40. The de-Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature T(kelvin) and mass m, is

1) $\frac{h}{\sqrt{mkT}}$ 2) $\frac{h}{\sqrt{3mkT}}$ 3) $\frac{2h}{\sqrt{3mkT}}$ 4) $\frac{2h}{\sqrt{mkT}}$

41. Two identical photocathodes receive light of frequencies f_1 and f_2. If the velocities of the photoelectrons (of mass *m*) coming out are respectively v_1 and v_2, then

1) $v_1^2 - v_2^2 = \frac{2h}{m}(f_1 - f_2)$ 2) $v_1 + v_2 = \left[\frac{2h}{m}(f_1 + f_2)\right]^{1/2}$

3) $v_1^2 + v_2^2 = \frac{2h}{m}(f_1 + f_2)$ 4) $v_1 - v_2 = \left[\frac{2h}{m}(f_1 - f_2)\right]^{1/2}$

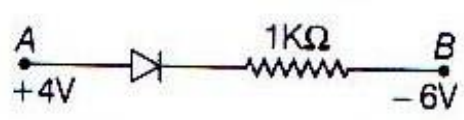
42. An excited hydrogen atom returns to the ground state. The wavelength of emitted photon is λ. The principal quantum number of the excited state will be

1) $\left(\frac{\lambda R}{\lambda R - 1}\right)^{1/2}$ 2) $\left(\frac{\lambda R - 1}{\lambda R}\right)^{1/2}$ 3) $\left[\lambda(\lambda R - 1)\right]^{1/2}$ 4) $\left[\frac{1}{\lambda R(\lambda R - 1)}\right]^{1/2}$

43. Radioactive material A has decay constant 8λ and material B has decay constant λ. Initially, they have same number of nuclei. After what time, the ratio of number of nuclei of material A to that B will be $\frac{1}{e}$?

1) $\frac{1}{\lambda}$ 2) $\frac{1}{7\lambda}$ 3) $\frac{1}{8\lambda}$ 4) $\frac{1}{9\lambda}$

44. Consider the junction diode as ideal. The value of current flowing through AB is



1) $10^{-2}A$ 2) $10^{-1}A$ 3) $10^{-3}A$ 4) $0A$

45. A common emitter amplifier has a voltage gain of 50, an input impedance of 100Ω and an output impedance of 200Ω. The power gain of the amplifier is

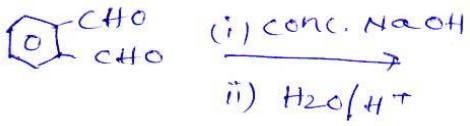
1) 1000 2) 1250 3) 100 4) 500

CHEMISTRY

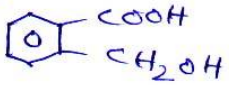
46. Cloud or fog is a colloidal system in which the dispersed phase and the dispersion medium are ___ and _____ respectively.

1) Liquid, gas 2) gas, liquid 3) Liquid, Liquid 4) Solid, gas

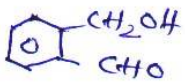
47.



1) 

2) 

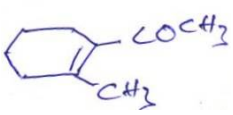
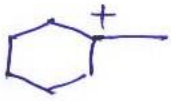
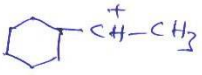
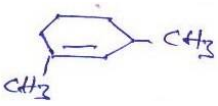
3) 

4) 

48. IUPAC name of Acetanilide is :

1) N-phenyl ethanamide 2) N-methyl benzanamide
3) N-phenyl benzene carboxamide 4) N-methyl ethanamide

49. In which of the following molecules all the effects namely inductive, mesomeric and hyperconjugation operate ?

1)  2)  3)  4) 

50. Total number of isomers (structural, stereo) possible with the formula $C_4H_{10}O$

1) 6 2) 4 3) 8 4) 5

51. $PbCl_4$ exists but $PbBr_4$ and PbI_4 do not exist because of

1) Large size of Br^- & I^- 2) Strong oxidizing character of Pb^{4+}

3) Strong reducing character of pb^{4+} 4) Low electronegativity of Br and I

52. In an organic compound various elements are estimated by different experiments. Incorrect about their estimation is:

1) chlorine is estimated as ClO_2

2) Sulphur is estimated as $BaSO_4$

3) Nitrogen is estimated as N_2 (in dumas) and NH_3 (in kjeldahl's)

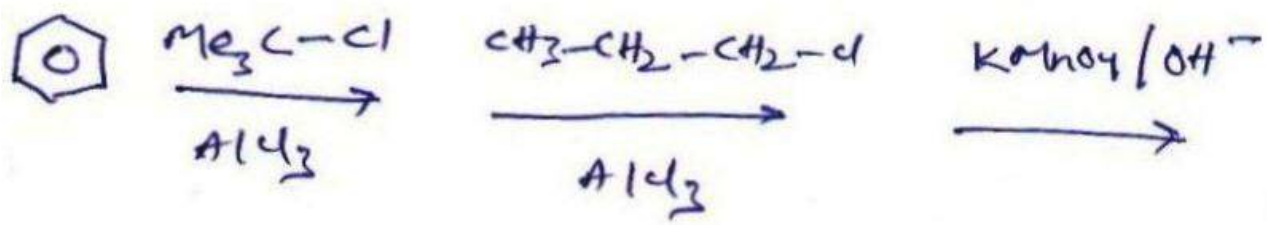
4) Phosphorous is estimated either as $Mg_2P_2O_7$ (or) as $(NH_4)_3PO_4.12Mo_3O$

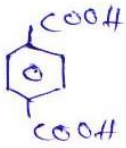
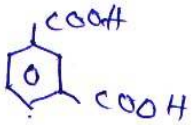
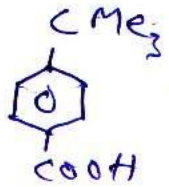
53. $CH_3-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow[ii)\ H_2O]{i)\ CH_3MgBr}$ **product. What is that product ?**

1) $CH_3-\underset{OH}{\underset{|}{C}}H-CH_3$ 2) $CH_3-\overset{OH}{\overset{|}{\underset{CH_3}{\underset{|}{C}}}}-CH_3$

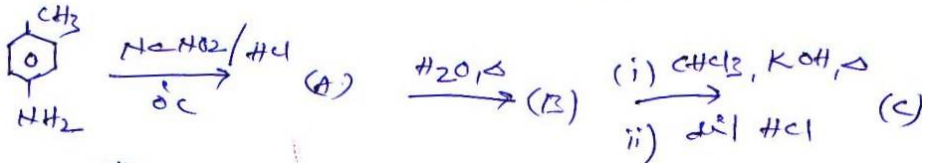
3) $CH_3-\underset{CH_3}{\underset{|}{C}}H-CH_3$ 4) $CH_3-CH_2-CH_2-CH_3$

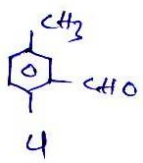
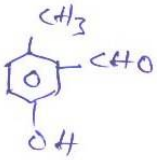
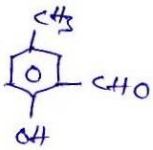
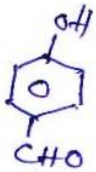
54. The final product of the following reaction sequence is



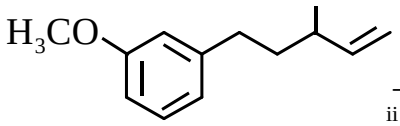
1)  2)  3)  4) 

55. Identify (C) in the reaction (s)

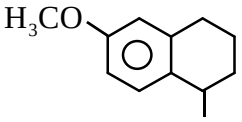


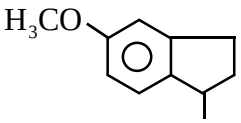
1)  2)  3)  4) 

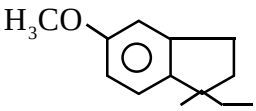
56.

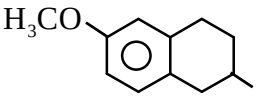


What is 'P' in the above reaction

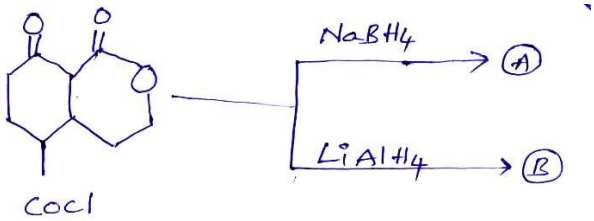
1) 

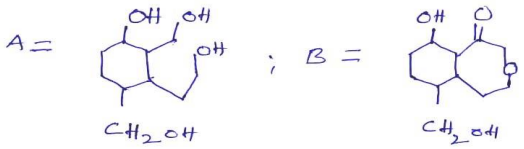
2) 

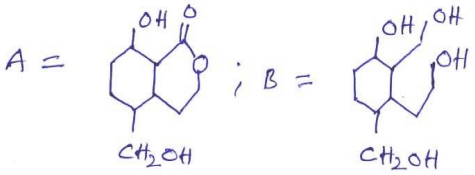
3) 

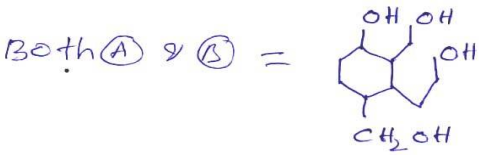
4) 

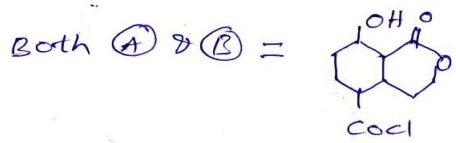
57.



1) 

2) 

3) 

4) 

58. **By the action of conc. H_2SO_4, phosphorous changes to**

1) H_3PO_3 2) HPO_3 3) H_3PO_4 4) $H_4P_2O_7$

59. **Identify the correct sequence of increasing number of $\pi-bonds$ in structure of following molecules :**

I) $H_2S_2O_6$ II) H_2SO_3 III) $H_2S_2O_5$

1) I, II, III 2) II, III, I 3) II, I, III 4) I, III, II

60. **The oxidation state of Iron in Brownring test.**

1) 0 2) 1 3) 2 4) 3

61. **Nessler's reagent is used to detect :**

1) CrO_4^{2-} 2) PO_4^{3-} 3) MnO_4^- 4) NH_4^+

62. **The radius of which of the following hydrate ion is smallest ?**

1) $\left[Li(H_2O)_n\right]^+$ 2) $\left[Na(H_2O)_n\right]^+$ 3) $\left[K(H_2O)_n\right]^+$ 4) $\left[Cs(H_2O)_n\right]^+$

63. **The ion helpful for controlling heart beating and muscle contraction is**

1) Mg^{2+} 2) Na^+ 3) K^+ 4) Ca^{2+}

64. **The value of 'n' in the reaction $Cr_2O_7^{2-}+14H^++nFe^{2+}\rightarrow 2Cr^{3+}+nFe^{3+}+7H_2O$ will be**

1) 2 2) 3 3) 6 4) 7

65. **An aqueous solution of 6.3g of oxalic acid dihydrate is made up of to 250mL. The volume of 0.1N NaOH required to completely neutralise 10mL of this solution is:**

1) 20mL 2) 40mL 3) 10mL 4) 4mL

66. **The degree of dissociation of $Ca(NO_3)_2$ in a dilute aqueous solution containing 14g of the salt per 200g of water 100^0C is 70%. If the vapour pressure of water at 100^0C is 760mm. The vapour pressure of the solution is.**

1) 746.3mm of Hg 2) 757.5 mm of Hg 3) 740.9mm of Hg 4) 750 mm of Hg

67. **The pH of 0.1M solution of the following salts increases in the order**

1) $NaCl < NH_4Cl < NaCN < HCl$ 2) $HCl < NH_4Cl < NaCl < NaCN$

3) $NaCN < NH_4Cl < NaCl < HCl$ 4) $HCl < NaCl < NaCN < NH_4Cl$

68. $2N_2O_5 \rightarrow 4NO_2 + O_2$ **what is the ratio of the rate of decomposition of N_2O_5 to rate of formation of NO_2 is :**

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

69. **The ultimate product formed on methylation of diborane is**

1) $B_2(CH_3)_6$ 2) $B_2H_4(CH_3)_2$ 3) $B_2H_3(CH_3)_3$ 4) $B_2H_2(CH_3)_4$

70. **13g of a metal 'M' is deposited at cathode by passing 0.4F of electricity. If the cathodic reaction is $M^{n+} + ne^- \rightarrow M$, the formula of the metallic chloride is (Atomic weight of M=65)**

1) MCl_4 2) MCl_3 3) MCl 4) MCl_2

71. **For which of the following entropy change is negative**

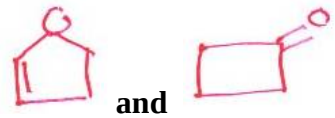
1) Conversion of $CaSO_{4(s)}$ into $CaO_{(s)}$ and $SO_{2(g)}$. 2) Dissolution of I_2 in water

3) Synthesis of ammonia 4) Sublimation of dry ice

72. **At 298K the molar conductivities at infinite dilution $\wedge_m^0$ of $NH_4Cl, KOH \& KCl$ are 152.8, 272.6 and 149.8 $Scm^2\,mol^{-1}$ respectively. The $\wedge_m^0$ of NH_4OH is $Scm^2\,mol^{-1}$ and % dissociation of 0.01M NH_4OH with $\wedge_m = 25.1 Scm^2\,mol^{-1}$ at the same temperature are :**

1) 269.6 ; 9.6 2) 205.4 ; 8.4 3) 275.6 ; 0.091 4) 275.6 ; 9.1

73.

 **and are**

1) Functional isomers 2) Metamers

3) Metamers + Functional isomers 4) Positional isomers

74. **If there are three possible values $\left(-\frac{1}{2}, 0, +\frac{1}{2}\right)$ for the spin quantum, then the potassium belongs to the following group is**

1) IA 2) VII A 3) IV A 4) III A

75. **Correct statements among the following regarding to silicones are.**

A) They are polymers with hydrophobic character

B) They are biocompatible

C) In general, they have high thermal stability and low dielectric strength

D) Usually, they are resistant to oxidation and use as greases

1) A, B, C, D 2) A, B, C 3) A, B 4) A, B, D

76. **0.5 moles of gas A and x moles of gas B exert $10m^3$ at 1000K with a pressure of 200 pascals Given R is the gas constant in $JK^{-1}\,mol^{-1}$, x is**

1) $\frac{2R}{4+R}$ 2) $\frac{2R}{4-R}$ 3) $\frac{4+R}{2R}$ 4) $\frac{4-R}{2R}$

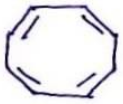
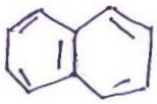
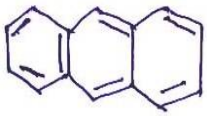
77. **The following results were obtained during kinetic studies of the reaction $2A + B \rightarrow products$**

Experiment	$[A]$ $\left(molL^{-1}\right)$	$[B]$ $\left(molL^{-1}\right)$	**Initial rate of reaction** $molL^{-1}\min^{-1}$
I	0.10	0.20	6.93×10^{-3}
II	0.10	0.25	6.93×10^{-3}
III	0.20	0.30	1.386×10^{-2}

The time (in minutes) required to consume half of 'A' is

1) 5 2) 10 3) 1 4) 100

78. The following will have lowest heat of hydrogenation per mole of compound is :

1)  2)  3)  4) 

79. In the sulphonation of benzene, the electrophile involved is :

1) HSO_4^- 2) SO_3 3) SO_2 4) SO_4^{2-}

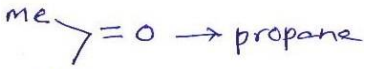
80. When Grignard reagent (C_2H_5MgBr) is treated with phenol, we get :

1) C_2H_5OH 2) C_2H_6 3) Ethyl benzene 4) Benzene

81. Reaction of HBr with propene in absence of peroxide is :

1) electrophilic addition 2) electrophilic substitution
3) nucleophilic addition 4) free radical addition

82.



Column – I	**Column – II**
1) 	a) Alkaline $KMnO_4$
2) 	b) HI + P
3) 	c) $AlCl_3$ at 570K
4) 	d) NaI + acetone e) Zn-Hg/Conc.HCl

1) $1\to e;2\to a;3\to b;4\to c$ 2) $1\to a;2\to e;3\to c;4\to b$
3) $1\to c;2\to a;3\to e;4\to b$ 4) $1\to d;2\to a;3\to b;4\to e$

83. In permanganate ion MnO_4^-, manganese has an oxidation number of +7. Therefore it is :

1) sp^3d^3 hybridized 2) sp^3 hybridized 3) dsp^2 hybridized 4) d^3sp^3 hybridized

84. In the presence of strong electrical field, the following set of orbitals are not degenerate

1) $3d_{xy}$ and $3d_{yZ}$ 2) $3d_{xy}$ and $3d_{z^2}$ 3) $3d_{xy}, 3d_{yz}$ and $3d_{zx}$ 4) $3d_{x^2-y^2}$ and $3d_{z^2}$

85. The magnetic moment of an ion is close to 36×10^{-24} joule/tesla. The number of unpaired electrons of the ion are : $(1BM = 9.273\times10^{-24}\,J/T)$

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

86. No.of ionisable & non-iosizable Cl^- ions in $COCl_3.5NH_3$ respectively are

1) 3,0 2) 2,1 3) 1,2 4) 0,3

87. For the given complex $\left[COCl_2(en)(NH_3)_2\right]^+$, the number of geometrical, optical and total isomers of all types possible respectively are

1) 2,2 and 4 2) 2,2 and 3 3) 2,0 and 2 4) 0,2 and 2

88.

Column – I (Equivalent conductance)	**Column – II Formule**
A) 229	**p)** $\left[Pt(NH_3)_3Cl\right]Cl_3$
B) 97	**q)** $\left[Pt(NH_3)_3Cl_3\right]Cl$
C) 404	**r)** $\left[Pt(NH_3)_4Cl_2\right]Cl_2$
D) 523	**s)** $\left[Pt(NH_3)_6\right]Cl_4$

A	**B**	**C**	**D**		**A**	**B**	**C**	**D**	
1)	s	p	q	r	1)	r	q	s	p
3)	r	q	p	s	4)	s	p	r	q

89. Number of HIO_4 molecules required for complete oxidation of one mole of glucose is

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

90.

List – I	**List – II**
1) Urea formaldehyde resin	a) $\left(-NH-(CH_2)_5-CO-\right)_n$
2) Neoprene	b) $\left(-NH-(CH_2)_6-NH-\right)_n$
3) PVC	c) $\left(-CH_2-\underset{Cl}{\underset{\vert}{C}}=CH-CH_2-\right)_n$
4) Nylon-6	d) $\left(CH_2-\underset{Cl}{\underset{\vert}{CH}}-\right)_n$
	e) $\left(NH-CO-NH-CH_2-\right)_n$

The correct match is

	1	2	3	4		1	2	3	4
1)	e	d	c	b	2)	e	c	b	d
3)	a	c	d	b	4)	e	c	d	a

BIOLOGY

91. Study the following table which shows different organisms with their taxonomic categories.

Common name

S.No	Common name	Family	Order	Class	Division
i.	Man	Hominidae	Primata	Mammalia	**A**
ii.	Housefly	Muscidae	Diptera	**B**	Arthropoda
iii.	Mango	**C**	Sapindales	Dicotyledonae	Angiospermae
iv.	Wheat	Poaceae	Poales	**D**	Angiospermae

Select the correct option for A, B, C and D.

A	**B**	**C**	**D**
1) Chordata	Insecta	Anacardiaceae	Monocotyledonae
2) Animalia	Arachnida	Anacardiaceae	Monocotyledonae
3) Chordata	Arachnida	Polygonaceae	Monocotyledonae
4) Non – Chordata	Insecta	Anacardiaceae	Dicotyledonae

92. A normal woman, whose father had haemophilia, married a normal man. What is the chance of occurrence of hemophilia in their children?

1) 25 % children will be hemophilic
2) 50% children will be hemophilic
3)75 % children will be hemophilic
4) None hemophilic but 75 % will be carriers

93. The given flow chart represents the hierarchy of various taxonomic categories. Identify the missing categories (A, B and C) and select the correct statements regarding :