

Since 1999



NEET 2023-24

Mark 720	Group PCB	PRE FINAL ROUND - 07	Date : 30/03/2024 Time : 3 :20 Hours
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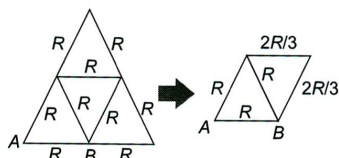
Answer Key Version - Q (PCB NEET 2023-24)

Physics					Chemistry				
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105. 4	116. 4	127. 2	137. 2	148. 1	155. 1	166. 1	177. 1	187. 1	198. 4
106. 4	117. 4	128. 2	138. 2	149. 3	156. 1	167. 2	178. 1	188. 4	199. 1
107. 1	118. 1	129. 4	139. 1	150. 4	157. 4	168. 2	179. 1	189. 4	200. 1
108. 3	119. 4	130. 1	140. 2		158. 4	169. 2	180. 3	190. 1	
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PHYSICS

SECTION - A (35 Questions)

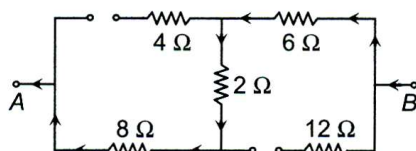
01. (1) $n_i^2 = n_h n_e \Rightarrow (10^{19})^2 = 10^{21} \times n_e = 10^{17} / \text{m}^3$.
02. (2) Zener breakdown can occur in heavily doped diodes. In lightly doped diodes the necessary voltage is higher, and avalanche multiplication is then the chief process involved.



03. (4)



04. (3) According to the given figure, A is at lower potential w.r.t. B . Hence, both diodes are in reverse biasing, so equivalent circuit can be redrawn as follows:



Equivalent resistance between A and B ,

$$R = 8 + 2 + 6 = 16 \Omega$$

05. (3) $v_d = \frac{i}{Ane}$;

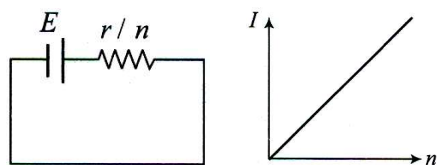
As $A \uparrow$ so $v_d \downarrow \Rightarrow v_p > v_0$

06. (4) Infrared radiation is found in Paschen, Brackett and Pfund series and it is obtained when electron transition occurs from high energy level to minimum third level.

07. (1) (A) \rightarrow (4); (B) \rightarrow (3); (C) \rightarrow (1); (D) \rightarrow (2)

08. (1) If n batteries are in parallel then the circuit can

be made as $I = \frac{nE}{r}$



i is directly proportional to n .

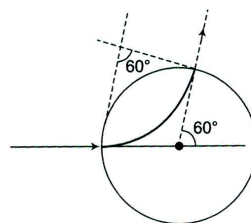
09. (4) At time $t = 0$ i.e., when capacitor is charging,

$$\text{current } i = \frac{2}{1000} = 2 \text{ mA}$$

When capacitor is fully charged, no current will pass through it. Hence, current through the circuit

$$\text{is } i = \frac{2}{2000} = 1 \text{ mA}$$

10. (1) Balancing length is independent of the cross-sectional area of the wire.
11. (1) According to given conditions TIR must take place at both the surfaces AB and AC . Hence only option (1) is correct.
12. (3) Angle rotated in magnetic field = 60°



So time taken should be $\frac{1}{6}$ of time period.

$$t = \frac{T}{6} = \frac{1}{6} \left(\frac{2\pi m}{qB} \right) = \frac{\pi m}{3qB}$$

13. (3) Torque acting on the loop is

$$\tau = M \times B = MB \sin \theta$$

where θ = angle between M and B

In the figure shown, $\theta = 90^\circ$ because B is in plane of loop.

Or $\tau = MB$ = maximum torque

Hence, (3) is correct and choice (4) is wrong.

Since, torque is acting on the loop so loop is not in equilibrium.

14. (3) If nothing is said then it is considered that final images are formed at infinite and

$$m_\infty \frac{(L_\infty - f_o - f_e) \cdot D}{f_o f_e} \approx \frac{LD}{f_o f_e}$$

$$\Rightarrow 400 = \frac{20 \times 25}{0.5 \times f_e}$$

$$\Rightarrow f_e = 2.5 \text{ cm.}$$

15. (2) $B = \mu_0 \mu_r H \Rightarrow \mu_r \propto \frac{B}{H}$ = slope of B - H curve

According to the given graph, slope of the graph is highest at point Q .

16. (3) When key K is pressed, current through the electromagnet starts increasing, i.e., flux linked with ring increases which produces repulsion effect.

17. (4) By Fleming's right hand rule, field due to wire inwards and perpendicular to the plane. This field keeps on decreasing as distance from wire increases. So, potential at A will be higher than that at B .

18. (3) For frequency $0 - f_r$, Z decreases, hence $I (= V/Z)$, increases.
For frequency $f_r - \infty$, Z increases I decreases.

19. (2) For series LCR circuit,

$$\text{Voltage, } V = \sqrt{V_R^2 + (V_L - V_C)^2}$$

Since, $V_L = V_C$, hence $V = V_R = 220 \text{ V}$

Also, current $i = \frac{V}{R} = \frac{220}{100} = 2.2 \text{ A}$

20. (1) The direction of EM wave is given by the direction of $\vec{E} \times \vec{B}$.

21. (4) $P = P_1 + P_2$
 $= +12 - 2 = 10 \text{ D}$

Now $F = \frac{1}{P} = \frac{1}{10} \text{ m} = 10 \text{ cm}$.

22. (3) Slit width ratio = 1 : 9

Since slit width ratio is the ratio of intensity and intensity $\propto (\text{amplitude})^2$

$\therefore I_1 : I_2 = 1 : 9$

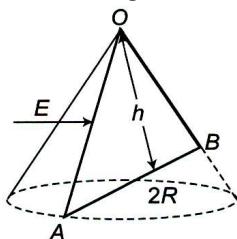
$\Rightarrow a_1^2 : a_2^2 = 1 : 9$

$\Rightarrow a_1 : a_2 = 1 : 3$

$\text{Im in} / \text{Im ax} = \left(\frac{a_1 - a_2}{a_1 + a_2} \right)^2 = \left(\frac{2}{4} \right)^2 = \frac{1}{4}$

23. (4) In a non-uniform magnetic field both torque and net force acts on the dipole. If magnetic field were uniform, net force on dipole would be zero.

24. (2) Plane normal to electric field is a triangle with base length $2R$ and height h .



Area of triangle $A = \frac{1}{2} \times 2Rh = Rh$

Electric flux entering the cone $= E_A = ERh$

25. (4) Energy required to remove electron in the $n = 2$ state

$= + \frac{13.6}{(2)^2} = +3.4 \text{ eV}$

26. (2) $v \propto Z^2$

$\Rightarrow \frac{v_H}{v_{He}} = \left(\frac{1}{2} \right)^2 = \frac{1}{4}$

$\Rightarrow v_{He} = 4v_H = 4v_0$

27. (3) ${}_{85}X^{297} \rightarrow {}_{77}Y^{281} + 4({}_2\text{He}^4)$

28. (1) Number of fissions per second

$= \frac{\text{Power output}}{\text{Energy released per fission}}$

$= \frac{3.2 \times 10^6}{200 \times 10^6 \times 1.6 \times 10^{-19}} = 1 \times 10^{17}$

\Rightarrow Number of fission per minute
 $= 60 \times 1 \times 10^{17} = 6 \times 10^{18}$

29. (4) Nuclear radius $r \propto A^{1/3}$, where A is mass number

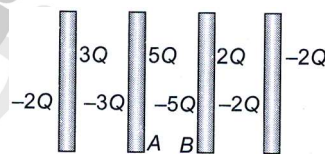
$r = r_0(27)^{1/3} = 3r_0$

$\Rightarrow r_0 = \frac{3.6}{3} = 1.2 \text{ fm}$

For ${}_{64}\text{Cu}$,

$r = r_0 A^{1/3} = 1.2 \text{ fm} (64)^{1/3} = 4.8 \text{ fm}$

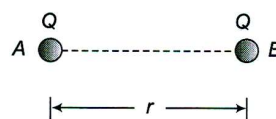
30. (1) Distribution of charge before the wire is connected is shown in figure.



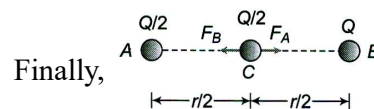
On connecting with wire $5Q$ and $-5Q$ will get neutralized. Hence, $5Q$ charge will flow from A to B .

31. (3) $P = \frac{nhc}{\lambda t} \Rightarrow \frac{n}{t} = \frac{P\lambda}{hc} = \frac{100 \times 5000 \times 10^{-10}}{6.6 \times 10^{-34} \times 3 \times 10^8} = 2.50 \times 10^{20}$

32. (1) Initially,



$F = k \frac{Q^2}{r^2}$



Force on C due to A , $F_A = \frac{k(Q/2)^2}{(r/2)^2} = \frac{kQ^2}{r^2}$

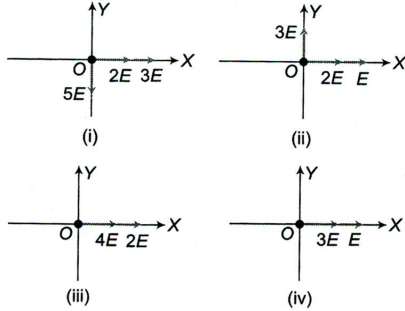
Force on C due to B , $F_B = \frac{KQ(Q/2)}{(r/2)^2} = \frac{2KQ^2}{r^2}$

\therefore Net force on C , $F_{net} = F_B - F_A = \frac{kQ^2}{r^2} = F$

33. (2) Negative charges are attracted to surface of M

near S by electrostatic induction and positive charges are repelled to surface of M away from S such that entire M still remains neutral (uncharged). Charge on S is also redistributed to have more charge on surface near to M due to the field set up by negative charges on M .

34. (3) If electric field due to charge $|q|$ at origin is E , then electric field due to charges $|2q|$, $|3q|$, $|4q|$ and $|5q|$ are respectively $2E$, $3E$, $4E$ and $5E$.



$$E_{(i)} = \sqrt{(5E)^2 + (5E)^2} = 5\sqrt{2}E$$

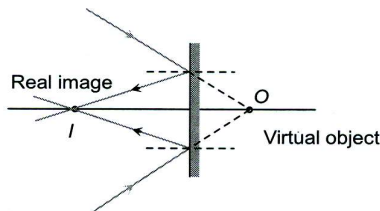
$$E_{(ii)} = \sqrt{(5E)^2 + (3E)^2} = 3\sqrt{2}E$$

$$E_{(iii)} = 4E + 2E = 6E \text{ and}$$

$$E_{(iv)} = 3E + E = 4E$$

$$\Rightarrow E_{(i)} > E_{(iii)} > E_{(ii)} > E_{(iv)}$$

35. (2) A Plane mirror can form a real image only for a virtual object.



SECTION - B (Attempt Any 10 Questions)

36. (3) As there is no power losses, so input power will be equal to output power.

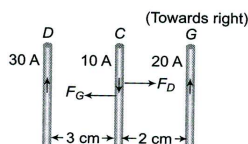
37. (2) By using $E(\text{eV}) = \frac{12375}{\lambda(\text{\AA})}$

$$\Rightarrow \lambda = \frac{12375}{2.48} = 4989.9 \text{ \AA} \approx 5000 \text{ \AA}$$

38. (3) Force on wire C due to wire D .

$$F_D = \frac{\mu_0 i_1 i_2 \ell}{2\pi r}$$

$$F_D = 10^{-7} \times \frac{2 \times 30 \times 10}{3 \times 10^{-2}} \times 25 \times 10^{-2} = 5 \times 10^{-4} \text{ N}$$



Force on wire C due to wire G = $5 \times 10^{-4} \text{ N}$.

39. (2) Since $m = \frac{f_o}{f_e}$

$$\text{Also } m = \frac{\text{Angle subtended by the image}}{\text{Angle subtended by the object}}$$

$$\therefore \frac{f_o}{f_e} = \frac{\alpha}{\beta} \Rightarrow a = \frac{f_o \times \beta}{f_e} = \frac{60 \times 2}{5} = 24^\circ$$

40. (2) $n_1 \lambda_1 = n_2 \lambda_2 \Rightarrow n_2 = n_1 \times \frac{\lambda_2}{\lambda_1} = 12 \times \frac{600}{400} = 18$

41. (2) $Q = 4(x_2 - x_1)$

42. (4) For $1k \Omega$:

$$i_1 = \frac{15}{1} = 15 \text{ mA}$$

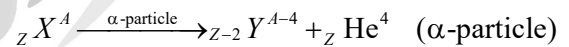
For 250Ω :

$$i_{250\Omega} = \frac{20 - 15}{250} = \frac{5}{250} = \frac{20}{1000} = 20 \text{ mA}$$

$$\therefore i_{\text{Zener}} = 20 - 15 = 5 \text{ mA}$$

43. (1) The emission of an α -particle from the atom of an element reduces its atomic number by 2 and mass number by 4.

Hence, the radioactive emission is as follows:



Also from law of conservation of momentum,

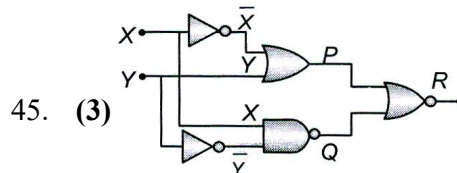
$$m \times 0 = m_y v_y + m_\alpha v_\alpha$$

$$= (A - 4)v_y + 4v \Rightarrow v_y = \frac{4v}{A - 4}$$

44. (1) A diverging lens is ruled out because both x and y are positive values. Both x and y equal 20 cm at their smallest sum, which occurs when $x + y = 40 \text{ cm} = 4f$

$$\therefore f = 10 \text{ cm}$$

This indicates a converging lens of focal length = 10 cm



45. (3)

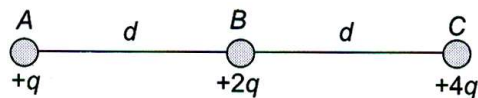
The truth table can be written as

X	Y	\bar{X}	\bar{Y}	$P = \bar{X} + Y$	$Q = X\bar{Y}$	$R = \bar{P} + \bar{Q}$
0	1	1	0	1	1	0
1	1	0	0	1	1	0
1	0	0	1	0	0	1
0	0	1	1	1	1	0

Hence $X = 1$, $Y = 0$ gives output $R = 1$

46. (1) The work function has no effect on current so long as $h\nu > W_0$. The photoelectric current is proportional to the intensity of light. Since there is no change in the intensity of light, therefore $I_1 = I_2$.

47. (2) From equilibrium of charge q ,



$$k \left[\frac{2q^2}{d^2} + \frac{4q^2}{4d^2} \right] = T_{AB}$$

$$\Rightarrow T_{AB} = \frac{3kq^2}{d^2}$$

From equilibrium of charge $4q$,

$$k \left[\frac{8q^2}{d^2} + \frac{4q^2}{4d^2} \right] = T_{BC}$$

$$\Rightarrow T_{BC} = \frac{9kq^2}{d^2}$$

Thus, $\frac{T_{AB}}{T_{BC}} = \frac{1}{3}$

48. (3) $R_1 = R_1(1 + \alpha_1 t)$ and $R_2 = R_2(1 + \alpha_2 t)$

Also $R_{c,q} = R_1 + R_2$

$$\Rightarrow R_{c,q} = R_1 + R_2 + (R_1\alpha_1 + R_2\alpha_2)t$$

$$\Rightarrow R_{c,q} = (R_1 + R_2) \left\{ 1 + \left(\frac{R_1\alpha_1 + R_2\alpha_2}{R_1 + R_2} \right) t \right\}$$

So $\alpha_{eff} = \frac{R_1\alpha_1 + R_2\alpha_2}{R_1 + R_2}$

49. (3) Output of upper OR gate = $W + X$

Output of lower OR gate = $W + Y$

Net output, $F = (W + X)(W + Y)$

$$= WW + WY + XW + XY$$

(Since $WW = W$)

$$= W(1 + Y) + XW + XY \quad (\text{Since } 1 + Y = 1)$$

$$= W + XW + XY = W(1 + X) + XY = W + XY$$

50. (3) For first minima $\sin \theta = \frac{\lambda}{a}$

$$\Rightarrow \frac{1}{2} = \frac{6200 \times 10^{-10}}{a}$$

$$a = 12400 \times 10^{-10} \text{ m}$$

$$a = 1.24 \text{ microns}$$

CHEMISTRY

SECTION - A (35 Questions)

51. (2) In oxyacids of chlorine HClO , HClO_2 , HClO_3 , HClO_4 , the Cl central atom is sp^3 -hybridised. The half filled unhybridised d-orbitals of Cl and p-orbitals of oxygen overlap to form π -bonds.

52. (1) 1-Bromobutane

53. (4) (a), (b) and (c)

54. (4)

$$\frac{p^0 - p_s}{p_s} = \frac{n}{N} = \frac{18 \times 18}{180 \times 178.2} = 0.01$$

($p^0 = 760$ torr) On solving

$$\frac{760 - p_s}{p_s} = 0.01.$$

$$p_s = 752.4 \text{ torr}$$

55. (2) Number of ions formed



$$0.01 \text{ mole} : 0.01 \times 2 \text{ mole} : 0.01 \times 3 \text{ mol}$$

$$1 : 2 : 3$$

Thus, ΔT_f is also in the same ratio.

($\Delta T_f \propto i$, when molality is constant)

56. (1) Only primary valencies are ionisable. Presence of two ionisable chloride ions shows that two chlorine atoms satisfy primary valency and remaining one chlorine atom satisfies secondary valency.

57. (2) two, tetrahedral

58. (2)



59. (1) $(\text{CH}_3)_3\text{C-I}$ and $\text{C}_2\text{H}_5\text{OH}$

60. (1) For spontaneous process,

$$\Delta G = -ve, K > 1 \text{ and } E_{\text{cell}}^{\circ} = +ve$$

61. (3) From the given expression

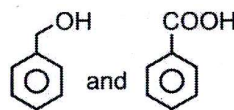


62. (2) Mn^{2+} ($3d^5$) is more stable than Mn^{3+} ($3d^4$).

63. (2) Mn^{2+} has most stable configuration, i.e., $3d^5$ (all the five d-orbitals are singly occupied). Hence, to remove electron from Mn^{2+} ion requires more energy, i.e., the third ionisation enthalpy of manganese is highest.

64. (2) Stephen reaction

65. (3)



66. (3) 1 mole Mn_3O_4 lose $\left(6 - \frac{8}{3}\right) \times 3 = 10$ mole e^- .

So total charge required = $2 \times 10 = 20F$.

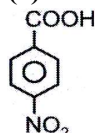
67. (2) H_2 and O_2

68. (1) For the first four actinide elements, Th, Pa, U

and Np, the difference in energy between 5f and 6d-orbitals is small. Thus, in these elements (and their ions) electrons may occupy the 5f or the 6d levels or sometimes both. Later in the actinide series the 5f-orbitals d become appreciably lower in energy. Thus, from Pu onwards the 5f-shell fills in a regular way and the elements become very similar.

69. (1) Both Assertion and Reason are correct statements, and Reason is the correct explanation of the Assertion.

70. (3)



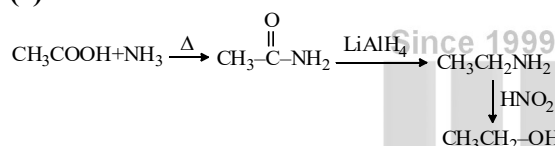
71. (1) Only i-amines will give isocyanide test.

72. (1) Temperature

73. (3) $L \cdot mol^{-1} s^{-1}$

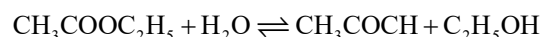
74. (3) Only aliphatic amines prepared.

75. (2)



76. (1) Pseudo-unimolecular reactions occur when one or more reactants is in excess. Usually such reactions occur in solvents, which itself is one of the reactants.

e.g.,



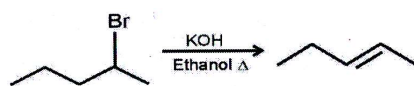
77. (1) If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion, then mark (1)

78. (4) (1)-(iv); (2)-(iii); (3)-(ii); (4)-(i)

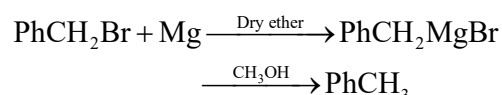
79. (1) Sucrose

80. (4) (a), (b) & (c)

81. (2)



82. (2)



83. (4) (1)-(iii); (2)-(iv); (3)-(ii); (4)-(i)

84. (2) $1 < 2 < 4 < 3$

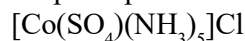
85. (2) PH_3 is less basic than NH_3 due to lesser availability of lone pair of electrons.

SECTION - B (Attempt Any 10 Questions)

86. (3) E_{cell} becomes zero at equilibrium point but E_{cell}° remains constant under all conditions.

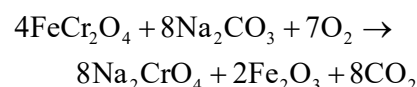
87. (4) Sulphatopentaamminecobalt(III) bromide:
 $[Co(SO_4)(NH_3)_5]Br$

Sulphatopentaamminecobalt(III) chloride:

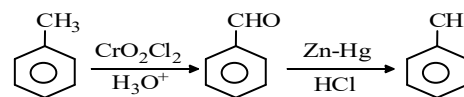


Two compounds have different molecular formula hence, there is no isomerism between these two.

88. (1) The correct reaction is



89. (3)



90. (4) a, b, c and d

91. (2) $t_{1/2}$ of first order reaction is independent of initial concentration of reactant.

92. (1) From expt (1) and (2), it is clear that when $[B_2]$ is kept constant and $[A]$ is made 6 times, the rate also becomes 6 times, thus $r \propto [A]^1$. Further from expt (1) and (3) when $[A]$ is kept constant and $[B_2]$ is tripled, rate also becomes three times,

Thus, $t \propto [B_2]^1$

Hence $r = k[A]^1[B_2]^1$

93. (2) (A)-(3); (B)-(1); (C)-(4); (D)-(2)

94. (2) If both Assertion & Reason are true but the Reason is not the correct explanation of the Assertion, then mark (2)

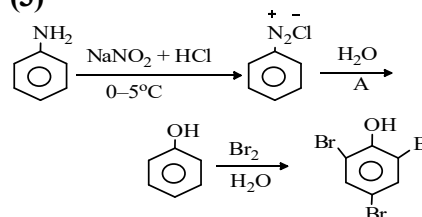
95. (3) Lactose (C1 of β -glucose and C4 of β -galactose)

96. (3) A unit formed by the attachment of a base to 1' position of sugar is known as nucleotide

97. (2) Gluconic acid and saccharic acid

98. (3) (Anti Markovnikov's addition).

99. (3)

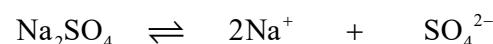


100. (3) $P(Na_2SO_4) = i CRT = i(0.004) RT$

$p(\text{glucose}) = CRT = 0.010 RT$

As solutions are isotonic, $i(0.004) RT = 0.01 RT$

This gives $i = 2.5$



1 mole

0

0

$1 - \alpha$

2α

$\alpha,$

Total = $1 + 2\alpha$, that is, $i = 1 + 2\alpha$

$$\alpha = \frac{i-1}{2} = \frac{2.5-1}{2} = \frac{1.5}{2} = 0.75 = 75\%$$