arthropods and molluscs in which blood pumped by the heart passes through large vessels into open spaces or body cavities called sinuses. Plasma is a straw coloured viscous fluid present in our body contains factors for coagulation or clotting of blood in an inactive form.

(NEW NCERT; Class11th; Page No.-194, 197)

177. (2)

Every 100 ml of oxygenated blood can deliver around 5 ml of O_2 to the tissues under normal physiological conditions.

So, in 1 litre, 50 ml of O_2 is transported.

(NEW NCERT; Class11th; Page No.-189)

178. (2)

Tidal Volume = EC – ERV

Residual Volume = FRC – ERV

Vital capacity = ERV + TV + IRV

Or ERV = VC – IRV – TV

(NEW NCERT; Class11th; Page No.-186)

179. (1)

Exchange of O_2 and CO_2 at the alveoli and tissues occur by diffusion. Rate of diffusion is dependent on the partial pressure gradients of O_2 (pO_2) and CO_2 (pCO_2), their solubility as well as the thickness of the diffusion surface.

(NEW NCERT; Class11th; Page No.-188)

180. (3)

Among vertebrates, fishes use gills whereas amphibians, reptiles, birds and mammals respire through lungs. Amphibians like frogs can respire through their moist skin (cutaneous respiration) also.

(NEW NCERT; Class11th; Page No.-183)

181. (2)

Inspiratory Reserve Volume (IRV) is additional volume of air, a person can inspire by a forcible inspiration. This averages 2500 mL to 3000 mL. Expiratory Reserve Volume (ERV) is the additional volume of air, a person can expire by a forcible expiration. This averages 1000 mL to 1100 mL.

(NEW NCERT; Class11th; Page No.- 186)

182. (3)

When $p\text{CO}_2$ is high and $p\text{O}_2$ is low as in the tissues, more binding of carbon dioxide occurs whereas, when the $p\text{CO}_2$ is low and $p\text{O}_2$ is high as in the alveoli, dissociation of CO_2 from carbamino-haemoglobin takes place, i.e., CO_2 which is bound to haemoglobin from the tissues is delivered at the alveoli

(NEW NCERT; Class11th; Page No.-189, 190)

183. (2)

Neural signal from this centre can reduce the duration of inspiration and thereby alter the respiratory rate. A chemosensitive area is situated adjacent to the rhythm centre which is highly sensitive to CO_2 and hydrogen ions. The role of oxygen in the regulation of respiratory rhythm is quite insignificant.

(NEW NCERT; Class11th; Page No.-190)

184. (2)

Relaxation of the diaphragm and the inter-costal muscles returns the diaphragm and sternum to their normal positions and reduce the thoracic volume and thereby the pulmonary volume. This leads to an increase in intra-pulmonary pressure to slightly above the atmospheric pressure causing the expulsion of air from the lungs, i.e., expiration.

(NEW NCERT; Class11th; Page No.-186)

185. (3)

A-40 mm Hg, B-45 mm Hg, C-95 mm Hg, D-40 mm Hg

(NEW NCERT; Class11th; Page No.-188)

SECTION-B

186. (4)

Medulla is considered as a respiratory rhythm centre in animals. Rate of breathing is regulated by medulla because of the changes in CO_2 , O_2 and pH of blood.

(NEW NCERT; Class11th; Page No.-190)

187. (4)

RBCs contain a very high concentration of the enzyme, carbonic anhydrase and minute quantities of the same is present in the plasma too. This enzyme facilitates the formation of HCO_3^- from CO_2 and H_2O and in reverse direction too.

(NEW NCERT; Class11th; Page No.-190)

188. (3)

Conceptual based question.

(NEW NCERT; Class11th; Page No.-203)

189. (4)

To begin with, all the four chambers of heart are in a relaxed state, i.e., they are in joint diastole. As the tricuspid and bicuspid valves are open, blood from the pulmonary veins and vena cava flows into the left and the right ventricle respectively through the left and right atria. The semilunar valves are closed at this stage.

(NEW NCERT; Class11th; Page No.-199)

190. (2)

RBCs are formed in the red bone marrow in the adults.

(NEW NCERT; Class11th; Page No.-194)

191. (2)

(V), (IV), (III), (II), (I)

(NEW NCERT; Class11th; Page No.- 196)

192. (2)

A bundle of nodal fibres, atrioventricular bundle (AV bundle) continues from the AVN which passes through the atrio-ventricular septa to emerge on the top of the inter-ventricular septum and immediately divides into a right and left bundle. These branches give rise to minute fibres throughout the ventricular musculature of the respective sides and are called purkinje fibres.

The SAN can generate the maximum number of action potentials, i.e., $70-75 \text{ min}^{-1}$, and is responsible for initiating and maintaining the rhythmic contractile activity of the heart.

(NEW NCERT; Class11th; Page No.-199)

193. (3)

Neutrophils are the most abundant cells (60-65 per cent) of the total WBCs and basophils are the least (0.5-1 per cent) among them. Neutrophils and monocytes (6-8 per cent) are phagocytic cells which destroy foreign organisms entering the body.

(NEW NCERT; Class11th; Page No.-194)

194. (1)

Both B and T lymphocytes are responsible for immune responses of the body. Antibodies are produced by B-lymphocytes.

(NEW NCERT; Class11th; Page No.-195)

195. (1)

Heart failure is not the same as cardiac arrest (when the heart stops beating) or a heart attack (when the heart muscle is suddenly damaged by an inadequate blood supply).

(NEW NCERT; Class11th; Page No.-203)

196. (2)

The QRS complex represents the depolarisation of the ventricles, which initiates the ventricular contraction. The contraction starts shortly after Q and marks the beginning of the systole.

(NEW NCERT; Class11th; Page No.-201)

197. (4)

Erythrocytes, leucocytes and platelets are collectively called formed elements and they constitute nearly 45 per cent of the blood. Erythrocytes or red blood cells (RBC) are the most abundant of all the cells in blood.

(NEW NCERT; Class11th; Page No.-194)

198. (2)

Conceptual based question.

(NEW NCERT; Class11th; Page No.-196)

199. (4)

Hypertension is the term for blood pressure that is higher than normal (120/80). If repeated checks of blood pressure of an individual is 140/90 (140 over 90) or higher, it shows hypertension. High blood pressure leads to heart diseases and also affects vital organs like brain and kidney.

(NEW NCERT; Class11th; Page No.-202, 203)

200. (4)

Conceptual based question.

(NEW NCERT; Class11th; Page No.-196)

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