RJ VISION PVT. LTD.

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FT – 13

ENG

PCB SOLUTION

COURSE NAME: 12^{TH} DATE : 15-06-2026

FT - 13 (FR) (NEET - CBSE, GSEB) (15 - 06 - 2026)

ANSWER KEY

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

PHYSICS:

1. Sol. (2)

- All type of semiconductors are electrically neutral.
- Conductivity of semiconductor

  $(\sigma) = e\,(n_e\mu_e + n_h\mu_h)$

For intrinsic semiconductor $n_e = n_h = n_i$

I.e., $\sigma = n_i e(\mu_e + \mu_h)$

2. Sol. (3)

The force F on the charged particle due to magnetic field provides the required centripetal force

($= mv^2/r$) necessary for motion along the circular path of radius r.

$\therefore \quad qvB = \frac{mv^2}{r}$

or $\quad r = \frac{mv}{qB}$

$\therefore \quad r \propto v$

As v is doubled, the radius also becomes double.

Hence, radius = 2 × 2 = 4 cm/

3. Sol. (3)

Thrust on the rocket is the force with which the rocket moves upwards. Thrust on rocket at time t is given by

$$F = -u\frac{dm}{dt}$$

The negative sign indicates that thrust on the rocket is in a direction opposite to the direction of escaping gases,

Here, velocity of the rocket u = 300 m/s and force

F = 345 N

$\therefore$ Rate of combustion of fuel

$$-\left(\frac{dm}{dt}\right) = \frac{F}{u} = \frac{345}{300}$$

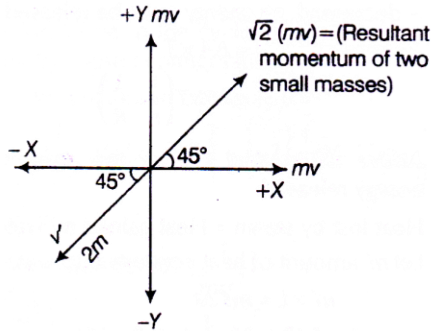
= 1.15 kg/s

4. Sol. (1)

- Angular acceleration rad/s^2
- Moment of interia = kg m^2

- Torque = N m
- Angular momentum = mvr = J s

5. Sol. (2)



According to question, the third part of mass 2m will move as shown in the figure, because the total momentum of the system after explosion must remain zero. Let the velocity of third part is v′.

From the conservation of momentum

$$\sqrt{2}\,(mv) = (2m) \times v' \quad \Rightarrow \quad v' = \frac{v}{\sqrt{2}}$$

⇒ So total kinetic energy generated by the explosion

$= mv^2 + mv^2 + \frac{1}{2}(2m)\,v'^2$

$= mv^2 + m \times \left(\frac{v}{\sqrt{2}}\right)^2$

$= mv^2 + \frac{mv^2}{2} = \frac{3}{2}\,mv^2.$

6. Sol. (2)

$$V = \frac{1}{4\pi\varepsilon_0}\frac{q}{r}$$

Here, $V = 2\,V_{+ve} + 2\,V_{-ve}$

$$V = \frac{1}{4\pi\varepsilon_0}\left[\frac{2q}{L} - \frac{2q}{L\sqrt{5}}\right]$$

$$V = \frac{2q}{4\pi\varepsilon_0}\frac{2q}{L}\left(1 - \frac{1}{\sqrt{5}}\right)$$

7. Sol. (3)

Here on the entire system net external force on the system is zero hence centre of mass remains unchanged.

8. Sol. (3)

If the man pulls the cart by the rope, the man and cart will meet at the centre of mass.

$$x_{CM} = \frac{m_1x_1 + m_2x_2}{m_1 + m_2}$$

$$= \frac{M \times 0 + M \times 10}{M + M}$$

$$= \frac{10M}{2M} = 5m$$

9. Sol. (3)

Kepler's 3rd law is given by

$T^2 \propto r^3$

$\therefore \quad \frac{T_A^2}{T_B^2} = \frac{r_A^3}{r_B^3}$

$\therefore \quad \frac{r_A}{r_B} = \left(\frac{T_A}{T_B}\right)^{2/3}$

$= (8)^{2/3} = 2^{3\times\frac{2}{3}} = 4$

or $r_A = 4r_B$

Thus, distance of A from the sun is 3 (= 4 – 1) times greater than that of B from the sun.

10. Sol. (3)

$B = \frac{p}{\frac{\Delta V}{V}}$ $\qquad \frac{\Delta V}{V} = \frac{p}{B}$

$\frac{p}{B} = \frac{3\Delta r}{r}$

For small change : $\frac{\Delta r}{r} = \frac{p}{3B}$

11. Sol. (3)

Speed of light is air $V_1 = \frac{x}{t_1}$

Speed of light is air $V_2 = \frac{10x}{t_2}$

$\sin\theta_c = \frac{V_2}{V_1} = \frac{10xt_1}{t_2x}$

$\theta_c = \sin^{-1}\left(\frac{10t_1}{t_2}\right)$

12. Sol. (1)

E = hv

⇒ h = Planck's constant = $\frac{E}{v}$

$\therefore \quad [h] = \frac{[ML^2T^{-2}]}{[T^{-1}]}$

$= [ML^2T^{-1}]$

and I = moment of inertia = MR^2

⇒ $[I] = [ML^2]$

Hence, $\frac{[h]}{[I]} = \frac{[ML^2T^{-1}]}{[ML^2]} = [T^{-1}]$

$= \frac{1}{[T]}$ = dimension of frequency

Alternative :

$\frac{h}{I} = \frac{E/v}{I}$

$= \frac{E \times T}{I} = \frac{(kg - m^2/s^2) \times s}{(kg - m^2)}$

$= \frac{1}{s} = \frac{1}{\text{time}}$

= frequency

Thus, dimensions of $\frac{h}{I}$ is same as that of frequency.

13. Sol. (1)

Linear expansion coefficient

$= \frac{\text{change in length}}{\text{original length} \times \text{rise in temperature}}$

or $\alpha = \frac{\Delta \ell}{\ell t}$

or $\Delta \ell = \ell \alpha t$

For brass rod, $\Delta \ell_1 = \ell_1 \alpha_1 t$

For steel rod, $\Delta \ell_2 = \ell_2 \alpha_2 t$

Since, $\ell_2 - \ell_1$ = constant

(given)

So, $\Delta \ell_2 - \Delta \ell_1 = 0$

or $\Delta \ell_2 = \Delta \ell_1$

∴ $\ell_2 \alpha_2 t = \ell_1 \alpha_1 t$

As $t \neq 0$, hence

$\ell_2 \alpha_2 = \ell_1 \alpha_1$

14. Sol. (1)

No. of moles n = $\frac{m}{\text{molecular weight}} = \frac{5}{32}$

So, from ideal gas equation

pV = nRT

⇒ $pV = \frac{5}{32} RT$

15. Sol. (4)

RMS speed is defined as the square root of the mean of the squares of the random velocities of the individual molecules of a gas. From Maxwellian distribution law, RMS speed is given by

$c_{rms} = \sqrt{\left(\frac{3kT}{m}\right)}$

⇒ $c_{rms} \propto \sqrt{T}$

∴ $\frac{(c_{rms})_1}{(c_{rms})_2} = \sqrt{\frac{T_1}{T_2}}$

Here, T_1 = 27°C = 300 K

T_2 = 927°C = 1200 K

∴ $\frac{(c_{rms})_1}{(c_{rms})_2} = \sqrt{\frac{300}{1200}} = \frac{1}{2}$

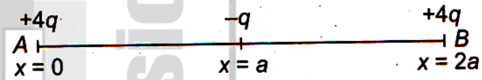
⇒ $(c_{rms})_2 = 2\,(c_{rms})_1$

16. Sol. (4)

Velocity is the slope on displacement-time graph. At point E, the slope is negative so instantaneous velocity of the particle is negative at the point E. At point C and F, the slope is positive and at D, the slope is zero.

17. Sol. (3)

Net force on charge placed at A due to charges placed at C and B



$F_A = \frac{1}{4\pi\varepsilon_0}\frac{(+4q)(-q)}{a^2} + \frac{1}{4\pi\varepsilon_0}\frac{(+4q)(+4q)}{(2a)^2}$

$= -\frac{1}{4\pi\varepsilon_0}\frac{4q^2}{a^2} + \frac{1}{4\pi\varepsilon_0}\frac{4q^2}{a^2} = 0$

Similarly, F_B and F_C will be zero.

As net force on each charge is zero, therefore all the charges are in equilibrium. If we were to displace – q to the right, (in figure), net force of attraction will be to the right which will displace in further. Therefore, equilibrium is unstable.

18. Sol. (4)

The energy stored in the capacitor = $\frac{1}{2}CV^2$. This energy will be converted into heat in the resistor.

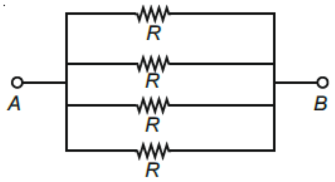
∴ $H = \frac{1}{2}CV^2$

$= \frac{1}{2} \times 4 \times 10^{-6} \times (400)^2 = 0.32$ J

19. Sol. (1)

All the wires are identical and of same material so they will have same value of resistance. Let it be R.

When these are (four) connected in parallel.



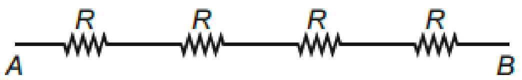
$$R_P = \frac{R}{4} \quad \left(\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4}\right)$$

Given $R_P = 0.25\ \Omega$

$$0.25 = \frac{R}{4}$$

$\therefore R = 1\ \Omega$

Now these four resistance are arranged in series



$R_S = R + R + R + R = 4R$

$R_S = 4 \times 1 = 4\ \Omega$

20. **Sol. (3)**

When $\vec{v}$, $\vec{E}$ and $\vec{B}$ are mutually perpendicular to each other, in this situation if $\vec{E}$ and $\vec{B}$ are such that $\vec{F} = \vec{F}_e + \vec{F}_m = 0$, then acceleration in the particle, $\vec{a} = \frac{\vec{F}}{m} = 0$. It means particle will pass undeflected.

Here, $F_e = F_m$

So, $qE = qvB$ or $v = \frac{E}{B}$

Here, $E = 20\ Vm^{-1}$

$B = 0.5\ T$

$\therefore \quad v = \frac{20}{0.5} =$ 40 m/s

21. **Sol. (4)**

According to Biot-Savart's law, the magnetic field induction dB (also called magnetic flux density) at a point P due to current element depends upon the factors are stated below

(i) $dB \propto i$ (ii) $dB \propto dl$

(iii) $dB \propto \sin\theta$ (iv) $dB \propto \frac{1}{r^2}$

Combining these factors, we get

$$dB \propto \frac{i\,dl\sin\theta}{r^2}$$

In vector from,

$$\vec{dB} = \frac{\mu_0}{4\pi} i \frac{(\vec{dl} \times \vec{r})}{r^2}$$

22. **Sol.(4)**

Magnetic field exist in

Closed Loops (Monopoles do not exist)

$$\oint \vec{B}.d\vec{A} = 0$$

(Gauss law for magnetism)

23. **Sol. (2)**

$$i_{max} = \frac{E_{max}}{R} = \frac{NBA\omega}{R}$$

$$i_{max} = \frac{1000 \times 2 \times 10^{-5} \times \pi(10^2) \times 2}{12.56}$$

$$i_{max} = 1A$$

24. **Sol. (1)**

$$\omega = 100$$

$$v = \frac{\omega}{2\pi} = \frac{100}{2\pi} = \frac{50}{\pi} Hz$$

Resonance frequency

$$v_0 = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi} = \sqrt{\frac{1}{10 \times 10 \times 10^{-6}}}$$

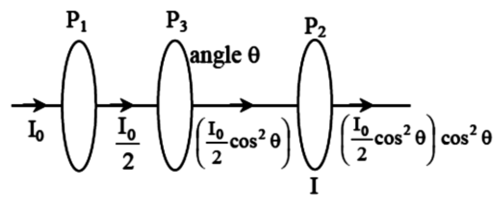
$$= \frac{50}{\pi} Hz$$

25. **Sol. (2)**

In an electromagnetic wave, half of the intensity is provided by the electric field and half by the magnetic field.

Hence required ratio should be 1 : 1.

26. **Sol. (2)**



Intensity of light after passing form I polaroid = $\frac{I_0}{2}$

From malus law

Intensity of light after passing from II Polaroid = $\frac{I_0}{2}\cos^2\theta = \frac{I_0}{2}\cos^2 45^o = \frac{I_0}{4}$

Intensity of light after passing from III Polaroid =

$\frac{I_0}{4}\cos^2\theta = \frac{I_0}{4}\cos^2(45^o) = \frac{I_0}{4}\times\frac{1}{2} = \frac{I_0}{8}$

27. Sol. (4)

$v = \frac{3}{2}v_0$

$v' = \frac{v}{2} = \frac{3}{4}v_0$

$\because \quad v' < v_0$

$\therefore$ No photoelectric emission will take place.

28. Sol. (4)

Energy of incident light

$$E\,(eV) = \frac{12375}{2000} = 6.2\,eV\,(200\,nm = 2000\,\mathring{A})$$

According to the relation $E = W_0 + eV_0$

$$\Rightarrow \quad V_0 = \frac{E - W_0}{e} = \frac{(6.2 - 5.01)e}{e} = 1.2\,V$$

29. Sol. (2)

Lyman $\frac{1}{\lambda_1} = R\left(\frac{1}{1^2} - \frac{1}{\infty^2}\right)$

$\frac{1}{\lambda_1} = (R)$

$\Rightarrow \quad \lambda_1 = \frac{1}{R}$

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

$\frac{1}{\lambda_2} = \frac{R}{4}$

$\Rightarrow \lambda_2 = \frac{4}{R}$

$\frac{\lambda_2}{\lambda_1} = 4$

30. Sol. (2)

Nuclear Radius:

$R = R_0(1)^{1/3}$

$$\frac{R(125)}{R(64)} = \frac{R_0(125)^{1/3}}{R_0(64)^{1/3}} = \frac{5}{4}$$

31. Sol. (1)

In p-type semiconductor, an intrinsic semi conductor is doped with trivalent impurities, that creates deficiencies of valence electrons called holes which are majority charge carriers.

32. Sol. (1)

33. Sol. (1)

$v_0 = R_e\sqrt{\frac{g}{R_e + h}}$

For satellite revolving very near to earth

$R_e + h = R_e$

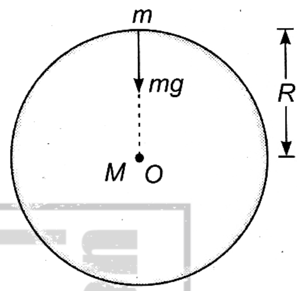
As (h<<R)

$v_o = \sqrt{R_e g} \simeq \sqrt{64\times10^5\times10} = 8\times10^3\ m/s = 8\,kms^{-1}$

Which is independent of height of a satellite

34. Sol. (4)

Let m is mass of body, it is placed on spherical body of mass M, radius R and centre O. if acceleration due to gravity is g and density of spherical body is uniform such that its mass can be supposed to be concentrated at its centre O.



Let F be the force of attraction between body of mass m and spherical body of mass M.

According to Newton's law of gravitation

$$F = \frac{GMm}{R^2}$$

From gravity pull F = mg

$\therefore \quad mg = \frac{GMm}{R^2}$

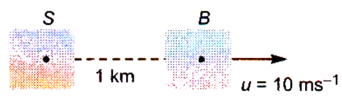
or $\quad g = \frac{GM}{R^2}$

$\therefore \quad M = \frac{gR^2}{G}$

35. Sol. (1)

Let v be the relative velocity of scooter (s) w.r.t bus (2), then

$v = v_S - v_B$



$\therefore \quad v_s = v + v_B$ …(i)

Relative velocity = displacement/time

$$= \frac{1000}{100} = 10\,ms^{-1}$$

Now, substituting the value of v in Eq. (i), we get

$v_s = 10 + 10 = 20\ ms^{-1}$

36. Sol. (2)

The tangential acceleration

$a_T = r\alpha$ …(i)

from 2nd equation of motion in rotational motion,

$$\omega^2 = \omega_0^2 + 2\alpha\theta$$

Here, $\omega_0 = 0,\ \omega = \frac{v}{r} = \frac{80}{20/\pi}$ = 4π rad/s,

θ = 2 × 2π rad

So, $\alpha = \frac{\omega^2}{2\theta} = \frac{(4\pi)^2}{2\times(2\times2\pi)}$

$= \frac{16\pi^2}{8\pi} = 2\pi$

Hence, from Eq. (i), we have

$a_T = r\alpha = \frac{20}{\pi} \times 2\pi = 40\ m/s^2$

37. Sol. (1)

Both hydrogen and oxygen are diatomic gases and

$C_p - C_V = R$ for all gases, hence a = b, provided C_p and C_V are gram molar specific heats.

➔ **If it was the case of specific heat of 1 g**

$C_p - C_V = r = \frac{R}{m}$

∴ $C_p - C_V = \frac{R}{2}$ (for H_2) = a

$C_p - C_V = \frac{R}{32}$ (for O_2) = b

∴ R = 2a = 32 b

∴ a = 16b

38. Sol. (3)

$|a| = \omega^2 y$

$\Rightarrow 20 = \omega^2(5)$

$\Rightarrow \omega = 2\ \text{rad/s}$

$T = \frac{2\pi}{\omega} = \frac{2\pi}{2} = \pi\ s$

39. Sol. (3)

Electric flux (ϕ_e) is a measure of the number of field lines crossing a surface. The number of field lines passing through unit area (N/S) will be proportional to the electric field, or,

$$\frac{N}{S} \propto E \Rightarrow N \propto ES$$

The quantity ES is the electric flux through surface S.

As we have seen in the problem that, lines of force that enter the closed surface leave the surface immediately, so no electric flux is bound to the system. Hence, electric flux is zero.

40. Sol. (3)

By Coulomb's law, the electrostatic force

$$F = \frac{1}{4\pi\varepsilon_0} \times \frac{q_1 q_2}{r^2}$$

$\Rightarrow \quad \varepsilon_0 = \frac{1}{4\pi} \times \frac{q_1 q_2}{r^2 F}$

Substituting the units for q, r and F, we obtain unit of

$$\varepsilon_0 = \frac{\text{coulomb} \times \text{coulomb}}{\text{newton} - (\text{metre})^2}$$

$$= \frac{(\text{coulomb})^2}{\text{newton} - (\text{metre})^2}$$

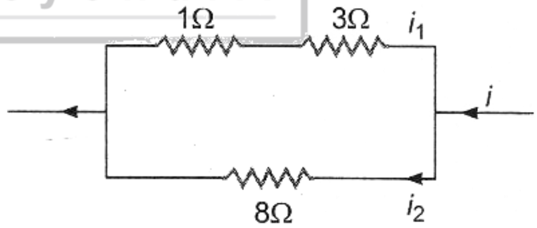
$= C^2/N\text{-}m^2$

41. Sol. (4)

Resistance 1Ω and 3Ω are connected in series, so effective resistance

R' = 1 + 3 = 4Ω

Now, R' and 8Ω are in parallel. We know that potential difference across resistances in parallel order is same.



Hence, $R' \times i_1 = 8i_2$

or $4 \times i_1 = 8i_2$

or $i_1 = \frac{8}{4} i_2 = 2i_2$

or $i_1 = 2i_2$ …(i)

Power dissipated across 8Ω resistance is

$i_2^2(8)t = 2W$

or $i_2^2 t = \frac{2}{8}$ = 0.25 W …(ii)

Power dissipated across 3Ω resistance is

$H = i_1^2(3)t$

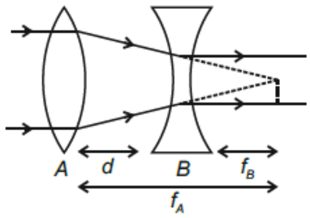
$= (2i_2)^2 (3)t$

$= 12 i_2^2 t$

but $i_2^2 t$ = 0.25 W

$\therefore$ H = 12 × 0.25 = 3W

42. **Sol. (3)**



Parallel beam of light after refraction from convex lens converge at the focus of convex lens. In question it is given light after refraction pass through concave lens becomes parallel. Therefore light refracted from convex lens virtually meet at focus of concave lens.

According to above ray diagram

d = $f_A - f_B$ = 20 – 5 = 15 cm

43. **Sol. (2)**

In general we have assumed $\mu = 1.5$

So, $f = 20 cm$

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

$$\frac{1}{20} = \frac{1}{v} + \frac{1}{30}$$

$$\frac{1}{v} = \frac{1}{20} - \frac{1}{30} = \frac{10}{600}$$

$$v = 60 cm$$

$$\frac{h_i}{h_0} = 2 \qquad h_i = 2 \times |h_0| \qquad h_i = 4cm$$

Here, image is real, inverted, magnified field and height of image s 4 cm.

44. **Sol. (2)**

$\vec{E} = 30 \sin(6 \times 10^8 t + kz)\hat{i}$

E = E_0 sin (ωt + kz)

Direction of propagation = –z axis

wave length λ = π = 3.14 m

Direction of M. field direction of $\vec{v} =$ direction of $\vec{E} \times \vec{B}$

$-k = \hat{i} \times \vec{B}$

$\hat{B} = -\hat{j}$

45. **Sol. (2)**

As the number of protons increases, Coulomb repulsive force among protons increases. To compensate, number of neutrons which are neutral is increased.

CHEMISTRY:

46. Sol.(3)

$C_2H_4 + 3\,O_2 \rightarrow 2CO_2 + 2H_2O$

28kg 96 kg

$\because$ 28 kg of C_2H_4 undergo complete combustion by = 96 kg of O_2

$\therefore$ 2.8 kg of C_2H_4 undergo complete combustion by = 9.6 g of O_2.

47. Sol. (1)

No. of radial nodes in 3p-orbital

$= (n - \ell - 1)$

[for p orbital $\ell = 1$]

$= 3 - 1 - 1 = 1$

48. Sol. (2)

(ii) is not possible for any value of because ℓ varies from 0 to (n – 1) thus for n = 2, ℓ can be only 0, 1, 2.

(iv) is not possible because for $\ell = 0$, m = 0.

(v) is not possible because for $\ell = 2$, m varies from –2 to +2.

49. Sol. (3)

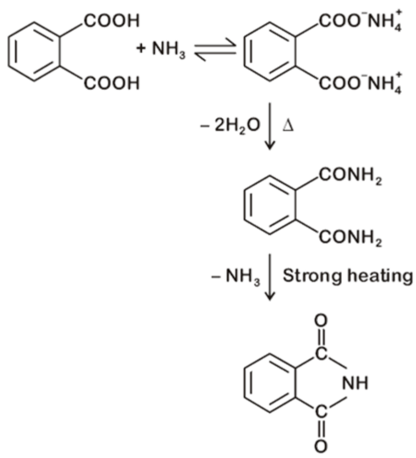
Wurtz reaction is used to prepare symmetrical alkanes like $R_1 - R_1$ as

$$R_1 - X + 2Na + X - R_1 \xrightarrow{DryEther} R_1 - R_1 + 2NaX$$

If R_1 and R_2 are different, then mixture of alkanes may be obtained as

$$R_1 - X + 2Na + R_2 - X \xrightarrow{DryEther} R_1 - R_1 + R_1 - R_2 + R_2 - R_2 + 2NaX$$

50. Sol. (1)



Phthalimide

51. Sol. (4)

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

When the reaction is in equilibrium, $\Delta G = 0$

$0 = \Delta H - T\Delta S \Rightarrow T = \dfrac{\Delta H}{\Delta S}$

$T = \dfrac{30 \times 1000}{105} = 285.7\,K$

52. Sol. (3)

$H_2O(\ell) \rightleftharpoons H_2O(v)$, $\Delta S > 0$

Expansion of gas at constant temperature, $\Delta S > 0$

Sublimation of solid to gas, $\Delta S > 0$

$2H(g) \therefore H_2(g)$, $\Delta S < 0$ ($\because \Delta n_g < 0$)

53. Sol. (3)

In presence of the given salts, the solubility of AgCl decreases due to common ion effect.

54. Sol. (2)

For an acid-base indicator

$HIn \rightleftharpoons H^+ + In^-$

$\therefore K_{In} = \dfrac{[H^+][In^-]}{[HIn]}$ or $[H^+] = K_{In} \times \dfrac{[HIn]}{[In^-]}$

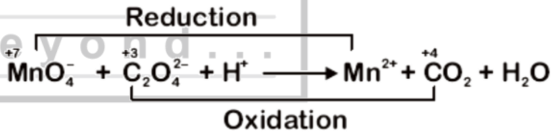
or $\log H^+ = \log K_{In} + \log \dfrac{[HIn]}{[In^-]}$

Taking negative on both sides

$-\log[H^+] = -\log K_{In} - \log \dfrac{[HIn]}{[In^-]}$

or $\log \dfrac{[In^-]}{[HIn]} = pH - pK_{In}$

55. Sol. (3)



n-factor of $MnO_4^- \Rightarrow 5$

n-factor of $C_2O_4^{2-} \Rightarrow 2$

Ratio of n-factor of MnO_4^- and $C_2O_4^{2-}$ is 5 : 2

So, molar ratio in balanced reaction is 2 : 5

$\therefore$ The balanced equation is

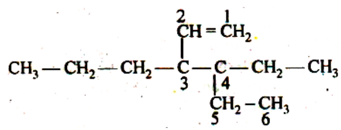
$$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$$

56. Sol. (2)

Stability of +1 oxidation state due to inert pair effect Tl > In > Ga > Al

57. Sol. (1)

The given compound is



4 ethyl, 3 propyl hex –1–ene

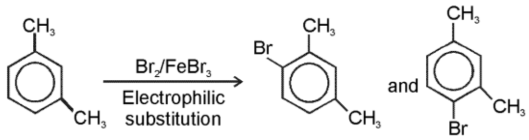
58. **Sol. (4)**

Unununium

Atomic number = 111

IUPAC official name : Roentgenium

59. **Sol. (3)**



60. **Sol. (1)**

Pure ethanol molecules are hydrogen bonded.

On adding acetone, its molecules get in between the ethanol molecules and break some of the hydrogen bonds between them.

This weakens the intermolecular attractive interactions and the solution shows positive deviation from Raoult's law.

61. **Sol. (2)**

$Cu^{2+} + 1e^- \rightarrow Cu^+$

$E_1^\circ = 0.15$ V; $\Delta G_1^\circ = -n_1E_1^\circ F$

$Cu^+ + 1e^- \rightarrow Cu$

$E_2^\circ = 0.50$ V; $\Delta G_2^\circ = -n_2E_2^\circ F$

$Cu^{2+} + 2e^- \rightarrow Cu$ $\Delta G^\circ = \Delta G^\circ_1 + \Delta G^\circ_2$

$-nE^\circ F = -1\ n_1 E_1^\circ F + (-1)\ n_2 E_2^\circ F$

$-nE^\circ F = -1\ (n_1 E_1^\circ F + n_2 E_2^\circ F)$

$$E^\circ = \frac{n_1E_1^\circ + n_2E_2^\circ}{n} = \frac{0.15 \times 1 + 0.50 \times 1}{2}$$

$\Rightarrow$ 0.325

62. **Sol. (3)**

Half life of zero order

$$t_{1/2} = \frac{[A_0]}{2K}$$

$t_{1/2}$ will be doubled on doubling the initial concentration.

63. **Sol. (1)**

- Few reactions can have zero activation energy for example radical reactions.
- Activation energy is defined as the minimum amount of extra energy absorbed by reactants to achieve threshold energy.

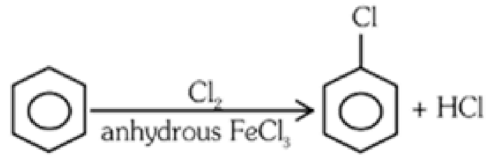
64. **Sol. (3)**

We know that IUPAC name of $[Pt(NH_3)_3(Br)(NO_2)Cl]Cl$ is triamminebromochloronitroplatinum (IV) chloride

65. **Sol. (2)**

S_N1 reaction gives racemic mixture with slight predominance of that isomer which corresponds to inversion because SN_1 also depends upon the degree of 'shielding' of the front side of the reacting carbon.

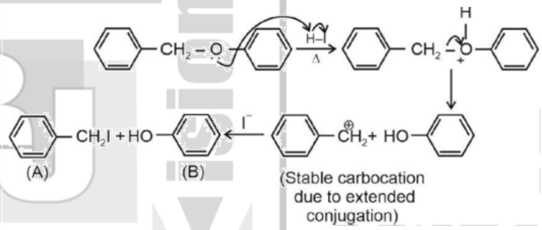
66. **Sol. (4)**



67. **Sol. (3)**

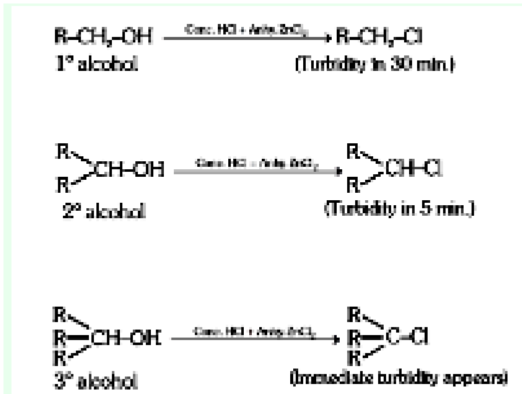
Oxidation of phenol with chromic acid produces a conjugated diketone known as benzoquinone quinones

68. **Sol. (2)**



69 **Sol. (2)**

1°, 2°, 3° Alcohol are distinguished by Lucas test on the basis of the time taken for turbidity to appear

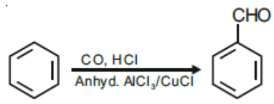


Reactivity of alcohol towards Lucas reagent

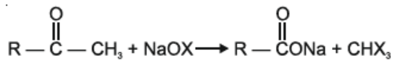
$\Rightarrow 3^\circ > 2^\circ > 1^\circ$ Alcohol

70. **Sol. (1)**

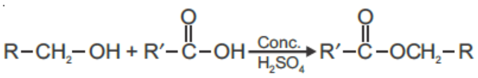
- Gattermann-Koch reaction:



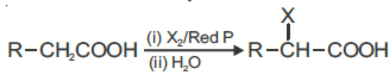
- Haloform reaction:



- Esterification:

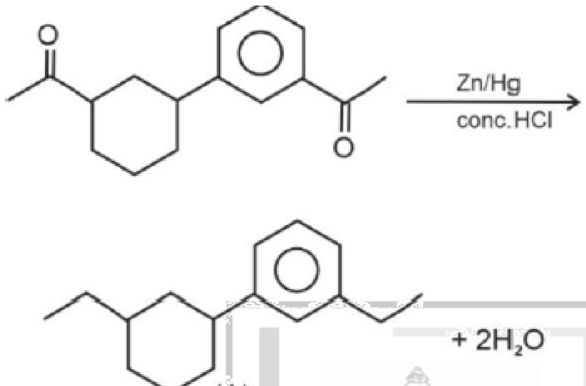


- Hell-Volhard-Zelinsky reaction:



71. **Sol. (4)**

This reaction is Clemmensen reduction



(A)

72. **Sol. (4)**

The amount of energy released when an electron is added to an isolated gaseous atom produce a monovalent anion is called electron gain enthalpy. Electron affinity value generally increase on moving from left to right in a period however there are exceptions of this rule in the case of those atoms which have stable configuration. These atoms resist the addition of extra electron, therefore the low value of electron affinity

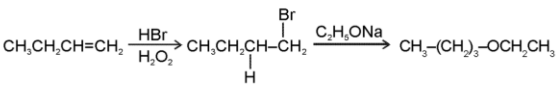
$$\underset{-1.48}{O} < \underset{-2.0}{S} < \underset{-3.6}{F} < \underset{-3.8}{Cl}$$

On the other hand Cl because of its compariti very bigger size than F, allow the addition of an extra electron more easily.

73. **Sol. (4)**

Electron withdrawing (–I, –M) groups increases reactivity towards nucleophilic addition reaction. In Group increases the reactivity towards nucleophilic addition reaction at CHO group.

74. **Sol. (1)**

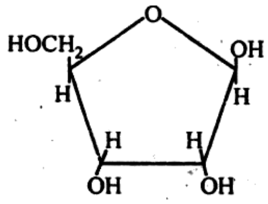


HBr in presence of peroxide gives anti Markovnikoff addition product.

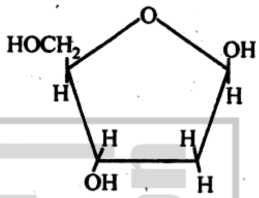
1°alkyl halide on reaction with C_2H_5ONa gives S_N2 reaction.

75. **Sol. (3)**

Each nucleic acid consists of a pentose sugar a heterocyclic base, and phosphoric acid. The sugar present in DNA is 2-deoxy-D (–) ribose and the sugar present in RNA is D(–) ribose. The chirality of DNA and RNA molecules are due to the presence of sugar components.



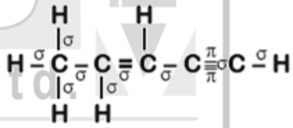
D(–)-ribose



2-deoxy-D(–)-ribose

76. **Sol. (3)**

77. **Sol. (4)**



Number of σ bonds = 10

and number of π bonds = 3

78. **Sol. (2)**

79. **Sol. (4)**

Interhalogen compound group 17th

ICl is more reactive due to polar bonds.

From NCERT – X – X' bond is weaker than X – X bond except F_2.

80. **Sol.(3)**

Molarity of H_2SO_4 solution.

$$= \frac{98 \times 1000}{98 \times 100} \times 1.84 = 18.4$$

Suppose V ml of this H_2SO_4 is used to prepare 1 lit. of 0.1 M H_2SO_4

$\therefore \quad V \times 18.02 = 1000 \times 0.1$

Or $\quad V = \dfrac{1000 \times 0.1}{18.02} = 5.55$ ml.

81. **Sol. (1)**

Given mass of an electron(m) = 9.1×10^{-28} g;

Velocity of electron (v) = 3×10^{4} cm/s;

Accuracy in velocity = 0.001% = $\frac{0.001}{100}$;

Actual velocity of the electron

$(\Delta v) = 3 \times 10^{4} \times \frac{0.001}{100} = 0.3$ cm/s.

Planck's constant (h) = 6.626×10^{-27} erg-sec.

∴ Uncertainty in the position of the electron

$$(\Delta x) = \frac{h}{4\pi m \Delta v} = \frac{6.626 \times 10^{-27} \times 7}{4 \times 22 \times (9.1 \times 10^{-28}) \times 0.3}$$

= 1.93 cm

82. **Sol. (1)**

'Be' and 'N' have comparatively more stable valence sub–shell than 'B' and 'O'

∴ Correct order of first ionisation enthalpy is:

Li < b < Be < C < O < N < F < Ne

83. **Sol. (1)**

Given species: O_2, O_2^{-1}, O_2^{+1}, O_2^{2-}

Total number of electrons

$O_2 \rightarrow 16e^-$

$O_2^{-1} \rightarrow 17e^-$

$O_2^{+1} \rightarrow 15e^-$

$O_2^{2-} \rightarrow 18e^-$

	O_2^{+1}	O_2	O_2^{-1}	O_2^{2-}
Bond order	2.5	2	1.5	1

* Stability order [$O_2^{+1} > O_2 > O_2^{-1} > O_2^{2-}$]

84. **Sol. (3)**

$$A_2 + B_2 \rightleftharpoons 2AB \quad K_c = \frac{[AB]^2}{[A_2][B_2]}$$

$$K_c = \frac{(2.8 \times 10^{-3})^2}{3 \times 10^{-3} \times 4.2 \times 10^{-3}}$$

$$= \frac{(2.8)^2}{3 \times 4.2} = 0.62$$

85. **Sol.(4)**

gEq of $KMnO_4$ = gEq of KI

Moles of $KMnO_4$ × 1 = 1 × 6.

Moles of $KMnO_4$ = 6.

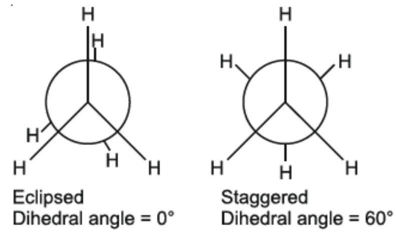
86. **Sol. (1)**

Ethane has two conformers

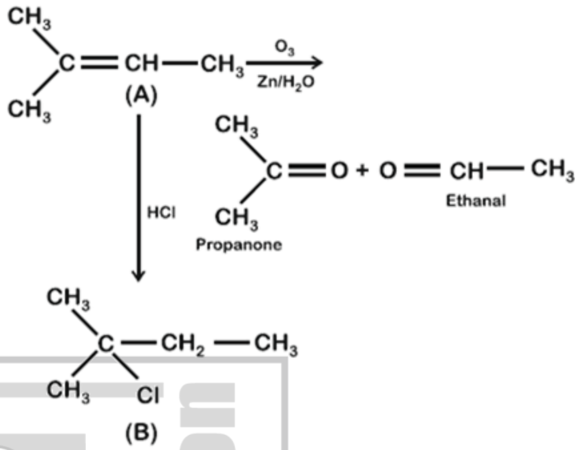
(i) Eclipsed

(ii) Staggered

Eclipsed conformer is least stable while staggered conformer is most stable. In eclipsed conformer the dihedral angle is 0°



87. **Sol. (2)**

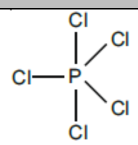
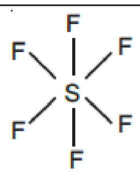
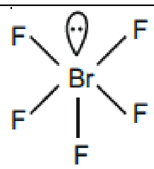
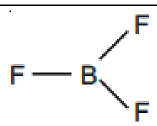


88. **Sol. (3)**

$\Delta T_f = i K_f m$, i is highest for $Al_2(SO_4)_3$

89. **Sol. (4)**

90. **Sol. (2)**

List – I	List – II
(1) 	sp^3d hybridised and trigonal bipyramidal in shape
(2) 	sp^3d^2 hybridised and octahedral in shape
(3) 	sp^3d^2 hybridised and square pyramidal in shape
(4) 	sp^2 hybridised and trigonal planar in shape