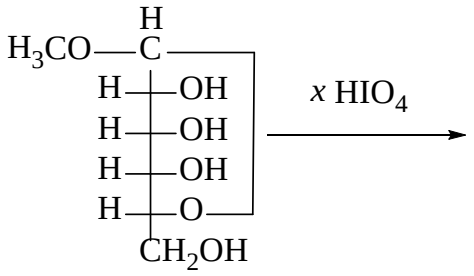
75. What is the maximum value of *x* ?



1) 1 2) 2 3) 3 4) 4

76. Sec. butyl chloride will undergo alkaline hydrolysis in the polar solvent by

1) S_N^2 2) S_N^1

3) S_N^1 and S_N^2 4) None of these

77. A solution of sodium sulphate in water is electrolysed using inert electrodes. The products at cathode and anode are, respectively,

1) H_2, O_2 2) O_2, H_2 3) O_2, Na 4) O_2, SO_2

78. Which of the following compounds yields only one product on monobromination?

1) Neopentane 2) Toluene

3) Phenol 4) Aniline

79. Which of the following reactions does not occur in Bessemer convertor in the extraction of copper from chalcopyrites?

1) $2CuFeS_2 + O_2 \longrightarrow Cu_2S + 2FeS + SO_2$

2) $FeO + SiO_2 \longrightarrow FeSiO_3$

3) $2FeS + 3O_2 \longrightarrow 2FeO + 2SO_2$

4) $Cu_2S + 2Cu_2O \longrightarrow 6Cu + SO_2$

80. 2 moles of iso-pentylene on reaction with A gives compound B, which on treatment with 1-phenyl-2-butyne followed by H_2O_2 oxidation results in C. A is in-turn generated by treating BCl_3 with $LiAlH_4$. Compound C gives

1) Tollen's reagent 2) Iodoform test

3) Fehling's test 4) 1 & 3

81. How many enantiomers pairs are produced by the monochlorination of 2-methylbutane?

1) 1 2) 2 3) 4 4) 6

82. The correct order among the following is

1) $ClO_4^- > BrO_4^- > IO_4^- \left(basicity\right)$

2) $ClO^- > ClO_2^- > ClO_3^- > ClO_4^- \left(\text{delocalization of negative charge}\right)$

3) $ClO^- > ClO_2^- > ClO^-_3 > ClO_4^-$ (charge density)

4) $NH_3 > PH_3 > AsH_3$ (delocalization of lone pair electron)

83. The number of isomers possible for C_4H_8 are

1) 4 2) 3 3) 5 4) 6

84. High concentration of fluoride is poisonous and harmful to bones and teeth at levels over

1) 1 ppm 2) 3 ppm 3) 5 ppm 4) 10 ppm

85. Mole fraction of a non electrolyte in aqueous solution is 0.07. If K_f is 1.86° mol^{-1} kg, depression in f.p, ΔT_f is,

1) 0.26° 2) 1.86° 3) 0.13° 4) 7.78°

86. Which of the following statements is incorrect?

1) The order of splitting energy is $PtCl_4^{2-} > PdCl_4^{2-} > NiCl_4^{2-}$

2) $[Co(NH_3)_6]^{3+}$ is colourless whereas $[Ni(H_2O)_6]^{2+}$ is coloured.

3) $[M(en)(gly)]^{n+}$ will exhibit geometrical isomerism.

4) The magnetic moment of $K_3[Fe(CN)_6]$ is $\sqrt{3}$ B.M.

87. The volume occupied by 2 mol of N_2 at 200K and 10.1325 MPa pressure is (Given that $\frac{P_C V_C}{RT_C} = \frac{3}{8}$ *and* $\frac{P_r V_r}{T_r} = 2.21$), where P_r, V_r & T_r are reduced pressure , reduced volume & reduced temperature.

1) $20.7\ cm^3$ 2) $544\ cm^3$

3) $272.0\ cm^3$ 4) $136\ cm^3$

88. Choose the correct code to identify (X), (Y) and 'Z' in each case for the changes indicated.

(i) $CrO_2Cl_2 \xrightarrow{KOH} (X) \xrightarrow{\text{Conc. } H_2SO_4} (Y) \xrightarrow{AgNO_3} (Z)$

(ii) $CrCl_3(aq) \xrightarrow[NaOH]{\text{excess}} (X) \xrightarrow[H_2O,\ \text{boil}]{Na_2O_2} (Y) \xrightarrow[\text{acetate}]{\text{lead}} (Z)$

(iii) $ZnSO_4(aq) \xrightarrow{Na_2CO_3} (X) \xrightarrow{\Delta} (Y) \xrightarrow[\text{nitrate},\Delta]{\text{cobalt}} (Z)$

(iv) $CuCl_2(aq) \xrightarrow[H_2S]{NH_4OH} (X) \xrightarrow[\Delta]{HNO_3} (Y) \xrightarrow[\text{excess}]{KCN} (Z)$

1) $X = K_2CrO_4; Y = K_2Cr_2O_7; Z = Ag_2CrO_4$

2) $X = Cr(OH)_3; Y = Na_2CrO_4; Z = PbCrO_4$

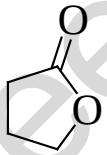
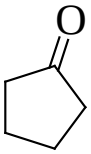
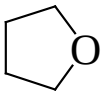
3) $X = ZnCO_3; Y = ZnO; Z = CoZnO_2$

4) $X = CuS; Y = Cu(NO_3)_2; Z = K_3[Cu(CN)_4]$

89. The pH of a buffer solution changes from 6.20 to 6.17 when 0.003 mole of acid is added to 500 mL of the buffer. The buffer capacity of the system is, therefore,

1) 0.1 2) 0.3 3) 0.2 4) 0.4

90. $HOCH_2CH_2CH_2COOH$ on reaction with H^+ forms

1)  2)  3)  4) 

KEY SHEET

PHYSICS

1	**1**	2	**2**	3	**2**	4	**1**	5	**1**
6	**4**	7	**4**	8	**2**	9	**4**	10	**2**
11	**2**	12	**4**	13	**4**	14	**2**	15	**3**
16	**3**	17	**1**	18	**2**	19	**1**	20	**2**
21	**2**	22	**4**	23	**1**	24	**1**	25	**2**
26	**4**	27	**1**	28	**1**	29	**2**	30	**2**

MATHEMATICS

31	**2**	32	**3**	33	**4**	34	**1**	35	**3**
36	**1**	37	**2**	38	**4**	39	**1**	40	**2**
41	**3**	42	**1**	43	**2**	44	**3**	45	**4**
46	**2**	47	**3**	48	**2**	49	**1**	50	**4**
51	**1**	52	**2**	53	**3**	54	**4**	55	**4**
56	**2**	57	**1**	58	**3**	59	**2**	60	**4**

CHEMISTRY

61	**2**	62	**4**	63	**2**	64	**3**	65	**4**
66	**2**	67	**1**	68	**3**	69	**1**	70	**2**
71	**2**	72	**1**	73	**3**	74	**3**	75	**2**
76	**2**	77	**1**	78	**1**	79	**1**	80	**2**
81	**2**	82	**3**	83	**4**	84	**4**	85	**4**
86	**3**	87	**3**	88	**4**	89	**3**	90	**1**

JEE MAIN MODEL GRAND TEST

SOLUTIONS

PHYSICS

1. $Mg\frac{1}{\sqrt{2}}=\frac{1}{2}Iw^2=\frac{1}{2}\left(\frac{2}{3}\right)Ma^2\omega^2$

   Which gives $\omega=\left[\frac{3g}{\sqrt{2}a}\right]^{1/2}=\left[\frac{3g}{a\sqrt{2}}\right]^{1/2}$

2. For I mode

   $\frac{L}{6}=\frac{\lambda_1}{4}$

   $L=\frac{3\lambda_1}{2}$

   For II mode

   $\frac{L}{6}=\frac{3}{4}\lambda_2$

   $L=\frac{9}{2}\lambda_2$

   $v=f_1\lambda_1=f_2\lambda_2$

   Or $f_2=\frac{f_1\lambda_1}{\lambda_2}=f\times\frac{9}{3}=3f$

   $f_1=\frac{n_1v}{2L}=\frac{3V}{2L}$

   $f_2=\frac{n_2v}{2L}=\frac{9V}{2L}$

   $\frac{f_2}{f_1}=3.\ f_2=300Hz$

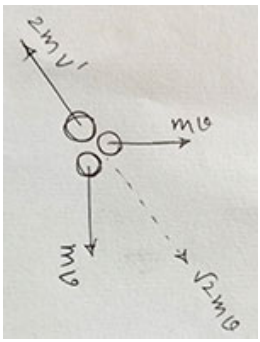
3. $\frac{1}{2}Kx^2=mg\left(R+R\cos 45^0\right)$

   $=mgR\left(1+\frac{1}{\sqrt{2}}\right)$

   But $x=\frac{\pi R}{2}-\frac{\pi R}{4}=\frac{\pi R}{4}$

So, $K = \dfrac{16\sqrt{2mg}\left(1+\sqrt{2}\right)}{\pi^2 R}$

4. In figure p_2 should be $mV\sqrt{2}$ in opposite direction to $\vec{P}_R$ for conservation of linear momentum



So, $(2m)V' = mV\sqrt{2}$

$V' = \dfrac{V}{\sqrt{2}}$

Total energy released $= 2\dfrac{1}{2}mV^2 + \dfrac{1}{2}(2m)V'^2$

$= \dfrac{3}{2}mV^2$

5. For AG, $h = \dfrac{1}{2}gt_1^2$

$t_1^2 = \dfrac{2h}{g}$

For AB,

$\dfrac{h}{n} = \dfrac{1}{2}gt_2^2$

$t_2^2 = \dfrac{2h}{ng}$

$(t_1 - t_2) = \left(\dfrac{2h}{g}\right)^{1/2} - \left(\dfrac{2h}{ng}\right)^{1/2}$

$= \left(\dfrac{2h}{g}\right)^{1/2}\left(n^{1/2}-1\right) = t_2\left(n^{1/2}-1\right)$

If $t_2 = t_{AB}, (t_1 - t_2) = t_{BG} = t_{AB}\left(n^{1/2}-1\right)$

or $\frac{t_{AB}}{t_{BG}} = \frac{1}{\left(n^{1/2}-1\right)} = \frac{1}{\left(\sqrt{7}-1\right)}$

So n=7

So, $AB = \frac{h}{g} = \frac{h}{7}$

6. Kinetic energy required to escape $= \frac{GM_e m}{R}$

Energy provided to the particle $= \frac{GM_e m}{2R}$

So, kinetic energy at the surface of the earth

$$\frac{GM_e m}{2R} = \frac{-GM_e m}{\left(R+h\right)} - \left(\frac{-GM_e m}{R}\right)$$

7. $t = \gamma^{\frac{A}{a}} \sqrt{\frac{2}{g}} \left(\sqrt{H_1} - \sqrt{H_2}\right)$

$$= \frac{A}{a}\sqrt{\frac{2}{g}}\frac{\sqrt{m_0}}{\rho A}\left[1-\frac{1}{2}\right]$$

$$= \frac{A}{2a}\sqrt{\frac{2m_o}{\rho A g}}$$

$ma = \rho a v^2$

$a_0 = \frac{a}{A} 2g$

$dv = \frac{2ga}{A} dt$

$v = \frac{2ga}{A} t = \frac{2ga}{A} \times \frac{A}{2a}\sqrt{\frac{2M_0}{\rho A g}}$

$= g\sqrt{\frac{2m_0}{\rho A g}}$

$= \sqrt{\frac{2m_0 g}{\rho A}}$

8. $W = k_f - k_f = \frac{1}{2} m\left(v_f^2 - v_i^2\right)$

$$= \frac{1}{2} m\left[\left(\frac{1}{2} a_2 t_2\right)^2 - \left(\frac{1}{2} a_1 t_1\right)^2\right]$$

$$= \frac{1}{8} m \left[\frac{t_2^4}{t_1 2} a_1^2 - a_1^2 t_1^2 \right] \qquad \left(Since, a_2 = \frac{t_2}{t_1} a_1 \right)$$

$$= \frac{m a_1^2}{8 t_1^2} \left(t_2^4 - t_1^4 \right)$$

$$F + \mu mg = k x_0$$

9. Radius of cylinder =R and outer radius of shell =nR

$$R_{eq} = \frac{R_1 R_2}{R_1 + R_2} = \frac{\frac{1}{K_1 \pi R^2} \times \frac{1}{K_2 \left(n^2 - 1 \right) \pi R^2}}{\frac{1}{K_1 \pi R^2} + \frac{1}{K_2 \left(n^2 - 1 \right) \pi R^2}}$$

On solving $k = \frac{\left[K_1 + K_2 \left(n^2 - 1 \right) \right]}{n^2}$

$$= \frac{4K_1 + 5K_2}{9} \quad \text{(given)}$$

$$= \frac{k_1 + 5k_2 / 4}{9 / 4}$$

n=3/2

10. $R = \frac{2}{3} C_v$

We know, $C_p - C_v = R$

or $\gamma - 1 = \frac{R}{C_v}$

or $R = C_v \left(\gamma - 1 \right)$

Comparing $\gamma = 5/3$

$P^{1-\gamma T^y}$ =constant=K

Or $P = T^{(\gamma / \gamma - 1)}$

Given $\gamma = 5/3$

$\gamma \left(\gamma - 1 \right) = 5/2$

So, $p \alpha T^{5/2}$

11. Molar heat capacity

$$C = \frac{dQ}{ndT} = 3R(given)$$

$$= 2C_0 \quad \left(As \;\; C_v = \frac{3}{2}R \right)$$

$$C = \frac{dQ}{ndT} = \frac{2nC_vT}{ndT} = \frac{2dU}{ndT}$$

So, $dQ = 2dU$

12. If nth minima of 400 nm is coinciding with mth minima of 560nm then

$$(2m-1)\frac{560}{2} = (2n-1)\frac{400}{2}$$

$$\frac{(2n-1)}{(2m-1)} = \frac{7}{5} = \frac{14}{10} = \frac{21}{15} =$$

4th minima of 400 nm will coincide with 3rd minima of 560 nm. Its location is given by

$$= \frac{(2\times 4-1)(1000)\left(400\times 10^{-6}\right)}{2\times 0.4}$$

=14mm

Similarly,11th minima of 400 nm will coincide with 8th minima of 560nm.Its location is given by $= \frac{(2\times 11-1)(1000)\left(400\times 10^{-6}\right)}{2\times 0.1} = 42mm$

Minima distance between two successive region of complete darkness=42-14=28m

13. The total length of concave lens= $\frac{3}{2}f$

If focal length of concave lens is f

Now $\frac{1}{30} = \frac{1}{f} - \frac{2}{f} = \frac{1}{3f}$

Or $f = 10cm$

Focal length of concave lens=10 cm and that of concave lens=15cm

14. $E_p = 0$

or $q_1 + q_2 + q = q$

$q_1 = -q_2$

$V = \frac{q_1}{C} = \frac{2q_1}{2C}$

$= \frac{q_1 - (-q_1)}{2C} = \frac{q_1 - q_2}{2C}$

15. $Q = Q'$

$2CV = (KC + 2C)V'$

$V' = \left(\frac{3}{K+2}\right)V$

16. 13.6eV energy needed to liberate the electron form hydrogen atom.So electron will liberate with kinetic energy=15-13.6=1.4eV

17. $\frac{H_{AB}}{H_{BC}} = \frac{R_{AB}}{R_{BC}}\left(as\ H = I^2Rt\right)$

$= \frac{(1/2r)^2}{(1/r)^2} = \frac{1}{4}\left(as\ R\alpha\frac{1}{4}\alpha\frac{1}{r^2}\right)$

$H_{BC} = 4H_{AB}$

18. Magnetic field in region be upwards as points in this region are to right of the wires and in such condition, If current flows out of page, magnetic field will be upwards. For the same logic, magnetic field in region AX will be downwards. In region AC, points are closer to A than B and they are to the right of A(and to the left of B),magnetic field will be upwards. For the same logic, magnetic field in region BC will be downwards, Hence, option (b) is correct.

19. $E_{\lambda_1} = \frac{hc}{\lambda}$

$= \frac{1240}{550}eV = 2.25eV$

$E_{\lambda_2} = \frac{1240}{450}eV = 2.8eV$

and $E_{\lambda_3} = \frac{1240}{250}eV = 3.5eV$

For metal, r, λ_3 is able to generate photoelectron

For metal q, λ_2, λ_2 are able to generate electrtons.

For metal p, all wavelength are able to generate electrons

Hence photoelectric current will be maximum for P and minimum for r.

20. $i_L = \frac{V}{R}\left(1 - e^{-t/\tau_1}\right)$

$i_C = \frac{V}{R} e^{-t/\tau_2}$

$i_L = i_C \; at \; t = CR \ln(2)$

$1 - e^{-t/\tau_1} = e^{-t/\tau_2}$

At $t = CR\ln(2) = \tau \ln(2) \; for \; CR = \tau$

So that $\frac{t}{\tau} = \ln(2)$

$e^{-t/\tau} = \frac{1}{2}$

$2e^{-t/\tau} = 1$

From eq(1), $e^{-t/\tau_1} + e^{-t/\tau_2} = 1$

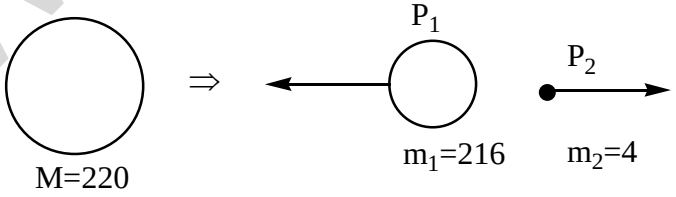
From eq(2) $2e^{-t/\tau} = 1$

On camparing $\tau_1 = \tau_2$

or $\frac{L}{R} = CR$

$R = \sqrt{L/C}$

21.



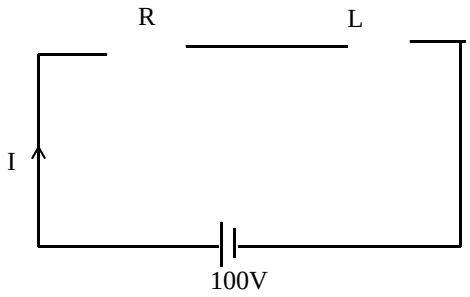
$K_1 + K_2 = 5.5 MeV$ ……(i)

and $P_1 = P_2 = \sqrt{2 \times 216 K_1} = \sqrt{2 \times 4 K_2}$ …….ii)

on solving equation(i)and (ii),we get

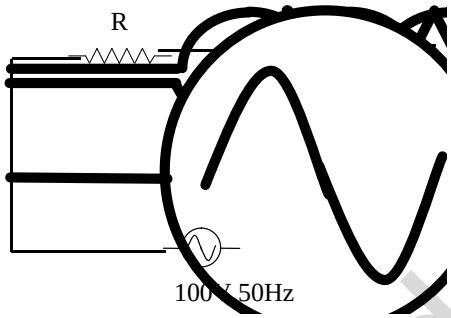
$K_2 = 5.4MeV$

22.



In dc circuit, resistance offered by inductor is zero in steady state

$$i = \frac{V}{R} \Rightarrow 1 = \frac{100}{R} \Rightarrow R = 100\Omega$$



$$i' = \frac{1}{2}A$$

$$i' = \frac{V}{\sqrt{R^2 + X_L^2}} \Rightarrow \frac{1}{2} = \frac{100}{\sqrt{R^2 + X_L^2}}$$

$$R^2 + X_L^2 = (200)^2 \Rightarrow X_L^2 = (200)^2 = (100)^2$$

$$X_L^2 = 300 \times 100$$

$$(2\pi fL)^2 = 300 \times 100$$

$$4\pi^2 \times (50)^2 \times (L)^2 = 300 \times 100$$

$$L^2 = 0.3 \Rightarrow L = \sqrt{0.3}H$$

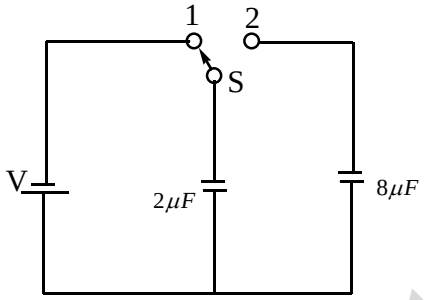
23. $\frac{1}{-50} - \frac{1}{-(25)} = \frac{1}{f}$

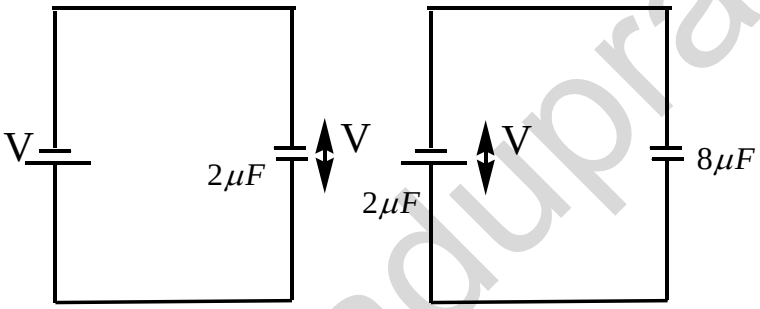
$$\frac{1}{f} = \frac{1}{50} \Rightarrow p = \frac{100}{f\,(cm)} = \frac{100}{50} = 2D$$

$$\frac{1}{-50}=\frac{1}{\infty}=\frac{1}{f}$$

$$f'=-150cm \Rightarrow p=\frac{100}{-150}=-\frac{2}{3}D$$

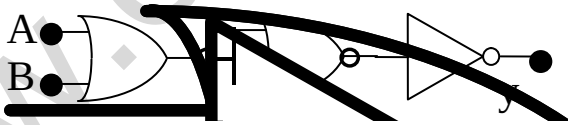
24. A capacitor of $2\mu F$ is changed as shown in the diagram. When the switch S is turned to position 2, the percentage of its stored energy dissipated is:





$$\frac{loss\ of\ energy}{stored\ energy}=\frac{\frac{1}{2}.\frac{2\times 8}{(2+8)}(V-0)^2}{\frac{1}{2}.2.V^2}=0.8\,i.e\,80\%$$

25. The given electrical network is equivalent to:



$$\overline{A}+\overline{B}\rightarrow A+B\rightarrow \overline{A}+\overline{B}$$

26. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angle of dip θ is given by:

$$\tan\theta_1=\frac{\tan\theta}{\cos\alpha},\tan\theta_2=\frac{\tan\theta}{\cos(90-\alpha)}=\frac{\tan\theta}{\sin\alpha}$$

$$\cos^2\alpha+\sin^2\alpha=1$$

$\cot^2\theta_1 + \cot^2\theta_2 = \cot^2\theta$

27. Signal frequency and peak voltage.

28. Applied electric field on the cavity of uncharged electrical conductor.

29. $A \to b \text{ and } c; B \to b \text{ and } c$

$C \to b \text{ and } a, D \to a \text{ and } d$

30. $\Delta Q = \dfrac{\Delta\phi}{R} = \dfrac{\Delta(NBA)}{R}$

$= \dfrac{N\mu_0 nA(i_1 - i_2)}{R}$

$= \dfrac{100 \times 4\pi \times 10^{-7} \times 2 \times 10^4 \times \pi(0.05)^2 \times (4-0)}{10\pi^2}$

$= 32 \times 10^{-6} C = 32\mu C$

MATHEMATICS

31. $f(x) = (x+1)^2 + 4x^2$

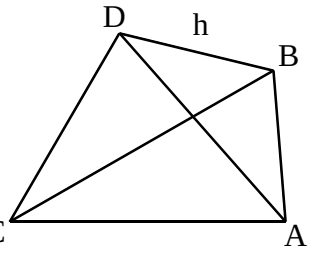
32. Multiplying both, get answer $x + y = \pi - 2\theta$

33. $aRb \Rightarrow bRa$ *fails*

$aRb, bRc \Rightarrow aRc$ *fails*

34. Cosine rule ,k=4

35. $AC = \dfrac{h}{\sqrt{3}}, BC = \sqrt{3}h$



$BC^2 - AC^2 = AB^2$

36. $\Delta > 0 \Rightarrow b^2 - 2(a-2)b + a^2 + 4a - 4 > 0, \forall b \in R$ Again $\Delta < 0 \Rightarrow a > 1$

37. $1 + \dfrac{1}{n^2} + \dfrac{1}{(n+1)^2} = \left(1 + \dfrac{1}{n} - \dfrac{1}{n+1}\right)^2$

38. $\frac{p}{v} = x$ the $n = \frac{3}{2}$

39. The number of natural numbers is 4373.

40. If is '0' in 7^4

41. $\frac{3}{4} - \frac{1}{3} - \frac{1}{3} = \frac{1}{12}$

42. k=$\frac{100}{17}$

43. Solving, the common points are $\left(\pm\frac{1}{2}\sin 2\alpha, \pm\frac{1}{2}\sin 2\alpha \right)$,for both e= $\sqrt{1-\tan^2\alpha}$

44. Arg=$\frac{\pi}{2} \Rightarrow z + \bar{z} = 0 \Rightarrow$ I is true z lies on $|z-(5-i)| = \sqrt{5} \Rightarrow$ II is false

45. The circle is $x^2 + y^2 - 5x - \frac{5}{2}y + \frac{1}{2} = 0$

46. Take

P	Q
T	F

and from the table.

47. $p_1 = (4,9), p_2 =$ harmonic conjugate p_1 max area $= \frac{1}{2}AB \times \frac{1}{2}P_1P_2$

48. L also lies in the plane 9x-2y-5z+4=0

49. $V = \frac{1}{2}\left[\bar{a}\bar{b}\bar{c}\right] = \sqrt{2}$

50. Expanding $\frac{a}{a-p} + \frac{b}{b-q} + \frac{r}{c-r} = 0$

51. Two linear functions intersect at $\left(0, \frac{3}{2}\right)$

52. $\lim_{x \to \pi/2} \sqrt{1-\sin x}\, f(\sin x) = \frac{1}{\sqrt{2}}$

53. Comparing $\frac{x}{\cos\theta} + \frac{y}{\sin\theta} = a, \frac{x}{x_1} + \frac{y}{y_1} = 2$

54. $p(x) = x^3 - 6x^2 + 9x + 2$

55. Since $f'(\pm 1) = 0$, by rolle's theorem no such k exists

56. Drawn both graph, two solutions is $(-2\pi, -\pi)$

57. $\ln y dy$

58. $\sec y = 1 + x + e^x$

59. $0^{-1}(x) = 0 \Rightarrow x = 20$

60. $\tan^{-1}(\tan(-6)) = 2\pi - 6, \cot^{-1}(\cot 4) = 4 - \pi$

CHEMISTRY

61. Bond enthalpies based on first law of thermodynamics.

62. Since there are six atoms (A) in the corner of the unit cell, the contribution of atoms in 1 unit cell is 6/8. Since 3 face-centered atoms (B) contribute to one unit cell, the formula is $A_{6/8}B_3$ or A_6B_{24} or AB_4.

63. $MnO_4^- + 5e^- + 8H^+ \rightarrow Mn^{2+} + 4H_2O$

Following Nernst equation, find out $E_{red(final)} - E_{red(initial)}$. Thus E_{red} decreases by 0.189 V. The tendency of the half cell to get reduced is its oxidising power. Hence, the oxidising power decreases by 0.189 V.

64. Follows S_N1 with conc.HI & S_N2 with anhyd.HI

65. More basic Nitrogen

66. When KI is added to AgI it would increase the concentration of I^- which is the negative part of the colloid and hence will give negatively charged colloidal particle.

67. Cyanohydrin formation follows nucleophilic addition mechanism

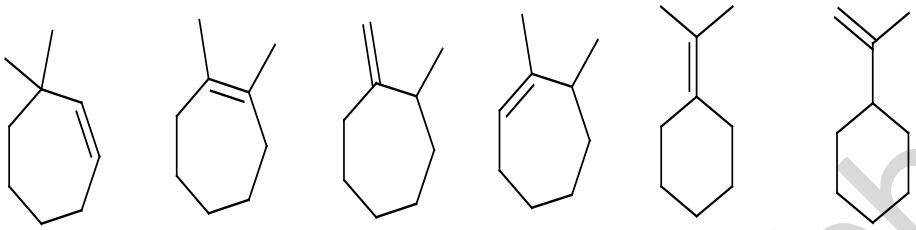
68. NF_3 and H_3O^+ have sp^3 hybridisation; NO^{3-} and BF_3 have sp^2 hybridisation.

69. $KO_2 + S \xrightarrow{\Delta} \underset{(A)}{K_2SO_4} \xrightarrow{BaCl_2} \underset{(B)}{BaSO_4} \xrightarrow[\Delta]{Carbon} \underset{(C)}{BaS} \xrightarrow{HCl} \underset{(D)}{H_2S}$

70. Step II, being r.d.s. Rate of overall reaction = Rate of Step II = KII $[O_3][O]$

substituting the value of [O] from the equilibrium of Step I, we get

Rate = $K_{II}K_C[O_3]^2/\ [O_2]$

71. 

72. Energy released in conversion of 6×10^{23} atoms of Cl^- ions = $6 \times 10^{23} \times$ electron affinity

$= 6 \times 10^{23} \times 3.61 = 2.166 \times 1024$ eV

Let x Cl atoms be converted to Cl^+ ion.

Energy absorbed = $x \times$ ionization energy

$\Rightarrow x \times 17.422 = 2.166 \times 10^{24}$

$\Rightarrow x = 1.243 \times 10^{23}$ atoms

73. Meq. of H_2SO_4 + Meq. of SO_3 = Meq. of NaOH

$\Rightarrow$ [(0.5-x)/ (98/2) x 1000] + [x/(80/2) x 1000] = 26.7×0.4

$\Rightarrow x = 0.103$

Percentage of SO_3 = 0.103/ 0.5 x 100 = 20.6%

74. Influence of electronic configuration on electron gain enthalpies.

75. One mole HIO_4 can oxidize 2 moles of alcoholic groups.

76. Polar medium sec. alkyl halide undergoes SN1 mechanism.

77. Na^+ ions are not reduced at cathode and SO_4^{2-} ions are not oxidized at anode.

78. $(CH_3)_4C$ has twelve equivalent 1°H. Hence, H forms only one product on monobromination.

79. It occurs during roasting in reverbetory furnace at moderate temperature in presence of air.

80. A is Ipc_2BH. C is a methyl ketone.

81. $CH_3CH(CH_3)CH_2CH_3$; it has four sets of equivalent hydrogens which result in the formation of four different monochlorination product. When chlorination takes place at first and third carbon, this results in the formation of a racemic mixture.

82. Charge density = Charge / Volume

	$ClO^-, ClO_2^-, ClO_3^-, ClO_4^-$
No.of $d_x - p_x$	0 1 2 3

More the number of d_x-p_x bonds, greater the delocalization of negative charge, so lesser charge density

83. Chain, positional and stereo isomerism.

84. Optimum fluoride is below 3ppm.
10ppm fluoride will be very dangerous to human life.

85. Mole fraction = 0.07

$K_f = 1.86$

$\Delta T_f = K_f\, m$

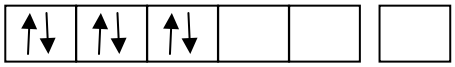
$$\frac{n_{solute}}{n_{solute} + n_{solvent}} = 0.07$$

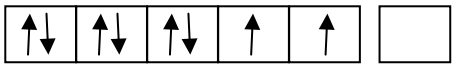
$$\therefore n_{solvent} = 0.93$$

$$\Delta T_f = 1.86 \times \frac{0.07 \times 1000}{0.93 \times 18} = 7.78^o$$

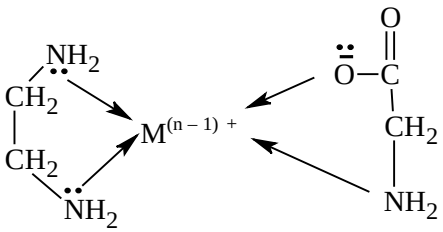
86. (1) The magnitude of splitting energy increases down the group. Thus
$Pt^{2+} - 5d^8$, $Pd^{2+} - 4d^8$ and $Ni^{2+} - 3d^8$.

(2) NH_3 is a borderline ligand which forces pairing of electrons in Co^{3+}, whereas H_2O is a weak-field ligand and it can not force the pairing in Ni^{2+}.

Co^{3+} in $[Co(NH_3)_6]^{3+}$ – $4s^0$, $3d^6$ 

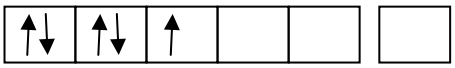
Ni^{2+} in $[Ni(H_2O)_6]^{2+}$ – $3d^8$, $4s^0$ 

So, there is no unpaired electron in $[Co(NH_3)_6^{3+}]$ whereas there are unpaired electron in $[Ni(H_2O)_6]^{2+}$. Thus $[Co(NH_3)_6]^{3+}$ is colourless and $[Ni(H_2O)_6]^{2+}$ is coloured due to d–d transition.

(3) 

As en is symmetrical ligand thus there is no geometrical isomerism.

(4) In $K_3[Fe(CN)_6]$, the oxidation state of Fe is +3.

$[Fe(CN)_6]^{3-}$ – $3d^5$, $4s^0$. 

Number of unpaired electron = 1

$\therefore \mu = \sqrt{n(n+2)}$ B.M. $= \sqrt{1(1+2)}$ B.M. $= \sqrt{3}$ B.M.

Thus answer is (3).

87. $\frac{P_c V_c}{RT_c} \times \frac{P_r V_r}{T_r} = \frac{3}{8} \times 2.21$ or $V_m = \left(\frac{3 \times 2.2}{8}\right)\frac{RT}{P}$

$V_m = 136.0 \text{ cm}^3$

Volume of 2 mol of N_2=272.0 cm^3.

88. Inorganic reactions are to be recollected properly.

89. Buffer capacity

= Number of moles of acid added per litre of buffer/Change in pH .

Buffer capacity = $\frac{0.006}{0.03} = 0.2$

90. Lactone is formed

Questions of this test were set and verified by

SRI CHAITANYA IIT ACADEMY