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FT – 12

ENG

PCB SOLUTION

COURSE NAME: 12TH **DATE : 14-06-2026**

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

PHYSICS:

1. **Sol. (4)**

$$\vec{E} = -\frac{\partial V}{\partial x}\hat{i} - \frac{\partial V}{\partial y}\hat{j} - \frac{\partial V}{\partial z}\hat{k}$$

$$= -[(6-8y)\,\hat{i} + (-8x-8+6z)\,\hat{j} + (6y)\,\hat{k}]$$

At (1, 1, 1), $\vec{E} = 2\hat{i} + 10\hat{j} - 6\hat{k}$

$$\Rightarrow \left(\vec{E}\right) = \sqrt{2^2+10^2+6^2} = \sqrt{140} = 2\sqrt{35}$$

2. **Sol.(2)**

3. **Sol. (1)**

Horizontal distance of the target is 100 m.

Speed of bullet = 1000 m/s

Time taken by bullet to cover the horizontal distance

$$t = \frac{100}{1000} = \frac{1}{10}\text{s}$$

During $\frac{1}{10}$s, the bullet will fall down vertically due to gravitational acceleration

Therefore, height above the target, so that the bullet hit the target is

$$h = ut + \frac{1}{2}gt^2$$

$$= \left(0 \times \frac{1}{10}\right) + \frac{1}{2} \times 10 \times (0.1)^2$$

= 0.05 m = 5 cm

4. **Sol. (2)**

$$\text{Total flux} = \frac{\text{Net enclosed charge}}{\varepsilon_0}$$

Hence, we can say the electric flux depends only on net enclosed charge by surface.

5. **Sol. (2)**

If $\vec{E}$ is the electric field strength and $\vec{B}$ the magnetic field strength and q the charge on a particle, then electric force on the charge

$$\vec{F}_e = q\vec{E}$$

and magnetic force on the charge

$$\vec{F}_m = q(\vec{v} \times \vec{B})$$

The net force on the charge

$$\vec{F} = \vec{F}_e + \vec{F}_m = q\vec{E} + q(\vec{v} \times \vec{B})$$

6. **Sol. (3)**

At temperature much lower than 0°C, graph deviates considerably from a straight line. Option (3) is correct.

7. **Sol. (3)**

From Keplar third's

$T^2 \propto r^3$

Hence, $T_1^2 \propto r_1^3$

and $T_2^2 \propto r_2^3$

So, $\frac{T_2^2}{T_1^2} = \frac{r_2^3}{r_1^3} = \frac{(3R)^3}{(6R)^3}$

or $\frac{T_2^2}{T_1^2} = \frac{1}{8}$ $\quad T_2^2 = \frac{1}{8}T_1^2$

$$T_2 = \frac{24}{2\sqrt{2}} = 6\sqrt{2}\ \text{h}.$$

8. **Sol. (3)**

Fracture point and ultimate strength point is close for material X, hence X is brittle in nature and both points are far apart for material Y hence it is ductile.

9. **Sol. (4)**

According to Newton's law of gravitation, the force between two spheres is given by

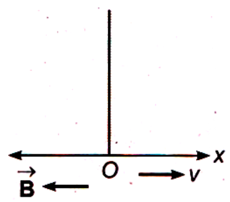
$$F = \frac{GMm}{r^2}$$

From the relation, we can say the gravitational force does not depend on the medium between two spheres hence, it remains same i.e., F.

10. **Sol. (1)**

Force on charged particle in the magnitude field is

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



or F = qvB sin θ when angle between velocity v and magnitude induction B is 180°, then

F = qvB sin 180° = 0

11. **Sol. (3)**

Both assertion and reason are true but potential difference across the resistance is zero, because diode is in reverse biasing hence no current flows.

12. **Sol. (3)**

When L is removed,

$$\tan\phi = \frac{|X_C|}{R} \Rightarrow \tan\frac{\pi}{3} = \frac{X_C}{R} \qquad \text{..... (i)}$$

When C is removed,

$$\tan\phi = \frac{|X_L|}{R} \Rightarrow \tan\frac{\pi}{3} = \frac{X_L}{R} \qquad \text{..... (ii)}$$

From (i) and (ii), $X_L = X_C$

Since, $X_L = X_C$, the circuit is in resonance.

Z = R

Power factor = $\cos\phi = \frac{R}{Z} = 1$

13. **Sol. (4)**

Energy stored in inductor

$$U = \frac{1}{2}LI^2$$

$$25\times10^{-3} = \frac{1}{2}\times L\times(60\times10^{-3})^2$$

$$L = \frac{25\times2\times10^6\times10^{-3}}{3600} = \frac{500}{36} = 13.89\ \text{H}$$

14. **Sol. (4)**

$$z = \sqrt{R^2 + X_c^2} = \sqrt{(100)^2 + (100)^2} = 100\sqrt{2}$$

$$i_{max} = \frac{v_{max}}{z} = \frac{220\sqrt{2}}{100\sqrt{2}} = 2.2$$

15. **Sol. (4)**

Ray optics, uses the geometry of straight lines to account for the macroscopic phenomena like rectilinear propagation, reflection, refraction etc. Ray optics can be taken as a limiting case of wave optics. This is primarily because wavelength of light is small.

16. **Sol. (1)**

By using Snell's Law & Triangle property

17. **Sol. (3)**

When electromagnetic wave enters in other medium, frequency remains unchanged while wavelength and velocity become $\frac{1}{\mu}$ times.

So, after entering from air to glass slab (μ), frequency remains v, wavelength $\lambda' = \frac{\lambda}{\mu}$ and velocity of light $v' = \frac{v}{\mu}$.

18. Sol. (3)

$$\frac{1}{f_{eq}} = \frac{1}{f_1} + \frac{1}{f_2}$$

$$\frac{1}{f_{eq}} = \frac{1}{f} - \frac{1}{f}$$

$$f_{eq} = \infty$$

19. Sol. (3)

The number of photoelectrons emitted is directly proportional to the intensity of light.

20. Sol. (1)

Isotones are the nuclides which contain the same number of neutrons i.e., in this case, (A – Z) = N is the same. In $_6C^{13}$ and $_7N^{14}$, number of neutrons in carbon = 13 – 6 = 7 and number of neutrons in nitrogen = 14 – 7 = 7.

21. Sol. (3)

$V = At + Bt^2$

$$x = \int_1^2 v\,dt = \int_1^2 (At + Bt^2)\,dt = \left(\frac{At^2}{2} + \frac{Bt^3}{3}\right)_1^2$$

$$= \frac{A}{2}(4-1) + \frac{B}{3}(8-1)$$

$$x = \frac{3A}{2} + \frac{7B}{3}$$

22. Sol. (1)

The charged particles whose flow in a definite direction constitutes the electric current are called current carriers. In metals the valence electrons of the atoms do not remain attached to individual atoms but are free to move throughout the volume of the conductor. Their velocity under normal conditions is of the order of a fraction of mm/s.

23. Sol. (4)

The linear acceleration of centre of mass will be $a = \frac{F}{m}$ wherever the force is applied. Hence, the acceleration will be same whatever the value of h may be.

24. Sol. (4)

$$P = P_0 + \frac{4T}{R}$$

⇒ R increases and P Decreases

25. Sol. (1)

Given, ideal gas is compressed to half its initial volume i.e.

The isochoric process is one in which volume is kept constant, meaning that work done by the system will be zero, i.e. $W_{isochoric} = 0$.

As we know, work done on the gas

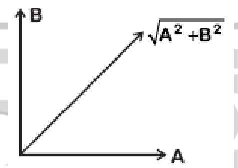
= Area under curve i.e.

$W_{adiabatic} > W_{isothermal} > W_{isobaric}$

26. Sol. (1)

The gases carbon-monoxide (CO) and nitrogen (N_2) are diatomic, so both have equal kinetic energy $\frac{5}{2}kT$, i..e, $E_1 = E_2$.

27. Sol. (1)



$y = A_0 + A\sin\omega t + B\sin\omega t$

Equate SHM

$y' = y - A_0 = A\sin\omega t + B\cos\omega t$

Resultant amplitude

$$R = \sqrt{A^2 + B^2 + 2AB\cos 90^\circ}$$

$$= \sqrt{A^2 + B^2}$$

28. Sol. (4)

The given equation is

$$y\,(x, t) = 8.0 \sin\left(0.5\pi x - 4\pi t - \frac{\pi}{4}\right) \quad \ldots(i)$$

The standard wave equation can be written as,

$y = a \sin (kx - \omega t + \phi)$

…(ii)

Where a is amplitude, k the propagation constant and ω the angular frequency, comparing the Eqs. (i) and (ii), we have

$k = 0.5\pi$, $\omega = 4\pi$

∴ Speed of transverse wave

$$v = \frac{\omega}{k} = \frac{4\pi}{0.5\pi} = 8\,m/s$$

29. Sol. (2)

(1) Force = mass × acceleration

or F = ma

= [M] [LT^{-2}]

= [MLT^{-2}]

Torque = moment of inertia × angular acceleration

or τ = I × α

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

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

(2) Work = force × displacement

or W = F × d

= [MLT^{-2}] [L] = [ML^2T^{-2}]

Energy = $\frac{1}{2}$ × mass × (velocity)^2

or $K = \frac{1}{2}mv^2$

= [M] [LT^{-1}]^2

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

(3) Force as discussed above

[F] = [MLT^{-2}]

Impulse = force × time-interval

∴ [I] = [MLT^{-2}] [T]

= [MLT^{-1}]

(4) Linear momentum = mass × velocity

or p = mv

∴ [p] = [M] [LT^{-1}]

= [MLT^{-1}]

Angular momentum = moment of inertia × angular velocity

or [L] = [I] × [ω]

∴ [L] = [ML^2] [T^{-1}]

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

Hence, we observe that choice (2) is correct.

In this problem, the momentum of inertia and impulse are given same symbol I.

30. Sol. (1)

$r_n = \frac{.529\, n^2}{Z}\text{Å}$

So, (1) → (q)

$V_n = \frac{2.2\times10^6\, Z}{n}\text{ms}^{-1}$

So, (4) → (p)

$I = \frac{1.06\, Z^2}{n^3}\text{mA}$

So, (2)→ (r)

Magnetic field, $B = \frac{12.5\, Z^3}{n^5}\text{T}$

So, c.→ s.

31. Sol.(1)

Venturimeter works an Bernoulli's principle

32. Sol. (3)

Electric force on charged particle

F = qE

Kinetic energy attained by particle

= work done

= force × displacement

= qE × y

Alternative Force on charged particle in a uniform electric field is

F = ma = Eq

or $a = \frac{Eq}{m}$ …(i)

From the equation of motion, we have

$v^2 = u^2 + 2ay$

$= 0 + 2\times\frac{Eq}{m}\times y$

$= \frac{2Eqy}{m}$

Now, kinetic energy of the particle

$K = \frac{1}{2}mv^2$

$= \frac{m}{2}\times\frac{2Eqy}{m} = qEy$

33. Sol. (2)

The formula for resistance of wire is

$R = \frac{\rho l}{A}$

where ρ = specific resistance of the wire

⇒ $R \propto \frac{l}{A}$

⇒ $R \propto \frac{l}{r^2}$ (∵ $A = \pi r^2$)

∴ $\frac{R_1}{R_2} = \frac{l_1}{l_2}\times\frac{r_2^2}{r_1^2}$ … (i)

Given, $l_1 = 1$, $l_2 = 2l$, $r_1 = r$, $r_2 = 2r$, $R_1 = R$.

Substituting these values in Eq. (i), we have

$\frac{R_1}{R_2} = \frac{l}{2l}\times\frac{(2r)^2}{r^2}$

$$\frac{R_1}{R_2} = \frac{l}{2l} \times \frac{(2r)^2}{r^2}$$

$$\frac{R_1}{R_2} = 2 \Rightarrow R_2 = \frac{R}{2}$$

Therefore, resistance will be halved.

Now, the specific resistance of the wire does not depend on the geometry of the wire hence, it remains unchanged.

34. **Sol. (2)**

First current develops in direction of abcd but when electron moves away, then magnetic field inside loop decreases & current changes its direction.

35. **Sol. (1)**

Magnetic Lorentz force $\vec{F} = q(\vec{v} \times \vec{B})$

$= -2 \times 10^{-6}\,[2 \times 2 \times 10^{6}]$

= 8 N along negative z-axis

36. **Sol. (1)**

Work done in rotating the dipole from

$\theta = \theta_1$ to $\theta = \theta_2$ is

$W = -MB\,(\cos\theta_2 - \cos\theta_1)$

In Ist case

$W_1 = -MB\,(\cos 90° - \cos 0°) = MB$

In IInd case

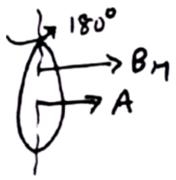
$W_2 = -MB\,(\cos 60° - \cos 0°)$

$$= -MB\left(\frac{1}{2} - 1\right) = \frac{1}{2}MB = \frac{1}{2}W_1$$

As $W_1 = n\,W_2$

$\therefore$ n = 2

37. **Sol. (4)**



$$|e| = \frac{\Delta\phi}{\Delta t} = \frac{2NBA}{\Delta t} = \frac{2 \times 500 \times 3 \times 10^{-5} \times 3.14\,(10^{-1})^2}{0.25}$$

38. **Sol. (3)**

Thickness of rectangular glass plate (t) = 6 cm

Distance of the object (u) = 8 cm

Distance of the image (v) = 12 cm

Let y = apparent position of the silvered surface. From property of mirror

Image distance of object from the mirror = distance of image from the mirror

or y + 8 = 12 + 6 – y

$\therefore$ = 5 cm

$$\therefore \quad \mu = \frac{\text{real depth}}{\text{apparent depth}} = \frac{6}{5} = 1.2$$

39. **Sol. (2)**

Given λ_1 = 12000 Å and λ_2 = 10000 Å,

D = 2 cm and d = 2 × 10^{-3} cm

We have $\frac{\lambda_1}{\lambda_2} = \frac{h_2}{h_1} = \frac{12000}{10000} = \frac{6}{5}$

as $x = \frac{u_1\lambda_1 D}{d} = \frac{5 \times 12000 \times 10^{-10} \times 2}{2 \times 10^{-3}}$

$= 5 \times 12 \times 10^{4} \times 10^{-10} \times 10^{3}$

= 6 mm.

40. **Sol. (3)**

Position of Ist minima

$$y = \frac{\lambda D}{a} = \frac{(5 \times 10^{-8})(0.6)}{0.02 \times 10^{-2}}$$

y = 0.15 cm.

41. **Sol. (3)**

Lyman series for H-ion

$$\frac{hc}{\lambda} = Rhc\left(\frac{1}{1^2} - \frac{1}{2^2}\right)$$

and for H-like ion

$$\frac{hc}{\lambda} = Z^2\,Rhc\left(\frac{1}{2^2} - \frac{1}{4^2}\right)$$

$$\therefore \quad \left(\frac{1}{1^2} - \frac{1}{2^3}\right) = Z^2\left(\frac{1}{4} - \frac{1}{16}\right)$$

$$\left(1 - \frac{1}{4}\right) = Z^2\left(\frac{1}{4} - \frac{1}{16}\right)$$

Z = 2.

42. **Sol. (2)**

Let distance between two places is d and t_1 is time taken by car to travel first-half length, t_2 is time taken by car to travel second-half length.

Time taken by car to travel first-half length,

$$t_1 = \frac{\left(\frac{d}{2}\right)}{40} = \frac{d}{80}$$

Time taken by car to travel second-half length,

$$t_2 = \frac{\left(\frac{d}{2}\right)}{60} = \frac{d}{120}$$

∴ Total time = $t_1 + t_2$

$$= \frac{d}{80} + \frac{d}{120}$$

$$= d\left(\frac{1}{80} + \frac{1}{120}\right) = \frac{d}{48}$$

∴ Average speed = $\frac{d}{t_1 + t_2} = \frac{d}{\left(\frac{d}{48}\right)}$

= 48 km/h

Alternative

$$v_{av} = \frac{2v_1v_2}{v_1 + v_2} = \frac{2 \times 40 \times 60}{40 + 60} = 48 \text{km/h}$$

43. **Sol. (4)**

Here, $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$

$$|F| = \sqrt{36 + 64 + 100}$$

$$= 10\sqrt{2} \text{ N}$$

a = 1 ms^{-2}

∴ $m = \frac{10\sqrt{2}}{1} = 10\sqrt{2} \text{ kg}$

44. **Sol. (3)**

Work done by a variable force F in displacement from x = x_1, to x = x_2 is given by

$$W = \int_{x_1}^{x_2} f(dx)$$

Here, $x_1 = 0$, $x_2 = 5$

F = $(7 - 2x + 3x^2)$ N

∴ W = $\int_0^5 (7 - 2x + 3x^2)dx$

$$= [7x - x^2 + x^3]_0^5$$

$$= [7 \times 5 - (5)^2 + (5)^3]$$

= [35 – 25 + 125]

= 135 J

45. **Sol. (4)**

Barrier potential should depend on all the three options given. Barrier potential depends on the material used to make p-n junction diode (whether it is Si or Ge). It should also depends on amount of doping due to which the number of majority carries will change. It should also depend on temperature due to number of minority carries will change.

CHEMISTRY:

46. **Sol. (4)**

Acc. to Bohr's atomic model

$r \propto \frac{n^2}{z}$ 3rd orbit of Li^{+2} $n_1 = 3$

$\Rightarrow$ 2nd orbit of He^{+} $n_2 = 2$

$Z_2 = 2$

$$\frac{(r_3)_{Li^{+2}}}{(r_2)_{He^{+}}} = \frac{n_1^2}{n_2^2} \times \frac{Z_2}{Z_1} = \frac{3^2 \times 2}{2^2 \times 3}$$

$(r_3)_{Li^{+2}}$ = 158.7 pm

47. **Sol.(2)**

48. **Sol.(4)**

We know that all non-zero digits are significant and the zeros at the beginning of a number are not significant. Therefore number 161 cm, 0.161 cm and 0.0161 cm have 3, 3 and 3 significant figures respectively.

49. **Sol. (2)**

BF_3 : $\frac{3+3}{2} = 3$ means sp^2

NO_2^- : $\frac{5+1}{2} = 3$ means sp^2

50. **Sol. (4)**

PO_4^{3-} = x + 4 (–2) = –3; x – 8 = –3; x = +5

SO_4^{2-} = x + 4 (–2) = –2; x – 8 = –2; x = +6

$Cr_2O_7^{2-}$ = 2x + 7 (–2) = –2; 2x – 14 = –2; 2x = 12; x = +6

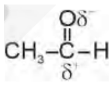
51. **Sol. (3)**

We know that bond angles of NH_3 = 107°, NH_4^+ = 109.5°, H_2O = 105°. Therefore bond angle of NH_4^+ is maximum.

52. **Sol.(4)**

53. **Sol.(3)**

A reagent that brings an electron pair to the reactive site is called a nucleophile i.e. nucleus seeking.

In 

, carbonyl carbon is electron deficient centre hence it will be electrophilic centre.

54. **Sol. (4)**

For a cyclic process

$\Delta E = 0$, $\Delta H = 0$ & $\Delta G = 0$. As all depend upon final state and initial state, w doesn't depend initial and final state.

55. **Sol. (4)**

According to Le-Chatalier principle.

56. **Sol. (4)**

(1) $CH_3CH_2–CH_2–CH_2–NH_2$

(ii) With KOH (alcohol) and $CHCl_3$ produces bad smell

(2) $CH_3C \equiv CH$

(ii) Gives white ppt with ammonical $AgNO_3$

(3) $CH_3CH_2COOCH_3$

(i) Alkaline hydrolysis

(4) $CH_3CHOH – CH_3$

(ii) with Lucas reagent cloudiness appears after 5 minutes

$\therefore$ Correct choice: (4)

57. **Sol. (4)**

$$H\overset{+1}{Br}O \longrightarrow \overset{0}{Br}, \; E^o_{HBrO/Br_2} = 1.59 \text{ V}$$

$$H\overset{+1}{Br}O \longrightarrow \overset{+5}{Br}O_3^-, \; E^o_{BrO_3^-/HBrO} = 1.5 \text{ V}$$

E^o_{cell} for the disproportionation of HBrO,

$E^o_{cell} = E^o_{HBrO/Br_2} - E^o_{BrO_3^-/HBrO}$

= 1.59 -1.5

=0.095 V = + ve

Hence, option (4) is correct answer.

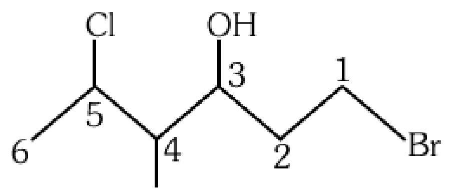
58. **Sol. (4)**

Potash Alum, K_2SO_4 . $Al_2(SO_4)$. $24H_2O$ is a double salt.

59. **Sol. (4)**

We know that q (heat) and work (w) are not state functions but (q + w) is a state functions. H – TS (i.e. G) is also a state functions. Thus II and III are not state functions so the correct answer is option (4).

60. **Sol. (4)**



1 – Bromo – 5-chloro-4-methylhexan-3-ol

61. **Sol. (2)**

Enantiomers are non-superimposable mirror images of each other.

62. **Sol. (4)**

$$CH \equiv CH \xrightarrow{Hg^{+2}/H_2SO_4} CH_3-\overset{\overset{O}{||}}{C}-H$$

63. **Sol. (4)**

Given : $n_{C_6H_6} : n_{C_8H_{18}} = 3:2$

So, $\chi_{C_6H_6} = \frac{3}{5}, \chi_{C_8H_{18}} = \frac{2}{5}$

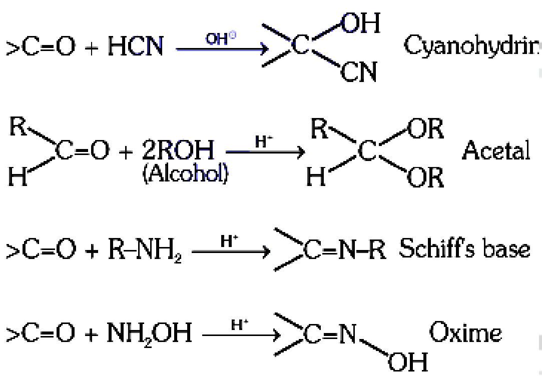
$$p_s = p^o_{C_6H_6}\chi_{C_6H_6} + p^o_{C_8H_{18}}\chi_{C_8H_{18}}$$

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

= 168 + 168

= 336 mm of Hg

64. **Sol. (3)**



65. **Sol. (1)**

$$2H^+(aq) + 2e^- \rightarrow H_2(g)$$

$$\therefore \quad E = E^0 - \frac{0.0591}{2}\log\frac{P_{H_2}}{[H^+]^2}$$

$$0 = 0 - 0.0295\log\frac{P_{H_2}}{(10^{-7})^2}$$

$$\frac{P_{H_2}}{(10^{-7})^2} = 1$$

$P_{H_2} = 10^{-14}$ atm

66. **Sol. (2)**

Conductivity = conductance × cell constant

k = G G*

$= \frac{1}{R}G^*$

G* = k × R = 0.0210 × 60 = 1.26 cm^{-1}

67. **Sol. (2)**

$N_2 + 3H_2 \rightleftharpoons 2NH_3$

Rate of reaction is given as

$$-\frac{d[N_2]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt} = +\frac{1}{2}\frac{d[NH_3]}{dt}$$

68. **Sol. (1)**

Rate = K(1)°

Unit of K = mol L^{-1} sec^{-1}

69. **Sol. (1)**

$2KMnO_4 + 5H_2S + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 5S + 8H_2O$

Thus, in this reaction sulphur (S) is produced.

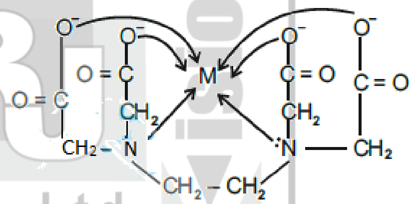
70. **Sol. (1)**

Ni^{2+} - d^8, configuration and 2 unpaired electrons, μ = 2.84 BM.

71. **Sol. (1)**

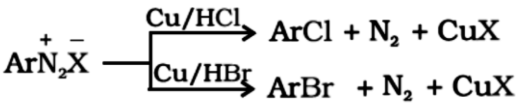
72. **Sol. (2)**

Ethylene diaminetetraacetate (EDTA) ion is a hexadented ligand having four donor oxygen atoms and two donor nitrogen atoms.

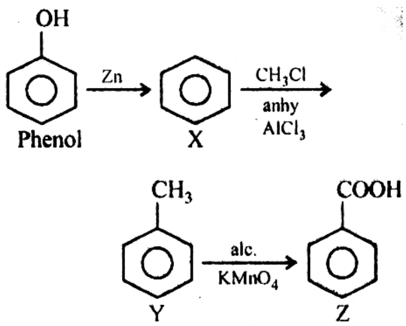


73. **Sol. (4)**

Chlorine or bromine can also be introduced in the benzene ring by treating the diazonium salt solution with corresponding halogen acid in the presence of copper powder. This is referred as Gatterman reaction.



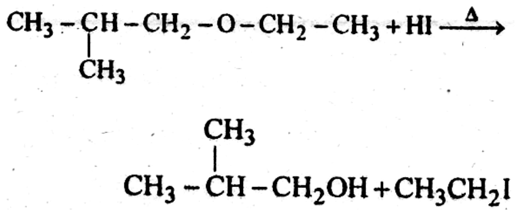
74. **Sol. (2)**



75. **Sol. (2)**

76. Sol. (3)

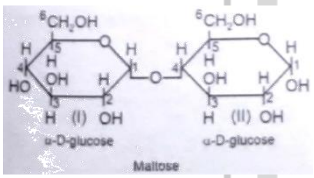
In the cleavage of mixed ether with two different alkyl groups, the alcohol and alkyl iodide that form depend on the nature of alkyl group. When primary or secondary alkyl groups are present, it is the lower alkyl group that forms alkyl iodide therefore



77. Sol. (3)

I_2 and NaOH react with acetophenone ($C_6H_5COCH_3$) to give yellow ppt. of CHI_3 but benzophenone ($C_6H_5COC_6H_5$) does not and hence can be used to distinguish between them. Oxidation of methyl ketones with sodium Hypoiodite (NaOI) or (I_2 + NaOH) give iodoform (CHI_3) but not in case of benzophenone.

78. Sol.(3)



The free aldehyde group can be obtained at C1 of second glucose in solution and it shows reducing property.

79. Sol. (2)

$\Delta_{mix}H = 0$

$\Delta_{mix}S > 0$

$\Delta_{mix}G < 0$

$\Delta_{mix}V = 0$

80. Sol. (2)

81. Sol. (1)

Equilibrium constant value depends only on temperature.

82. Sol.(4)

Average isotopic mass of

$$X = \frac{200 \times 90 + 199 \times 8 + 202 \times 2}{90 + 8 + 2}$$

$$= \frac{18000 + 1892 + 404}{100} = \frac{19996}{100}$$

= 199.96 amu

83. Sol. (1)

84. Sol.(4)

$3O_2(g) \rightleftharpoons 2O_3(g)$

$$K_c = \frac{[O_3]^2}{[O_2]^3}$$

$[O_3]^2 = 3 \times 10^{-59} \times 64 \times 10^{-6}$

$= 19.2 \times 10^{-64}$

$= 4.38 \times 10^{-32}$ M

85. Sol. (4)

Dimethylammonium acetate is a salt of weak acid and weak base whose pH can be calculated as

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

$$= 7 + \frac{1}{2}(4.77 - 3.27) = 7.75$$

86. Sol. (4)

Using Ion electron method:

Reduction Half reaction: $Cr_2O_7^{2-} + 6e^- \rightarrow 2Cr^{3+}$

Oxidation Half reaction: $SO_3^{2-} \rightarrow SO_4^{2-} + 2\bar{e} \times 3$

Overall reaction:

$Cr_2O_7^{2-} + 3SO_3^{2-} \rightarrow 2Cr^{3+} + 3SO_4^{2-}$

- To balance 'O' atoms, adding H_2O on LHS

$Cr_2O_7^{2-} + 3SO_3^{2-} \rightarrow 2Cr^{3+} + 3SO_4^{2-} + 4H_2O$

- To balance 'H' atoms, adding H^+ on RHS

$Cr_2O_7^{2-} + 3SO_3^{2-} + 8H^+ \rightarrow 2Cr^{3+} + 3SO_4^{2-} + 4H_2O$

∴ a = 1
b = 3
c = 8

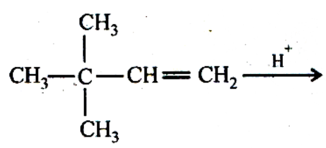
87. Sol. (4)

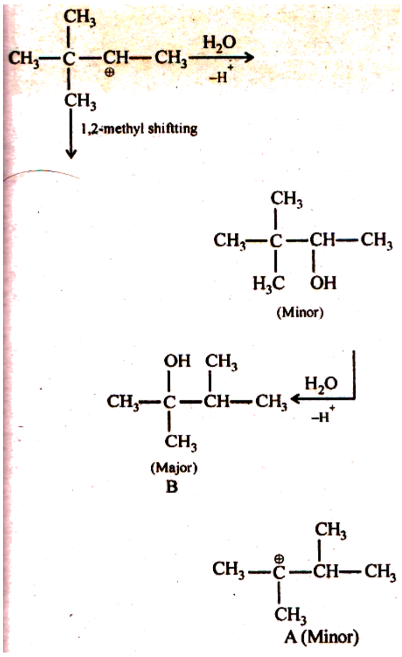
88. Sol. (3)

Both reactions (1) and (2) are examples of decomposition reactions.

Reactions (3) and (4), both are examples of displacement reactions, while reaction (3) is an example of metal displacement reaction.

89. Sol. (1)




CH3
CH3—C—CH—CH3
H2O
–H+
1,2-methyl shifting
CH3—C—CH—CH3
H3C OH
(Minor)
OH CH3
CH3—C—CH—CH3
(Major)
B
A (Minor)

90. **Sol. (1)**