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IIB CAREER INSTITUTE PVT.LTD.

NEET 2023-24

Mark	Group		
720	PCB	PRE FINAL ROUND - 07	Date : 30/03/2024 Time : 3 :20 Hours

Answer Key Version - R (PCB NEET 2023-24)

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Biology

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109. 2	120. 4	131. 3	141. 4		159. 1	170. 3	181. 1	191. 1	

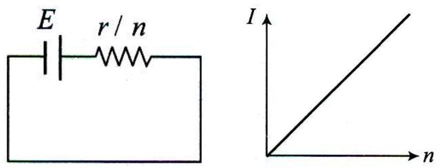
PHYSICS

SECTION - A (35 Questions)

01. **(4)** Infrared radiation is found in Paschen, Brackett and Pfund series and it is obtain when electron transition occur from high energy level to minimum third level.

02. **(1)** (A)$\rightarrow$(4) ; (B)$\rightarrow$(3) ; (C)$\rightarrow$(1) ; (D)$\rightarrow$(2)

03. **(1)** If n batteries are in parallel than the circuit can be made as $I = \frac{nE}{r}$



i is directly proportional to n.

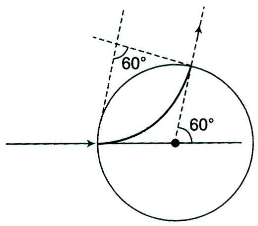
04. **(4)** At time t = 0 i.e., when capacitor is charging, current $i = \frac{2}{1000} = 2\,\text{mA}$

When capacitor is fully charged, no current will pass through it. Hence, current through the circuit is $i = \frac{2}{2000} = 1\,\text{mA}$

05. **(1)** Balancing length is independent of the cross-sectional area of the wire.

06. **(1)** According to given conditions TIR must take place at both the surfaces AB and AC. Hence only option (1) is correct.

07. **(3)** Angle rotated in magnetic field = 60°



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

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

08. **(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.

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

$$m\infty \frac{(L_\infty - f_o - f_e).D}{f_o f_e} \simeq \frac{LD}{f_0 f_e}$$

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

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

10. **(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.

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

12. **(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.

13. **(3)** For frequency $0 - f_r$, Z decreases, hence I(= V/Z), increases.

For frequency $f_r - \infty$, Z increases I decreases.

14. **(2)** For series LCR circuit,

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

Since, $V_L = V_C$, hence $V = V_R = 220$ V

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

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

16. **(4)** $P = P_1 + P_2$
$= +12 - 2 = 10$ D

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

17. **(3)** Slit width ratio = 1 : 9

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

$\therefore I_1 : I_2 = 1 : 9$

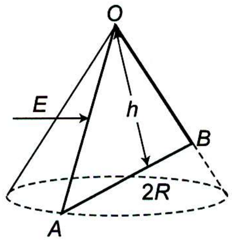
$\Rightarrow a_1^2 : a_2^2 = 1 : 9$

$\Rightarrow a_1 : a_2 = 1 : 3$

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

18. **(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.

19. **(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 $= E_A = ERh$

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

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

21. **(2)** $v \propto Z^2$

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

$$\Rightarrow v_{\text{He}} = 4v_{\text{H}} = 4v_0$$

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

23. **(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

$= 60 \times 1 \times 10^{17} = 6 \times 10^{18}$

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

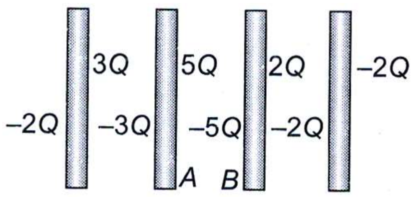
$$r = r_0 (27)^{1/3} = 3r_0$$

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

For 64Cu,

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

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

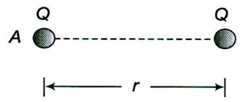


On connecting with wire $5Q$ and $-5Q$ will get neutralized. Hence, $5Q$ charge will flow from A to B.

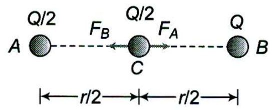
26. **(3)** $P = \frac{nhc}{\lambda t} \Rightarrow \frac{n}{t} = \frac{P.\lambda}{hc} = \frac{100 \times 5000 \times 10^{-10}}{6.6 \times 10^{-34} \times 3 \times 10^8}$

$= 2.50 \times 10^{20}$

27. **(1)** Initially,



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



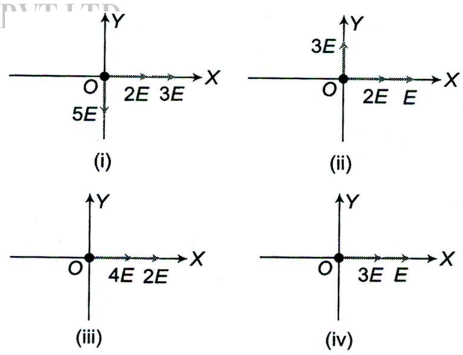
Force on C due to A, $F_A = \frac{k(Q/2)^2}{(r/2)^2} = \frac{kQ^2}{r^2}$

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, $F_{net} = F_B - F_A = \frac{kQ^2}{r^2} = F$

28. **(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.

29. **(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 $5E$.



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

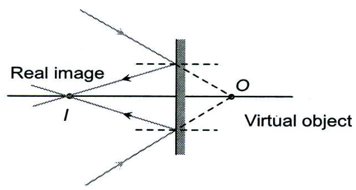
$$E_{(\text{ii})} = \sqrt{(5E)^2 + (3E)^2} = 3\sqrt{2}E$$

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

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

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

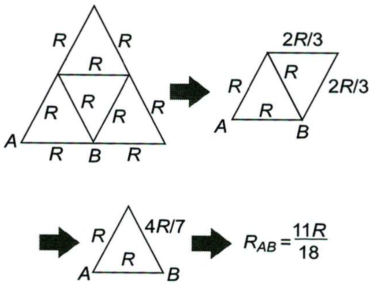
30. **(2)** A Plane mirror can form a real image only for a virtual object.



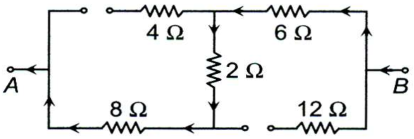
31. **(1)** $n_i^2 = n_h n_e \Rightarrow (10^{19})^2 = 10^{21} \times n_e = 10^{17}/\text{m}^3$.

32. **(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.

33. **(4)**



34. **(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 Ω

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

As $A\uparrow$ so $v_d \downarrow \Rightarrow v_P > v_Q$

SECTION - B (Attempt Any 10 Questions)

36. **(2)** $Q = 4\,(x_2 - x_1)$

37. **(4)** For 1k Ω :

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

For 250 Ω :

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

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

38. **(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:

$${}_Z X^A \xrightarrow{\alpha\text{-particle}} {}_{Z-2}Y^{A-4} + {}_Z\text{He}^4 \quad (\alpha\text{-particle})$$

Also from law of conservation of momentum,

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

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

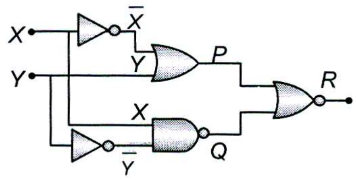
39. **(1)** A diverging lens if ruled out because both x and y are positive values. Both x and y equal 20 cm at their smallest sum, which occurs when

$x + y = 40$ cm $= 4f$

$\therefore\ f = 10$ cm

The indicates a converging lens of focal length.
= 10 cm

40. **(3)**



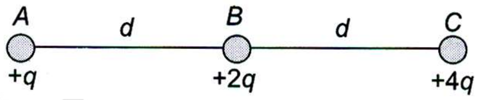
The truth table can be written as

X	Y	$\overline{X}$	$\overline{Y}$	$P = \overline{X} + Y$	$Q = \overline{X.\overline{Y}}$	$R = \overline{P + Q}$
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 $R = 1$

41. **(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 $I_1 = I_2$.

42. **(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, $\frac{T_{AB}}{T_{BC}} = \frac{1}{3}$

43. **(3)** $R_{t_1} = R_1(1 + \alpha_1 t)$ and $R_{t_2} = R_2(1 + \alpha_2 t)$

Also $R_{eq.} = R_{t_1} + R_{t_2}$

$$\Rightarrow R_{eq} = R_1 + R_2 + (R_1\alpha_1 + R_2\alpha_2)t$$

$$\Rightarrow R_{eq} = (R_1 + R_2)\left\{1 + \left(\frac{R_1\alpha_1 + R_2\alpha_2}{R_1 + R_2}\right).t\right\}$$

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

44. **(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)
$= W(1+Y)+XW+XY$ (Since $1+Y=1$)
$= W+XW+XY = W(1+X)+XY = W+XY$

45. **(3)** For first minima $\sin\theta = \dfrac{\lambda}{a}$

$\Rightarrow \dfrac{1}{2}=\dfrac{6200\times10^{-10}}{a}$

$a = 12400\times10^{-10}$ m
$a = 1.24$ microns

46. **(3)** As there is no power loses, so input power will be equal to output power.

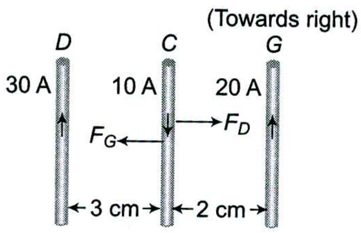
47. **(2)** By using $E(eV)=\dfrac{12375}{\lambda(Å)}$

$\Rightarrow \lambda=\dfrac{12375}{2.48}=4989.9\ Å\approx5000\ Å$

48. **(3)** Force on wire *C* due to wire *D*.

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

$F_D=10^{-7}\times\dfrac{2\times30\times10}{3\times10^{-2}}\times25\times10^{-2}=5\times10^{-4}$ N



Force on wire *C* due to wire *G* $=5\times10^{-4}$ N.

49. **(2)** Since $m=\dfrac{f_o}{f_e}$

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

$\therefore \dfrac{f_o}{f_e}=\dfrac{\alpha}{\beta}\Rightarrow a=\dfrac{f_o\times\beta}{f_e}=\dfrac{60\times2}{5}=24^\circ$

50. **(2)** $n_1\lambda_1=n_2\lambda_2\Rightarrow n_2=n_1\times\dfrac{\lambda_2}{\lambda_2}=12\times\dfrac{600}{400}=18$

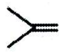
CHEMISTRY

SECTION - A (35 Questions)

51. **(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.

52. **(2)** two, tetrahedral

53. **(2)**



54. **(1)** $(CH_3)_3C–I$ and C_2H_5OH

55. **(1)** For spontaneous process,
ΔG = –ve, K > 1 and E^o_{cell} = +ve

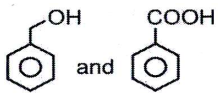
56. **(3)** From the given expression
At anode: $A\rightarrow A^++e$ At cathode: $B^++e\rightarrow B$
Overall raction is: $A+B^+\rightarrow A^++B$

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

58. **(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.

59. **(2)** Stephen reaction

60. **(3)**



61. **(3)** 1 mole Mn_3O_4 lose $\left(6-\dfrac{8}{3}\right)\times3=10$ mole e^-.

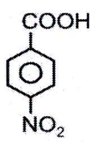
So total charge required = 2 × 10 = 20F.

62. **(2)** H_2 and O_2

63. **(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.

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

65. **(3)**



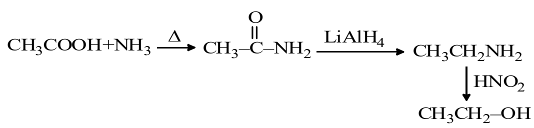
66. **(1)** Only i-amines will given isocyanide test.

67. **(1)** Temperature

68. **(3)** L. mol^{-1} s^{-1}

69. **(3)** Only aliphatic amines prepared.

70. **(2)**

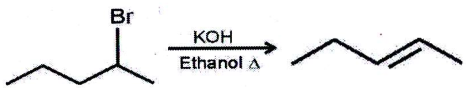


71. **(1)** Pseudo-unimolcualr reactions occur when one

or more reactants is in excess. Usually such reactions occur in solvents, which itself is one of the reactants.
e.g.,

$$CH_3COOC_2H_5 + H_2O \rightleftharpoons CH_3COCH + C_2H_5OH$$

72. **(1)** If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion, then mark (1)
73. **(4)** (1)-(iv); (2)-(iii); (3)-(ii); (4)-(i)
74. **(1)** Sucrose
75. **(4)** (a), (b) & (c)
76. **(2)**



77. **(2)**

$$PhCH_2Br + Mg \xrightarrow{\text{Dry ether}} PhCH_2MgBr$$

$$\xrightarrow{CH_3OH} PhCH_3$$

78. **(4)** (1)-(iii); (2)-(iv); (3)-(ii); (4)-(i)
79. **(2)** $1 < 2 < 4 < 3$
80. **(2)** PH_3 is less basic than NH_3 due to lesser availability of lone pair of electrons.
81. **(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.
82. **(1)** 1-Bromobutane
83. **(4)** (a), (b) and (c)
84. **(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

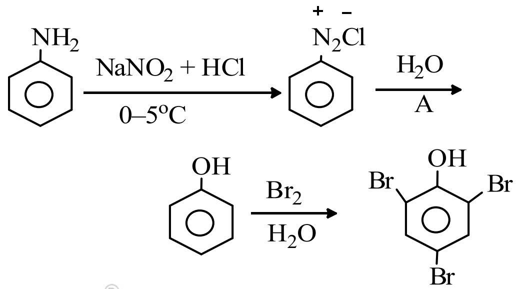
$$\frac{760 - p_s}{p_s} = 0.01.$$

$p_s = 752.4$ torr

85. **(2)** Number of ions formed
Urea : NaCl : Na_2SO_4
0.01 mole : 0.01 × 2 mole : 0.01 × 3 mol
1 : 2 : 3
Thus, ΔT_f is also in the same ratio.
($\Delta T_f \propto$ i, when molality is constant)

SECTION - B (Attempt Any 10 Questions)

86. **(2)** $t_{1/2}$ of first order reaction is independent of initial concentration of reactant.
87. **(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 $r \propto [A]^1$. Furthr 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 $r = k[A]^1 [B_2]^1$
88. **(2)** (A)-(3); (B)-(1); (C)-(4); (D)-(2)
89. **(2)** If both Assertion & Reason are true but the Reason is not the correct explanation of the Assertion, then mark (2)
90. **(3)** Lactose (C1 of β-glucose and C4 of β-galactose)
91. **(3)** A unit formed by the attachment of a base to 1' position of sugar is known as nucleotide
92. **(2)** Gluconic acid and saccharic acid
93. **(3)** (Anti Markovnikov's addition).
94. **(3)**



95. **(3)** $P(Na_2SO_4) = i\,CRT = i\,(0.004)\,RT$
p (glucose) = CRT = 0.010 RT
As solutions are isotonic, i (0.004) RT = 0.01 RT
This gives i = 2.5

Na_2SO_4	$\rightleftharpoons$	$2Na^+$	+	SO_4^{2-}
1 mole		0		0
$1-\alpha$		2α		α,

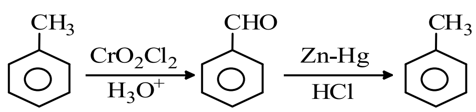
Total = $1 + 2\alpha$, that is, $i = 12\alpha$

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

96. **(3)** E_{cell} becomes zero at equilibrium point but E^o_{cell} remains constant under all conditions.
97. **(4)** Sulphatopentaamminecobalt(III) bromide: $[Co(SO_4)(NH_3)_5]Br$
Sulphatopentaamminecobalt(III) chloride: $[Co(SO_4)(NH_3)_5]Cl$
Two compounds have different molecular formula hence, there is no isomerism between these two.
98. **(1)** The correct reaction is

$$4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \rightarrow 8Na_2CrO_4 + 2Fe_2O_3 + 8CO_2$$

99. **(3)**



100. **(4)** a, b, c and d