PACE-IIT & MEDICAL

ANSWER KEY FOR MAJOR TEST- 03 (FOR 2024 ASPIRANTS) 26th March 2023

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

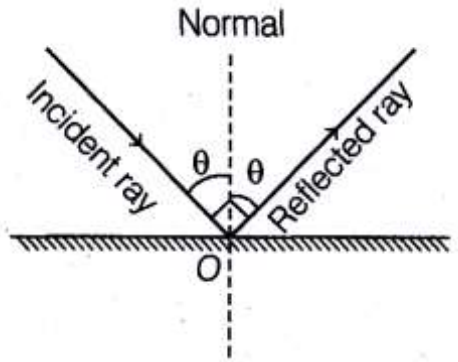
Solutions

1. Sol. (3)

Let the angle of incidence be θ. From the law of reflection.

Angle of incidence = Angle of reflection $= \theta$

So, the given situation can be depicted as follows.



Given, incident ray is perpendicular to reflected ray

$\Rightarrow \theta + 0 = 2\theta = 90^{\circ}$ (from figure) $\Rightarrow \theta = 45^{\circ}$

So, angle of incidence $= 45^{\circ}$

2. Sol. (2)

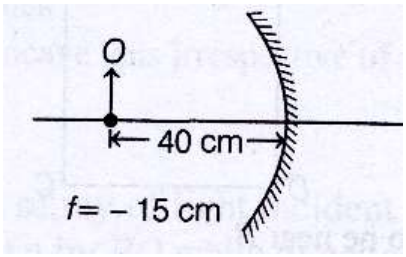
The focal length of a mirror is $f = \frac{R}{2}$

Where, R is the radius of curvature of mirror.

Here, $R = 16\text{cm}$ $\quad \therefore f = \frac{16}{2} = 8\text{cm}$

3. Sol. (2)

Case I: When the object distance, $u_1 = -40\text{cm}$. Focal length of mirror, $f = -15\text{cm}$



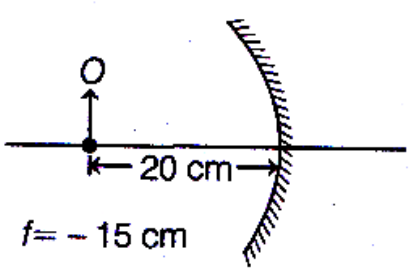
Using the mirror formula, we get

1/f = 1/v + 1/u hence 1/(-15) = 1/v + 1/(-40)

$\Rightarrow \frac{1}{v_1} = \frac{1}{40} - \frac{1}{15} = \frac{3.8}{120} = \frac{-5}{120}$ replace 3.8 by 3-8

$\Rightarrow v_1 = \frac{-120}{5} = -24\text{cm}$

Case II When the object distance , $u_2 = -20\text{cm}$



Using the mirror formula again, we get

$$\frac{1}{f}=\frac{1}{v_2}+\frac{1}{u_2}\Rightarrow -\frac{1}{15}=\frac{1}{v_2}+\left(-\frac{1}{20}\right)$$

$$\Rightarrow \frac{1}{v_2}=\frac{1}{20}-\frac{1}{15}=\frac{3-4}{60}=\frac{-1}{60}\Rightarrow v_2=-60\text{cm}$$

As, the net displacement of the images is equal to the difference between the image distance in both the cases

$\therefore$ The displacement of the image is

$$=v_2-v_1=-60-(-24)$$

$$=-60+24 \text{ or } =-36\text{cm}$$

$$=36\text{cm}\text{ , away from the mirror.}$$

4. (1)

Given, size(height) of the object, $h_1=2\text{cm}$, object distance, $u=-16\text{cm}$ and size(height) of the image, $h_2=-3\text{cm}$

(since the image is real and inverted)

As, linear magnification, $m=\frac{-h_2}{h_1}=\frac{v}{u}$

Where, v is image distance.

$$\Rightarrow v=\frac{-h_2}{h_1}\times u=-\frac{(-3)}{2}\times(-16)=-24\text{cm}$$

Now, using mirror formula,

$$\frac{1}{f}=\frac{1}{v}+\frac{1}{u}=-\frac{1}{24}-\frac{1}{16}=\frac{-2-3}{48}=\frac{-5}{48}$$

$$f=\frac{-48}{5}=-9.6\text{cm}$$

5. Sol: (2)

Given, power of lens, $P=20\text{D}$

Power of lens (in dioptre) $P=\frac{100}{\text{focal length f (in cm)}}$

$$\Rightarrow f=\frac{100}{20}=5\text{cm}$$

From lens Maker's formula, $\frac{1}{f}=(n-1)\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

For biconvex lens, $R_1=+R$

And $R_2=-R$

$$\Rightarrow \frac{1}{f}=(n-1)\left(\frac{1}{R}+\frac{1}{R}\right)=(n-1)\left(\frac{2}{R}\right)$$

$$\frac{1}{5}=(n-1)\left(\frac{2}{5}\right)\ [\because \text{given}, R=5\text{cm}]$$

$$2n-2=1\Rightarrow 2n=3\Rightarrow n=3/2$$

6. Sol: (4)

For equivalent focal length

$$\frac{1}{f}=\frac{1}{f_1}+\frac{}{f_2}+\frac{1}{f_3}$$

Given, $f_1=40\text{cm}, f_2=-40\text{cm}$ and $f_3=-15\text{cm}$

$$\Rightarrow \frac{1}{f}=\frac{1}{(+40)}+\frac{1}{(-40)}+\frac{1}{(-15)}$$

$$\Rightarrow \frac{1}{f}=-\frac{1}{15}\Rightarrow f=-15\text{cm}$$

Since, power, P (in D) $=\dfrac{1}{f\,(\text{in m})}=-\dfrac{100}{15}=-\dfrac{20}{3}$

$=-6.67\,\text{D}$

7. (1)

Given, $A=60^\circ$ for equilateral prism and $D_m=30^\circ$. According to prism formula, $n=\dfrac{\sin\left(\dfrac{A+D_m}{2}\right)}{\sin\left(\dfrac{A}{2}\right)}$

Substituting the given values in above equation, we get

$$n=\frac{\sin\left(\dfrac{60^\circ+30^\circ}{2}\right)}{\sin\left(\dfrac{60^\circ}{2}\right)}=\frac{\sin 45^\circ}{\sin 30^\circ}\,n=\sqrt{2}$$

$$\because n=\frac{\text{speed of light in air}(c)}{\text{Speed of light in prim}(v)}$$

$$\Rightarrow v=\frac{c}{n}=\frac{3\times10^8}{\sqrt{2}}=\frac{3}{\sqrt{2}}\times10^8\,\text{m/s}$$

8. Sol. (1)

Given, $n=1.57, D=5.5^\circ$

Since, the angle of deviation is very small, so we can use the relation , 4 must be A

$$\Rightarrow A=\frac{D}{n-1}=\frac{5.5}{1.57-1}=9.65^\circ$$

9. Sol. (4)

Different colours of white light have different wavelengths. The descending order of the wavelength of the component of white light is

$\lambda_{Red}>\lambda_{Green}>\lambda_{Blue}>\lambda_{violet}$

$\therefore$ Red colour light has the longest wavelength.

10. (2)

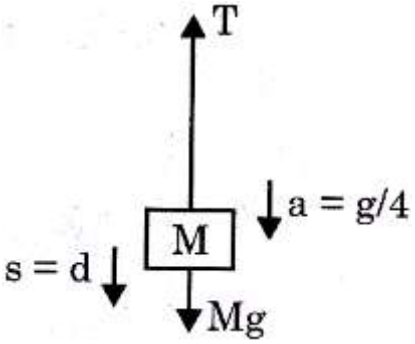
$\theta = 10 - 5t + 4t^2$

$$\omega_{avg} = \frac{\Delta\theta}{\Delta t} = \frac{\theta_2 - \theta_1}{t_2 - t_1} = \frac{31-9}{3-1} = 11 rad/s$$

11. Sol. (1)
For 360 rpm we have

$$360 rpm = \frac{2\pi}{60} \times 360 = 12\pi \, rad/s$$

12. Sol. (3)
Work done by cord, $W = Td\cos 180^\circ$ ……(i)



From NLM

$Mg - T = ma$

$Mg - T = Mg/4$

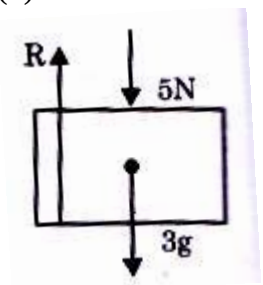
$T = 3Mg/4$

Put in equation(i)

$$W = \left(\frac{3Mg}{4}\right)(d)(-1)$$

$$W = -\frac{3Mgd}{4}$$

13. Sol. (3)



F.B.D. of block A

$R = 5 + 3g$

$= 5 + 30$

$= 35N$

14. Sol. (4)

$$\mu\left(\frac{2}{3}mg\right) = \left(\frac{1}{3}mg\right) \Rightarrow \mu = \frac{1}{2}$$

15. Sol: (1)$R = u^2 2\sin\theta\cos\theta)/g$ and $H = u^2\sin^2\theta/2g$ As R = 2H we get after solving $\sin\theta = 2\cos\theta$ so $\tan\theta = 2$ hence $\sin\theta = 2/\sqrt{5}$, $\cos\theta = 1/\sqrt{5}$ hence (1)

16. Sol: (4)

If two vectors A and B are given then range of their resultant can be written as

$(A-B) \le R \le (A+B)$ i.e., $R_{max} = A+B$ and $R_{min} = A-B$

If $B = 1$ and $A = 4$ then their resultant will lies in between 3N and 5N. It can never be 2N.

If these three vectors are represented by three sides of triangle then they form equilateral triangle.

17. Sol. (4)

Let mass $m \propto F^a \upsilon^b T^c$

Where k is a dimensionless constant and a, b and c are the exponents .

Writing dimensions on both sides, we get

$$\left[ML^0T^0\right] = \left[MLT^{-2}\right]^a \left[LT^{-1}\right]^b [T]^c$$

$$\left[ML^0T^0\right] = \left[M^0L^{a+b}T^{-2a-b+c}\right]$$

Applying the principle of homogeneity of dimensions, we get

$a = 1$ .....(ii)

$a + b = 0$ .....(iii)

$-2a - b + c = 0$ ....(iv)

Solving Eqs. (ii), (iii) and (iv), we get

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

From equation (i) $[m] = \left[F\upsilon^{-1}T\right]$

18. Sol: (4)

$C = ms$

$= 40gm \times 0.2cal/gm\,^\circ C = 8cal/^\circ C$

19. Sol: (3)

20. Sol: (2)

Ratio of thermal capacity

$$\frac{C_1}{C_2} = \frac{m_1 s_1}{m_2 s_2}$$

Material is same so $m \propto V$

$$\frac{C_1}{C_2} = \frac{\rho\left(\frac{4}{3}\pi R_1^3\right)}{\rho\left(\frac{4}{3}\pi R_2^3\right)s} \Rightarrow \frac{C_1}{C_2} = \frac{1}{8}$$

21. Sol: (3)

$Q = mc\Delta\theta$

Or $420 = 10 \times 10^{-3} \times (4.2 \times 1000\Delta\theta)$

($\because$ specific heat of water $= 4.2kJ\,kg^{-1}C^{-1}$)

$$\Delta\theta = \frac{420}{10 \times 10^{-3} \times 4200} = 10\,^\circ C$$

22. Sol: (4)

Heat given by 1 gm steam when it converts into water at $0\,^\circ C$

$= mL_f + ms\Delta\theta$

$= [1 \times 540 + 1 \times 1 \times 100]cal$

$= 640\text{cal}$

Using this heat m gm ice will convert into water

So $640\,\text{cal} = m(80\,\text{cal/gm}) \Rightarrow m = 8\text{gm}$

23. Sol: (1)

$m_1 s\theta\Delta = m_2 L_f$

$80(1)(30\,^\circ\text{C}) = m(80) \Rightarrow m = 30\text{gm}$

24. Sol: (1)

$ms\Delta\theta = \dfrac{mgh}{2} \Rightarrow \Delta\theta = \dfrac{gh}{2s}$

Specific heat of water $s = 4200\text{J/kg}\,^\circ\text{C}$

$\Delta\theta = \dfrac{9.8\times 84}{2(4200)}\,^\circ\text{C} = 0.098\,^\circ\text{C}$

25. Sol: (1)

Thermal energy $= \dfrac{1}{2}m\left(\upsilon^2 - u^2\right)$

$= \dfrac{1}{2}\times\left(\dfrac{100}{1000}\right)\left(10^2 - 5^2\right) = 3.75\text{J}$

26. Sol: (3)

Heat lost by A= Heat gained by B

$\Rightarrow m_A \times C_A \times (T_A - T) = m_B \times C_B \times (T - T_B)$

Since $m_A = m_B$ and temperature of the mixture $(T) = 28\,^\circ\text{C}$

$\therefore C_A \times (32-28) = C_B \times (28-24)$

$\Rightarrow \dfrac{C_A}{C_B} = 1:1$

27. Sol: (4)

Using law of mixture

$ms_1(31-28) = m\,s_2(28-24)$

$\dfrac{s_1}{s_2} = \dfrac{4}{3}$

28. Sol: (2)

If the sheet is heated then both d_1 and d_2 will increase since the thermal expansion of isotropic solid is similar to true photographic enlargement.

29. Sol: (4)

$\rho = \dfrac{\rho_0}{(1+3\alpha\Delta\theta)}$

$9.7 = \dfrac{10}{1+3\alpha(100^\circ\text{C} - 0^\circ\text{C})}$

$\alpha = 1.03\times 10^{-4}\,/\,^\circ\text{C} \simeq 10^{-4}\,/\,^\circ\text{C}$

30. Sol: (1)
Coefficient of thermal conductivity K is a constant, whose value depends upon the material.

31. Sol: (1)
Temperature of interface,

$$\theta = \frac{K_1\theta_1 l_2 + K_2\theta_2 l_1}{K_1 l_2 + K_2 l_1}$$

Given, $K_{Cu} = 9K_s$, so,

If $K_s = K_1 = K$, then $K_{Cu} = K_2 = 9K$

$$\Rightarrow \theta = \frac{9K \times 100 \times 6 + K \times 0 \times 18}{9K \times 6 + K \times 18}$$

$$\theta = \frac{5400K}{72K} = 75^\circ C$$

32. Sol: (3)
Thermal radiation is radiated following Stefan-Botlzmann law and the radiation travels with a velocity if light.

33. Sol: (3)

$$\Delta U = C_v \Delta T$$

$$\Delta U = \left(\frac{5}{2}R\right)\Delta T \text{ or } \Delta T = \frac{2(\Delta U)}{5R}$$

From first law of thermodynamics,

$$\Delta U = \Delta Q - \Delta W = Q - \frac{Q}{4} = \frac{3Q}{4}$$

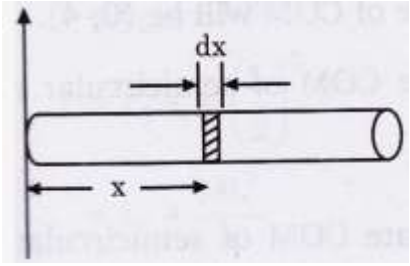
Now molar heat capacity,

$$C = \frac{\Delta Q}{\Delta T} = \frac{Q}{\frac{2(\Delta U)}{5R}} = \frac{5RQ}{2\left(\frac{3Q}{4}\right)} = \frac{10}{3}R$$

34. (3)
When the ball is released from the top of tower then ratio of distances covered by the ball in first, second and third second
$h_I : h_{II} : h_{III} = 1 : 3 : 5$: [Because $h_n \propto (2n-1)$]
∴ Ratio of work done $mgh_I : mgh_{II} : mgh_{III} = 1 : 3 : 5$

35. Sol: (2)
Depends on the distribution of mass in the body.

36. Sol: (2)



Linear density of the rod varies with distance

$\frac{dm}{dx} = \lambda$ (Given) $\therefore dm = \lambda dx$

Position of center of mass

$$x_{CM} = \frac{\int dm \times x}{\int dm}$$

$$= \frac{\int_0^3 (\lambda\, dx) \times x}{\int_0^3 \lambda\, dx} = \frac{\int_0^3 (2+x)\, x\, dx}{\int_2^3 (2+x)\, dx} = \frac{\left[x^2 + \frac{x^3}{3}\right]_0^3}{\left[2x + \frac{x^2}{2}\right]_0^3}$$

$$= \frac{9+9}{6+\frac{9}{2}} = \frac{36}{21} = \frac{12}{7}\,m$$

37. Sol: (4)

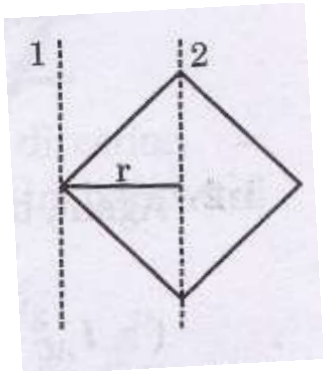
$$I_{CD} = I_{CM} + M\left(\frac{L}{4}\right)^2 = \frac{ML^2}{12} + \frac{ML^2}{16} = \frac{7ML^2}{48}$$

38. Sol: (4)

$F_{net} = 0$

So, COM may be at rest or may move with constant speed.

39. Sol: (3)



By theorem of parallel axis,

$I_1 = I_2 + (4M)r^2$

$$= 4\left[\frac{ML^2}{3}\sin^2 45^\circ\right] + 4M\left[\frac{\sqrt{2}L}{2}\right]^2$$

$$= \frac{8}{3}ML^2$$

40. Sol: (2)

$$\theta = \omega_0 t + \frac{1}{2}\alpha t^2 = 2\times 2 + \frac{1}{2}\times 3\times (2)^2$$

$= 4 + 6 = 10$ radian

41. Sol: (3)

$$K_A = \frac{1}{2} I\omega_A^2$$

$$K_B = \frac{1}{2}(2I)\omega_A^2$$

$$\Rightarrow \frac{1}{2}I\omega_A^2 = \frac{1}{2}(2I)\omega_B^2$$

$$\Rightarrow \omega_A^2 = 2\omega_B^2 \Rightarrow \left(\frac{\omega_A}{\omega_B}\right)^2 = 2$$

$$\Rightarrow \frac{\omega_A}{\omega_B} = \sqrt{2} \Rightarrow \omega_A : \omega_B = \sqrt{2} : 1$$

42. Sol: (2)

As $\tau = I\alpha$

$\alpha \propto \frac{1}{I}$ (τ is constant)

MI of figure (ii) is smaller hence acceleration is greater.

43. Sol: (4)

$\omega_f = \omega_i + \alpha t$

$300(2\pi) = 100(2\pi) + \alpha(10)$

$\alpha = 40\pi \text{ rad/sec}^2$

$\omega_f^2 = \omega_i^2 + 2\alpha\theta$

$360000\pi^2 - 40000\pi^2 = 80\pi\theta$

$\frac{320000\pi}{80} = \theta$

$4000\pi = 0$

No. of round $n = \frac{4000\pi}{2\pi} = 2000$ round

OR number of rotation $= \frac{n_{1+}n_2}{2}t = \frac{100+300}{2}10 = 2000$

44. Sol: (4)

$\alpha = \frac{\tau}{I} \Rightarrow \alpha = \frac{1000\,N-m}{200\,kg-m^2} \Rightarrow \alpha = 5 \text{rad/sec}^2$

Using 1st equation

$\omega_f = \omega_i + \alpha t$

$\omega_f = 0 + (5)(3) = 15 \text{rad/sec}$

45. Sol. (2)

$\Delta PE = \Delta RKE$

$$Mg\frac{L}{2} = \frac{1}{2}\left(\frac{ML^2}{3}\right)\omega^2 \Rightarrow \omega = \sqrt{\frac{3g}{L}}$$

$$\upsilon = \omega L \Rightarrow \upsilon = \left(\sqrt{\frac{3g}{L}}\right)L$$

$$\upsilon = \sqrt{3gL} \Rightarrow \upsilon = \sqrt{3\times 9.8\times 1} = 5.4 \text{m/sec}$$

46. Sol; (4)

$$K_T = K_R \Rightarrow \frac{1}{2}m\upsilon^2 = \frac{1}{2}m\upsilon^2\left(\frac{K^2}{R^2}\right) \Rightarrow \frac{K^2}{R^2} = 1$$

This value of K^2/R^2 match with hollow cylinder.

47. Sol: (4)

$$KE_{Rolling} = PE$$

$$\frac{1}{2}m\upsilon^2\left[1+\frac{K^2}{R^2}\right] = mgh$$

$$\frac{1}{2}\upsilon^2\left[1+\frac{K^2}{R^2}\right] = g\frac{7.\upsilon^2}{10g}$$

$$1+\frac{K^2}{R^2} = \frac{7}{5} \Rightarrow \frac{K^2}{R^2} = \frac{2}{5}$$

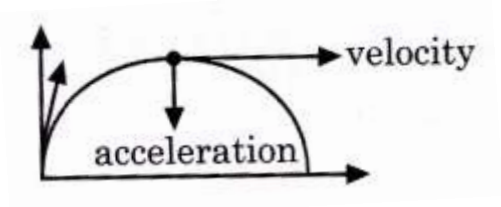
Hence body is solid sphere

48. Sol: (3)

$$a = \frac{g\sin\theta}{1+k^2/R^2} = \frac{g\sin 30^\circ}{1+1} = \frac{g}{4}$$

49. Sol: (2)

As shown in figure velocity acts in horizontal direction and acceleration due to gravity acts in vertical direction. So angle between them is 90°.



50. Sol: (3)

Horizontal range $(R) = u_x T$ where u_x is horizontal component and T is time of flight

$\Rightarrow 100 - u_x.20 \Rightarrow u_x = 5m/s$

51.

Element	Percentage	Atomic ratio	Simplest ratio	Whole no. ratio
P	43.6%	$\frac{43.6}{31} = 1.41$	$\frac{1.41}{1.41} = 1$	2
O	56.4%	$\frac{56.4}{16} = 3.52$	$\frac{3.52}{1.41} = 2.5$	5

Formula P_2O_5

52. $$\frac{1}{\lambda_1} = R\left(\frac{1}{2^2} - \frac{1}{3^2}\right)$$

Or $\frac{1}{6561} = R\left(\frac{1}{4} - \frac{1}{9}\right) = \frac{5}{36}R$

$\frac{1}{\lambda_2} = R\left(\frac{1}{2^2} - \frac{1}{4^2}\right)$

or $\frac{1}{\lambda_2} = R\left(\frac{1}{4} - \frac{1}{16}\right) = \frac{3}{16}R$

$\therefore \frac{1}{6561} \times \frac{\lambda_2}{1} = \frac{5}{36} \times \frac{16}{3}$

Or $\lambda_2 = \frac{5 \times 16 \times 6561}{36 \times 3} = 4860\,\text{Å}$

53. $m = (2l+1) \therefore 7 = 2l+1$ or $l = 3$

54. $\lambda = \frac{h}{m\upsilon} = \frac{6.6 \times 10^{-34} kg^2 ms^{-1}}{100 \times 10^{-3} kg \times 10^3 \times 10^{-2} ms^{-1}}$

$6.6 \times 10^{-32} cm$

55. (4)

56. (1)

57. (4)

58. (3)

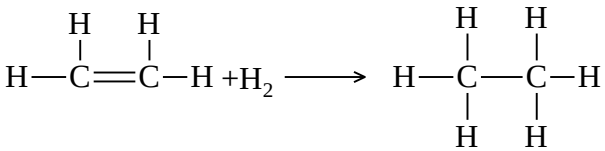
59. (2)

60. (4)

61. $\Delta U = q + p\Delta V = 10 + 0 = 10kJ$

62. (4)

63.



$\Delta H = 4$(B.E of C – H) + (B.E. of C = C) +(B.E. of H – H) -6(B.E. of C – H) – (B. E. of C – C)

$= 4(413) + 615 + 433 - 6(413) - 347$

$= -125kJ$

64. $K_1 = \frac{[NO_2]}{[NO][O_2]^{1/2}}$

And $K_2 = \frac{[NO]^2[O_2]}{[NO_2]} = \frac{1}{K_1^2}$

$\therefore K_2 = \frac{1}{K_1^2}$

65. Change in volume of container will change the concentrations of the reaction mixture but the equilibrium constant remains unchanged.

66. (4)

67. (2)

68. (4)

69. $s = \left(\frac{K_{sp}}{4}\right)^{1/3}$

$= \left(\frac{3.2\times10^{-11}}{4}\right)^{1/3}$

$= 2\times10^{-4}$

70. (3)

71. (4)

72. (3)

73. (3)

74. (4)

75. Halogen are deactivating (–l > +m) but o–p directing due to +M effect.

76. $\overset{\oplus}{C}H_3$ carbocation has no stabilizing force

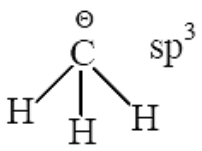
Stability order

$Ph-\overset{\oplus}{C}H_2 > CH_3-\overset{\oplus}{C}H-CH_3 > CH_3-\overset{\oplus}{C}H_2 > CH_3$

Resonance +I +I + I

77. (4)

It can be all

eq.  sp^3 $\overset{\ominus}{H}C = CH_2$ (sp^2) $CH \equiv \overset{\ominus}{C}$ (sp)

78. (3)

79. (3)

80. (4)

81. (3)

82. (1)

83. (1)

84. (3)

85. (2)

86. No. of atoms of electrons can be calculated as

No. of atoms = $\frac{\text{Mass}}{\text{At, mass}}$

Now, for same mass (100g), the number of atoms will be maximum if atomic mass is least. Therefore, carbon will have maximum number of atoms.

87. Let mass of O_2 =x

Mass of N_2 = 4x

Moles of O_2= $\frac{x}{32}$

Molecules of $O_2 = \frac{x}{32} \times 6.02 \times 10^{23}$

Moles of $N_2 = \frac{4x}{28} = \frac{x}{7}$

Moles of N_2= $\frac{x}{7} \times 6.02 \times 10^{23}$

Ratio of molecules

$= \frac{x}{32} \times 6.02 \times 10^{23} : \frac{x}{7} \times 6.02 \times 10^{23}$

$\frac{1}{32} : \frac{1}{7}$ or 7 : 32

88. (3)

89. (2)

90. (3)

91. (3)

92. $\Delta G = \Delta H - T\Delta S$

$0 = (170 \times 10^3 J) - T(170 JK^{-1})$

T = 1000K

For spontaneity, ΔG is –ve

Hence T should be > 1000K.

93. $K = \frac{[C]^2[D]}{[A][B]^2}$

[C]=0.2 [D]=0.1, [A] = 1.1 – 0.1=1.0

[B] = 2.2 – 0.2 = 2.0

$\therefore K = \frac{(0.2)^2(0.1)}{(1.0)(2.0)^2} = 0.001$

94. (2)

95. (3)

96. $pH = pK_a + \log \frac{[Salt]}{[Acid]}$

$pH = 9.30 + \log \frac{(2.50)}{(2.50)}$

= 9.30

97. (3)

98. (1)

99. (1)

100. (1)

101. NCERT XI Pg. 180

102. NCERT XI Pg. 243

103. NCERT XI Pg. 96

104. NCERT XI Pg. 79,80,81

105. NCERT XI Pg. 168

106. NCERT XI Pg. 32

107. NCERT XI Pg. 138

108. NCERT XI Pg. 26

109. NCERT XI Pg. 244

110. NCERT XI Pg. 181,182

111. NCERT XI Pg. 9, 10

112. NCERT XI Pg. 74

113. NCERT XI Pg 90

114. NCERT XI Pg 131,132

115. NCERT XI Pg 42

116. NCERT XI Pg 168

117.

118. NCERT XI Pg 31, 34 and 37

119. NCERT XI Pg 77

120. NCERT XI Pg 243

121. NCERT XI Pg 8

122. NCERT XI Pg 180

123. NCERT XI Pg 139 & 140

124. NCERT XI Pg 16

125. NCERT XI Pg 169

126. NCERT XI Pg 23 and 24

127. NCERT XI Pg 72

128. NCERT XI Pg 13

129. NCERT XI Pg 29, 30

130. NCERT XI Pg 86

131. NCERT XI Pg. 8 & 9

132. NCERT XI Pg 170

133. NCERT XI Pg 248,249,250

134. NCERT XI Pg 23 and 24

135. NCERT XI Pg 179

136. NCERT XI Pg 24

137. NCERT XI Pg 36 and 38

138. NCERT XI Pg 128 and 133 and 135

139. NCERT XI Pg 97

140. NCERT XI Pg 183

141. NCERT XI Pg 6 and 7

142. NCERT XI Pg 19, 20

143. NCERT XI Pg 252

144. NCERT XI Pg 79,80 and 81

145. NCERT XI Pg 182

146. NCERT XI Pg 96

147. NCERT XI Pg 251

148. NCERT XI Pg 38,39

149. NCERT XI Pg 80

150. NCERT XI Pg 168,169 and 170

151. Solution: In the kidney the correct sequence of formation of urine involves the following processes: glomerular filtration --> reabsorption --> tubular secretion.

152. XI NCERT pg 283

153. Obturator foramen is present in the hip bone allow passage of inguinal canal, acetabulum provide articulation to the head of thigh bone.

154. Solution: A fall in glomerular filteration rate (GFR) activates juxta glomerlular of kidney cells to release renin, which activates the renin-angiotensin -aldosterone system (RAAS), which is a signaling pathway responsible for regulating blood pressure. ANF is secreted when BP is high or GFR is high.

155. XI NCERT pg 286

156. Diuresis excessive urination is due to deficiency of ADH.

157. Solution: Mammals have the ability to produce a concentrated urine. The Henle's loop and vasa recta play a significant role in this. The flow of filtrate in the two limbs of Henle's loop is in opposite directions and thus forms a counter current. The flow of blood through the two limbs of vasa recta is also in a counter current pattern.

158. Ligament is not the thissue of articulation but prevents dislocation of bones.

159. XI NCERT pg 312

160. Solution: In the kidney, glucose is mainly absorbed in the proximal convoluted tubules which is the segment of nephron present in the kidney.

161. Solution: Electric ray is called Torpedo, and it is a Chondrichthyes or cartilaginous fish.

162. (3)
XI NCERT pg 312. Myasthenia gravis is an auto-immune disease in which acetyl choline receptors on muscles is blocked by antibodies.

163. (2)

164. XI NCERT pg 312

165. Normal activities of the human heart is regulated intrinsically hence it is myogenic. A special neural centre in the medulla oblongata can moderate the cardiac function through the ANS. Parasympathetic neural signals decrease the rate of heart beat.

166. XI NCERT pg 283. Pericardium – Fibrous tissue.

167. Solution: NCERT XI page 305

168. XI NCERT pg 151

169. Solution:XI NCERT pg 297. An increase in body fluid volume can switch off the osmoreceptors and suppress the ADH release to complete the feedback. ADH mainly acts on collecting ducts of kidney and increase the water reabsorption in this part.

170. Inspiration involves muscle contraction and hence active whereas expiration involves muscle relaxation and hence passive.

171. (3)
XI NCERT pg 294.PCT, DCT, CT are the sites for selective secretion.
Secretion of H^+, NH_4^+, HCO_3^- occurs in PCT.

172. Solution: Ammonia is highly soluble in water, so in aquatic animals e.g., tadpole of frog, the nitrogenous waste products are excreted in the form of ammonia. In terrestrial animals e.g., adult frog, these wastes are excreted in the form of urea.

173. Solution: Nerve cells and muscle cells are excitable. Their cell membrane undergo polarity changes. In both cell types, the membrane generates an impulse because of excitation.

174. Solution: Smooth muscles is spindle shape, uninucleate and involuntary.

175. Solution: The renal corpuscle is also known Malpighian body. It consists of cup like double walled structure known as Bowman's capsule and the bunch of capillaries present in the Bowman's capsule is known as glomerulus.

176. XI NCERT pg 312

177. Tetanus is bacterial infection affecting skeletal muscles.

178. Solution: The bladder fills with urine. → Stretch receptors on the wall of urinary bladder send signals to the CNS. →
CNS passes on motor messages to initiate the contraction of smooth muscles of bladder and simultaneous relaxation of sphincter. → Micturition

179. (2)
NCERT Pg 307, 1st paragraph figure 20.4.

180. (3)
Blood group 'O' is universal donor
Blood group 'AB' is universal receiver.

181. XI NCERT pg 287. Sympathetic nerves and Adrenal medullary hormones are stimulatory for heart . Inhibitory signals from Pneumotaxic center increases breathing rate and hence increases heart rate causing increase in cardiac output.

182. (1)
NCERT Pg. 288

183. (3)
Hyoid bone is not considered as part of skull.
Ribs has 2 articulation surfaces on its dorsal end and hence called bicephalic ribs.

184. XI NCERT pg 285. Semi lunar valves close down forcefully producing second heart sound at end of VS.

185. XI NCERT pg 284. SA node generates the highest number of action potentials 70-75 times/ min and hence the pacemaker of heart.

186. (4)
XI NCERT pg 297.ADH is suppressed by diuretic substances such as low temp. Alcohol, caffeine due to which urine output increase (diuresis)

187. Glomerular filteration is non-selective process.

188. Humans cannot directly alter the pulmonary volume without change in the volume of thoracic cavity. Our lungs are elastic.

189. Villi is the site of max. absorption of water and all nutrients.

190. XI NCERT pg 310. Most of the mammals have seven cervical vertebrae.

191. Most of the enzymes are proteins but some are RNA like ribozyme.

192. XI NCERT pg 292

193. (1)
Constriction of efferent arteriole result increase in Glomerular hydrostatic pressure (GHP) which ultimately results increase in GFR.

194. Solution: *Adamsia* is a polyp form.

195. XI NCERT pg 307

196. Solution: Transitional epithelium is a type of stratified epithelium. Transitional epithelium is a type of tissue that changes shape in response to stretching (stretchable epithelium).

197. NCERT Pg. 281, 1st paragraph

198. Fibrinogen is converted to fibrin by protein enzyme called thrombin.

199. XI NCERT pg 307,308. The process of contraction continues till the calcium ions are pumped back to the sarcoplasmic cisternae and resulting in the masking of actin Filaments.

200. XI NCERT pg 279