Sri Chaitanya IIT Academy.,India.

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A right Choice for the Real Aspirant

ICON Central Office - Madhapur - Hyderabad

SEC: : Sr.S60_Elite, Target & LIIT-BTs JEE-MAIN(1st Year Syllabus) Date: 20-12-2024

Time: 09.00Am to 12.00Pm GTM-07/02 Max. Marks: 300

KEY SHEET

MATHEMATICS

1	**2**	2	**2**	3	**3**	4	**3**	5	**1**
6	**4**	7	**1**	8	**3**	9	**2**	10	**1**
11	**4**	12	**3**	13	**2**	14	**3**	15	**1**
16	**3**	17	**2**	18	**3**	19	**2**	20	**2**
21	**7**	22	**3**	23	**2**	24	**17**	25	**5**

PHYSICS

26	**2**	27	**3**	28	**4**	29	**2**	30	**1**
31	**2**	32	**1**	33	**3**	34	**2**	35	**2**
36	**4**	37	**1**	38	**2**	39	**1**	40	**3**
41	**1**	42	**1**	43	**3**	44	**1**	45	**1**
46	**2**	47	**2**	48	**33**	49	**10**	50	**89**

CHEMISTRY

51	**2**	52	**3**	53	**3**	54	**2**	55	**2**
56	**3**	57	**4**	58	**3**	59	**3**	60	**4**
61	**3**	62	**4**	63	**1**	64	**4**	65	**2**
66	**4**	67	**2**	68	**3**	69	**3**	70	**3**
71	**9**	72	**8**	73	**1**	74	**190**	75	**30**

SOLUTION
MATHEMATICS

1. $y = f\left(e^x\right) + f\left(\ln|x|\right)$

   domain $f(x) = (0, 1) \quad \Rightarrow 0 < e^x < 1 \Rightarrow \; x < 0 \quad ....(1)$

   and $\; 0 < \ln|x| < 1 \Rightarrow 1 < |x| < e \Rightarrow x \in (-e, -1) \cup (1, e) \,.........(2)$

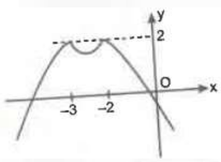
   Taking intersection $x \in (-e, -1)$

2. $\lim\limits_{x\to\infty} \frac{3}{x}\left(\frac{x}{4} - \left\{\frac{x}{4}\right\}\right) = \frac{3}{4} - 0 = \frac{3}{4} \qquad \Rightarrow p + q = 7$

3. $c > \sqrt{26}$

4. $f(x) = \lim\limits_{n\to\infty}\left(\cos\frac{x}{2}.\,\cos\frac{x}{2^2}.\,\cos\frac{x}{2^3}.....\cos\frac{x}{2^n}\right) = \lim\limits_{n\to\infty}\frac{\sin x}{\frac{1}{2^n}\sin\left(\frac{x}{2^n}\right)} = \frac{\sin x}{x}$

5.



$b^2 + 1 \geq 2$

$|A| = 3$

$|\operatorname{adj}(-4\operatorname{adj}(-3\operatorname{adj}(3\operatorname{adj}((2A)^{-1}))))|$

$|-4\operatorname{adj}\big(-3\operatorname{adj}(3\operatorname{adj}(2A)^{-1})|^2$

$4^6|\operatorname{adj}(-3\operatorname{adj}(3\operatorname{adj}(2A)^{-1}))|^2$

$2^{12}\cdot 3^{12}|3\operatorname{adj}(2A)^{-1}|^8$

$2^{12}\cdot 3^{12}\cdot 3^{24}|\operatorname{adj}(2A)^{-1}|^8$

$2^{12}\cdot 3^{36}|(2A)^{-1}|^{16}$

$2^{12}\cdot 3^{36}\frac{1}{|2A|^{16}}$

$2^{12}\cdot 3^{36}\frac{1}{2^{48}|A|^{16}}$

$2^{12}\cdot 3^{36}\frac{1}{2^{48}.3^{16}}$

$\frac{3^{20}}{2^{36}} = 2^{-36}\cdot 3^{20}$

$m = -36 \quad n = 20$

6. $m + 2n = 4$

7. A.M = G.M only when $p = q = r$

8. $D = \begin{vmatrix} 1 & 2 & 1 \\ 1 & 3 & 4 \\ 1 & 5 & 10 \end{vmatrix} = 0 \qquad D_1 = \begin{vmatrix} 1 & 2 & 1 \\ K & 3 & 4 \\ K^2 & 5 & 10 \end{vmatrix} = 5\left(K^2 - 3K + 2\right) = 5(K-1)(K-2)$

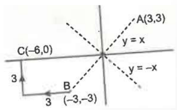
   $D_2 = \begin{vmatrix} 1 & 1 & 1 \\ 1 & K & 4 \\ 1 & K^2 & 10 \end{vmatrix} = -3\left(K^2 - 3K + 2\right) = -3(K-2)(K-1)$

$$D_3 = \begin{vmatrix} 1 & 2 & 1 \\ 1 & 3 & K \\ 1 & 5 & K^2 \end{vmatrix} = K^2 - 3K + 2 = (K-2)(K-1)$$

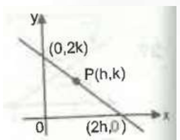
9. $\left|A^{-}\right| = \frac{1}{|A|} = \frac{1}{5}$ $\quad\left|(AB)^T\right| = |AB| = \left|A.(\text{adj }A)\right| = |A|.|\text{adj.}(A)| = 5\times 5^2 = 5^3$

$\therefore \left|\left|A^{-1}\right|(AB)^T\right| = \left|\frac{1}{5}(AB)^T\right| = \frac{1}{5^3}|AB| = 1$

10.



11. Equation of line is $\frac{x}{2h} + \frac{y}{2k} = 1$



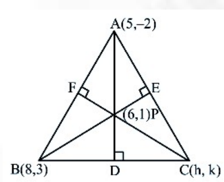
If it passes through fixed point (x_1, y_1) $\quad \frac{x_1}{2h} + \frac{y_1}{2k} = 1$

12. $\operatorname{cosec}\theta + \operatorname{cosec}(60^0 - \theta) - \operatorname{cosec}(60^0 + \theta)$ where $\theta = 10^0$

13. $x^3 + bx^2 + cx + 1 = 0$ $\quad f(-1) = b - c < 0$ $\quad f(0) = 1 > 0$ $\quad B \in (0,1)$

$y = -2\tan^{-1}(\operatorname{cosec}B) - \tan^{-1}\left(\frac{2\sin B}{\cos^2 B}\right) = -\left(\pi + \tan^{-1}\frac{2\cos B}{1-\operatorname{cosec}^2 B}\right) - \tan^{-1}\frac{2\sin B}{\cos^2 B} = -\pi$

14.



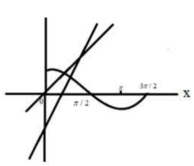
Slope of AD =3, Slope of BC $=-\frac{1}{3}$, Equation of BC =3y+x-17=0

Slope of BE =1, Slope of AC =-1, Equation of AC is x+y-3=0 , point C is (-4, 7)

15. (A) $\lim\limits_{x\to\infty}\left(\frac{x^2+2x-1}{2x^2-3x-2}\right)^{\frac{2x+1}{2x-1}} = \frac{1}{2}$

(B) $\lim\limits_{x\to 0}\frac{\log_{\sec x/2}\cos x}{\log_{\sec x}\cos\frac{x}{2}} = \lim\limits_{x\to 0}\left(\log_{\sec\frac{x}{2}}\cos x\right)^2 = \lim\limits_{x\to 0}\left(\frac{In\cos x}{In\sec x/2}\right)^2 = 2$

(C)



(D) $\sin x \neq \frac{1}{3}, \frac{2}{3}, \frac{3}{3}$

16. Let the point $P\left(x_p, y_p, z_p\right)$ be the required point,

the distance of the point from x-axis is $\sqrt{y_p^2+z_p^2}$, The distance from the point (1, -1, 2) is

$\Rightarrow y_p^2+z_p^2=\left(x_p-1\right)^2+\left(y_p+1\right)^2+\left(z_p-2\right)^2 \Rightarrow x_p^2-2x_p+2y_p-4z_p+6=0$

Therefore, the locus of point P is $x^2-2x+2y-4z+6=0$

17. $g(x)=\dfrac{1}{f(|x|)}$ $g(x)\Rightarrow$ even functions $\Rightarrow$ symmetric about y-axis

$\Rightarrow x\to\infty \;\; f(x)\to 0$ at $x=x_1$ $f(x)=0\Rightarrow g(x_1)\to\infty$

18. $a=\dfrac{3}{1+2\log_3 2}\Rightarrow \log_3 2=\dfrac{3-a}{2a};\ \log_6 16=\dfrac{4\log_3 2}{1+\log_3 2}$

19. Minimum value $\dfrac{-D}{4}=-5\Rightarrow D=20$ $|\alpha-\beta|=\dfrac{\sqrt{D}}{1}=\sqrt{20}$

20. Equation of line is $y-2=m(x-8)$, $OA=8+\dfrac{2}{(-m)}$ and $OB=8(-m)+2$

$OA+OB=10+8(-m)+\dfrac{2}{(-m)}\geq 18\,(AM\geq GM)$

21. $y=\dfrac{x-\dfrac{1}{x}}{x^3-\dfrac{1}{x^3}+2}$ Let $t=x-\dfrac{1}{x}>0$ for $x>1$, $y=\dfrac{t}{t\left(t^2+3\right)+2}$ $x^3-\dfrac{1}{x^3}=t\left(t^2+3\right)$

$=\dfrac{1}{t^2+\dfrac{2}{t}+3}\left(\begin{array}{l} t^2+\dfrac{2}{t}=t^2+\dfrac{1}{t}+\dfrac{1}{t}\geq 3 \\ \therefore t^2+\dfrac{2}{t}+3\geq 6(AM\geq GM)\end{array}\right.$, $y_{max}=\dfrac{1}{\left(t^2+\dfrac{2}{t}+3\right)_{min}}=\dfrac{1}{6}$ $p=1, q=6$

22. $\displaystyle\sum_{r=1}^{n}\frac{\sin\left(2^r-2^{r-1}\right)}{\cos 2^r\cos 2^{r-1}}=\sum_{r=1}^{n}\left(\tan 2^r-\tan 2^{r-1}\right)=\tan 2^n-\tan 1$

23. Let $l=m=n=\dfrac{1}{\sqrt{2}}$

24. F(x) = f(x) $x>1$
$=\dfrac{f(x)+g(x)}{2}$ $x=1$
$=f(x)$ $-1<x<1$
$=\dfrac{f(x)+g(x)}{2}$ $x=-1$
$=g(x)$ $x<-1$

If f(x) is continuous at x = 1 $F\left(1^+\right)=F(1)=F\left(1^-\right)$ $b=a+3$

$F\left(-1^-\right)=F(-1)=F\left(-1^+\right)$ $a+b=5$

25. First element of matrix $A_{10}=286$ (10^{th} of sequence 1, 2, 6, 15, …….)

Trace of $A_{10}=286+297+308+319+\ldots\ldots+385=3055$

PHYSICS

26. Force of interaction between two atoms,

$$F = \alpha\beta e^{\left(\frac{-x^2}{\alpha kT}\right)}$$

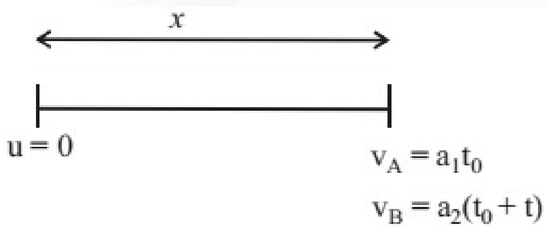
Since exponential terms are dimensionless $\therefore \alpha\beta e^{\left(\frac{-x^2}{\alpha kT}\right)}$

$[F] = [\alpha][\beta]$

$MLT^{-2} = M^{-1}T^{2}[\beta] \quad \Rightarrow [\beta] = M^{2}LT^{-4}$

27. Let time taken by A to reach finishing point is t_0

$\therefore$ Time taken by B to reach finishing point $= t_0 + t$



$\Rightarrow \sqrt{a_1 t_0} = \sqrt{a_2}(t_0 + t) \quad \Rightarrow \left(\sqrt{a_1} - \sqrt{a_2}\right)t_0 = \sqrt{a_2}t \quad \Rightarrow t_0 = \dfrac{\sqrt{a_2}t}{\sqrt{a_1} - \sqrt{a_2}}$

$= \left(\sqrt{a_1} + \sqrt{a_2}\right)\sqrt{a_2}t - a_2t = \sqrt{a_1a_2}t + a_2t - a_2t$

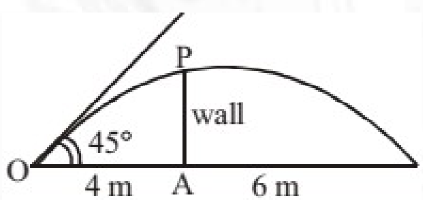
28. Let '*S*' be the distance between two ends '*a*' be the constant acceleration

As we know $v^2 - u^2 = 2aS$

Let *v* be velocity at mid point.

therefore, $v_c^2 - u^2 = 2a\dfrac{S}{2} \quad v_c^2 = u^2 + \dfrac{v^2 - u^2}{2} \quad v_c = \sqrt{\dfrac{u^2 + v^2}{2}}$

29.



As ball is projected at an angle 45^0 to the horizontal therefore Range = 4H

or $10 = 4H \Rightarrow H = \dfrac{10}{4} = 2.5$ m

Height of wall PA $= OA \tan\theta - \dfrac{1}{2}\dfrac{g(OA)^2}{u^2\cos^2\theta} = 4 - \dfrac{1}{2} \times \dfrac{10 \times 16}{10 \times 10 \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}} = 2.4$ m

30. Volume of removed sphere

$$V_{remo} = \frac{4}{3}\pi\left(\frac{R}{2}\right)^3 = \frac{4}{3}\pi R^3\left(\frac{1}{8}\right)$$

Volume of the sphere (remaining)

$$V_{remain} = \frac{4}{3}\pi R^3 - \frac{4}{3}\pi R^3\left(\frac{1}{8}\right) = \frac{4}{3}\pi R^3\left(\frac{7}{8}\right)$$

Therefore mass of sphere carved and remaining sphere

Are at respectively $\frac{1}{8}M$ and $\frac{7}{8}M$

Therefore, gravitational force between these two sphere $\simeq \frac{41}{3600}\frac{GM^2}{R^2}$

31. Gravitational field, $E = -\frac{GM}{r^2}$

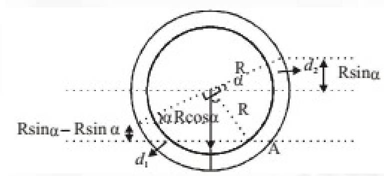
Flux, $\phi = \int \vec{E}_g . \vec{d}S = |E.\, 4\pi r^2| = -4\pi GM$

Where, M = mass enclosed in the closed surface

This relationship is valid when $\left|\vec{E}_g\right| - \propto \frac{1}{r^2}$

32. From the graph, it is clear that for the same value of load, elongation is maximum for wire *OA*. Hence *OA* is the thinnest wire among the four wires.

33. Pressure at interface A must be same from both the sides to be in equilibrium



$$\therefore \left(R\cos\alpha + R\sin\alpha\right)d_2 g = \left(R\cos\alpha - R\sin\alpha\right)d_1 g$$

$$\Rightarrow \frac{d_1}{d_2} = \frac{\cos\alpha + \sin\alpha}{\cos\alpha - \sin\alpha} = \frac{1+\tan\alpha}{1-\tan\alpha}$$

34. From Stoke's law, force of viscosity acting on a spherical body is

$F = 6\pi\eta rv$

hence *F* is directly proportional to radius & velocity.

35. Surface tension of a liquid decreases with the rise in temperature. At the boiling point of liquid, surface tension is zero. Capillary rise $h = \frac{2T\cos\theta}{rdg}$

As surface tension T decreases with rise in temperature

hence capillary rise also decreases

36. I) Adiabatic process : No exchange of heat takes place with surroundings. $\Rightarrow \Delta Q = 0$

II) Isothermal process : Temperature remains constant

$$\therefore \Delta T = 0 \Rightarrow \Delta U = \frac{f}{2} n\, R\Delta T \Rightarrow \Delta U = 0$$

No change in internal energy [D$U = 0$].

III) Isochoric process volume remains constant

$$\Delta V = 0 \Rightarrow W = \int P.\, dV = 0$$

Hence work done is zero.

IV) In isobaric process pressure remains constant

$\Delta U = \frac{f}{2} nR\Delta T = \frac{f}{2}[P\Delta V] \neq 0 \quad \therefore \Delta Q = nC_p\Delta T \neq 0$

37. As we know,
$\Delta Q = \Delta u + \Delta w$ (I^{st} law of thermodynamics) $\Rightarrow \Delta Q = \Delta u + P\Delta v$
or $150 = \Delta u + 100(1-2) = \Delta u = 100 \quad \therefore \Delta u = 150 + 100 = 250J$

38. We have given, $P = P_0\left[1 + \frac{1}{2}\left(\frac{V_0}{V}\right)^2\right]$

When $V_1 = V_0 \quad \Rightarrow P_1 = P_0\left[1 - \frac{1}{2}\right] = \frac{P_0}{2}$

When $V_2 = 2V_0$

$$\Delta T = \left|\left(\frac{1}{nR}\right)(P_1V_1 - P_2V_2)\right| = \left(\frac{1}{nR}\right)\left|\left(\frac{P_0V_0}{2} - \frac{7P_0V_0}{4}\right)\right| = \frac{5P_0V_0}{4nR} = \frac{5P_0V_0}{4R} \quad (\because n = 1)$$

39. $N = \int \rho(dv) = \int_0^r n_0 e^{-\alpha r^4} \times 4\pi r^2 dr = 4p\, n_0 \int_0^r r^2\left(e^{-\alpha r^4}\right) dr \quad \propto n_0 a^{-3/4}$

40. As, work done is zero.
So, loss in kinetic energy = heat gain by the gas

$\frac{1}{2}mv^2 = nC_v\Delta T = n\frac{R}{\gamma - 1}\Delta T \quad \frac{1}{2}mv^2 = \frac{m}{M}\frac{R}{\gamma - 1}\Delta T \quad \therefore \Delta T = \frac{Mv^2(\gamma - 1)}{2R}K$

41. According to question VT = K

We also know that PV = nRT $\Rightarrow T = \left(\frac{PV}{nR}\right)$

$\Rightarrow V\left(\frac{PV}{nR}\right) = k \Rightarrow PV^2 = K$

$C = \frac{R}{1-2} + \frac{3R}{2} = \frac{R}{2} \quad \therefore \Delta Q = nC\,\Delta T \quad = \frac{R}{2} \times \Delta T$ [here, n = 1 mole]

42. Velocity of the tennis ball on the surface the earth or ground

$v = \sqrt{\frac{2gh}{1 + \frac{k^2}{R^2}}}$ (where k = radius of gyration of spherical shell $= \sqrt{\frac{2}{3}}R$

Horizontal range AB $= \frac{v^2 \sin 2\theta}{g} \quad \frac{\left(\sqrt{\frac{2gh}{1 + k^2/R^2}}\right)^2 \sin(2 \times 30^0)}{g} = 1.87$ m

43. Both fall with equal acceleration g, have equal displacements in time t; therefore Extension = 0.

44. Conceptual

45. $K.E_1 = \frac{1}{2v}m_1v_1^2; \; E.K_2 = \frac{1}{2}m_2v_2^2$

$$\frac{K.E_1}{K.E_2}=\frac{\frac{1}{2}\left(\frac{m_1-m_2}{m_1+m_2}\right)u_1^2}{\frac{1}{2}m_2\left(\frac{2m_1}{m_1+m_2}\right)^2u_1^2}=\frac{(m_1-m_2)^2}{4m_1m_2}$$

For perfectly elastic collision, $e=1$

46. Total energy, $E=\frac{1}{2}m\omega^2a^2$;

$$K.E.=\frac{3E}{4}=\frac{1}{2}m\omega^2\left(a^2-y^2\right).$$

So, $\frac{3}{4}=\frac{a^2-y^2}{a^2}$ or $y^2=\frac{a^2}{4}$ or $y=\frac{a}{2}$

47. Centre of mass of the rod is given by :

$$x_{cm}=\frac{\int_0^L\left(ax+\frac{bx^2}{L}\right)dx}{\int_0^L\left(a+\frac{bx}{L}\right)dx}=\frac{\frac{aL^2}{2}+\frac{bL^2}{3}}{aL+\frac{bL}{2}}=\frac{L\left(\frac{a}{2}+\frac{b}{3}\right)}{a+\frac{b}{2}}$$

Now $\frac{7L}{12}=\frac{\frac{a}{2}+\frac{b}{3}}{a+\frac{b}{2}}$, On solving we get, $b=2a$

48. The thermal resistance is given by

$$\frac{x}{KA}+\frac{4x}{2KA}=\frac{x}{KA}+\frac{2x}{KA}=\frac{3x}{KA}$$

$$\therefore\frac{dQ}{dt}=\frac{\Delta T}{\frac{3x}{KA}}=\frac{(T_2-T_1)KA}{3x}\qquad=\frac{1}{3}\left\{\frac{A(T_2-T_1)K}{x}\right\}\qquad\therefore f=\frac{1}{3}$$

49. Since $\mu mg\cos\theta>mg\sin\theta$

So block is in rest.

Force of friction is $f=mg\sin\theta$

$$=2\times10\times\sin30=10\,N$$

50. Fractional decrease in kinetic energy of mass 'm'

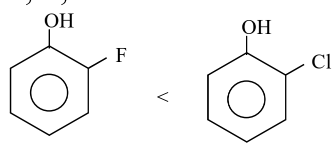
$$=1-\left(\frac{m_2-m_1}{m_2+m_1}\right)^2=1-\left(\frac{2-1}{2+1}\right)^2=1-\left(\frac{1}{3}\right)^2=1-\frac{1}{9}=\frac{8}{9}$$

Percentage loss in energy $=\frac{8}{9}\times100\simeq89\%$

CHEMISTRY

51. (Reference NCERT Page No. 216, 217

52. 1, 2, 4 are correct



$K_a = 15\times10^{-10}$ $\quad K_a = 77\times10^{-10}$, Phenols are more acidic than alcohol

Carboxylic acids are more acidic than alcohols and phenols

53. $\lambda = \dfrac{h}{\sqrt{2meV}}, \lambda_1 = \dfrac{h}{\sqrt{2me(100)}} = \dfrac{h}{10\sqrt{2me}} = \dfrac{k}{10}, k = \dfrac{h}{\sqrt{2me}}$

$\lambda_2 = \dfrac{h}{\sqrt{2me(81)}} = \dfrac{k}{9}, \lambda_3 = \dfrac{h}{\sqrt{2me(49)}} = \dfrac{k}{7} \qquad \dfrac{\lambda_3 - \lambda_2}{\lambda_1} = \dfrac{\dfrac{k}{7} - \dfrac{k}{9}}{\dfrac{k}{10}} = \dfrac{\left(\dfrac{2k}{63}\right)}{\left(\dfrac{k}{10}\right)} = \dfrac{20}{63}$

54. I is exothermic, II is endothermic

55. Solubility of AgCl in water: $\quad AgCl = Ag^+ + Cl^-$

$K_{sp} = \left[Ag^+\right]\left[Cl^-\right] = (S_1)(S_1) = S_1^2 \quad \therefore\ S_1 = \sqrt{K_{sp}} = 1.34\times10^{-5}$ mole/litre

Solubility of AgCl in 0.01 M $CaCl_2$

$\left[Ag^+\right] = S_2; \left[Cl^-\right] = (2\times0.0+S_2) \qquad K_{sp} = \left[Ag^+\right]\left[Cl^-\right] \qquad \therefore S_2 = 9\times10^{-9}$ mole/litre

Solubility of AgCl in 0.01 M NaCl

$\left[Ag^+\right] = S_3; \left[Cl^-\right] = (0.01+S_3) \qquad \therefore 1.8\times10^{-10} = S_3(0.01+S_3) \qquad \therefore S_3 = 1.8\times10^{-8}$ mole/litre

Solubility of AgCl in 0.05 M $AgNO_3$

$\left[Ag^+\right] = (0.05+S_4); \left[Cl^-\right] = S_4 \qquad \therefore S_4 = 3.6\times10^{-9}$ mole/litre

From the values of solubility we get $S_1 > S_3 > S_2 > S_4$

56. 1) $\overset{+2}{C}O \rightarrow \overset{+4}{C}O_2$ 2) $\overset{+2}{Cu}O \rightarrow \overset{+2}{Cu}Cl_2$ 3) $\overset{+1}{H_2}O \rightarrow \overset{0}{H_2}$ 4) $\overset{0}{C} \rightarrow \overset{+4}{C}O_2$, Only in (3), O.N. of hydrogen decreases from + 1 to 0 and hence H_2O gets reduced to H_2

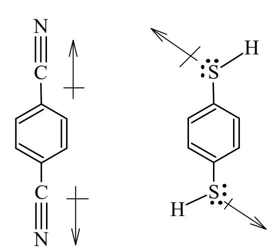
57. $BaCl_2.xH_2O \rightarrow BaCl_2 + x\,H_2O, (137+2\times35.5+18x) = (208+18x)g/mole$

$\dfrac{208+18x}{208} = \dfrac{61}{52}$ $, 10816+936x = 12688,\ 936x = 1872,\ x = 2,$ Formula is $BaCl_2.2H_2O$

58. In (I)– solid formed. In others more number of moles of gases are formed, $\Delta S = +ve$.

59. SO_3 & CO_3^{-2} central atoms are undergoes sp^2Hyb. With zero L.P .Hence trigonal planar shape

60.



$\mu = 0 \qquad \mu \neq 0$

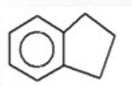
61. Reference NCERT. XI Page No.391
62. Reference NCERT. XI Page No.399
63. Reference NCERT. XI Page No.394, 395
64. Reference NCERT. XI Page No.379, 382, 383
65. Both give hydroxides which are Amphoteric oxides
66 . Inert pair effect
67. B > Tl > Ga > Al > In

801 589 579 577 558 (K J /mol)

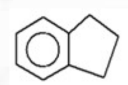
68. S – I is true & S – II is false
69. $AlCl_3 < MgCl_2 < NaCl$ [*melting point*]

$IE_3 C > Ge > Si > Pb > Sn$, $B > Al > Tl > In > Ga$

70. $(X)PhCH_2CH = CH_2$ and $(Y)PhCH_2CH_2CH_2OH$

(Z) 

$$C_6H_6 + CH_2 = CHCH_2Cl \xrightarrow{AlCl_3} \underset{(X)}{PhCH_2CH = CH_2}$$

$$\xrightarrow[(II)H_2O_2, OH^-]{(I)BH_3/THF} \underset{(Y)}{PhCH_2CH_2CH_2OH} \xrightarrow[\Delta]{H^+}$$ 

71 . With principal 'n' the total number of electrons can present is given as "$2n^2$"

$\therefore$ If $n = 3$ total electrons can be $2.3^2 = 18$.

Out of them half can have $m_s = -\frac{1}{2}$

72. Sol $\underset{(g)}{AB} \rightleftharpoons \underset{(g)}{A} + \underset{(g)}{B}$

to :	1	0	0
t_{eq}:	1-1/3	1/3	1/3
i.e.	2/3	1/3	1/3

$\therefore$ mole ratio of mixture = 2 : 1 : 1 $\quad \therefore K_p = \frac{P_A P_B}{P_{AB}} = \frac{P}{8} \therefore \frac{P}{K_P} = 8$

73. $M_2O_7^{2-} + X^{n+} \to X^{5+}O_3^- + M^{3+} \quad 6X10^{-3}X6 = (5-n)X9X10^{-3} \Rightarrow n = 1$

74. 190 kJ/mol

$\frac{1}{2}N_2 + \frac{3}{2}H_2 \to NH_3$, $Let\ B.EN \equiv N\ is\ x - 46 = \frac{x}{2} + \frac{3}{2} \times 436 - 3 \times 393$, $x = 958, N_2H_4 \to N_2 + 2H_2$

$\Delta H = \left[\Delta H_{vap}(N_2H_4) + 4 \times B.E(N-H) + B.E(N-N)\right] - B.E\ of\ N \equiv N + 2B.E(H_{B.E})$

75. $M \longrightarrow M^+ + e^-$ Number of moles $\frac{5}{25} = 0.2$

Energy required to form M^+ ions $= 0.2 \times 800 = 160$ KJ mol^{-1}

Remaining energy = 90 KJ, This is used to convert M^+ to M^{+2}

Number of moles of M^{+2} formed $= \frac{90}{1500} = 0.06 \quad \%M^{+2} = \frac{0.06}{0.2} \times 100 = 30\%$