VMC MEDICAL

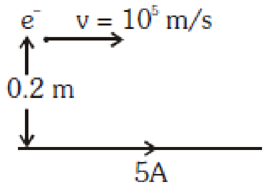
Paper Code
M5

Aggarwal Corporate Heights, 3rd Floor, Plot No. A-7, Netaji Subhash Place,
Pitampura, New Delhi-110034 Ph.: 011-45221189 - 93 Fax : 011-25222953

DETAILED SOLUTION
NEET-2021

Section- A (PHYSICS)

1. **(4)**



$$f = ev\left(\frac{\mu_0 i}{2\pi r}\right)$$

$$f = \frac{1.6\times10^{-19}\times10^{5}\times2\times10^{-7}\times5}{0.2}$$

$$f = 8\times10^{-20}\text{ Newton}$$

2. **(2)**

Displacement equation of SHM of frequency 'n'

$x = A\sin(\omega t) = A\sin(2\pi nt)$

Now,

Potential energy $U = \frac{1}{2}kx^2 = \frac{1}{2}KA^2\sin^2 2\pi nt$

$$= \frac{1}{2}kA^2\left[\frac{1-\cos 2\pi\ 2n\ t}{2}\right]$$

So frequency of potential energy = 2n

3. **(3)**

$${}^{A}_{Z}X \xrightarrow{\beta^+} {}_{Z-1}B \xrightarrow{\alpha} {}_{Z-3}C \xrightarrow{\beta^-} {}_{Z-2}D$$

β^+ decreases atomic number by 1

α decreases atomic number by 2

β^- increases atomic number by 1

4. **(4)**

$$v_e = \sqrt{\frac{2GM}{R}} = \sqrt{\frac{2G}{R}\times\frac{4}{3}\pi R^3\rho}$$

$$= \sqrt{\frac{8\pi G\rho}{3}R^2}$$

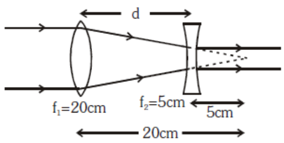
$$\Rightarrow v_e \propto R$$

$$\Rightarrow \frac{v_e}{\nu} = \frac{4R}{R} \Rightarrow v_e = 4v$$

5. **(2)**

$$\frac{A}{A_0} = \left(\frac{1}{2}\right)^{t/T_H} = \left(\frac{1}{2}\right)^{150/100} = \frac{1}{2\sqrt{2}}$$

6. **(2)**



$d = f_1 - f_2$

$= 20 - 5$

$= 15\text{cm}$

7. **(1)**

$q = CV$

$$\frac{dq}{dt} = \frac{CdV}{dt}$$

$I_d = C(V_0\omega \cos\omega t)$

$= V_0\omega C \cos\omega t$

8. **(2)**

S_n = Distance in n^{th} sec. i.e. t = n – 1 to t = n

S_n + 1 = Distance in $(n + 1)^{th}$ sec.

i.e. t = n to t = n + 1

So as we know

$Sn = \frac{a}{2}\ 2n-1$ a = acceleration

$$\frac{S_n}{S_{n+1}} = \frac{\frac{a}{2}\ 2n-1}{\frac{a}{2}\ 2\ n+1\ -1} = \frac{2n-1}{2n+1}$$

$$\frac{S_n}{S_{n+1}} = \frac{2n-1}{2n+1}$$

9. **(4)**

U + KE = E

4U = E = mgS

4mgh = mgS

$$h = \frac{S}{4}$$

$$v = \sqrt{2g\left(\frac{3S}{4}\right)} = \sqrt{\frac{3gS}{2}}$$

10. **(1)**

$$\frac{E_1}{E_2} = \frac{\phi\ell_1}{\phi\ell_2}$$

$$\frac{1.5}{2.5} = \frac{36}{\ell_2} \Rightarrow \ell_2 = 36\times\frac{5}{3} = 60\text{cm}$$

11. **(2)**

$\vec{v} \parallel \vec{E}\times\vec{B}, \hat{v} = \hat{i}$

Option **(1)** $\vec{E}\times\vec{B} = \vec{0}$ $\vec{E} \parallel \vec{B}$

Option **(2)** $\vec{E}\times\vec{B} = 2\hat{i}$ parallel to $\vec{v}$

Option **(2)** $\vec{E}\times\vec{B} = \vec{0}$ $\vec{E} \updownarrow \vec{B}$

Option **(2)** $\vec{E}\times\vec{B} = \vec{0}$ $\vec{E} \parallel \vec{B}$

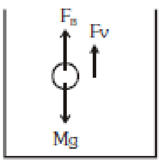
12. **(4)**

Polar molecules have centres of positive and negative charges separated by some distance, so they have permanent dipole moment

.

13. **(1)**

Mass = M



Density of ball = d

Density of glycerine = $\frac{d}{2}$

$F_B = V_s \rho_\ell g = V\frac{d}{2}g$

$F_g = Mg = vdg$

For constant velocity, $F_{net} = 0$

$\therefore\ F_B + F_v = Mg$

$F_V = Mg - F_B = Vdg - \frac{Vdg}{2} = \frac{Vdg}{2} = \frac{Mg}{2}$

14. **(3)**

Root mean square speed of gas molecules

$\nu_{rms} = \sqrt{\frac{3RT}{M}}$

Pressure exerted by ideal Gas

$P = \frac{1}{3}\rho\nu_{rms}^2$

$P = \frac{1}{3}mn\nu^2$

$\rho = mn, v_{rms}^2 = \nu^{-2}$

Average kinetic energy of a molecular

$KE = \frac{3}{2}KT$

Total internal energy of 1 mole of a diatomic gas

$$U = \frac{f}{2}\mu RT$$

$$U = \frac{5}{2}RT \text{ (For 1 mole diatomic gas)}$$

15. **(2)**

$P_{in} = \frac{mgh}{t} = \frac{15 \times 10 \times 60}{1} = 9000$ w

P_{out} = 90% of P_{in}

$\Rightarrow 8.1$ kw

16. **(4)**

$$MP = \frac{f_0}{f_e}$$

$$R.P. = \frac{a}{1.22\lambda}$$

large aperture(a) of the objective lens provides better resolution $\therefore$ good quality of image is formed and also it gathers more light.

17. **(3)**

In n–type semiconductor majority charge carriers are e– and P type semiconductor majority charge carriers are holes.

$I = neAV_d = neA\,(\mu E)$

$\mu_e > \mu_h \Rightarrow I_e > I_h$

18. **(4)**

$X^{240} \rightarrow Y^{120} + Z^{120}$

given binding energy per nucleon of X, Y & Z are 7.6 MeV, 8.5 MeV & 8.5 MeV respectively.

Gain in binding energy is :-

Q = Binding Energy of products – Binding energy of reactants

= (120 × 8.5 × 2) – (240 × 7.6) MeV

= 216 MeV

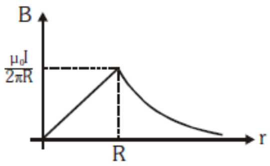
19. **(3)**

Inside a current carrying cylindrical conductor,

$B = \frac{\mu_0 I}{2\pi r}$ $\therefore B \propto r$

Outside the conductor,

$B = \frac{\mu_0 I}{2\pi r^2} \therefore B \propto \frac{1}{r}$



20. **(2)**

For a conducting sphere

$$E = \frac{\sigma}{\varepsilon_0}$$

$$V = \frac{\sigma R}{\varepsilon_0}$$

as both spheres have same potential after connecting with wire,

$V_1 = V_2$

$\sigma_1 R_1 = \sigma_2 R_2$

$\Rightarrow \frac{\sigma_1}{\sigma_2} = \frac{R_2}{R_1}$

21. **(1)**

E = energy = $[ML^2T^{-2}]$

G = Gravitational constant = $[M^{-1}L^3T^{-2}]$

So $\frac{E}{G} = \frac{E}{G} = \frac{ML^2T^{-2}}{M^{-1}L^3T^{-3}} = \left[M^2L^{-1}T^0\right]$

22. **(4)**

F = kx

$10 = k(5 \times 10^{-2})$

$k = \frac{10}{5 \times 10^{-2}} = 2 \times 10^2 = 200 N/M$

Now, $T = 2\pi\sqrt{\frac{m}{k}} = 2\pi\sqrt{\frac{2}{200}} = \frac{2\pi}{10} = 0.628 \sec.$

23. **(1)**

(A) $v_d = \left(\frac{eE}{m}\right)\tau$

(B) $J = \sigma E = E/\rho$

$\Rightarrow \rho = E/J$

(C) $\rho = \frac{E}{nev_d}$

$v_d = \frac{E}{ne\rho}$

$\frac{eE}{m}\tau = \frac{E}{ne\rho}$

(D) $i = neAv_d$

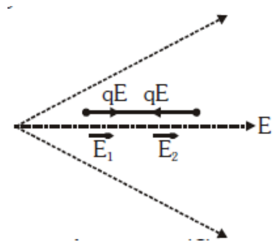
$\frac{i}{A} = nev_d$

$J = nev_d$

24. **(2)**

$\left|\vec{E}_1\right| > \left|\vec{E}_2\right|$

as field lines are closer at charge +q, so net force on the dipole acts towards right side. A system always moves to decrease it's potential energy



25. **(1)**

Reverse bias Zener diode use as a voltage regulator

for Ge Potential barrier $V_0 = 0.3$ V

Si Potential barrier $V_0 = 0.7$ V

26. **(4)**

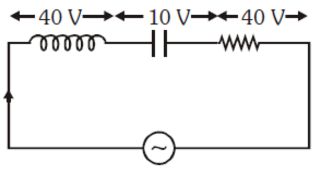
Least count $= \frac{1\text{mm}}{100} = 0.01\text{mm}$

Diameter = main scale reading + circular scale reading

Diameter = 0 + 52 × 0.01 mm

= 0.52 mm = 0.052 cm

27. **(4)**



$I_0 = 10\sqrt{2}\text{A}$

$I_{RMS} = \frac{I_0}{\sqrt{2}} = 10\text{A}$

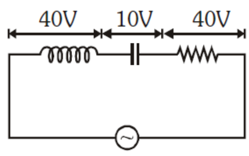
$V_{RMS} = \sqrt{V_R^2 + (V_L - V_C)^2}$

$= \sqrt{40^2 + (40-10)^2} = 50$ V

$Z = \frac{V_{RMS}}{10\text{V}} = \frac{50\text{V}}{10\text{V}} = 5\Omega$

For Hindi :

$I_{rms} = 10\sqrt{2}\text{A}$



$V_{rms} = \sqrt{V_R^2 + (V_L - V_C)^2}$

$= 50\text{V}$

$Z = \frac{V_{rms}}{I_{rms}} = \frac{50\text{V}}{10\sqrt{2}\text{A}} = \frac{5}{\sqrt{2}}\Omega$

28. **(3)**

$E=\frac{1}{2}CV^2$

$=\frac{1}{2}\left(\frac{\varepsilon_0 A}{d}\right) Ed^{\ 2}$

$=\frac{1}{2}\varepsilon_0 E^2 Ad$

29. **(3)**

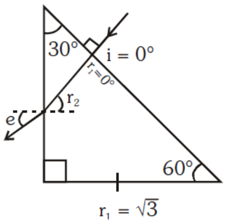
$\frac{hc}{\lambda}=K_{max}+\phi$ [given ϕ is negligible]

So, $\frac{hc}{\lambda}=K_{max}$

$\lambda_d=\frac{h}{\sqrt{2mK_{max}}}\Rightarrow K_{max}=\frac{h^2}{2m\lambda_d^2}$

$\left(\frac{hc}{\lambda}\right)=\frac{h^2}{2m\lambda_d^2}\Rightarrow \lambda=\left(\frac{2mc}{h}\right)\lambda_d^2$

30. **(1)**



$r_1+r_2=A=30^\circ$

$r_2=30^\circ\ \ r_1=0^\circ$

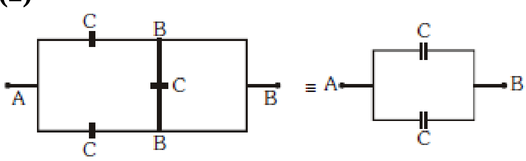
For Snell's law

$\sqrt{3}\sin r_2=1\times\sin e$

$\sqrt{3}\sin 30^\circ=\sin e$

$e=60^\circ$

31. **(2)**



(one capacitor gets short)

$\Rightarrow C_{eq}=C_1+C_2$

$=C+C$

$=2C$

32. **(2)**

$E\propto F^a A^b T^c$

$[M^1L^2T^{-2}]\propto[M^1L^1T^{-2}]^a\,[LT^{-2}]^b\,[T]^c$

$a=1$

$a+b=2\Rightarrow b=1$

$-2a-2b+c=-2$

$\Rightarrow c = 2$

a = 1 b = 1 c = 2

$E \propto [F]\,[A]\,[T^2]$

33. (2)

According to Newton's law of cooling

$$\frac{T_1 - T_2}{t} = K\left[\frac{T_1 + T_2}{2} - T_0\right]$$

For 1st cup of coffee,

$$\Rightarrow \frac{90-80}{t} = K\left(\frac{90+80}{2} - 20\right) \quad \ldots(i)$$

For 2nd cup of coffee,

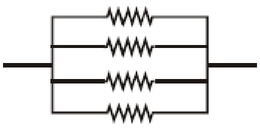
$$\Rightarrow \frac{80-60}{t'} = K\left(\frac{80+60}{2} - 20\right) \quad \ldots(i)$$

Divide **(1)** by **(2)**

$$\frac{t'}{2t} = \frac{65}{50} \Rightarrow t' = \frac{13}{5}t$$

34. (4)

$$R_{||} = \frac{R}{4} = 0.25\Omega$$



$R = 1\Omega$

$R_{series} = 4R$

$= 4(\mathbf{1})$

$= 4\Omega$

35. (3)

$$p = \frac{nhc}{\lambda} \Rightarrow n\frac{p\lambda}{hc}$$

$$n = \frac{3.3\times10^{-3}\times600\times10^{-9}}{6.6\times10^{-34}\times3\times10^{8}} = 10^{16}$$

Section- B (PHYSICS)

36. (2)

$V = ir$

$$i = \frac{V}{r}$$

$$i = \frac{1}{r}$$ [v is same for r_2 & r_3]

$$\frac{i_2}{i_3} = \frac{r_3}{r_2}$$

$i_3 = \frac{r_2}{r_2 + r_3} i_1$

$\frac{i_3}{i_1} = \frac{r_2}{r_2 + r_3}$

37. **(4)**

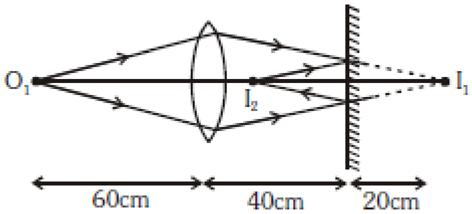
first, for image formation from lens

u = – 60 cm

f = + 30 cm

$\Rightarrow v = \frac{uf}{u+f} = \frac{-60 \times 30}{-60+30} = 60\text{cm}$

this real image formed by lens acts as virtual object for mirror



Real image from plane mirror is formed 20 cm in front of mirror, hence at 20 cm distance from lens.

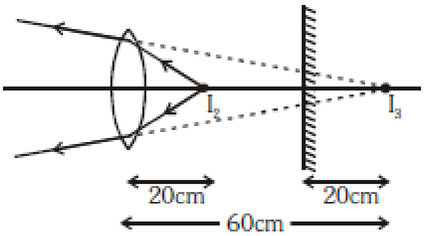
Now, for second refraction from lens,

u = – 20 cm

f = +30 cm

$v = \frac{uf}{u+f} = \frac{-20 \times 30}{-20+30} = -60\text{cm}$

So, final virtual image is 60 cm from lens, or 20 cm behind mirror



38. **(3)**

$Y = A.B + \overline{B.C}$

(i) 0 to t_1 A = 0, B = 0, C = 1

(ii) $Y = 0.0 + \overline{0.1} = 0 + 1 = 1$

(ii) t_1 to t_2 A = 1, B = 0, C = 1

$Y = 1.0 + \overline{0.1} = 0 + 1 = 1$

(iii) t_2 to t_3 A = 0, B = 1, C = 0

$Y = 0.1 + \overline{0.1} = 0 + 1 = 1$

39. **(1)**

$220 \times i_p = 44$

$\Rightarrow I_P = \frac{44}{220} = \frac{1}{5} = 0.2\text{A}$

40. **(1)**

$M_1 = \left(\frac{\sqrt{3}}{4}a^2\right)I \times 4 = \sqrt{3}Ia^2$ no. of turns= 4

$M_2 = a^2 I \times 3 = 3Ia^2$ no. of turns= 3

41. **(2)**

$\vec{F} = q\ \vec{v} \times \vec{B}$

$$4i - 20\hat{j} + 12\hat{k} = 1\begin{vmatrix} i & j & \hat{k} \\ 2 & 4 & 6 \\ B & B & B_0 \end{vmatrix}$$

Comparing

$$\Rightarrow \left.\begin{array}{l} 4 = 4B_0 - 6B \\ -20 = -2B_0 + 6B \\ 12 = 2B - 4B \end{array}\right\} \begin{array}{l} \text{Solving} \\ B = -6 \\ B_0 = -8 \end{array}$$

$\therefore\ \vec{B} = -6\hat{i} - 6\hat{j} - 8\hat{k}$

42. **(4)**

$T = \frac{2\pi R}{v} \Rightarrow v = \frac{2\pi R}{T}$ ...(i)

$H_{max} = \frac{v^2 \sin^2\theta}{2g} = \frac{2\pi^2 R^2 \sin\theta}{gT^2} = 4R$

$\sin\theta = \left(\frac{2gT^2}{\pi^2 R}\right)^{1/2}$

$\theta = \sin^{-1}\left[\frac{2gT^2}{\pi^2 R}\right]^{1/2}$

43. **(3)**

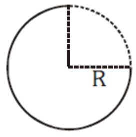
$Q = \frac{\omega}{\Delta\omega} = \frac{\omega L}{R} \Rightarrow \Delta\omega = R / L = \frac{50}{4} = 8$ rad/sec

$\omega_0 = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{5 \times 80 \times 10^{-6}}} = 50$rad/sec

$\omega_{min} = \omega_0 - \frac{\Delta\omega}{2} = 46$ rad/sec

$\omega_{max} = \omega_0 - \frac{\Delta\omega}{2} = 54$ rad/sec

44. **(1)**

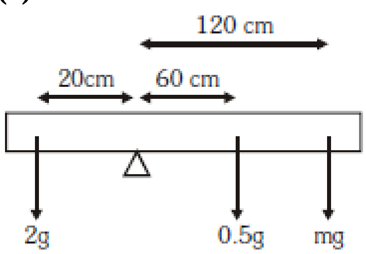


$M_{remain} = \frac{3}{4}M$

$I = M_{remain}R^2$

$= \frac{3}{4}MR^2$

45. **(2)**



By balancing torque

2g × 20 = 0.5 g × 60 + mg × 120

$m = \frac{0.5}{6}kg = \frac{1}{12}kg$

46. **(4)**

$\frac{4}{3}\pi R^3 = 27\left(\frac{4}{3}\pi r^3\right) \Rightarrow R = 3r \qquad \ldots(i)$

$v = \frac{Kq}{r} \Rightarrow \frac{V_1}{V_2} = \left(\frac{q_1}{q_2}\right)\left(\frac{r_2}{r_1}\right)$

$\Rightarrow \frac{220}{V_2} = \left(\frac{q_1}{27q}\right)\left(\frac{3r}{r}\right)$

$\Rightarrow \frac{220}{V_2} = \frac{1}{9}$

$\Rightarrow V_2 = 220 \times 9 = 1980$ volt

7. **(4)**

velocity of car at t = 4 sec is

v = u + at

v = 0 + 5(4)

= 20 m/s

At t = 6 sec

acceleration is due to gravity $\therefore$ a = g = 10 m/s

v_x = 20 m/s (due to car)

v_y = u + at

= 0 + g(2) (downward)

= 20 m/s (downward)

$v = \sqrt{v_x^2 + v_y^2}$

$= \sqrt{20^2 + 20^2}$

$= 20\sqrt{2}$ m/s

48. (4)

$$h = \frac{R}{\frac{2gR}{V^2} - 1} = \frac{R}{\frac{V_e^2}{K^2V_e^2}} = \frac{RK^2}{1-K^2}$$

49. (2)

Velocity just before striking the ground

$v_1 = \sqrt{2gh}$

$v_1 = \sqrt{2\ 10\ \ 10} = 10\sqrt{2}$m/s

$v_1 = -10\sqrt{2}\hat{j}$

If it reaches the same height, speed remains same after collision only the direction changes.

$v_2 = 10\sqrt{2}$m/s

$\overline{v}_2 = 10\sqrt{2}\hat{j}$

|Impulse|= m|$\Delta\vec{v}$ |

= m|10 $\sqrt{2}$ j – (–10 $\sqrt{2}$ j)|

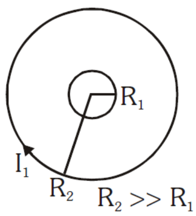
= 0.15[2(10 $\sqrt{2}$)]

= 3 $\sqrt{2}$ kg m/s

= 4.2 kg m/s

50. (4)

$$M = \frac{\phi_{12}}{I_1} = \frac{B_1A_2}{I_1} = \frac{\left(\frac{\mu_0 I_1}{2R_1}\right)\pi R_2^2}{I_1}$$



$$M = \frac{\mu_0 \pi R_2^2}{2R_1}$$

$$M \propto \frac{R_2^2}{R_1}$$

Section- A (CHEMISTRY)	

51. (4)

No. of atoms in Hexagonal primitive unit cell = 6

No. of Tetrahedral voids = 2 × No. of atoms per unit cell

= 2 × 6= 12

No. of Octahedral voids = No. of atoms per unit cell= 6

52. (3)

Due to lanthanoid contraction Zr and Hf has similar atomic and ionic radii.

53. (2)

For a given reaction ΔH is negative. Hence, potential energy profile is of an exothermic reaction.

54. (1)

Tritium is radioactive and emits low energy β^- particles ($_{-1}e^o$)

55. (1)

Vitamin B_{12} deficiency → Pernicious anaemia (RBC deficient in heamoglobin)

56. (2)

$$\wedge^{\infty}_{m(NaCl)} = 126.45 Scm^2 mol^{-1}$$

$$\wedge^{\infty}_{m(HCl)} = 426.16 Scm^2 mol^{-1}$$

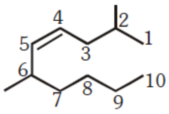
$$\wedge^{\infty}_{m(CH_3COONa)} = 91 Scm^2 mol^{-1}$$

$$\therefore \wedge^{\infty}_{m(CH_3COOH)} = \wedge^{\infty}_{m(CH_3COONa)} + \wedge^{\infty}_{m(HCl)} - \wedge^{\infty}_{m(NaCl)}$$

$$= 91 + 426.16 - 126.45$$

$$= 391.72 Scm^2 mol^{-1}$$

57. (1)



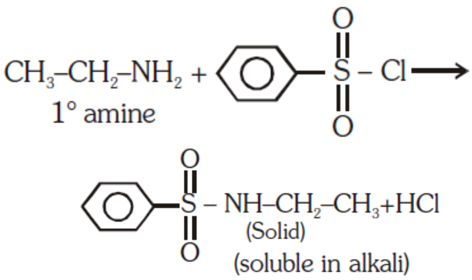
2,6-Dimethyldec-4-ene

58. (2)

The maximum temperature that can be achieved in blast furnace is upto 2200 K.

59. (3)

1° amines react with Hingsberg's reagent to give a solid, which dissolve in alkali.



60. (1)

$$\pi = iCRT$$

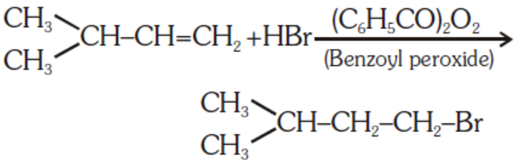
$P_1 = 1 \times \frac{10}{180} \times R \times T$ (For Glucose)

$P_2 = 1 \times \frac{10}{60} \times R \times T$ (For Urea)

$P_3 = 1 \times \frac{10}{342} \times R \times T$ (For Sucrose)

$\therefore\ P_2 > P_1 > P_3$

61. **(1)**



In the presence of peroxide, addition of HBr to unsymmetrical alkenes take place by anti-Markovnikov's rule/Peroxide effect/Kharash effect.

62. **(2)**

Aspirin and paracetamol belongs to the class of non-narcotic analgesic.
Morphine and heroin are narcotic analgesics.

63. **(2)**

Correct sequence of bond enthalpy of C–X bond is

$CH_3{-}F > CH_3 - Cl > CH_3 - Br > CH_3 - I$

64. **(3)**

sp^2, Trigonal planar $6e^-$ around central atom

65. **(2)**

For one mole of an ideal gas

$C_p - C_v = R$

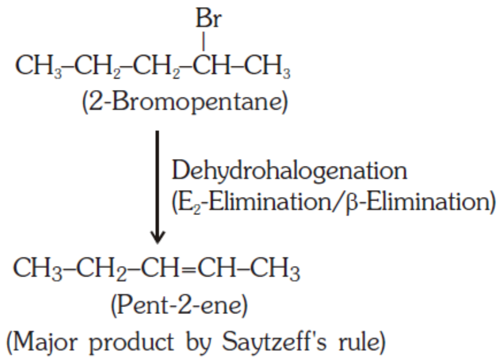
66. **(4)**

$BeCl_2$ is covalent and soluble in a organic solvent

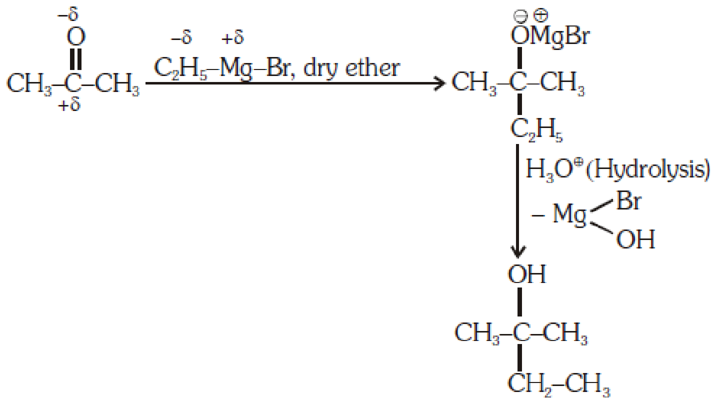
67. **(3)**

Element	%	At. Weight	$\frac{\%}{\text{At.weight}}$	simplest ratio
C	78	12	6.5	1
H	22	1	22	$\simeq 3$

68. **(1)**



69. **(4)**



2-Methylbutan-2-ol

70. **(2)**

Noble gases have weak dispersion forces so their melting and boiling point are very low.

71. **(3)**

Dimethylammonium acetate is a weak acid & weak base type of salt.

$$pH = 7 + \frac{1}{2}pK_a - \frac{1}{2}pK_b$$

$$= 7 + \frac{1}{2} \times 4.77 - \frac{1}{2} \times 3.27$$

= 7.75

72. **(3)**

Tyndall effect is exhibited by colloidal solutions.

Starch solution is a colloidal solution

73. **(1)**

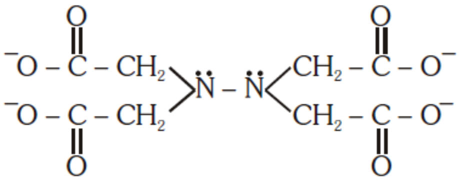
H–F	H–Cl	H–Br	H–I
1s–2p	1s–3p	1s–4p	1s–5p

⟶

Down the group size increases

Overlapping decreases
Acidic strength increases

74. **(1)**



Donar atom (N, N, O, O, O, O)

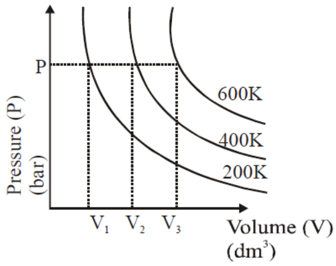
75. **(4)**

According to Boyle's law

$P \propto \frac{1}{V}$

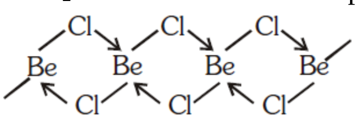
At a given pressure,

$V \propto T$



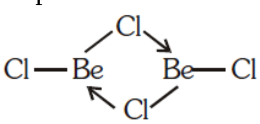
76. **(1)**

$BeCl_2$ in solid state exist in a polymeric form & in a vapour state in exist in a dimeric form.



chain polymeric structure

Vapour state exist in a dimeric form



77. **(3)**

At room temperature Hg is liquid and it is purified by 'Distillation method'.

78. **(4)**

(4) $C_4H_{10}O$ will have different alkyl group attached with polyvalent functional group that's why show metamerism

$CH_3-CH_2-O-CH_2-CH_3$

$CH_3-O-CH_2-CH_2-CH_3$

(3) $C_3H_6O \Rightarrow CH_3-\underset{\underset{O}{\|}}{C}-CH_3$

Only one arrangement possible so can not show metamerism.

(2) $C_3H_8O \Rightarrow CH_3 - O - CH_2 - CH_3$

Only one arrangement possible so can not show metamerism.

(1) No polyvalent functional group in C_5H_{12}, so can not show metamerism.

79. **(4)**

The number of Body centred unit cells in all 14 types of Bravais lattice unit cells is 3.

80. **(1)**

Teflon are prepared by addition polymerization from tetrafluroethene.

$$CF_2 = CF_2 \xrightarrow[\text{High pressure}]{\text{catalyst}} \underset{\text{Teflon}}{-\!\!\left(CF_2 - CF_2\right)\!\!-_n}$$

Nylon-66, Novolac, Dacron are prepared by condensation polymerisation.

81. **(1)**

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

$$\lambda = \frac{3 \times 10^8}{1368 \times 10^3} = 219.298\text{m} \simeq 219.3\text{m}$$

82. **(2)**

Aluminium is more electropositive than Cr, so it displaced chromium from Cr_2O_3.

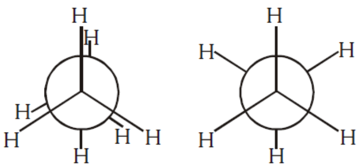
$$Cr_2O_3 + Al \xrightarrow{\Delta} Al_2O_3 + Cr$$

83. **(2)**

Most of the trivalent lanthanoid ions are coloured in the solid state.

84. **(4)**

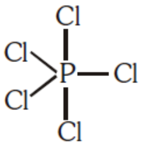
Dihedral angle (D.A.) of least stable conformer of ethane = 0°



D.A. = 0° (Eclipsed) D.A. = 60° (Staggered)

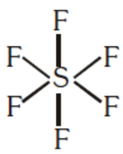
85. **(1)**

PCl_5:



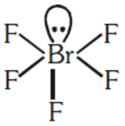
Trigonal bipyramidal sp^3d

SF_6 :



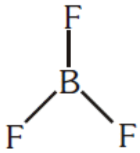
Octahedral sp^3d^2

BrF_5:



Square pyramidal sp^3d^2

BF_3:



Trigonal planar sp^2

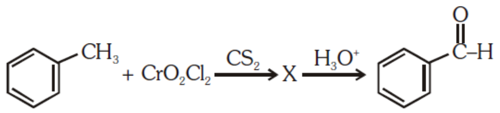
Section- B (CHEMISTRY)	

86. (3)

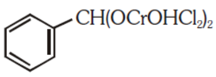
$$CH_3-CH_2-COO^-Na^+ \xrightarrow[\text{Heat}]{\text{NaOH+?}} CH_3-CH_3+Na_2CO_3$$

Decarboxylation takes place by soda-lime (NaOH + CaO)

87. (1)



Toluene Benzaldehyde

X = 

88. (3)

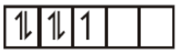
	List-I		List-II
(a)	$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$	(iv)	Tropospheric pollution
(b)	$HOCl(g) \xrightarrow{h\nu} \dot{O}H + \dot{C}l$	(iii)	Ozone depletion
(c)	$CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$	(i)	Acid rain
(d)	$NO_2(g) \xrightarrow{h\nu} NO(g) + O(g)$	(ii)	Smog

89. (4)

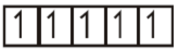
	List-I	List-II
(a)	 $\xrightarrow[\text{Anhydrous } AlCl_3/CuCl]{CO,\ HCl}$	(ii) Gattermann-Koch reaction
(b)	$R-\overset{O}{\overset{\Vert}{C}}-CH_3 + NaOX \longrightarrow$	(iii) Haloform reaction
(c)	$R-CH_2OH + R'COOH \xrightarrow{\text{conc. } H_2SO_4}$	(iv) Esterification
(d)	$R-CH_2COOH \xrightarrow[\text{(ii) } H_2O]{\text{(i) } X_2/\text{Red P}}$	(i) Hell-Volhard Zelinsky reaction

90. **(4)**

$[Fe(CN)_6]^{-3}$ $Fe^{+3} = 3d^5$



Unpaired electron = 1, μ = 1.7 BM

$[Fe(H_2O)_6]^{+3}$ $Fe^{+3} = 3d^5$ 

Unpaired electrons = 5, μ = 5.9 BM

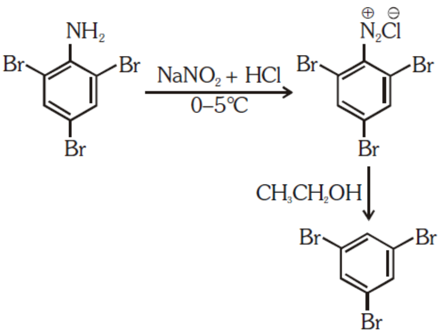
$[Fe(CN)_6]^{-4}$ $Fe^{+2} = 3d^6$ 

Unpaired electron = 0, μ = 0 BM

$[Fe(H_2O)_6]^{+2}$ $Fe^{+2} = 3d^6$ 

Unpaired electrons = 4, μ = 4.9 BM

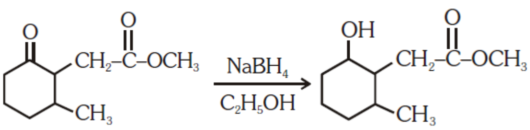
91. **(3)**



R: CH_3CH_2OH

Certain mild reducing agents like hypophosphorus acid or ethanol reduce diazonium salts to arene and themselves get oxidised to phosphorous acid and ethanal respectively.

92. **(4)**



$NaBH_4$ reduces aldehyde/ketone but does not reduce ester

93. **(4)**

		Total no. of e^-
$_{26}Fe \rightarrow 3d^6 4s^2$,	$Fe^{+2} \rightarrow 3d^6$	24
$_{25}Mn \rightarrow 3d^5 4s^2$,	$Mn^{+2} \rightarrow 3d^5$	23

94. **(3)**

$$\wedge^0_{M(CH_3COOH)} = \wedge^0_{M_{(H^+)}} + \wedge^0_{M_{(CH_3COO^-)}}$$

$$= 350 + 50 = 400\,S\,cm^2 mol^{-1}$$

$$\alpha = \frac{\wedge^C_M}{\wedge^0_M}$$

$\alpha = \frac{20}{400} = 5 \times 10^{-2}$

$K_{a(CH_3COOH)} = C\alpha^2$

$= 0.007 \times (5 \times 10^{-2})^2$

$= 1.75 \times 10^{-5} \text{mol L}^{-1}$

95. (3)

$n_{O_2} = \frac{4}{32} = \frac{1}{8} \text{mol}$

$n_{H_2} = \frac{2}{2} = 1 \text{mol}$

$n_{Total} = n_{O_2} + n_{H_2} = \frac{1}{8} + 1 = \frac{9}{8} \text{mol}$

$PV = nRT$

$P_{Total} \times 1 = \frac{9}{8} \times 0.082 \times 273$

$P_{Total} = 25.18 \text{atm}$

96. (3)

$\frac{n_B}{n_O} = \frac{3}{2}$

$n_B = 3, N_O = 2$

$n_{Total} = 3 + 2 = 5$

$X_B = \frac{n_B}{n_T} = \frac{3}{5}$

$X_O = \frac{n_O}{n_T} = \frac{2}{5}$

$P_S = P_B^0 x_B + P_O^0 X_O$

$P_S = 280 \times \frac{3}{5} + 420 \times \frac{2}{5}$

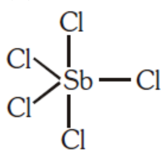
$= 336 \text{mm of Hg}$

97. (3)

For irreversible expansion of an ideal gas under isothermal condition

$\Delta U = 0, \Delta S_{Total} \neq 0$

98. (3)



sp^3d	Dipole moment (μ) = 0
Trigonal bipyramidal	Non-polar

99. (2)

$H_2O < H_2S < H_2Se < H_2Te$

$\longrightarrow$

Down the group acidic strength increases

So pK_a value decreases

100. (1)

$\ln K = \ln A - \frac{Ea}{R}\left(\frac{1}{T}\right)$

In $\ln K$ v/s $\frac{1}{T}$ graph

$\text{Slope} = -\frac{Ea}{R}$

$-5\times10^3 = \frac{-Ea}{8.314}$

$Ea = 5\times10^3 \times 8.314$

$= 41500\,J\,mol^{-1}$ or $41.5\,kJ\,mol^{-1}$

Section- A (BOTANY)	

151. (3)
152. (1)
153. (1)
154. (2)
155. (3)
156. (1)
157. (2)
158. (1)
159. (1)
160. (4)
161. (2)
162. (3)
163. (4)
164. (3)
165. (1)
166. (1)
167. (3)
168. (2)
169. (4)
170. (2)
171. (3)
172. (2)

173. **(3)**
174. **(2)**
175. **(1)**
176. **(1)**
177. **(3)**
178. **(2)**
179. **(3)**
180. **(3)**
181. **(2)**
182. **(1)**
183. **(4)**
184. **(4)**
185. **(3)**

Section- A (BOTANY)

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

Section- A (ZOOLOGY)

151. **(3)**
Intercalated disc is property of Smooth Muscle

152. **(2)**
E.R, Golgi Complex, lysosomes And Vacuoles are part of Endomembrane system

153. **(3)**
The rDNA technology produced Insulin doesnot have "C" peptide.

154. **(3)**

Veneral Disease are spread through blood contamination by infected mother through placenta and blood transfusion from infected person.

155. (1)
Low pO_2, high CO_2, high H^+ and High temperature causes oxygen-Haemoglobin dissociation.

156. (3)
Common names from examples in NCERT

157. (3)
Sickle Cell Anemia is autosomal recessive thus cross between two hetrozygous will have only one out of four(which is 25% probability)of homozygous infected individual.

158. (1)
Common names from examples in NCERT

159. (2)
Sphincter of ODDI guards the entry of hepatopancreatic duct into Duodenum

160. (2) Biofortification involves increase in the Nutritional Quality of the crops.

161. (4) J.G cells of Kidney release erythropoietin

162. (1)
Pneumatic bones is property of AVES, (Neophron= Vulture, which belongs to Aves)

163. (1)
Centrioles divide during 'S' phase of Cell Division

164. (3)
Dobson unit is the unit of thickness of Ozone

165. (4)
Housefly(*Musca domestica*) belongs to family muscidae

166. (4)
Metagenesis is shown by Coelenterates, Comb plates help in locomotion

167. (3)
E.L.I.S.A is method of Antigen-Antibody interaction which can give faster diagnose of disease

168. (4)
ZP3 receptors of Zona pellucida bind to sperm.

169. (3)
Myasthenia gravis is an autoimmune disorder where antibodies inhibit the Ach-receptor at Motor End plate thus leading to fatigue , weakening and paralysis of muscle.

170. (2)
LNG 20 is an IUD thus releasing Levenogestral a synthetic Analog of Progesterone.

171. (2)
Basic Contraception methods given in NCERT

172. (3) Basic Examples from NCERT

173. (1)
No of Chromosome donot change in S phase, only the DNA content is doubled

174. (3)
high temperature is required for denaturation/ melting of DNA

175. (3)
Basic question based on Chargaff Rule

176. (1)
Thrombin digests the Prothrombin into Thrombin

177. (2)
Succus entericus is another name of intestinal juice

178. (4)
Abrin and Ricin are toxins

179. (3)
Diakinesis shows terminalisation of chiasmata as its dinstinctive feature.

180. (4)
AB blood group individuals have nither Anti-A nor Anti-B antibodies thus making it a very good Recipient.

181. (3)
The restriction sites are Palindromuc sequence

182. (1)
Hepatic cecae are present at junction of the fore-gut and the mid-gut

183. (4)
SiRNA(Silencing RNA acts in the regulation of the Gene Expression rather protein formation.

184. (2)
DNA dependent RNA polymerase , can also cuse initiation along with extension and termination.

185. (1)
Partial pressure values of the oxygen and CO2 as given in NCERT

Section- B (ZOOLOGY)	

186. (1)
F.S.H like activity hormone is admnistered for multiple ovulation

187. (2)
Relaxin is released from Ovary(Corpus leuteum) during the later phase of pregnancy

188. (1)
A' band remains same during contraction

189. (3)
Lipids with double bonds are unsaturated, Palmictic acid and Archidonic acid has 16C and 20C respectively

190. (2)
Histones are Basic Proteins

191. (1)
Basic Examples from NCERT

192. (2)
Tight junction prevents transport whereas Gap juntion allows free flow of substances

193. (1)
Prostomium is not the first segment whereas Peristomium is the first segment.

194. (1)
ADA deficiency causes SCID (Severe Combined Immunological disorders)

195. (4)
AUG' doesnot code for the phenylalanine

196. (1)
Altitude sickness is due to the low pressur thus deficiency of oxygen

197. (3)
Kangroo Rat conserves water by modified Physiology, Polar seals have reduced extremities.

198. (2)
Basic Disease causing Pathogens from NCERT

199. (4)
Prolactin doesnot play any role in parturition

200. (4)
Basic examples of bones and Joint from NCERT.