PACE-IIT & MEDICAL

TWT - (NEET 2024 Aspirants) – Answer key & Solutions

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

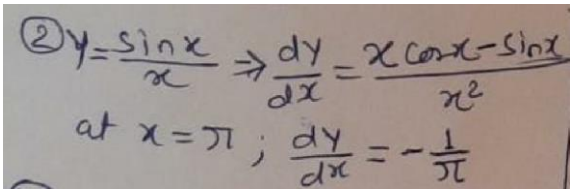
SOLUTIONS

1. (2)

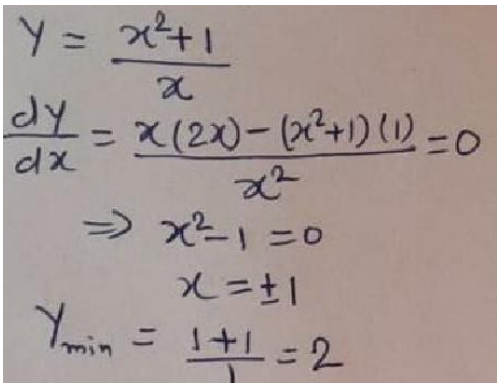
$$y = x^2 \sin x, \ \frac{dy}{dx} = x^2 \cos x + 2x \sin x$$

$$\text{At } x = \pi; \frac{dy}{dx} = -\pi^2$$

2.



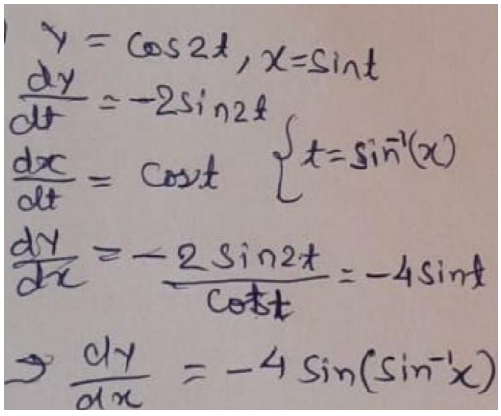
3.



4. (2)

$$\int_0^P dP = \int_0^{10} (10+2t)\,dt \ \Rightarrow \ P = \left(10t+t^2\right)_0^0 = 100+100 = 200$$

5.



6. (4)

$$\int_5^{10} \left(3x^2+6x+7\right)\cdot dx = \left(x^3+3x^2+7x\right)_5^{10}$$

$$= \left(1000+300+70\right) - \left(125+75+35\right) = 1135$$

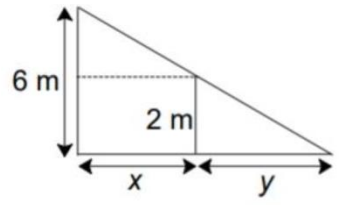
7.

$$\int_0^1 \frac{dx}{(ax+b)} = \frac{1}{a}\ln(ax+b)_0^1$$
$$= \frac{1}{a}\ln\left(\frac{a+b}{b}\right)$$
$$= \frac{1}{a}\ln\left(1+\frac{a}{b}\right)$$

8.

$$\tan\theta = \frac{R}{H} \Rightarrow R = H\tan\theta$$
$$\frac{dR}{dt} = \tan\theta\frac{dy}{dt}$$
$$2 = \left(\frac{5}{8}\right)\frac{dH}{dt} \Rightarrow \frac{dH}{dt} = \frac{16}{5}$$
$$\Rightarrow \frac{dH}{dt} = 3.2 \text{ cm/s}$$

9.



$$\frac{y}{2} = \frac{x}{4} \Rightarrow \frac{dy}{dt} = \frac{1}{2}\left(\frac{dx}{dt}\right) \Rightarrow V_s = \frac{1}{2}(5) = 2.5 \text{ km/h}$$

10.

$$y = \frac{4}{x} \Rightarrow \frac{dy}{dx} = -\frac{4}{x^2}$$
$$\Rightarrow \frac{dy}{dx} = -\frac{y}{x}$$

11.

$$\int_0^\infty e^{-2x}dx = \left.\frac{e^{-2x}}{-2}\right|_0^\infty$$
$$= -\frac{1}{2}\left(\frac{1}{e^\infty} - \frac{1}{e^0}\right) = \frac{1}{2}$$

12. (2)

$$y = \sqrt{x}\ln x$$
$$\frac{dy}{dx} = \frac{\ln x}{2\sqrt{x}} + \frac{\sqrt{x}}{x} = \frac{\ln x + 2}{2\sqrt{x}}$$

13.

$$y = \frac{x \ln x}{e^x}$$

$$\frac{dy}{dx} = \frac{e^x\left(x\cdot\frac{1}{x} + \ln x\right) - x\ln x \cdot e^x}{(e^x)^2}$$

$$= \frac{1 + \ln x - x\ln x}{e^x}$$

14.

$$y = \ln(\cos^2 x)$$

$$\frac{dy}{dx} = \frac{1}{\cos^2 x}(-2\cos x \sin x) = -2\tan x$$

15.

$$\sin^2 e^x, \quad \frac{dy}{dx} = 2\sin e^x \cdot \cos e^x \cdot e^x$$

$$= e^x \sin 2e^x$$

16.

$$\frac{dy}{dx} = x^2 + 13x - 30 = 0$$

$$x = -15, 2$$

$$\frac{d^2y}{dx^2} = 2x + 13$$

at $x = -15$; $\frac{d^2y}{dx^2} = -17 < 0$ (maxima)

at $x = 2$; $\frac{d^2y}{dx^2} = 17 > 0$ (minima)

17.

$$= \int (5e^x + 2e^\pi + \sin x + x^5)\,dx$$

$$= 5e^x + 2e^\pi x - \cos x + \frac{x^6}{6} + C$$

18.

$$\int_0^{\pi/4} \sin 2x\,dx = \left[\frac{-\cos 2x}{2}\right]_0^{\pi/4} = \frac{1}{2}$$

19.

$$A = \int_{\pi/2}^{3\pi/2} \cos x \cdot dx = \left[\sin x\right]_{\pi/2}^{\frac{3\pi}{2}} = |-2| = 2$$

20.

$$S=\int_2^4 v\,dt=\left(\frac{5t^2}{2}+3t\right)_2^4=(40+12)-(10+6)$$
$$=52-16=36\ m.$$

21.

$$\frac{dy}{dx}=\frac{(2x+4)(5)-(5x+3)(2)}{(2x+4)^2}$$
$$=\frac{10x+20-10x-6}{(2x+4)^2}=\frac{14}{(2x+4)^2}=\frac{1}{14}$$

22.

$$y=\frac{\sin x}{x}+\frac{x}{\sin x}$$
$$\frac{dy}{dx}=\frac{(x\cos x-\sin x)}{x^2}+\frac{\sin x-x\cos x}{(\sin x)^2}$$
$$(x\cos x-\sin x)\left[\frac{1}{x^2}-\frac{1}{(\sin x)^2}\right]$$

23.

$$a=\frac{dv}{dt}$$
acceleration = slope of velocity time curve.

24. (4)

$$y=(e)^{\sqrt{x}}$$
$$\frac{dy}{dx}=\frac{(e)^{\sqrt{x}}}{2\sqrt{x}}$$

25. (2)

26. (1)

$$y=\ln(x)^{3/4}=\frac{3}{4}\ln x$$
$$\Rightarrow\ \frac{dy}{dx}=\left(\frac{3}{4}\right)\left(\frac{1}{x}\right)=\frac{3}{4}\times\frac{3}{4}$$
$$\frac{dy}{dx}=\frac{9}{16}$$

27. (1)

$$y = \frac{x^3}{3} - \ln x + 4x$$

$$\frac{dy}{dx} = x^2 - \frac{1}{x} + 4$$

$$\frac{d^2y}{dx^2} = 2x + \frac{1}{x^2} = 2(2) + \frac{1}{(2)^2}$$

$$\frac{d^2y}{dx^2} = \frac{17}{4}$$

28. (2)

$$\frac{d\sin(\ln x)}{d\ln x} \times \frac{d\ln x}{dx}$$

$$= \cos(\ln x) \times \frac{1}{x}$$

29. (4)

$$\frac{d(2x+3)^2}{d(2x+3)} \times \frac{d(2x+3)}{dx}$$

$$= 2(2x+3) \times 2$$

$$= 8x + 12$$

30. (1)

$$\frac{dx}{dy} = 3y^2 + 1$$

$$\frac{dy}{dx} = \frac{1}{1+3y^2}$$

31. (4)

$$\frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{\sec t . \tan t}{\sec^2 t}$$

$$= \frac{\tan t}{\sec t} = \frac{x}{y}$$

32. **Correct option is (4)**

$$a = 3t^2$$

$$\frac{dv}{dt} = 3t^2$$

$$dv = 3t^2 dt$$

$$\int_1^v dv = \int_0^2 3t^2 dt$$

$$v - 1 = \left[t^3\right]_0^2$$

$$v = 9 \text{ m/s}$$

33. (3)

$F = 4 + 3t^2$

$\frac{dp}{dt} = 4 + 3t^2$

$dp = \left(4 + 3t^2\right) dt$

$\int_{p_i}^{p_f} dp = \int_0^1 \left(4 + 3t^2\right) dt$

$p_f - p_i = \left[4t + t^3\right]_0^1$

$\Delta p = 5$ N-s

34. (4)

$\int_0^{\pi/4} \sin x\, dx - \int_0^{\pi/4} \cos x\, dx + \int_0^{\pi/4} \sec^2 x\, dx$

$= \left[-\cos x\right]_0^{\pi/4} - \left[\sin x\right]_0^{\pi/4} + \left[\tan x\right]_0^{\pi/4}$

$= \frac{-1}{\sqrt{2}} + 1 - \frac{1}{\sqrt{2}} + 1 = 2 - \frac{2}{\sqrt{2}}$

$= 2 - \sqrt{2}$

35. (4) - cos x + c

36. (3)

$\int_0^1 3x^2\, dx - \int_0^1 2x\, dx + \int_0^1 4\, dx$

$= \left[3\left(\frac{x^3}{3}\right)\right]_0^1 - \left[2\left(\frac{x^2}{2}\right)\right]_0^1 + \left[4x\right]_0^1$

$= 1 - 1 + 4 = 4$

37. (2)

$\int (\sec^2 x - 1) dx$

$= \tan x - x + c$

$\int \frac{e^x}{2e^x + 3} dx$

38. (1) $[2e^x + 3 = u; du = 2e^x dx]$

$= \frac{1}{2}\int \frac{du}{u} = \frac{1}{2}\ln|2e^x + 3| + c$

39. **(4)**

$$W = \int F\,dx$$

$$= \int_0^d (ax + b)\,dx$$

$$= \int_0^d ax\,dx + b\int_0^d dx$$

$$W = \frac{ad^2}{2} + bd$$

$$W = \frac{ad^2}{n} + bd$$

$$\therefore n = 2$$

40. (3) $\int_0^y 1dx = [x]_0^y$

$$= y - 0 = y$$

41. (1) $\left[\frac{x^3}{3}\right]_1^3 = \frac{3^3 - 1^3}{3}$

42. (4) $\left[\frac{\ln|9+2x|}{2}\right]_0^8 = \frac{1}{2}\ln\left|\frac{9+2x8}{9+2x0}\right| = \frac{1}{2}\ln\left|\frac{25}{9}\right| = \ln\left|\frac{25}{9}\right|^{\frac{1}{2}}$

$$= \ln\left|\frac{5}{3}\right|$$

43. (2)

$$\int_{t_1}^{t_2} v\,dt = \int_{x_1}^{x_2} dx$$

$$= x_2 - x_1 = \Delta x$$

= Displacement

44. **(2)**

$$y = 4x^2$$

Slope $\frac{dy}{dx} = 8x$

At $P(1,4)$ slope of the curve is Slope $\frac{dy}{dx} = 8(1) = 8$

45. (2) $\frac{dA}{dt} = \frac{d\pi R^2}{dt} = \pi\frac{dR^2}{dt} = \pi\frac{dR^2}{dR}\frac{dR}{dt} = \pi(2R)2$

46. (1)

$$y = \ln(x)^{3/4} = \frac{3}{4}\ln x$$

$$\Rightarrow \quad \frac{dy}{dx} = \left(\frac{3}{4}\right)\left(\frac{1}{x}\right) = \frac{3}{4}\times\frac{3}{4}$$

$$\frac{dy}{dx} = \frac{9}{16}$$

47. (3)

$$\int \tan x\, dx - \int \sec^2 x\, dx - \int \operatorname{cosec}^2 x\, dx$$

$$= \int \frac{\sin x}{\cos x} dx - \int \sec^2 x\, dx - \int \operatorname{cosec}^2 x\, dx$$

$$= -\ln\cos x - \tan x + \cot x + C$$

$$= \ln|\sec x| - \tan x + \cot x + C$$

48. (1)

$$y = \frac{x^3}{3} - \ln x + 4x$$

$$\frac{dy}{dx} = x^2 - \frac{1}{x} + 4$$

$$\frac{d^2y}{dx^2} = 2x + \frac{1}{x^2} = 2(2) + \frac{1}{(2)^2}$$

$$\frac{d^2y}{dx^2} = \frac{17}{4}$$

49. (1)

$$\int \frac{3x^2+2}{x^3+2x+8} dx$$

Let, $P = x^3 + 2x + 8$

$$\frac{dP}{dx} = 3x^2 + 2$$

$$\Rightarrow \quad \frac{3x^2+2}{x^3+2x+8} dx = \int \frac{dP}{P} = \ln P + C$$

$$= \ln\left(x^3 + 2x + 8\right) + C$$

50. (3)

$$y = \ln P^2 = 1\ln P$$

$$\Rightarrow \quad \frac{dy}{dP} = \frac{2}{P}$$

$$x = \frac{P^3}{3} \Rightarrow \frac{dx}{dP} = P^2 \text{ x}$$

$$\frac{dy}{dx}=\frac{dy}{dP}\times\frac{dP}{dx}=\frac{2}{P}\times\frac{1}{P^2}=\frac{2}{P^3}$$

51. (1)
The kinetic energy of photoelectrons does not depend upon intensity of incident radiation.

52. (4)
$$E=\frac{hc}{\lambda}$$
Ratio of energy of photon $\frac{E_1}{E_2}=\frac{\lambda_2}{\lambda_1}$
$$=\frac{4000\,\text{Å}}{2000\,\text{Å}}=2$$

53. (2)

54. (3)
$r_H=0.529\,\text{Å}$
$$r_n=r_H\times\frac{n^2}{Z}$$
For Li^{2+} (n = 2),
$$r_{Li^{2+}}=r_H\times\frac{(2)^2}{3}=\frac{r_H\times4}{9}$$
For Li^{2+} (n = 3),
$$r_{Li^{2+}}=r_H\times\frac{(3)^3}{3}=3r_H$$
For Be^{3+} (n = 2)
$$r_{Be^{3+}}=r_H\times\frac{(2)^2}{4}=r_H$$
For He^{+} (n = 2)
$$r_{He^{+}}=r_H\times\frac{(2)^2}{2}=2r_H$$
Thus, Be^{3+} (n = 2) has same radius as that of the first Bohr's orbit of H – atom.

55. (1)
$$\text{Angular momentum, } m\upsilon r=\frac{n\hbar}{2\pi}=\frac{3\times\hbar}{2\pi}=\frac{1.5\hbar}{\pi}$$
$$=3\hbar \qquad \left[\because \hbar=\frac{\hbar}{2\pi}\right]$$

56. (1)
Among the given option, transiton in option (a) require largest amount of energy.
The amount of energy required $\propto\left[\frac{1}{n_1^2}-\frac{1}{n_2^2}\right]$
On putting the value of n_1 and n_2, the calculated energy is maximum for electron transition from n = 1 to n = 2

$$\Rightarrow \left[\frac{1}{1^2}-\frac{1}{2^2}\right]=0.75$$

57. (2)

$$\Delta E = h\upsilon = \frac{2\pi^2 m Z^2 e^4 k^2}{h^2}\left[\frac{1}{n_1^2}-\frac{1}{n_2^2}\right]$$

If electron falls from n_2 level to n_1 level.

$\therefore$ In He^+ for the $n_2 = 4$ to $n_1 = 2$ transition

$$\upsilon(He^+) = \text{constant}\ (4)\left[\frac{1}{2^2}-\frac{1}{4^2}\right] \qquad [\because Z_{He^+} = 2]$$

$$= \text{constant} \times 4\left[\frac{3}{16}\right] = \frac{3}{4}\text{constant}$$

$$\upsilon(H) = \text{constant}\ (1)^2\left[\frac{1}{n_1^2}-\frac{1}{n_2^2}\right]$$

$$= \text{constant} \times \left[\frac{1}{n_1^2}-\frac{1}{n_2^2}\right]$$

(a) for $n_2 = 3$ and $n_1 = 1$

$$\upsilon(H) = \text{constant}\left[\frac{1}{1}-\frac{1}{9}\right]$$

$$= \frac{8}{9}\text{constant}$$

$$\neq \frac{3}{4}\times \text{constant}$$

(b) For $n_2 = 2$ and $n_1 = 1$

$$\upsilon(H) = \text{constant} \times \left[\frac{1}{1}-\frac{1}{4}\right]$$

$$= \frac{3}{4}\times \text{constant} = \upsilon(He^+)$$

58. (4)

Balmer series lies in the visible region of the electromagnetic spectrum. Photons that correspond to these energies will not strongly absorb highly excited hydrogen gas. So, there is the possibility for detecting absorption at Balmer line wavelength. Paschen, Brackett and Pfund series lies in the infrared region whereas, only Layman series lies in the ultraviolet region of the electromagnetic spectrum.

59. (3)

As we know that, $\Delta E = \frac{hc}{\lambda}$

Hence, λ will be, $\lambda = \frac{hc}{\Delta E}$

For, λ = minimum, i.e. shortest, ΔE =maximum

For Lyman series, n = 1 and for ΔE_{max} transition must

Be form $n_2 = \infty$ to $n_1 = 1$.

So, $\frac{1}{\lambda} = R_H Z^2 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$ $(\because n_1 = 1 \text{and} \, n_2 = \infty)$

$\frac{1}{\lambda} = R_H \left(\frac{1}{1^2} - \frac{1}{\infty^2}\right) \times (1)^2$

$\frac{1}{\lambda} = R_H (1-0)$

$\Rightarrow \frac{1}{\lambda} = R_H \times (1)^2 \Rightarrow \lambda_1 = \frac{1}{R_H}$ ....(i)

For longest wavelength, ΔE = minimum for Balmer series, $n_2 = 3$ to $n_1 = 2$ will have ΔE minimum.
For He^+, Z = 2

So, $\frac{1}{\lambda_2} = R_H \times 2^2 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$

$\frac{1}{\lambda_2} = R_H \times 4\left(\frac{1}{4} - \frac{1}{9}\right), \frac{1}{\lambda_2} = R_H \times 4 \times \frac{5}{36}$

$\frac{1}{\lambda_2} = R_H \times \frac{5}{9}$

$\Rightarrow \lambda_2 = \lambda_1 \times \frac{9}{5}$ [From eq.(i)]

60. (1)

$\lambda = \frac{h}{\sqrt{2kEm}}$

When kinetic energy of electron becomes four times, the de-Broglie wavelength will become half.

61. (1)
Na^{10+} ion has single electron

62. (3)
For *g*-subshell $l = 4$ and to have $l = 4$ minimum value of
$n = 5$ [because the value of $l = 0$ to (n – 1)]

63. (2)
(I) is not possible as $n \neq 0$
(II) is possible (1*s*)
(III) is not possible because if $n = 1$, $1 = 0$ only. Thus, $l \neq 1$
(IV) is possible (2*p*)
(V) is not possible because if $n = 3$, $1 = 0,1$ and 2. Thus, $(l \neq 3)$
(VI) is possible (3*p*)

64. (2)
Electrons (*e*) and protons (*p*) have the same charge (1.602×10^{-19}C)but protons are 1840 times heavier than electrons.
e/m_e of any particle decreases, if the mass is increased.
So, the e/m_e of electron is higher than the proton.
Alpha particle (α) is a helium nucleus which consists of two protons and two electrons. It has +2 charge and the mass of 4 protons. So, the α-particle has the least *e/m* because of its large mass.
Neutron (*n*) has no charge thus its e/m_e, is zero.
Thus, the increasing order of e/m_e, values is

$n < \alpha < p < e$

65. (2)

66. (4)

67. (1)
Mass number of an atom (*A*) is total number of nucleons,
i.e. *A* = number of protons + number of neutrons.

68. (1)
$^{14}_{6}C$ and $^{14}_{7}N$ are the examples of isobars having same mass number but different atomic numbers.

69. (4)
In $^{80}_{35}Br$
Number of protons = Number of electrons =35 = Atomic number
Number of neutrons = Mass number (A) – Number of proton = (80 35) = 45

70. (4)
Given, $\lambda = 45nm = 45\times10^{-9}m \left[\because 1\ nm = 10^{-9}m\right]$
The wavelength of light is related to its energy by the equation,
$E = hv \qquad \left[\because \text{where, } v = c/\lambda\right]$

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

Hence, $$E = \frac{6.63\times10^{-34}Js\times3\times10^{8}ms^{-1}}{45\times10^{-9}m}$$
$$= 4.42\times10^{-18}J$$
Hence, the energy corresponds to the light of wavelength
45 nm is 4.42×10^{-18}J.

71. (1)
Balmer series of transitions in the spectrum of
hydrogen atom fall in visible region. Lyman series fall in ultraviolet while Paschen, Brackett and P fund fall in infrared region.

72. (3)

73. (1)
Same no. of neutrons = Isotonic

74. (3)
$CO_2 \rightarrow$ no. of $e^- = 44$
$X^+ \rightarrow e = 44 \qquad X = 45$
$y^{+2} \rightarrow e = 44 \qquad Y = 46$
$Z^- \rightarrow e = 44 \qquad Z = 43$

75. (3)

76. (4)

$$F = \frac{C}{\lambda} = \frac{3\times10^{8}}{1\times10^{-10}} = 3\times10^{18}$$

77. (4)
Radius of first Bohr's orbit
$$= 0.529\frac{n^2}{Z} = 0.529\times\frac{1}{1}A^{o}$$
$$= 0.529A^{o}$$
Radius of (n = 2) Be^{+3}
$$= 0.529\times\frac{(z)^2}{4} = 0.529A^{o}$$

78. (4)
$$\Delta E = 13.6\times(1)^2\left(\frac{1}{1^2}-\frac{1}{4^2}\right)^{ev}$$
$$= 12.75ev$$

79. (3)

80. (2)
$$\frac{1}{\lambda} = R4(Z)^2\left(\frac{1}{2^2}-\frac{1}{3^2}\right)$$
$$\frac{1}{\lambda} = R(2)^2\left(\frac{1}{2^2}-\frac{1}{3^2}\right)$$
$$\frac{1}{\lambda} = R\times4\left(\frac{9-7}{4\times9}\right)$$
$$\frac{1}{\lambda} = R\times4\times = \frac{5}{36} = \frac{R\times20}{36}$$
$$\overline{V} = \frac{1}{\lambda} = \frac{20}{36}Rcm^{-1}$$

81. (4)

82. (3)
$$\frac{(2\pi r)_3}{(2\pi r)_2} = \frac{3^2}{2^2} = \frac{9}{4}$$

83. (4)
$h = 6^{th}$
$\ell = 0,1,2,3,4,5$
s, p, d, f, g, h

84. (1)
Theoretical

85. (3)

$$DE = 13.6 \times 11^2 \left(\frac{1}{2^2} - \frac{1}{4^2} \right)$$

$$= 13.6 \times \frac{12}{16 \times 4} = 2.55 ev$$

86. (1)

i) $V = 2.18 \times 10^6 \frac{(1)}{(1)} = V$

ii) $V = 2.18 \times 10^6 \frac{(4)}{(4)} = V$

87. (2)

$$\frac{1}{\lambda} = R_H (Z)^2 \left(\frac{1}{2^2} - \frac{1}{4^2} \right)$$

$$\frac{1}{\lambda} = R_H (1)^2 \times \frac{12}{4 \times 16}$$

$\lambda = 486 nm$

88. (3)

$n = 6 \qquad \ell = 2$

d subshell $= 10e^-$

89. (4)

Theoretical

90. (2)

$H \quad : \quad He^+ \quad : Li^{+2}$

$$0.529 \times \frac{(1)^2}{1} : 0.529 \times \frac{(1)^1}{2} : 0.529 \times \frac{(1)^2}{3}$$

$$1 : \quad \frac{1}{2} : \quad \frac{1}{3}$$

$6 : \quad 3 : \quad 2$

91. (1)

$$\frac{1}{\lambda} = RH(Z)^2 \left(\frac{1}{1^2} - \frac{1}{\infty^2} \right)$$

$$\frac{1}{\lambda} = R_H \qquad \lambda = \frac{1}{R_H}$$

$\lambda = 912 \times 10^{-10} m$

$$f = \frac{c}{\lambda} \qquad = \frac{3 \times 10^8}{912 \times 10^{-10}} = 8.22 \times 10^{14} sec^{-1}$$

92. (4)

I.E of $Li^{+2} = 13.6 \times 9 ev$

$= 122.4$ ev

93. (3)
Theoretical

94. (3)
Theoretical

95. (2)
$^{14}_{7}N$ $P = 7$ $N = 7$

$\text{mass no} = 14$

$P = 14$ $N = 3.5$

$\text{mass no} = 17.5$

Inceaud change = 3.5

% increment = $\frac{3.5}{14} \times 100 = 25\%$

96. (4)
$\lambda_1 = 2$ $\lambda_2 = \infty$

$DE = 13.6\left(\frac{1}{2^2} - \frac{1}{\infty^2}\right)$

$DE = \frac{13.6}{\lambda} = 3.4ev$

97. (2)
$\frac{(\lambda_2 - \lambda_1)(\lambda_2 - \lambda_1 + 1)}{2} = \frac{4 \times 3}{2}$

$= 6$

98. (2)
Theoretical

99. (2)
$n = 4$ $\ell = 0,1,2,3$

$\ell = 0$ $m = 0$

$\ell = 1$ $m = -1, 0, +1$

$\ell = 2$ $m = -2, -1, 0, +1, +2$

$\ell = 3$ $m = -3, -2, -1, 0, +1, +2, +3$

100. (4)
Theoretical

101. Biochemical reactions that involve breaking of complex compounds into simpler ones are catabolic reactions or catabolism; and those that are synthetic are anabolic reactions or anabolism.

102. XI NCERT Pg.11

103. XI NCERT Pg.11

104. NCERT XI – Page 10

105. NCERT XI – Page 10

106. NCERT XI – Page 9

107. NCERT XI – Page 6

108. XI NCERT Pg.10

109. NCERT XI – Page 12

110. NCERT XI – Page 12

111. NCERT XI – Page 18

112. NCERT XI – Page 17

113. NCERT XI – Page 17 (table 2.1)

114. XI NCERT Pg.10

115. XI NCERT Pg.10

116. NCERT XI – Page 9

117. NCERT XI – Page 12 & 13

118. NCERT XI – Page 19

119. Bacterial cell wall is composed of noncellulosic polysaccharide + aminoacid. The polymer is known as peptidoglycan or murein.

120. NCERT XI – Page 19

121. NCERT XI – Page 19

122. NCERT XI – Page 19

123. NCERT XI – Page 19

124. NCERT XI – Page 17

125. In unicellular organisms like bacteria, algae and *Amoeba*, reproduction signifies an increase in number of cells, i.e. it is synonymous with growth.

126. The process in which a lost part of the body is recreated by the organism, so as to develop a new organism is known as regeneration. It can be seen in *Planaria*.

127. Metabolism refers to the sum total of all the metabolic activities or chemical reactions in a body, i.e. anabolism and catabolism. Anabolism is a constructive process, while catabolism is a destructive process.

128. The defining property or characteristic of living organisms is response to external stimuli.
All living organisms from prokaryotes to the most complex eukaryotes can respond to external stimuli. The non-living things do not possess this property at all.

129. Option (4) is against the rules of ICBN According to ICBN, the first word denoting the genus (generic name) starts with a capital letter, while the specific epithet starts with a small letter.

130. XI NCERT Pg.9,10

131. NCERT XI – Page – 10

132. Taxonomic categories are the various grouping level or rank in classification like kingdom (largest) and species (lowest category). So, here division and phylum are categories, virus is not a category.

133. According to biological concept of species (proposed by Mayr), new species is formed from existing species, thus it has real existence.

134. Option (1) is correctly matched with its particular named taxonomic category as *tigris* is the species of tiger. Other options are not correctly matched with its particular named taxonomic category and can be corrected as, Mollusca is a Phylum, Primata is an Order and *Musca* is a Genus.

135. NCERT XI – Page – 9

136. NCERT XI – Page – 9

137. NCERT XI – Page – 10
Order being a higher category is the assemblage of families which exhibit few similar characters.

138. NCERT XI – Page – 10,11

139. NCERT XI – Page – 11

140. NCERT XI – Page – 12

141. NCERT XI – Page – 13

142. Each statement in the key is called a lead.

143. Monograph provides a complete information about a particular rank level or taxon like order of family of a taxonomic category. NCERT XI – Page no 14

144. All statements are correct except statement IV. Incorrect statement can be corrected as Monographs provide information of any one taxon. Therefore, they cannot help in identifying the species found in an area.

145. NCERT XI – Page – 20

146. Cyanobacteria have chlorophyll-*a*, similar to green plants and are photosynthetic autotrophs (photoautotrophic), e.g. *Nostoc* and *Anabaena.*

147. NCERT XI – Page – 18

148. NCERT XI – Page –20

149. NCERT XI – Page – 11

150. NCERT XI – Page –11

151. XI NCERT Pg 100, 1st para, last line

152. Both bone & cartilage have solid matrix but only compact bones have Haversian canals

153. Muscle cell plasma membrane is called sarcolemma.

154. Epithelium possess cell junctions. Goblet cells are unicellular

155. XI NCERT Pg. 103,104.

156. Chondrocytes are cells of cartilage

157. Digestive tract is lined by smooth / visceral muscle.

158. Myofibrils made of actin, myosin helps cell to contract.

159. Cardiac muscles are branched (inter-calated disc)

160. Neuroglia makes more than half of neural tissue.

161. PCT – brushbordered cuboidal ep.

162. XI NCERT Pg. 101, last line

163. Squamous ep. being flat cells cannot have cilia/microvilli

164. XI NCERT Pg 102

165. Epithelium originated first & later evolved into different tissue.

166. Endothelium – squamous ep. of blood vessels.
167. XI NCERT Pg 101, 102.

168. Glands are made of modified columnar/ cuboidal ep.

169. XI NCERT Pg. 105, last para

170. Glands originate from epithelium that can originate from any germ layer.

171. Epithelium rests on non-cellular basement membrane

172. Simple ep – Cells are compactly packed with negligible intercellular spaces.

173. XI NCERT Pg. 101, 103, 104.

174. Neurons axon is enveloped by schwann cells

175. Squamous (flat) cells join end to end & hence called pavement ep.

176. Myelin is white in colour

177. Collagen are unbranched protein fibres.

178. There are various types of glial cells

179. Actin is contractile protein found only in muscle.

180. Embryos of all animals (except porifera) has unipolar neurons.

181. WBC being amoeboid can squeeze out of blood capillaries.

182. XI NCERT Pg. 101, 102

183. Compound ep. forms the lining of the wet surfaces like buccal cavity and oesophagus .Endocrine glands are ductless..

184. XI NCERT Pg. 101, 102

185.

186. XI NCERT Pg 104, 2nd para. Bones are rich with hydroxyapatite $Ca_{10}(PO_4)_6 (OH)_2$

187. Haversian canals of compact bone are transversely connected via volkman's canal

188. Fibroblasts are cells of connective tissue

189. Heart shows inter-calated disc to work as a single unit.

190. Tendon-dense connective tissue, tip of nose-elastic cartilage lining of stomach-columnar ep.

191. XI NCERT, Pg 101.

192. XI NCERT Pg. 102, 2nd para. Compound ep. Protects exposed body parts

193. Free surface of columnar/cuboidal ep. Becomes absorptive when lined with microvilli

194. Most widely distributed tissue is areolar connective tissue.

195. Ependymal cells secrete CSF.

196. Neuron with myelin sheath is also called medullated neuron

197. XI NCERT Pg. 103

198. Blood matrix (plasma) is fibreless. Neuroglia support neurons. Biceps are striated hence voluntary.

199. Cartilage – specialised connective tissue. Tendon-dense connective tissue, adipose loose connective tissue.

200. XI NCERT Pg 103