Opened for Evaluation purpose

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

(PG–EE–2016 : CHEMISTRY)

Sr. No. 12069 **Code A**

Time : 1¼ Hour **Max. Marks : 100** **Total Questions : 100**

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

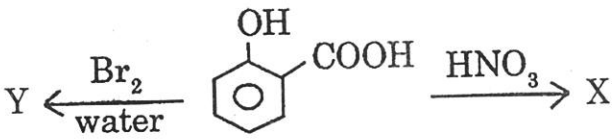
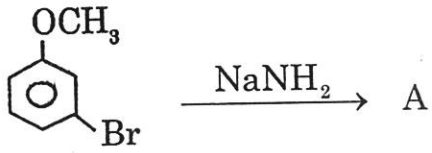
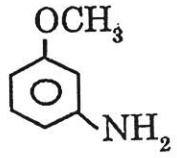
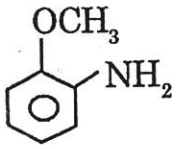
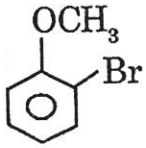
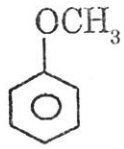
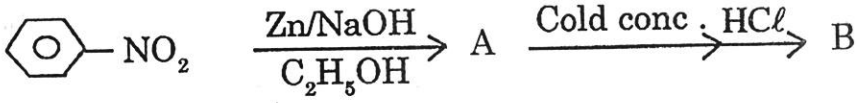
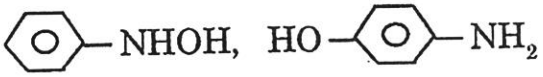
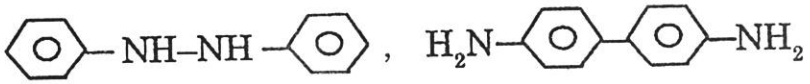
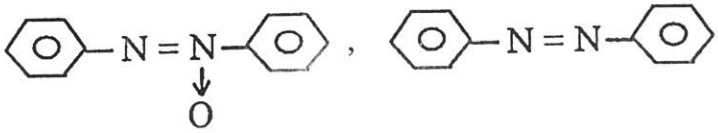
Mother's Name : _____ Date of Examination : _____

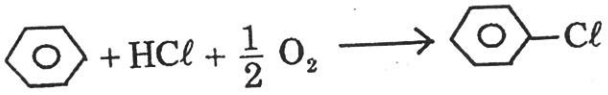
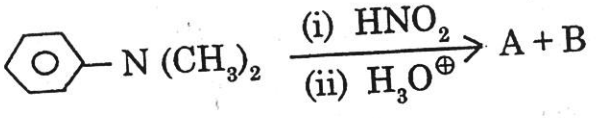
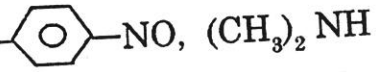
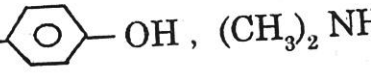
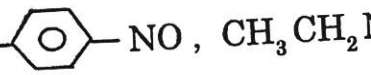
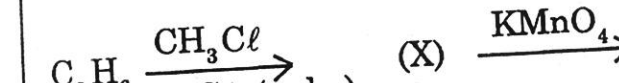
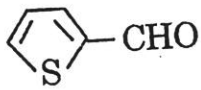
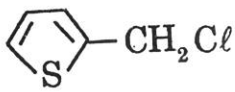
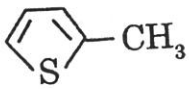
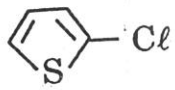
(Signature of the candidate) (Signature of the Invigilator)

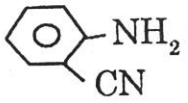
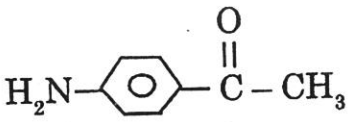
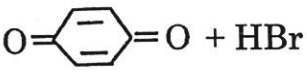
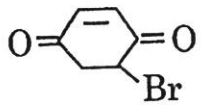
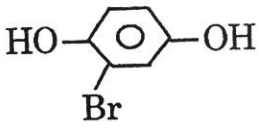
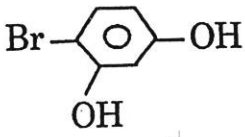
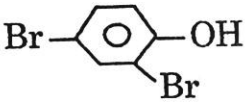
CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

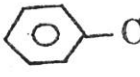
1. **All questions are compulsory.**
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing **within two hours** after the test is over. No such complaint(s) will be entertained thereafter.
4. The candidate MUST NOT do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
5. **There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.**
6. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

Confidential AL

Question No.	Questions
1.	 X and Y are (1) Picric acid, 2, 4, 6 – tribromophenol (2) 4-nitro salicylic acid, 4-bromo salicylic acid (3) o-nitrophenol, o-bromophenol (4) None is correct
2.	 A is (1)  (2)  (3)  (4) 
3.	 A and B are (1)  (2)  (3)  (4) None is correct

Question No.	Questions
4.	 This is called ..... reaction (1) Sandmeyer (2) Raschig (3) Gatterman (4) Hofmann
5.	 (1)  (2)  (3)  (4) None is correct
6.	In the reaction sequence  The product (Y) is (1) Chlorobenzene (2) Benzaldehyde (3) Benzoic acid (4) Benzene
7.	Thiophene reacts with HCHO in presence of aqueous HCℓ to give (1)  (2)  (3)  (4) 

Question No.	Questions
8.	Which is weaker base than aniline (1)  (2) (3)  (4) All
9.	End product of following reaction is  (1)  (2)  (3)  (4) 
10.	The reagent with which both aldehydes and ketones react easily is (1) Fehling's reagent (2) Schiff's reagent (3) Tollen's reagent (4) Grignard reagent
11.	Which of the following compounds will exhibit geometrical isomerism (1) 1, 1-diphenyl-1-propene (2) 3-phenyl-1-butene (3) 2-phenyl-1-butene (4) 1-phenyl-2-butene
12.	Propyne and propene can be distinguished by (1) Conc. H_2SO_4 (2) Br_2 in CCl_4 (3) Dil. $KMnO_4$ (4) $AgNO_3$ in ammonia

Question No.	Questions
13.	Which of the following has the most acidic hydrogen (1) 3-Hexanone (2) 2, 4-hexanedione (3) 2, 5-hexanedione (4) 2, 3-hexanedione
14.	Ammonia can be dried by (1) Conc. H_2SO_4 (2) P_4O_{11} (3) CaO (4) Anhydrous $CaCl_2$
15.	Amongst H_2O, H_2S, H_2Se and H_2Te, the one with the highest boiling point is (1) H_2O because of hydrogen bonding (2) H_2S because of hydrogen bonding (3) H_2Te because of higher molecular weight (4) H_2Se because of lower molecular weight
16.	When a mixture of one mole of C_6H_5COOH and one mole of C_6H_5OH is treated with one mole of $NaHCO_3$, the product formed will consist of (1) C_6H_5COOH, C_6H_5ONa (2) C_6H_5COONa, C_6H_5ONa (3) C_6H_5COONa, C_6H_5OH (4) None
17.	Addition of ethanol to aqueous hydrolysis of  does not increase the rate of hydrolysis but changes only the composition of final products. This indicates that reaction is proceeding through (1) S_N2 (2) S_N1 (3) S_E2 (4) S_E1
18.	Which one of the following is the best method for the preparation of acetophenone (1) Ph COOEt + CH_3MgBr (2) Ph $COCl$ + CH_3MgBr (3) Ph $CONH_2$ + CH_3MgBr (4) PhCN + CH_3MgBr

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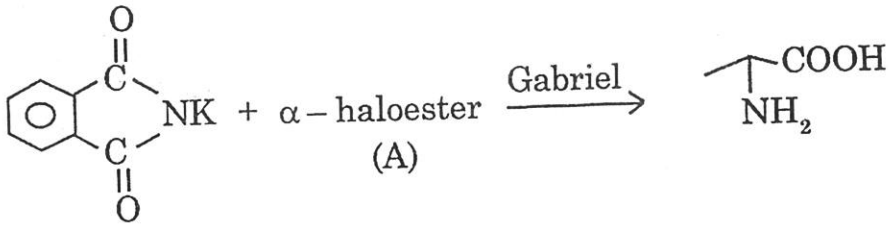
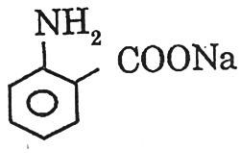
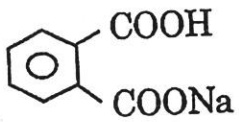
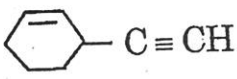
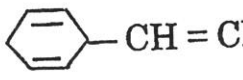
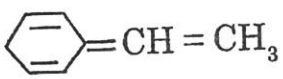
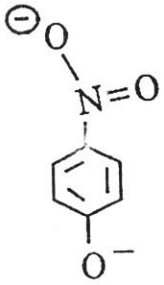
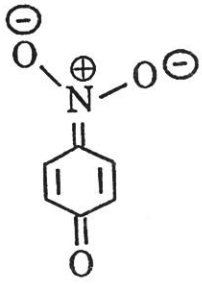
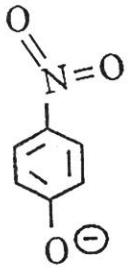
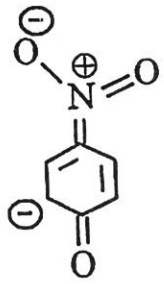
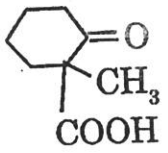
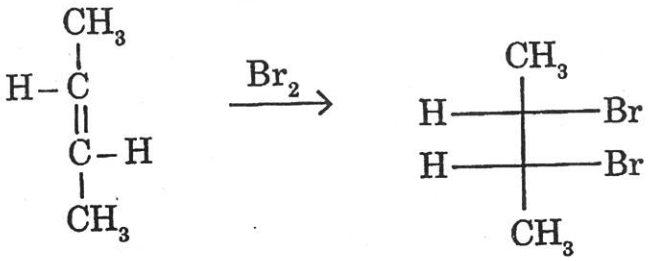
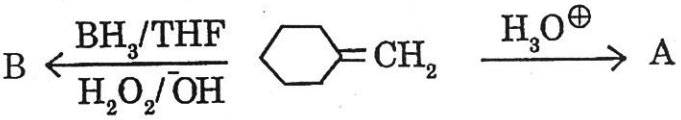
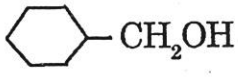
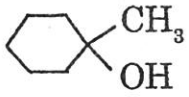
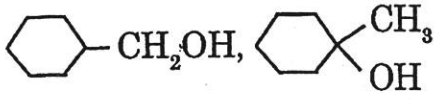
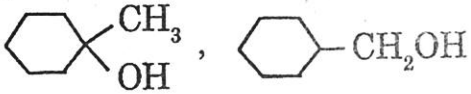
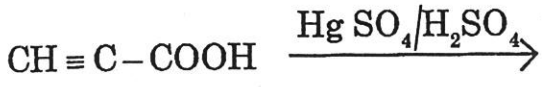
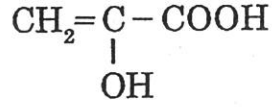
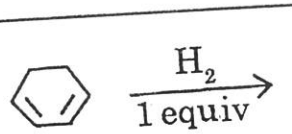
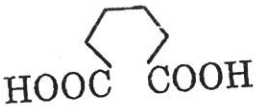
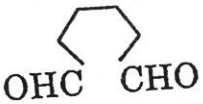
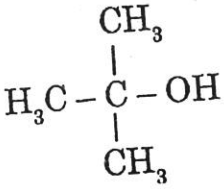
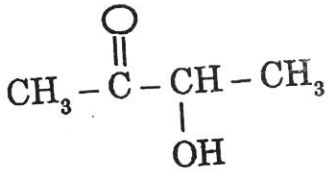
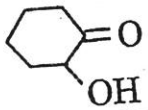
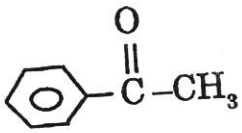
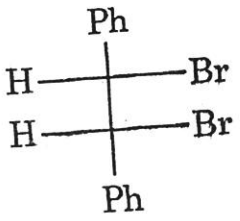
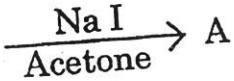
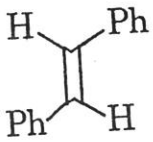
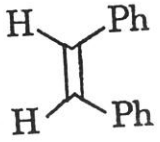
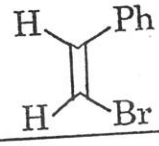
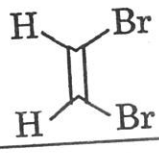
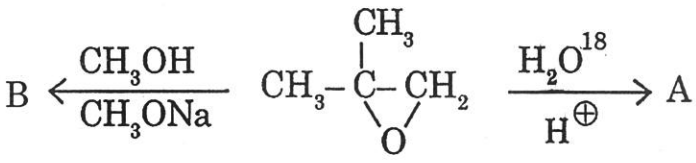
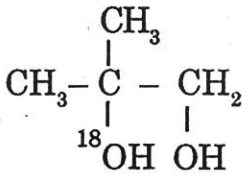
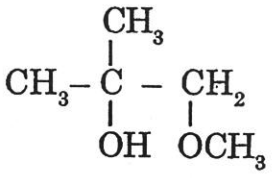
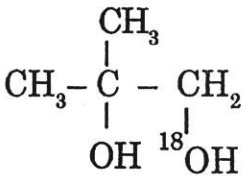
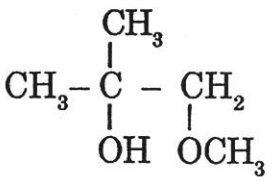
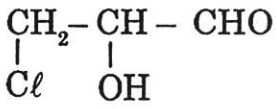
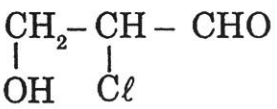
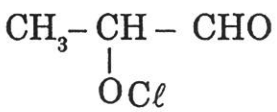
19.	 Required product is obtained when A is (1) Ethyl-3-Chlorobutyrate (2) Ethyl-3-Chloropropionate (3) Ethyl-2-Chloropropionate (4) Ethyl Chloroacetate
20.	$C_6H_{10} \xrightarrow{\text{Ozonolysis}} HCHO + CH_3CHO + CH_2(CHO)_2C_6H_{10}$ is (1) 1, 2-hexadiene (2) 1, 3-hexadiene (3) 1, 4-hexadiene (4) 2-methyl-1, 3-pentadiene
21.	Reagent which can convert an alkyl amine into alkyl chloride (1) Hinsberg's reagent (2) Lucas reagent (3) Tilden reagent (4) None
22.	Which is/are acid salt (1)  (2)  (3) NaH_2PO_2 (4) Na_2HPO_3
23.	Index of unsaturation of C_8H_{10} in six membered structure is (1) 4,  (2) 4,  (3) 4,  (4) All true

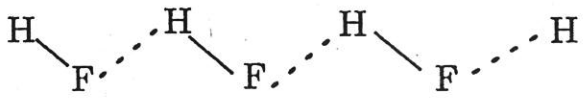
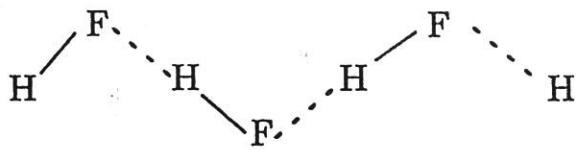
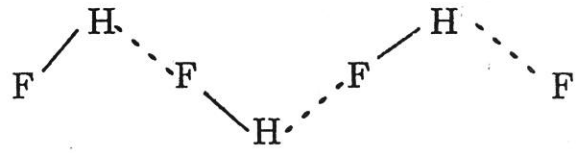
Question No.	Questions
24.	The mononitration of acetanilide ($C_6H_5NHCOCH_3$) gives predominantly (1) 3-nitroacetanilide (2) 2-nitroacetanilide (3) 2-, and 3-nitroacetanilide (4) 4-nitroacetanilide
25.	The most unlikely representation of resonance structures of p-nitrophenoxide ion is (1)  (2)  (3)  (4) 
26.	Chirality is lost when (1) $CH_3-\underset{\underset{OH}{|}}{CH}-COOH$ is heated (2)  is heated (3) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2COOH$ is heated (4) $CH_3-\underset{\underset{CH_2}{|}}{CH}-COOH$ is heate COOH

Question No.	Questions
27.	 Trans A which is true statement (1) A is formed by anti addition and is meso (2) A is formed by syn addition and is meso (3) A is formed by anti addition and is racemic (4) A is formed by syn addition and is racemic
28.	 A and B are (1) Both  (2) Both  (3)  (4) 
29.	 (1) (2) OHC CH_2 COOH (3)  (4) HO – CH = CH – COOH

Question No.	Questions
30.	 A and B are (1) ,  (2) , not formed (3) ,  (4) None is correct
31.	Maximum dehydration takes place of (1)  (2)  (3)  (4) 
32.	  A is (1)  (2)  (3)  (4) 

Question No.	Questions
33.	 A and B are (1)   (2)   (3) Both are correct (4) None is correct
34.	 A and B are (1) $CH_2 = CH - CHO$,  (2) $CH_2 = CH - CHO$,  (3) $CH_2 = CH - CHO$,  (4) None is correct

Question No.	Questions
35.	The quantum numbers, for the outer electrons of an atom are given by $n = 2 ; \ell = 0 ; m = 0 ; s = + 1/2$ (1) Lithium (2) Beryllium (3) Hydrogen (4) Boron
36.	"The exact path of electron 2p-orbital cannot be determined" The abov statement is based upon (1) Hund's rule (2) Bohr's rule (3) Uncertainty principle (4) Aufbau principle
37.	The ground state configuration of Fe^{3+} ion in gaseous state is (At. No. of Fe = 26) (1) $[Ar]^{18}\ 3d^3\ 4s^2$ (2) $[Ar]^{18}\ 3d^6\ 4s^2$ (3) $[Ar]^{18}\ 3d^5$ (4) $[Ar]^{18}\ 3d^6$
38.	Which of the following is the smallest in size (1) N^{3-} (2) O^{2-} (3) F^- (4) Na^+
39.	The electronegativity of the following elements increases in the order (1) C, N, Si, P (2) N, Si, C, P (3) Si, P, C, N (4) P, Si, N, C
40.	In ClF_3, Chlorine is (1) sp^2 hybridized (2) sp^3 hybridized (3) sp^3d hybridized (4) sp^3d^2 hybridized
41.	The angles between covalent bonds is maximum in (1) CH_4 (2) BF_3 (3) PF_3 (4) NH_3

Question No.	Questions
42.	Ionic solids with Schottky defects contain in their structure (1) equal number of cation and anion vacancies (2) interstitial anions and anion vacancies (3) cation vacancies only (4) cation vacancies and interstitial cations
43.	The H-Bonds in solid HF can be best represented as (1) H—F ----- H—F ----- H — F (2)  (3)  (4) 
44.	In which of the following molecules the van der Wall's forces is likely to be the most important in determining the m.pt. and b.pt. (1) CO (2) H_2S (3) Br_2 (4) HCl
45.	Alkali metal hydrides react with water to give (1) Acidic solution (2) Basic solution (3) Neutral solution (4) Hydride ion
46.	Which is a planar molecule (1) XeO_4 (2) XeF_4 (3) $XeOF_4$ (4) XeO_2F_2

Question No.	Questions
47.	A silicate used in talcum powder (1) consists of planar sheets which can slip over another (2) is known as talc (3) is a pure magnesium silicate of the form $3\ MgO.4\ SiO_2.\ H_2O$ (4) All of these
48.	Which of the following has the stronger bond (1) F – B (2) F – Cl (3) F – Br (4) Cl – Br
49.	Which one of the following metal ions is coloured (1) Cu^+ (2) Zn^{2+} (3) Sc^{3+} (4) V^{4+}
50.	Among the lanthanides the one obtained by synthetic method is (1) Lu (2) Pm (3) Pr (4) Gd
51.	Thorium element belongs to (1) Alkali metal (2) Transition elements (3) Lanthanides (4) Actinides
52.	H_2S would separate the following at pH < 7 (1) Zn^{2+}, Co^{2+} (2) Cu^{2+}, Cd^{2+} (3) Cu^{2+}, Cr^{3+} (4) Cu^{2+}, As^{3+}
53.	Nitrite (NO_2^-) interferes in the 'ring-test' of nitrate (NO_3^-). Some of th following reagents can be used for the removal of nitrite (I) NH_4Cl (II) $(NH_2)_2$ CS thiourea (III) NH_2SO_3H (sulphamic acid) (IV) Sulphanilic acid Correct choice is (1) I, II (2) I, II, IV (3) I, II, III (4) II, III, IV

Question No.	Questions
54.	The oxidation number of Fe in K_4 [Fe $(CN)_6$] is (1) 3 (2) 2 (3) 0 (4) 1
55.	CFSE value for an octahedral low spin d^6 metal ion complex will be (1) 20 Dq (2) 24 Dq (3) 12 Dq (4) 6 Dq
56.	The number of unpaired electrons in a d^7 tetrahedral complex (1) 3 (2) 2 (3) 1 (4) 7
57.	E.A.N in [Ni $(NH_3)_6]^{2+}$ is (1) 38 (2) 36 (3) 40 (4) 37
58.	Term symbol for ground state V^{3+} is (1) $^3F_2$ (2) $^4S_{3/2}$ (3) $^3P_0$ (4) $^3P_2$
59.	How many geometrical isomers are possible for [Co $(NH_3)_4$ Cl_2] (1) two (2) three (3) four (4) six
60.	Which of the following metal-carbonyls is paramagnetic (1) Fe $(CO)_5$ (2) Ni $(CO)_4$ (3) V $(CO)_6$ (4) Cr $(CO)_6$
61.	Which of the following carbonyls does not possess bridged CO (1) Fe_2 $(CO)_9$ (2) Fe_3 $(CO)_{12}$ (3) Ru_3 $(CO)_{12}$ (4) Co_2 $(CO)_8$

Question No.	Questions
62.	CH_3HgOH is classified as (1) Soft-Soft (2) Hard-Hard (3) Soft-Hard (4) Hard-Soft
63.	Which of the following is not border line acid (1) Bi^{3+} (2) BMe_3 (3) SO_2 (4) CO_2
64.	According to spectrochemical series which ligand will produce greate crystal field splitting (1) F^- (2) NH_3 (3) NO_2^- (4) CO
65.	The transition in $[Cu(H_2O)_6]^{2+}$ complexes is due to (1) Presence of water molecules (2) Intermolecular vibrations (3) Promotion of an electron from T_{2g} to Eg level as the transfer of hol from Eg to T_{2g} level (4) Excitation of electron from 3d to 4s energy level
66.	Vitamin B_{12} contains (1) Selenium (2) Zinc (3) Cobalt (4) Iron
67.	Which complex ion is thermodynamically stable and kinetically labile (1) $[Cu(NH_3)_4]^{2+}$ (2) $[Cr(CN)_6]^{3-}$ (3) $[Mn(CN)_6]^{3-}$ (4) $[Ni(CN)_4]^{2-}$

Question No.	Questions
68.	Radioactivity of a sample (Z = 22) decreases 90% after 10 years. What will be the half life of the sample (1) 5 years (2) 2 years (3) 3 years (4) 10 years
69.	A catalyst is a substance which (1) Supplies energy to the reaction (2) Shortens the time to reach the equilibrium (3) Increases the equilibrium constant of the reaction (4) Increases the equilibrium concentration of the product
70.	The temperature of the system decreases in an (1) Adiabatic compression (2) Isothermal expansion (3) Isothermal compression (4) Adiabatic expansion
71.	Consider a pure crystalline solid that is heated from absolute zero to a temperature above the boiling point of the liquid. Which of the following processes produces the greatest increase in entropy of the substance (1) Vaporizing the liquid (2) Melting the solid (3) Heating the liquid (4) Heating the gas
72.	Elastic deformation in polymers is due to (1) Slight adjustment of molecular chains (2) Slippage of molecular chains (3) Straightening of molecular chains (4) Severe of covalent bonds

Question No.	Questions
73.	Which of the following process is responsible for the formation of delta a place where rivers meet the sea (1) Emulsification (2) Coagulation (3) Colloid formation (4) Peptization
74.	Which of the following is correct for lyophillic sols (1) They are Irreversible (2) They are formed by inorganic substances (3) They are self stabilized (4) They are readily coagulated by addition of electrolytes
75.	Buffer solutions have constant acidity and alkalinity because (1) They have large excess of H^+ or OH^- ions (2) They have fixed value of pH (3) Acids and Alkalies in these solutions are shielded from attack b other ions (4) These give unionized acid or base on reaction with added aci or alkali
76.	Automobile steering wheels are normally made of (1) High density polythene (2) Cellulose acetate (3) Cellulose nitrate (4) PVC
77.	The de Broglie wavelength of an electron with kinetic energy of 1.0 eV i (1) 28.7 pm (2) 2.87 pm (3) 12.3 nm (4) 1.23 nm

Question No.	Questions
78.	If moisture and dirt entrapment is a major problem, it would be a good practice to (1) Butt weld (2) Stop weld (3) Skip weld (4) Stitch weld
79.	Iron crystallises in a b.c.c system with a = 2.86 Å . The density of Iron is (1) 79.2 g cm^{-3} (2) 7.92 g cm^{-3} (3) 0.79 g cm^{-3} (4) 792 g cm^{-3}
80.	The Born Lande equation for the estimation of lattice energy of an ionic crystal is (1) $U_0 = \frac{MN_AZ_+e}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (2) $U_0 = \frac{MN_AZ_-e}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (3) $U_0 = \frac{MN_AZ_+Z_-e^2}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (4) None of these
81.	Polydispersity index (P.D.I) of a polymer sample is given by (1) $P.D.I = \overline{M}_m - \overline{M}_n$ (2) $P.D.I = \overline{M}_m + \overline{M}_n$ (3) $P.D.I = \overline{M}_m\overline{M}_n$ (4) $P.D.I = \overline{M}_m / \overline{M}_n$ where $\overline{M}_m, \overline{M}_n$ are mass average and number-average molar masses respectively
82.	The coefficient of thermal expansion, α, is expressed as (1) $\alpha = -\frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$ (2) $\alpha = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$ (3) $\alpha = \frac{1}{T}\left(\frac{\partial V}{\partial T}\right)_P$ (4) $\alpha = -\frac{1}{T}\left(\frac{\partial V}{\partial T}\right)_P$

Question No.	Questions
83.	In B.E.T equation, which of the following statements is not true (1) It does not use the concept of saturated vapour pressure (2) It considers the multilayer adsorption (3) It is not valid for porous adsorbent (4) It uses the concept of latent heat of condensation
84.	Entropy is related to thermodynamic probability, W, by relation (1) $S = R\ell nW$ (2) $S = R - \ell nW$ (3) $S = k\ell nW$ (4) $S = k + \ell nW$
85.	The number of macro states for the distribution of three atoms (having total energy = 3 quanta) among ground, first, second states (possessing zero, one and two quanta of Energy respectively) are (1) one (2) six (3) ten (4) three
86.	The Ilkovic equation for diffusion current is given by (1) $\vec{i}_d = 607\ nDC\ m^{2/3}\ t^{1/2}$ (2) $\vec{i}_d = 607\ nD^{1/2}C\ m^{2/3}\ t^{1/6}$ (3) $\vec{i}_d = 607\ nDC^{1/2}\ m^{2/3}\ t^{1/6}$ (4) $\vec{i}_d = 607\ nD^{1/2}\ m^{2/3}\ t^{1/6}$ All notations have their usual meanings
87.	In the lead acid battery during charging the cathode reaction is (1) Reduction of Pb^{2+} to Pb (2) Formation of $PbSO_4$ (3) Formation of PbO_2 (4) None of these

Question No.	Questions
88.	The fundamental vibrational frequency of carbon mono oxide (CO) molecule is 2050 cm^{-1}. The force constant of CO molecule will be (1) $4\pi^2 c\mu (2050)^2 \times 10^4$ (2) $4\pi^2 c^2\mu^2 (2150) \times 10^{-4}$ (3) $4\pi^2 c^2\mu (2050)^2 \times 10^4$ (4) $4\pi^2 c^2\mu (2050) \times 10^2$
89.	The operator for linear momentum of a particle moving in a direction parallel to x-axis is given by (1) $\hat{p}_x = ih\frac{\partial}{\partial x}$ (2) $\hat{p}_x = -ih\frac{\partial}{\partial x}$ (3) $\hat{p}_x = -ih\frac{\partial^2}{\partial x^2}$ (4) $\hat{p}_x = -i\frac{h}{2\pi}.\frac{\partial}{\partial \pi}$
90.	The average of an observable quantity, x, is obtained by (1) $\hat{x} = \frac{<\psi x \psi^@>}{<\psi\psi^@>}$ (2) $\hat{x} = \frac{<\psi\psi^@ x>}{<\psi\psi^@>}$ (3) $\hat{x} = \frac{<\psi x^2\psi^@>}{<\psi\psi^@>}$ (4) $\hat{x} = \frac{<\psi\psi^@ x^2>}{<\psi\psi^@>}$ where ψ is the wave function
91.	Chromatography is based on (1) Physical absorption of the solute (2) Differential adsorption of different components (3) Chemisorption of the solute (4) Solubility of the solute

Question No.	Questions
92.	A hydrogen electrode and a normal calomel electrode had a voltage o 0.435 V when placed in a certain solution at 298 K. What will be the pH o the solution (1) 2.125 (2) 2.205 (3) 2.622 (4) 2.014
93.	A photon in 'X' region is more energetic than in the visible region. The 'X' is (1) Micro wave (2) Radio wave (3) IR (4) UV
94.	Select the correct statement (1) Composit reactions differ from complex reactions (2) Composit reactions involes more than one elementary reaction (3) Composit reactions involes only one elementary reaction (4) None of the above
95.	The values of van der Waal's constant "a" for gases O_2, N_2, NH_3 and CH_4 are 1.36, 1.39, 4.17 and 2.253 litre^2 atm mole^{-2} respectively. The gas which can most easily be liquified is (1) NH_3 (2) O_2 (3) N_2 (4) CH_4
96.	Frenkel defect appear in crystal in which (1) Size of anion is equal to size of cation (2) Size of anion is less than size of cation (3) Size of anion is much larger than cation (4) None of the above

Question No.	Questions
97.	Molar polarization, P_m, is independent of (1) Pressure (2) Temperature (3) Concentration (4) None of these
98.	At temperature near absolute zero gaseous molecules possess only (1) Translational energy (2) Rotational energy (3) Rotational and translational energy (4) Vibrational energy
99.	The molecule which is IR inactive but Raman active is (1) HCl (2) N_2 (3) SO_2 (4) Protein
100.	The cell potential is a (1) Intensive property (2) Extensive property (3) Thermodynamic property (4) Colligative property

Opened for Evaluation Purpose

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

(PG–EE–2016 : CHEMISTRY)

Sr. No. 12062

Code **B**

Time : 1¼ Hour **Max. Marks : 100** **Total Questions : 100**

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

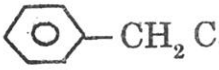
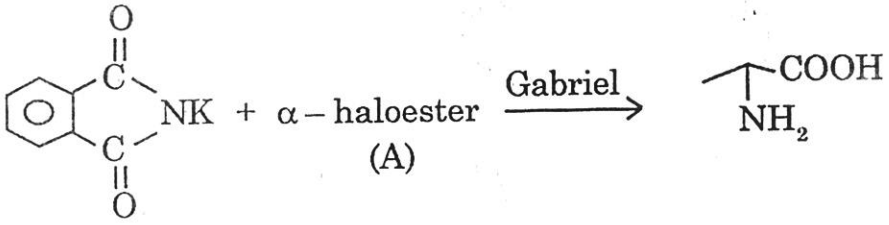
Mother's Name : _____ Date of Examination : _____

(Signature of the candidate) (Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. **All questions are compulsory.**
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing **within two hours** after the test is over. No such complaint(s) will be entertained thereafter.
4. The candidate MUST NOT do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
5. **There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.**
6. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

Question No.	Questions
1.	Which of the following compounds will exhibit geometrical isomerism (1) 1, 1-diphenyl-1-propene (2) 3-phenyl-1-butene (3) 2-phenyl-1-butene (4) 1-phenyl-2-butene
2.	Propyne and propene can be distinguished by (1) Conc. H_2SO_4 (2) Br_2 in CCl_4 (3) Dil. $KMnO_4$ (4) $AgNO_3$ in ammonia
3.	Which of the following has the most acidic hydrogen (1) 3-Hexanone (2) 2, 4-hexanedione (3) 2, 5-hexanedione (4) 2, 3-hexanedione
4.	Ammonia can be dried by (1) Conc. H_2SO_4 (2) P_4O_{11} (3) CaO (4) Anhydrous $CaCl_2$
5.	Amongst H_2O, H_2S, H_2Se and H_2Te, the one with the highest boiling point is (1) H_2O because of hydrogen bonding (2) H_2S because of hydrogen bonding (3) H_2Te because of higher molecular weight (4) H_2Se because of lower molecular weight
6.	When a mixture of one mole of C_6H_5COOH and one mole of C_6H_5OH is treated with one mole of $NaHCO_3$, the product formed will consist of (1) C_6H_5COOH, C_6H_5ONa (2) C_6H_5COONa, C_6H_5ONa (3) C_6H_5COONa, C_6H_5OH (4) None

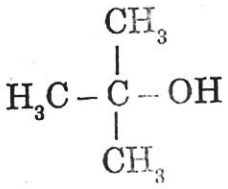
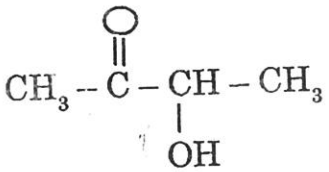
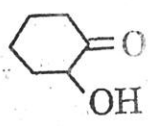
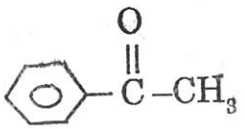
Question No.	Questions
7.	Addition of ethanol to aqueous hydrolysis of  does no increase the rate of hydrolysis but changes only the composition of fina products. This indicates that reaction is proceeding through (1) S_N2 (2) S_N1 (3) S_E2 (4) S_E1
8.	Which one of the following is the best method for the preparation o acetophenone (1) Ph COOEt + CH_3 MgBr (2) Ph COCl + CH_3 Mg Br (3) Ph $CONH_2$ + CH_3 Mg Br (4) PhCN + CH_3 Mg Br
9.	 Required product is obtained when A is (1) Ethyl-3-Chlorobutyrate (2) Ethyl-3-Chloropropionate (3) Ethyl-2-Chloropropionate (4) Ethyl Chloroacetate
10.	$C_6H_{10} \xrightarrow{\text{Ozonolysis}} HCHO + CH_3CHO + CH_2(CHO)_2$ C_6H_{10} is (1) 1, 2-hexadiene (2) 1, 3-hexadiene (3) 1, 4-hexadiene (4) 2-methyl-1, 3-pentadiene
11.	Chromatography is based on (1) Physical absorption of the solute (2) Differential adsorption of different components (3) Chemisorption of the solute (4) Solubility of the solute

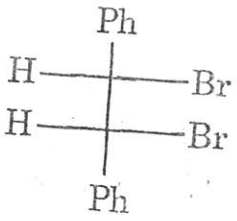
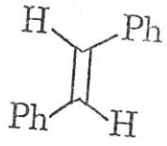
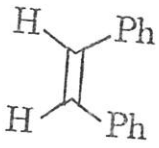
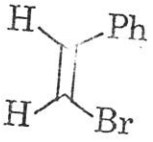
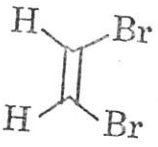
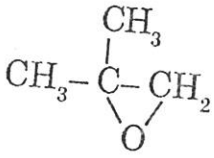
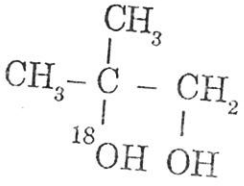
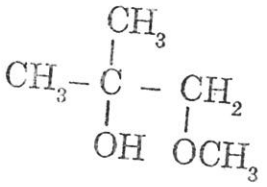
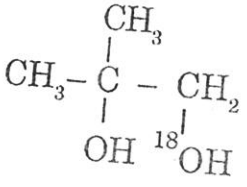
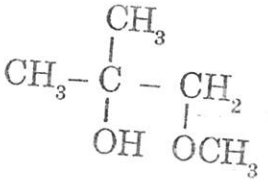
Question No.	Questions
12.	A hydrogen electrode and a normal calomel electrode had a voltage of 0.435 V when placed in a certain solution at 298 K. What will be the pH of the solution (1) 2.125 (2) 2.205 (3) 2.622 (4) 2.014
13.	A photon in 'X' region is more energetic than in the visible region. The 'X' is (1) Micro wave (2) Radio wave (3) IR (4) UV
14.	Select the correct statement (1) Composit reactions differ from complex reactions (2) Composit reactions involes more than one elementary reaction (3) Composit reactions involes only one elementary reaction (4) None of the above
15.	The values of van der Waal's constant "a" for gases O_2, N_2, NH_3 and CH_4 are 1.36, 1.39, 4.17 and 2.253 litre^2 atm mole^{-2} respectively. The gas which can most easily be liquified is (1) NH_3 (2) O_2 (3) N_2 (4) CH_4
16.	Frenkel defect appear in crystal in which (1) Size of anion is equal to size of cation (2) Size of anion is less than size of cation (3) Size of anion is much larger than cation (4) None of the above

Question No.	Questions
17.	Molar polarization, P_m, is independent of (1) Pressure (2) Temperature (3) Concentration (4) None of these
18.	At temperature near absolute zero gaseous molecules possess only (1) Translational energy (2) Rotational energy (3) Rotational and translational energy (4) Vibrational energy
19.	The molecule which is IR inactive but Raman active is (1) HCl (2) N_2 (3) SO_2 (4) Protein
20.	The cell potential is a (1) Intensive property (2) Extensive property (3) Thermodynamic property (4) Colligative property
21.	Consider a pure crystalline solid that is heated from absolute zero to a temperature above the boiling point of the liquid. Which of the following processes produces the greatest increase in entropy of the substance (1) Vaporizing the liquid (2) Melting the solid (3) Heating the liquid (4) Heating the gas
22.	Elastic deformation in polymers is due to (1) Slight adjustment of molecular chains (2) Slippage of molecular chains (3) Straightening of molecular chains (4) Severe of covalent bonds

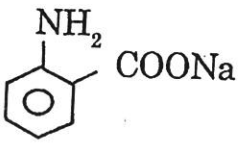
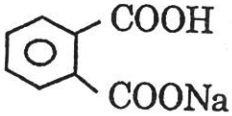
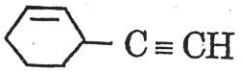
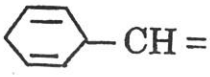
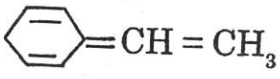
Question No.	Questions
23.	Which of the following process is responsible for the formation of delta at a place where rivers meet the sea (1) Emulsification (2) Coagulation (3) Colloid formation (4) Peptization
24.	Which of the following is correct for lyophillic sols (1) They are Irreversible (2) They are formed by inorganic substances (3) They are self stabilized (4) They are readily coagulated by addition of electrolytes
25.	Buffer solutions have constant acidity and alkalinity because (1) They have large excess of H^+ or OH^- ions (2) They have fixed value of pH (3) Acids and Alkalies in these solutions are shielded from attack by other ions (4) These give unionized acid or base on reaction with added acid or alkali
26.	Automobile steering wheels are normally made of (1) High density polythene (2) Cellulose acetate (3) Cellulose nitrate (4) PVC
27.	The de Broglie wavelength of an electron with kinetic energy of 1.0 eV is (1) 28.7 pm (2) 2.87 pm (3) 12.3 nm (4) 1.23 nm
28.	If moisture and dirt entrapment is a major problem, it would be a good practice to (1) Butt weld (2) Stop weld (3) Skip weld (4) Stitch weld

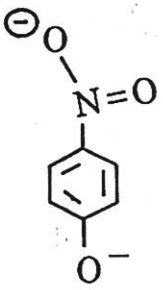
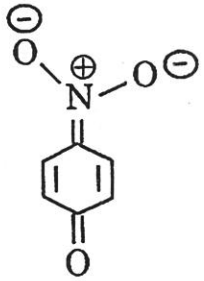
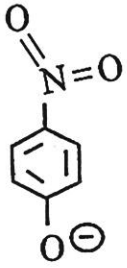
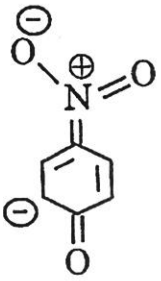
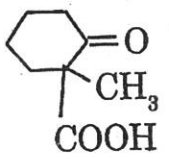
Question No.	Questions
29.	Iron crystallises in a b.c.c system with a = 2.86 Å . The density of Iron is (1) 79.2 g cm^{-3} (2) 7.92 g cm^{-3} (3) 0.79 g cm^{-3} (4) 792 g cm^{-3}
30.	The Born Lande equation for the estimation of lattice energy of an ionic crystal is (1) $U_0 = \frac{MN_A Z_+ e}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (2) $U_0 = \frac{MN_A Z_- e}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (3) $U_0 = \frac{MN_A Z_+ Z_- e^2}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (4) None of these
31.	Thorium element belongs to (1) Alkali metal (2) Transition elements (3) Lanthanides (4) Actinides
32.	H_2S would separate the following at pH < 7 (1) Zn^{2+}, Co^{2+} (2) Cu^{2+}, Cd^{2+} (3) Cu^{2+}, Cr^{3+} (4) Cu^{2+}, As^{3+}
33.	Nitrite (NO_2^-) interferes in the 'ring-test' of nitrate (NO_3^-). Some of the following reagents can be used for the removal of nitrite (I) NH_4Cl (II) $(NH_2)_2$ CS thiourea (III) NH_2SO_3H (sulphamic acid) (IV) Sulphanilic acid Correct choice is (1) I, II (2) I, II, IV (3) I, II, III (4) II, III, IV

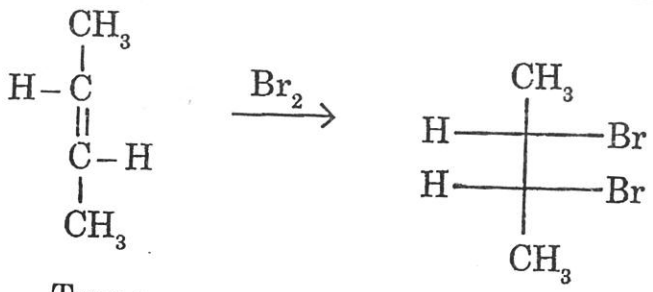
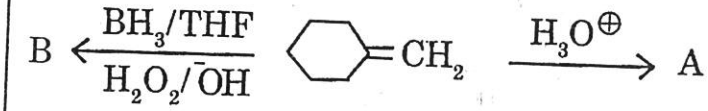
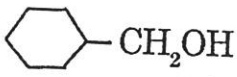
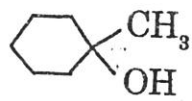
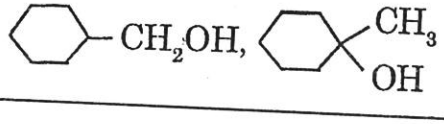
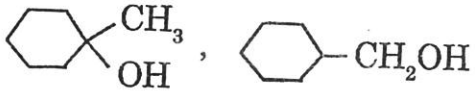
Question No.	Questions
34.	The oxidation number of Fe in K_4 [Fe $(CN)_6$] is (1) 3 (2) 2 (3) 0 (4) 1
35.	CFSE value for an octahedral low spin d^6 metal ion complex will be (1) 20 Dq (2) 24 Dq (3) 12 Dq (4) 6 Dq
36.	The number of unpaired electrons in a d^7 tetrahedral complex (1) 3 (2) 2 (3) 1 (4) 7
37.	E.A.N in $[Ni(NH_3)_6]^{2+}$ is (1) 38 (2) 36 (3) 40 (4) 37
38.	Term symbol for ground state V^{3+} is (1) $^3F_2$ (2) $^4S_{3/2}$ (3) $^3P_0$ (4) $^3P_2$
39.	How many geometrical isomers are possible for [Co $(NH_3)_4$ Cl_2] (1) two (2) three (3) four (4) six
40.	Which of the following metal-carbonyls is paramagnetic (1) Fe $(CO)_5$ (2) Ni $(CO)_4$ (3) V $(CO)_6$ (4) Cr $(CO)_6$
41.	Maximum dehydration takes place of (1)  (2)  (3)  (4) 

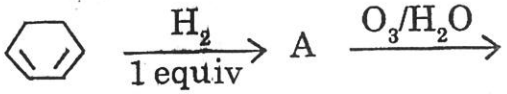
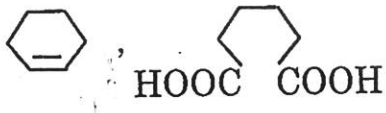
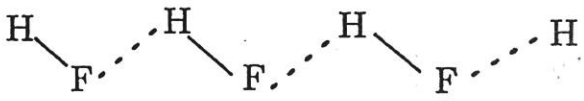
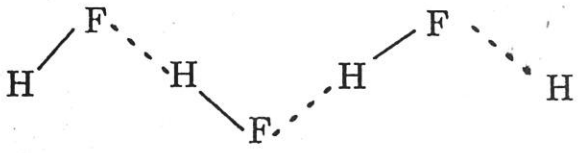
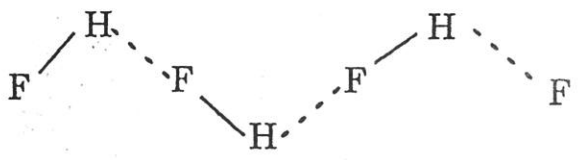
Question No.	Questions
42.	 $\xrightarrow[\text{Acetone}]{\text{Na I}}$ A A is (1)  (2)  (3)  (4) 
43.	B $\xleftarrow[CH_3ONa]{CH_3OH}$  $\xrightarrow[H^{\oplus}]{H_2O^{18}}$ A A and B are (1)   (2)   (3) Both are correct (4) None is correct

Question No.	Questions
44.	Glycerol + $KHSO_4$ $\longrightarrow$ A $\xrightarrow{HC\ell O}$ B A and B are (1) $CH_2 = CH - CHO$, $CH_2(C\ell) - CH(OH) - CHO$ (2) $CH_2 = CH - CHO$, $CH_2(OH) - CH(C\ell) - CHO$ (3) $CH_2 = CH - CHO$, $CH_3 - CH(OC\ell) - CHO$ (4) None is correct
45.	The quantum numbers, for the outer electrons of an atom are given by $n = 2$; $\ell = 0$; $m = 0$; $s = + 1/2$ (1) Lithium (2) Beryllium (3) Hydrogen (4) Boron
46.	"The exact path of electron 2p-orbital cannot be determined" The above statement is based upon (1) Hund's rule (2) Bohr's rule (3) Uncertainty principle (4) Aufbau principle
47.	The ground state configuration of Fe^{3+} ion in gaseous state is : (At. No. of Fe = 26) (1) $[Ar]^{18}\ 3d^3\ 4s^2$ (2) $[Ar]^{18}\ 3d^6\ 4s^2$ (3) $[Ar]^{18}\ 3d^5$ (4) $[Ar]^{18}\ 3d^6$

Question No.	Questions
48.	Which of the following is the smallest in size (1) N^{3-} (2) O^{2-} (3) F^- (4) Na^+
49.	The electronegativity of the following elements increases in the order (1) C, N, Si, P (2) N, Si, C, P (3) Si, P, C, N (4) P, Si, N, C
50.	In ClF_3, Chlorine is (1) sp^2 hybridized (2) sp^3 hybridized (3) sp^3d hybridized (4) sp^3d^2 hybridized
51.	Reagent which can convert an alkyl amine into alkyl chloride (1) Hinsberg's reagent (2) Lucas reagent (3) Tilden reagent (4) None
52.	Which is/are acid salt (1)  (2)  (3) NaH_2PO_2 (4) Na_2HPO_3
53.	Index of unsaturation of C_8H_{10} in six membered structure is (1) 4,  (2) 4,  (3) 4,  (4) All true

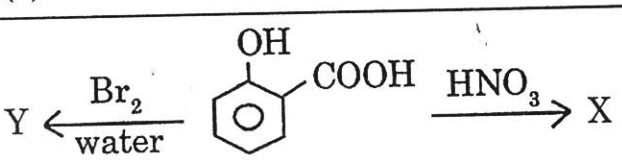
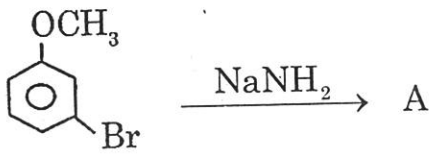
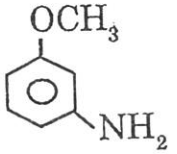
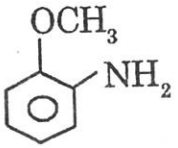
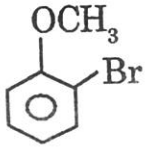
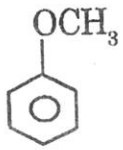
Question No.	Questions
54.	The mononitration of acetanilide ($C_6H_5NHCOCH_3$) gives predominantly (1) 3-nitroacetanilide (2) 2-nitroacetanilide (3) 2-, and 3-nitroacetanilide (4) 4-nitroacetanilide
55.	The most unlikely representation of resonance structures of p-nitrophenoxide ion is (1)  (2)  (3)  (4) 
56.	Chirality is lost when (1) $CH_3-\underset{\underset{OH}{|}}{CH}-COOH$ is heated (2)  is heated (3) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2COOH$ is heated (4) $CH_3-\underset{\underset{CH_2}{|}}{CH}-COOH$ is heated

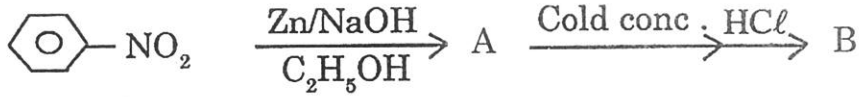
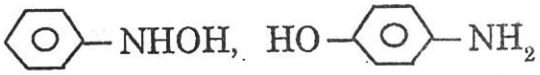
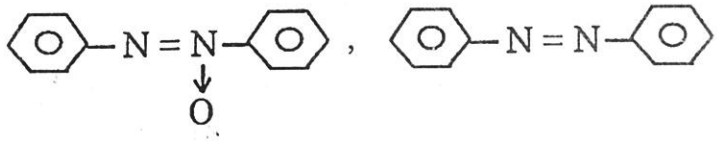
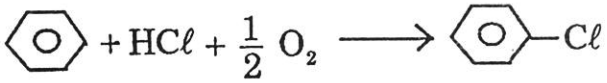
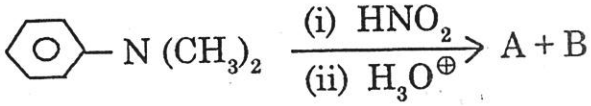
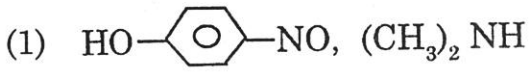
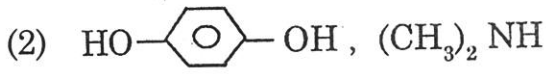
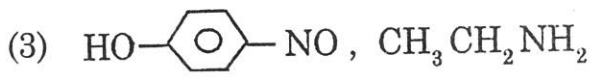
Question No.	Questions
57.	 Trans A which is true statement (1) A is formed by anti addition and is meso (2) A is formed by syn addition and is meso (3) A is formed by anti addition and is racemic (4) A is formed by syn addition and is racemic
58.	 A and B are (1) Both  (2) Both  (3)  (4) 
59.	$CH \equiv C-COOH \xrightarrow{Hg\,SO_4/H_2SO_4}$ Product (1) $CH_3-\underset{\underset{O}{\|}}{C}-COOH$ (2) $OHC\,CH_2\,COOH$ (3) $CH_2=\underset{\underset{OH}{\|}}{C}-COOH$ (4) $HO-CH=CH-COOH$

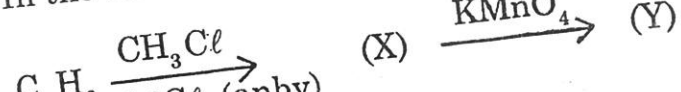
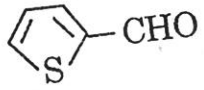
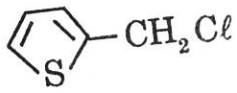
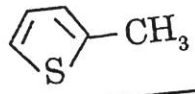
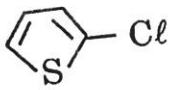
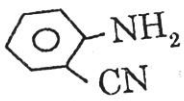
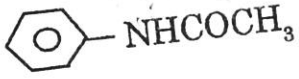
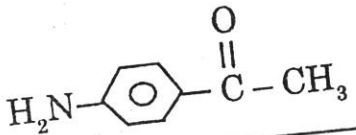
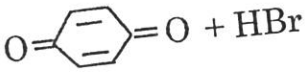
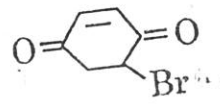
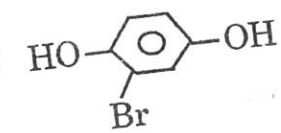
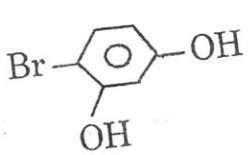
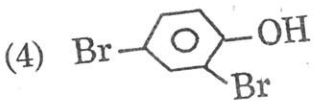
Question No.	Questions
60.	 A and B are (1)  (2) , not formed (3) (4) None is correct
61.	The angles between covalent bonds is maximum in (1) CH_4 (2) BF_3 (3) PF_3 (4) NH_3
62.	Ionic solids with Schottky defects contain in their structure (1) equal number of cation and anion vacancies (2) interstitial anions and anion vacancies (3) cation vacancies only (4) cation vacancies and interstitial cations
63.	The H-Bonds in solid HF can be best represented as (1) H—F ----- H—F ----- H — F (2)  (3)  (4) 

Question No.	Questions
64.	In which of the following molecules the van der Wall's forces is likely to be the most important in determining the m.pt. and b.pt. (1) CO (2) H_2S (3) Br_2 (4) HCl
65.	Alkali metal hydrides react with water to give (1) Acidic solution (2) Basic solution (3) Neutral solution (4) Hydride ion
66.	Which is a planar molecule (1) XeO_4 (2) XeF_4 (3) $XeOF_4$ (4) XeO_2F_2
67.	A silicate used in talcum powder (1) consists of planar sheets which can slip over another (2) is known as talc (3) is a pure magnesium silicate of the form 3 MgO.4 SiO_2. H_2O (4) All of these
68.	Which of the following has the stronger bond (1) F – B (2) F – Cl (3) F – Br (4) Cl – Br
69.	Which one of the following metal ions is coloured (1) Cu^+ (2) Zn^{2+} (3) Sc^{3+} (4) V^{4+}
70.	Among the lanthanides the one obtained by synthetic method is (1) Lu (2) Pm (3) Pr (4) Gd
71.	Which of the following carbonyls does not possess bridged CO (1) $Fe_2(CO)_9$ (2) $Fe_3(CO)_{12}$ (3) $Ru_3(CO)_{12}$ (4) $Co_2(CO)_8$

Question No.	Questions
72.	CH_3HgOH is classified as (1) Soft-Soft (2) Hard-Hard (3) Soft-Hard (4) Hard-Soft
73.	Which of the following is not border line acid (1) Bi^{3+} (2) BMe_3 (3) SO_2 (4) CO_2
74.	According to spectrochemical series which ligand will produce greater crystal field splitting (1) F^- (2) NH_3 (3) NO_2^- (4) CO
75.	The transition in $[Cu(H_2O)_6]^{2+}$ complexes is due to (1) Presence of water molecules (2) Intermolecular vibrations (3) Promotion of an electron from T_{2g} to Eg level as the transfer of hole from Eg to T_{2g} level (4) Excitation of electron from 3d to 4s energy level
76.	Vitamin B_{12} contains (1) Selenium (2) Zinc (3) Cobalt (4) Iron
77.	Which complex ion is thermodynamically stable and kinetically labile (1) $[Cu(NH_3)_4]^{2+}$ (2) $[Cr(CN)_6]^{3-}$ (3) $[Mn(CN)_6]^{3-}$ (4) $[Ni(CN)_4]^{2-}$

Question No.	Questions
78.	Radioactivity of a sample (Z = 22) decreases 90% after 10 years. What will be the half life of the sample (1) 5 years (2) 2 years (3) 3 years (4) 10 years
79.	A catalyst is a substance which (1) Supplies energy to the reaction (2) Shortens the time to reach the equilibrium (3) Increases the equilibrium constant of the reaction (4) Increases the equilibrium concentration of the product
80.	The temperature of the system decreases in an (1) Adiabatic compression (2) Isothermal expansion (3) Isothermal compression (4) Adiabatic expansion
81.	 X and Y are (1) Picric acid, 2, 4, 6 – tribromophenol (2) 4-nitro salicylic acid, 4-bromo salicylic acid (3) o-nitrophenol, o-bromophenol (4) None is correct
82.	 A is (1)  (2)  (3)  (4) 

Question No.	Questions
83.	 A and B are (1)  (2) (3)  (4) None is correct
84.	 This is called ..... reaction (1) Sandmeyer (2) Raschig (3) Gatterman (4) Hofmann
85.	 (1)  (2)  (3)  (4) None is correct

Question No.	Questions
86.	In the reaction sequence  The product (Y) is (1) Chlorobenzene (2) Benzaldehyde (3) Benzoic acid (4) Benzene
87.	Thiophene reacts with HCHO in presence of aqueous HCℓ to give (1)  (2)  (3)  (4) 
88.	Which is weaker base than aniline (1)  (2)  (3)  (4) All
89.	End product of following reaction is  (1)  (2)  (3)  (4) 

Question No.	Questions
90.	The reagent with which both aldehydes and ketones react easily is (1) Fehling's reagent (2) Schiff's reagent (3) Tollen's reagent (4) Grignard reagent
91.	Polydispersity index (P.D.I) of a polymer sample is given by (1) $P.D.I = \overline{M}_m - \overline{M}_n$ (2) $P.D.I = \overline{M}_m + \overline{M}_n$ (3) $P.D.I = \overline{M}_m \overline{M}_n$ (4) $P.D.I = \overline{M}_m / \overline{M}_n$ where $\overline{M}_m, \overline{M}_n$ are mass average and number-average molar masses respectively
92.	The coefficient of thermal expansion, α, is expressed as (1) $\alpha = -\frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$ (2) $\alpha = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$ (3) $\alpha = \frac{1}{T}\left(\frac{\partial V}{\partial T}\right)_P$ (4) $\alpha = -\frac{1}{T}\left(\frac{\partial V}{\partial T}\right)_P$
93.	In B.E.T equation, which of the following statements is not true (1) It does not use the concept of saturated vapour pressure (2) It considers the multilayer adsorption (3) It is not valid for porous adsorbent (4) It uses the concept of latent heat of condensation

Question No.	Questions
94.	Entropy is related to thermodynamic probability, W, by relation (1) $S = R\ell nW$ (2) $S = R - \ell nW$ (3) $S = k\ell nW$ (4) $S = k + \ell nW$
95.	The number of macro states for the distribution of three atoms (having total energy = 3 quanta) among ground, first, second states (possessing zero, one and two quanta of Energy respectively) are (1) one (2) six (3) ten (4) three
96.	The Ilkovic equation for diffusion current is given by (1) $\vec{i}_d = 607\ nDC\ m^{2/3}\ t^{1/2}$ (2) $\vec{i}_d = 607\ nD^{1/2}C\ m^{2/3}\ t^{1/6}$ (3) $\vec{i}_d = 607\ nDC^{1/2}\ m^{2/3}\ t^{1/6}$ (4) $\vec{i}_d = 607\ nD^{1/2}\ m^{2/3}\ t^{1/6}$ All notations have their usual meanings
97.	In the lead acid battery during charging the cathode reaction is (1) Reduction of Pb^{2+} to Pb (2) Formation of $PbSO_4$ (3) Formation of PbO_2 (4) None of these
98.	The fundamental vibrational frequency of carbon mono oxide (CO) molecule is 2050 cm^{-1}. The force constant of CO molecule will be (1) $4\pi^2\, c\mu\,(2050)^2 \times 10^4$ (2) $4\pi^2\, c^2\mu^2\,(2150) \times 10^{-4}$ (3) $4\pi^2\, c^2\mu\,(2050)^2 \times 10^4$ (4) $4\pi^2\, c^2\mu\,(2050) \times 10^2$

Question No.	Questions
99.	The operator for linear momentum of a particle moving in a direction parallel to x-axis is given by (1) $\hat{p}_x = ih\frac{\partial}{\partial x}$ (2) $\hat{p}_x = -ih\frac{\partial}{\partial x}$ (3) $\hat{p}_x = -ih\frac{\partial^2}{\partial x^2}$ (4) $\hat{p}_x = -i\frac{h}{2\pi}\cdot\frac{\partial}{\partial \pi}$
100.	The average of an observable quantity, x, is obtained by (1) $\hat{x} = \frac{<\psi x \psi^@>}{<\psi\psi^@>}$ (2) $\hat{x} = \frac{<\psi\psi^@ x>}{<\psi\psi^@>}$ (3) $\hat{x} = \frac{<\psi x^2\psi^@>}{<\psi\psi^@>}$ (4) $\hat{x} = \frac{<\psi\psi^@ x^2>}{<\psi\psi^@>}$ where ψ is the wave function

Opened for Evaluation Purpose

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(PG–EE–2016 : CHEMISTRY)

Code D

Sr. No. 12064

Time : 1¼ Hour **Max. Marks : 100** **Total Questions : 100**

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

Mother's Name : _____ Date of Examination : _____

(Signature of the candidate) (Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. **All questions are compulsory.**
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing **within two hours** after the test is over. No such complaint(s) will be entertained thereafter.
4. The candidate MUST NOT do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
5. **There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.**
6. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

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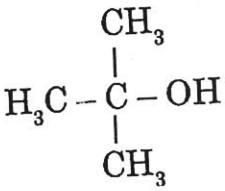
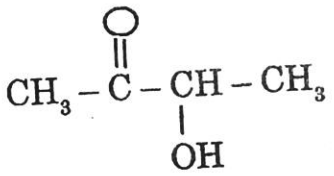
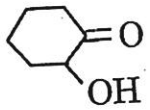
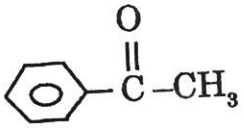
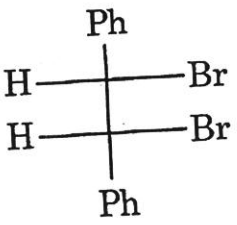
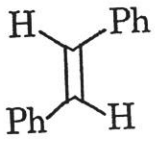
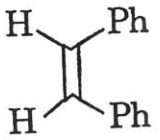
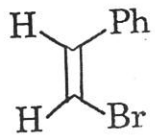
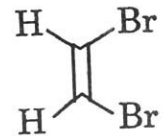
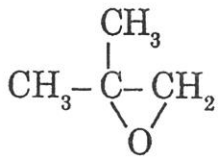
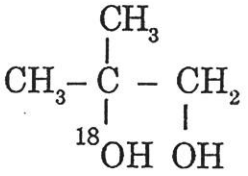
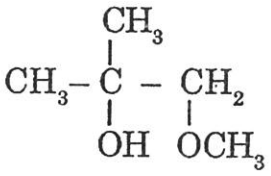
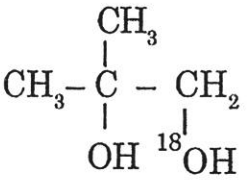
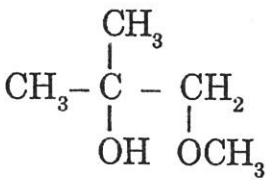
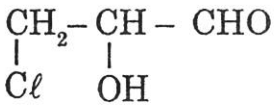
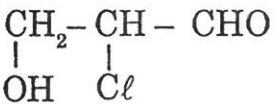
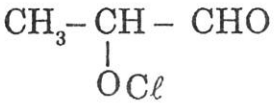
Question No.	Questions
1.	Consider a pure crystalline solid that is heated from absolute zero to a temperature above the boiling point of the liquid. Which of the following processes produces the greatest increase in entropy of the substance (1) Vaporizing the liquid (2) Melting the solid (3) Heating the liquid (4) Heating the gas
2.	Elastic deformation in polymers is due to (1) Slight adjustment of molecular chains (2) Slippage of molecular chains (3) Straightening of molecular chains (4) Severe of covalent bonds
3.	Which of the following process is responsible for the formation of delta at a place where rivers meet the sea (1) Emulsification (2) Coagulation (3) Colloid formation (4) Peptization
4.	Which of the following is correct for lyophillic sols (1) They are Irreversible (2) They are formed by inorganic substances (3) They are self stabilized (4) They are readily coagulated by addition of electrolytes
5.	Buffer solutions have constant acidity and alkalinity because (1) They have large excess of H^+ or OH^- ions (2) They have fixed value of pH (3) Acids and Alkalies in these solutions are shielded from attack by other ions (4) These give unionized acid or base on reaction with added acid or alkali

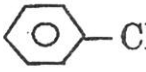
Question No.	Questions
6.	Automobile steering wheels are normally made of (1) High density polythene (2) Cellulose acetate (3) Cellulose nitrate (4) PVC
7.	The de Broglie wavelength of an electron with kinetic energy of 1.0 eV is (1) 28.7 pm (2) 2.87 pm (3) 12.3 nm (4) 1.23 nm
8.	If moisture and dirt entrapment is a major problem, it would be a good practice to (1) Butt weld (2) Stop weld (3) Skip weld (4) Stitch weld
9.	Iron crystallises in a b.c.c system with a = 2.86 Å . The density of Iron is (1) 79.2 g cm^{-3} (2) 7.92 g cm^{-3} (3) 0.79 g cm^{-3} (4) 792 g cm^{-3}
10.	The Born Lande equation for the estimation of lattice energy of an ionic crystal is (1) $U_0 = \frac{MN_A Z_+ e}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (2) $U_0 = \frac{MN_A Z_- e}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (3) $U_0 = \frac{MN_A Z_+ Z_- e^2}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (4) None of these
11.	Thorium element belongs to (1) Alkali metal (2) Transition elements (3) Lanthanides (4) Actinides

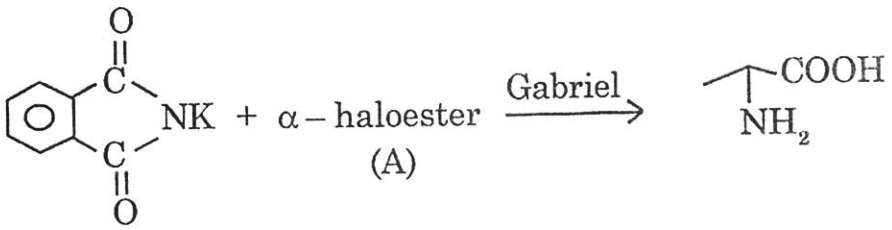
Question No.	Questions
12.	H_2S would separate the following at pH < 7 (1) Zn^{2+}, Co^{2+} (2) Cu^{2+}, Cd^{2+} (3) Cu^{2+}, Cr^{3+} (4) Cu^{2+}, As^{3+}
13.	Nitrite (NO_2^-) interferes in the 'ring-test' of nitrate (NO_3^-). Some of the following reagents can be used for the removal of nitrite (I) NH_4Cl (II) $(NH_2)_2$ CS thiourea (III) NH_2SO_3H (sulphamic acid) (IV) Sulphanilic acid Correct choice is (1) I, II (2) I, II, IV (3) I, II, III (4) II, III, IV
14.	The oxidation number of Fe in K_4 [Fe $(CN)_6$] is (1) 3 (2) 2 (3) 0 (4) 1
15.	CFSE value for an octahedral low spin d^6 metal ion complex will be (1) 20 Dq (2) 24 Dq (3) 12 Dq (4) 6 Dq
16.	The number of unpaired electrons in a d^7 tetrahedral complex (1) 3 (2) 2 (3) 1 (4) 7
17.	E.A.N in $[Ni(NH_3)_6]^{2+}$ is (1) 38 (2) 36 (3) 40 (4) 37
18.	Term symbol for ground state V^{3+} is (1) $^3F_2$ (2) $^4S_{3/2}$ (3) $^3P_0$ (4) $^3P_2$

Question No.	Questions
19.	How many geometrical isomers are possible for $[Co(NH_3)_4 Cl_2]$ (1) two (2) three (3) four (4) six
20.	Which of the following metal-carbonyls is paramagnetic (1) $Fe(CO)_5$ (2) $Ni(CO)_4$ (3) $V(CO)_6$ (4) $Cr(CO)_6$
21.	Maximum dehydration takes place of (1)  (2)  (3)  (4) 
22.	 $\xrightarrow[\text{Acetone}]{\text{Na I}}$ A A is (1)  (2)  (3)  (4) 

Question No.	Questions
23.	$B \xleftarrow[CH_3ONa]{CH_3OH}$  $\xrightarrow[H^{\oplus}]{H_2O^{18}} A$ A and B are (1)   (2)   (3) Both are correct (4) None is correct
24.	Glycerol + $KHSO_4 \longrightarrow A \xrightarrow{HC\ell O} B$ A and B are (1) $CH_2 = CH - CHO$,  (2) $CH_2 = CH - CHO$,  (3) $CH_2 = CH - CHO$,  (4) None is correct

Question No.	Questions
25.	The quantum numbers, for the outer electrons of an atom are given by $n = 2$; $\ell = 0$; $m = 0$; $s = + 1/2$ (1) Lithium (2) Beryllium (3) Hydrogen (4) Boron
26.	"The exact path of electron 2p-orbital cannot be determined" The above statement is based upon (1) Hund's rule (2) Bohr's rule (3) Uncertainty principle (4) Aufbau principle
27.	The ground state configuration of Fe^{3+} ion in gaseous state is : (At. No. of Fe = 26) (1) $[Ar]^{18}\ 3d^3\ 4s^2$ (2) $[Ar]^{18}\ 3d^6\ 4s^2$ (3) $[Ar]^{18}\ 3d^5$ (4) $[Ar]^{18}\ 3d^6$
28.	Which of the following is the smallest in size (1) N^{3-} (2) O^{2-} (3) F^- (4) Na^+
29.	The electronegativity of the following elements increases in the order (1) C, N, Si, P (2) N, Si, C, P (3) Si, P, C, N (4) P, Si, N, C
30.	In ClF_3, Chlorine is (1) sp^2 hybridized (2) sp^3 hybridized (3) sp^3d hybridized (4) sp^3d^2 hybridized
31.	Which of the following compounds will exhibit geometrical isomerism (1) 1, 1-diphenyl-1-propene (2) 3-phenyl-1-butene (3) 2-phenyl-1-butene (4) 1-phenyl-2-butene

Question No.	Questions
32.	Propyne and propene can be distinguished by (1) Conc. H_2SO_4 (2) Br_2 in CCl_4 (3) Dil. $KMnO_4$ (4) $AgNO_3$ in ammonia
33.	Which of the following has the most acidic hydrogen (1) 3-Hexanone (2) 2, 4-hexanedione (3) 2, 5-hexanedione (4) 2, 3-hexanedione
34.	Ammonia can be dried by (1) Conc. H_2SO_4 (2) P_4O_{11} (3) CaO (4) Anhydrous $CaCl_2$
35.	Amongst H_2O, H_2S, H_2Se and H_2Te, the one with the highest boiling point is (1) H_2O because of hydrogen bonding (2) H_2S because of hydrogen bonding (3) H_2Te because of higher molecular weight (4) H_2Se because of lower molecular weight
36.	When a mixture of one mole of C_6H_5COOH and one mole of C_6H_5OH is treated with one mole of $NaHCO_3$, the product formed will consist of (1) C_6H_5COOH, C_6H_5ONa (2) C_6H_5COONa, C_6H_5ONa (3) C_6H_5COONa, C_6H_5OH (4) None
37.	Addition of ethanol to aqueous hydrolysis of  does not increase the rate of hydrolysis but changes only the composition of final products. This indicates that reaction is proceeding through (1) S_N2 (2) S_N1 (3) S_E2 (4) S_E1

Question No.	Questions
38.	Which one of the following is the best method for the preparation of acetophenone (1) Ph COOEt + CH_3 MgBr (2) Ph COCl + CH_3 Mg Br (3) Ph $CONH_2$ + CH_3 Mg Br (4) PhCN + CH_3 Mg Br
39.	 Required product is obtained when A is (1) Ethyl-3-Chlorobutyrate (2) Ethyl-3-Chloropropionate (3) Ethyl-2-Chloropropionate (4) Ethyl Chloroacetate
40.	$C_6H_{10} \xrightarrow{\text{Ozonolysis}} HCHO + CH_3CHO + CH_2(CHO)_2$ C_6H_{10} is (1) 1, 2-hexadiene (2) 1, 3-hexadiene (3) 1, 4-hexadiene (4) 2-methyl-1, 3-pentadiene
41.	Chromatography is based on (1) Physical absorption of the solute (2) Differential adsorption of different components (3) Chemisorption of the solute (4) Solubility of the solute
42.	A hydrogen electrode and a normal calomel electrode had a voltage of 0.435 V when placed in a certain solution at 298 K. What will be the pH of the solution (1) 2.125 (2) 2.205 (3) 2.622 (4) 2.014

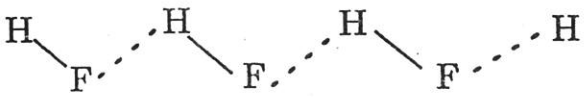
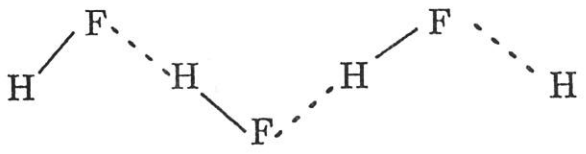
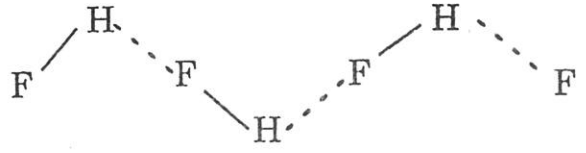
Question No.	Questions
43.	A photon in 'X' region is more energetic than in the visible region. The 'X' is (1) Micro wave (2) Radio wave (3) IR (4) UV
44.	Select the correct statement (1) Composit reactions differ from complex reactions (2) Composit reactions involes more than one elementary reaction (3) Composit reactions involes only one elementary reaction (4) None of the above
45.	The values of van der Waal's constant "a" for gases O_2, N_2, NH_3 and CH_4 are 1.36, 1.39, 4.17 and 2.253 litre^2 atm mole^{-2} respectively. The gas which can most easily be liquified is (1) NH_3 (2) O_2 (3) N_2 (4) CH_4
46.	Frenkel defect appear in crystal in which (1) Size of anion is equal to size of cation (2) Size of anion is less than size of cation (3) Size of anion is much larger than cation (4) None of the above
47.	Molar polarization, P_m, is independent of (1) Pressure (2) Temperature (3) Concentration (4) None of these
48.	At temperature near absolute zero gaseous molecules possess only (1) Translational energy (2) Rotational energy (3) Rotational and translational energy (4) Vibrational energy

Question No.	Questions
49.	The molecule which is IR inactive but Raman active is (1) HCl (2) N_2 (3) SO_2 (4) Protein
50.	The cell potential is a (1) Intensive property (2) Extensive property (3) Thermodynamic property (4) Colligative property
51.	Which of the following carbonyls does not possess bridged CO (1) $Fe_2(CO)_9$ (2) $Fe_3(CO)_{12}$ (3) $Ru_3(CO)_{12}$ (4) $Co_2(CO)_8$
52.	CH_3HgOH is classified as (1) Soft-Soft (2) Hard-Hard (3) Soft-Hard (4) Hard-Soft
53.	Which of the following is not border line acid (1) Bi^{3+} (2) BMe_3 (3) SO_2 (4) CO_2
54.	According to spectrochemical series which ligand will produce greater crystal field splitting (1) F^- (2) NH_3 (3) NO_2^- (4) CO
55.	The transition in $[Cu(H_2O)_6]^{2+}$ complexes is due to (1) Presence of water molecules (2) Intermolecular vibrations (3) Promotion of an electron from T_{2g} to Eg level as the transfer of hole from Eg to T_{2g} level (4) Excitation of electron from 3d to 4s energy level

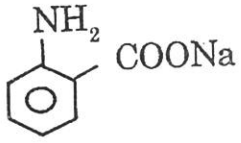
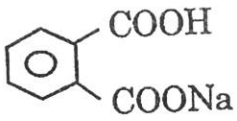
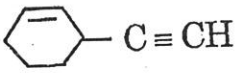
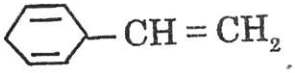
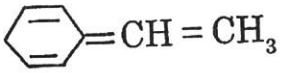
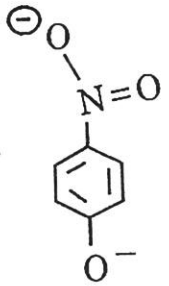
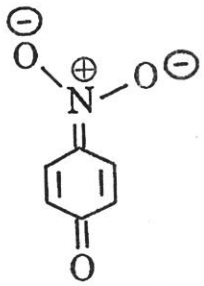
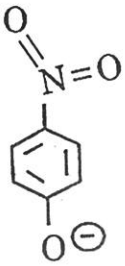
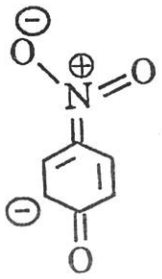
Question No.	Questions
56.	Vitamin B_{12} contains (1) Selenium (2) Zinc (3) Cobalt (4) Iron
57.	Which complex ion is thermodynamically stable and kinetically labile (1) $[Cu(NH_3)_4]^{2+}$ (2) $[Cr(CN)_6]^{3-}$ (3) $[Mn(CN)_6]^{3-}$ (4) $[Ni(CN)_4]^{2-}$
58.	Radioactivity of a sample (Z = 22) decreases 90% after 10 years. What will be the half life of the sample (1) 5 years (2) 2 years (3) 3 years (4) 10 years
59.	A catalyst is a substance which (1) Supplies energy to the reaction (2) Shortens the time to reach the equilibrium (3) Increases the equilibrium constant of the reaction (4) Increases the equilibrium concentration of the product
60.	The temperature of the system decreases in an (1) Adiabatic compression (2) Isothermal expansion (3) Isothermal compression (4) Adiabatic expansion

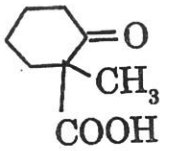
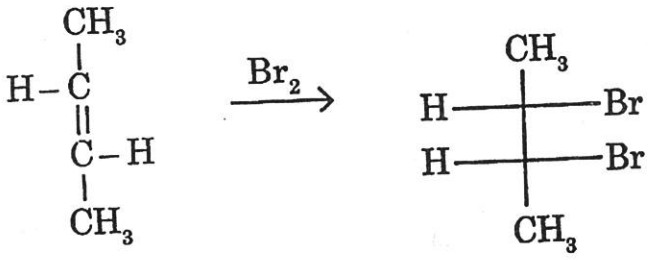
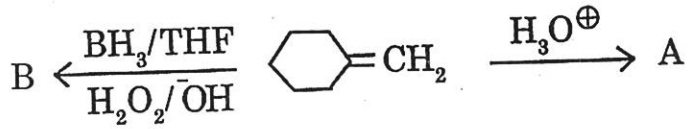
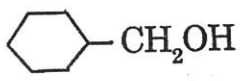
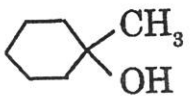
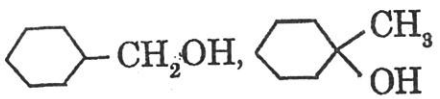
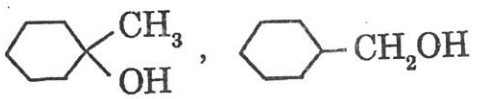
Question No.	Questions
61.	Polydispersity index (P.D.I) of a polymer sample is given by (1) $P.D.I = \overline{M}_m - \overline{M}_n$ (2) $P.D.I = \overline{M}_m + \overline{M}_n$ (3) $P.D.I = \overline{M}_m \overline{M}_n$ (4) $P.D.I = \overline{M}_m / \overline{M}_n$ where $\overline{M}_m, \overline{M}_n$ are mass average and number-average molar masses respectively
62.	The coefficient of thermal expansion, α, is expressed as (1) $\alpha = -\frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$ (2) $\alpha = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$ (3) $\alpha = \frac{1}{T}\left(\frac{\partial V}{\partial T}\right)_P$ (4) $\alpha = -\frac{1}{T}\left(\frac{\partial V}{\partial T}\right)_P$
63.	In B.E.T equation, which of the following statements is not true (1) It does not use the concept of saturated vapour pressure (2) It considers the multilayer adsorption (3) It is not valid for porous adsorbent (4) It uses the concept of latent heat of condensation
64.	Entropy is related to thermodynamic probability, W, by relation (1) $S = R\ell nW$ (2) $S = R - \ell nW$ (3) $S = k\ell nW$ (4) $S = k + \ell nW$

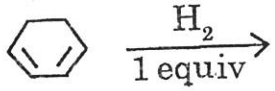
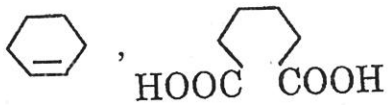
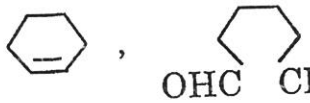
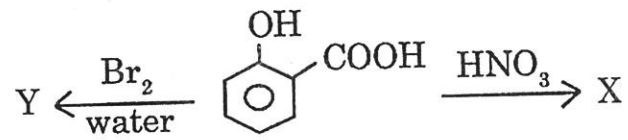
Question No.	Questions
65.	The number of macro states for the distribution of three atoms (having total energy = 3 quanta) among ground, first, second states (possessing zero, one and two quanta of Energy respectively) are (1) one (2) six (3) ten (4) three
66.	The Ilkovic equation for diffusion current is given by (1) $\vec{i}_d = 607\ nDC\ m^{2/3}\ t^{1/2}$ (2) $\vec{i}_d = 607\ nD^{1/2}C\ m^{2/3}\ t^{1/6}$ (3) $\vec{i}_d = 607\ nDC^{1/2}\ m^{2/3}\ t^{1/6}$ (4) $\vec{i}_d = 607\ nD^{1/2}\ m^{2/3}\ t^{1/6}$ All notations have their usual meanings
67.	In the lead acid battery during charging the cathode reaction is (1) Reduction of Pb^{2+} to Pb (2) Formation of $PbSO_4$ (3) Formation of PbO_2 (4) None of these
68.	The fundamental vibrational frequency of carbon mono oxide (CO) molecule is 2050 cm^{-1}. The force constant of CO molecule will be (1) $4\pi^2\, c\mu\,(2050)^2 \times 10^4$ (2) $4\pi^2\, c^2\mu^2\,(2150)\times 10^{-4}$ (3) $4\pi^2\, c^2\mu\,(2050)^2 \times 10^4$ (4) $4\pi^2\, c^2\mu\,(2050)\times 10^2$
69.	The operator for linear momentum of a particle moving in a direction parallel to x-axis is given by (1) $\hat{p}_x = ih\frac{\partial}{\partial x}$ (2) $\hat{p}_x = -ih\frac{\partial}{\partial x}$ (3) $\hat{p}_x = -ih\frac{\partial^2}{\partial x^2}$ (4) $\hat{p}_x = -i\frac{h}{2\pi}\cdot\frac{\partial}{\partial \pi}$

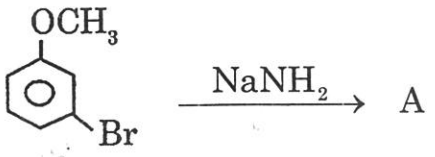
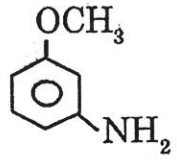
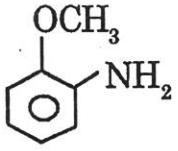
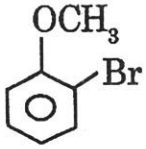
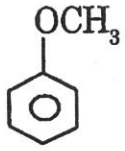
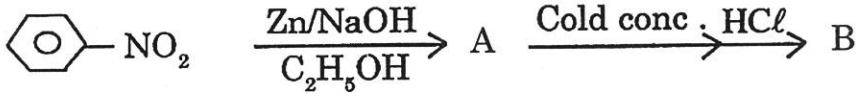
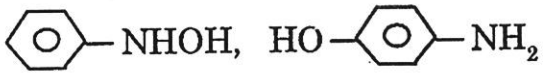
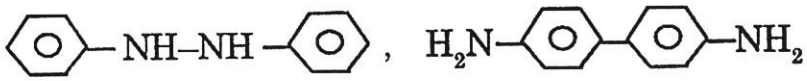
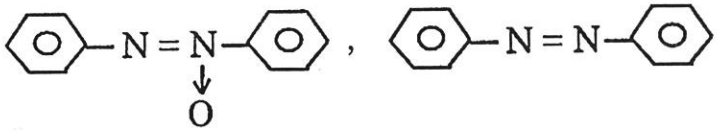
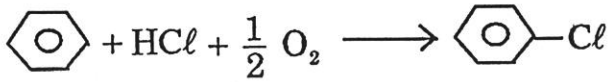
Question No.	Questions
70.	The average of an observable quantity, x, is obtained by (1) $\hat{x} = \frac{<\psi x \psi^{@}>}{<\psi \psi^{@}>}$ (2) $\hat{x} = \frac{<\psi \psi^{@} x>}{<\psi \psi^{@}>}$ (3) $\hat{x} = \frac{<\psi x^2 \psi^{@}>}{<\psi \psi^{@}>}$ (4) $\hat{x} = \frac{<\psi \psi^{@} x^2>}{<\psi \psi^{@}>}$ where ψ is the wave function
71.	The angles between covalent bonds is maximum in (1) CH_4 (2) BF_3 (3) PF_3 (4) NH_3
72.	Ionic solids with Schottky defects contain in their structure (1) equal number of cation and anion vacancies (2) interstitial anions and anion vacancies (3) cation vacancies only (4) cation vacancies and interstitial cations
73.	The H-Bonds in solid HF can be best represented as (1) H — F ----- H — F ----- H — F (2)  (3)  (4) 

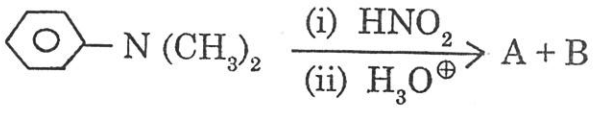
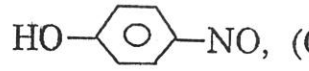
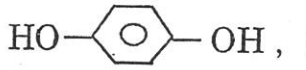
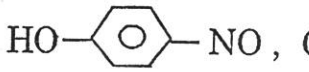
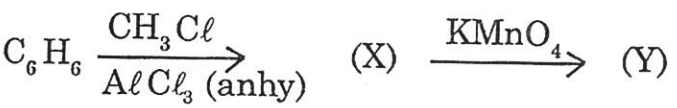
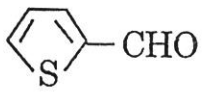
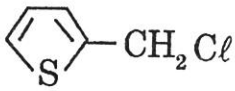
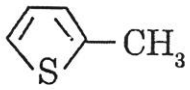
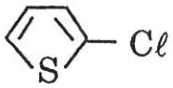
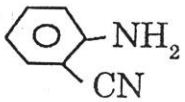
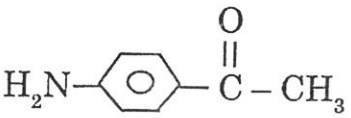
Question No.	Questions
74.	In which of the following molecules the van der Wall's forces is likely to be the most important in determining the m.pt. and b.pt. (1) CO (2) H_2S (3) Br_2 (4) HCl
75.	Alkali metal hydrides react with water to give (1) Acidic solution (2) Basic solution (3) Neutral solution (4) Hydride ion
76.	Which is a planar molecule (1) XeO_4 (2) XeF_4 (3) $XeOF_4$ (4) XeO_2F_2
77.	A silicate used in talcum powder (1) consists of planar sheets which can slip over another (2) is known as talc (3) is a pure magnesium silicate of the form 3 MgO.4 SiO_2. H_2O (4) All of these
78.	Which of the following has the stronger bond (1) F – B (2) F – Cl (3) F – Br (4) Cl – Br
79.	Which one of the following metal ions is coloured (1) Cu^+ (2) Zn^{2+} (3) Sc^{3+} (4) V^{4+}
80.	Among the lanthanides the one obtained by synthetic method is (1) Lu (2) Pm (3) Pr (4) Gd
81.	Reagent which can convert an alkyl amine into alkyl chloride (1) Hinsberg's reagent (2) Lucas reagent (3) Tilden reagent (4) None

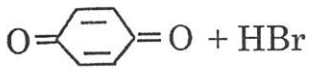
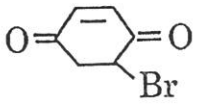
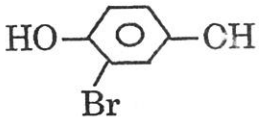
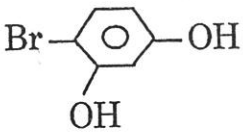
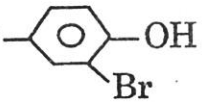
Question No.	Questions
82.	Which is/are acid salt (1)  (2)  (3) NaH_2PO_2 (4) Na_2HPO_3
83.	Index of unsaturation of C_8H_{10} in six membered structure is (1) 4,  (2) 4,  (3) 4,  (4) All true
84.	The mononitration of acetanilide ($C_6H_5NHCOCH_3$) gives predominantly (1) 3-nitroacetanilide (2) 2-nitroacetanilide (3) 2-, and 3-nitroacetanilide (4) 4-nitroacetanilide
85.	The most unlikely representation of resonance structures of p-nitrophenoxide ion is (1)  (2)  (3)  (4) 

Question No.	Questions
86.	Chirality is lost when (1) $CH_3-\underset{\underset{OH}{|}}{CH}-COOH$ is heated (2)  is heated (3) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2COOH$ is heated (4) $CH_3-\underset{\underset{CH_2\ COOH}{|}}{CH}-COOH$ is heated
87.	 Trans A which is true statement (1) A is formed by anti addition and is meso (2) A is formed by syn addition and is meso (3) A is formed by anti addition and is racemic (4) A is formed by syn addition and is racemic
88.	 A and B are (1) Both  (2) Both  (3)  (4) 

Question No.	Questions
89.	$CH \equiv C-COOH \xrightarrow{Hg\,SO_4/H_2SO_4}$ Product (1) $CH_3-\underset{\underset{O}{\|}}{C}-COOH$ (2) $OHC\,CH_2\,COOH$ (3) $CH_2=\underset{\underset{OH}{\|}}{C}-COOH$ (4) $HO-CH=CH-COOH$
90.	 A and B are (1)  (2) , not formed (3)  (4) None is correct
91.	 X and Y are (1) Picric acid, 2, 4, 6 – tribromophenol (2) 4-nitro salicylic acid, 4-bromo salicylic acid (3) o-nitrophenol, o-bromophenol (4) None is correct

Question No.	Questions
92.	 A is (1)  (2)  (3)  (4) 
93.	 A and B are (1)  (2)  (3)  (4) None is correct
94.	 This is called ..... reaction (1) Sandmeyer (2) Raschig (3) Gatterman (4) Hofmann

Question No.	Questions
95.	 (1)  (2)  (3)  (4) None is correct
96.	In the reaction sequence  The product (Y) is (1) Chlorobenzene (2) Benzaldehyde (3) Benzoic acid (4) Benzene
97.	Thiophene reacts with HCHO in presence of aqueous $HC\ell$ to give (1)  (2)  (3)  (4) 
98.	Which is weaker base than aniline (1)  (2) (3)  (4) All

Question No.	Questions
99.	End product of following reaction is  (1)  (2)  (3)  (4) 
100.	The reagent with which both aldehydes and ketones react easily is (1) Fehling's reagent (2) Schiff's reagent (3) Tollen's reagent (4) Grignard reagent

Opened for Evaluation purpose

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

(PG–EE–2016 : CHEMISTRY)

Sr. No. 12063 **Code C**

Time : 1¼ Hour **Max. Marks : 100** **Total Questions : 100**

Roll No. _____ (in figure) _____ (in words)

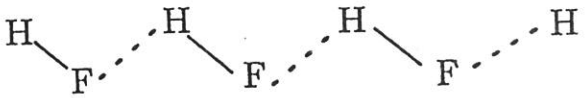
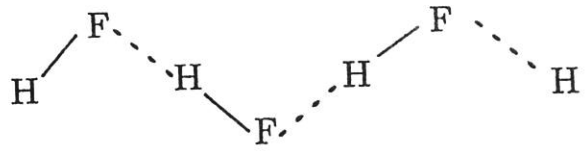
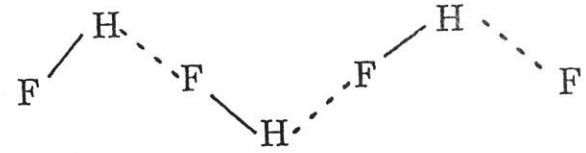
Name : _____ Father's Name : _____

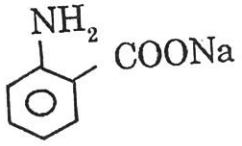
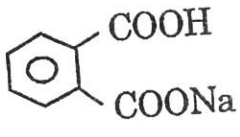
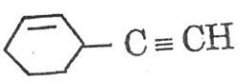
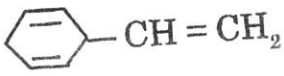
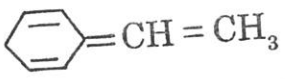
Mother's Name : _____ Date of Examination : _____

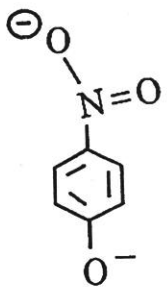
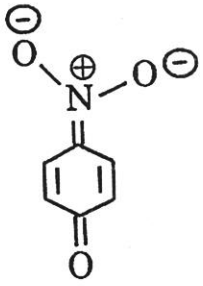
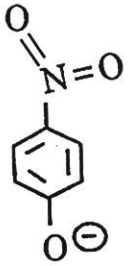
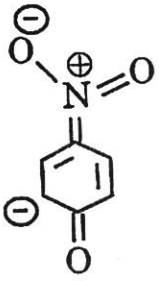
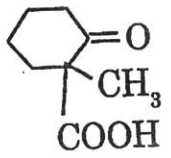
(Signature of the candidate) (Signature of the Invigilator)

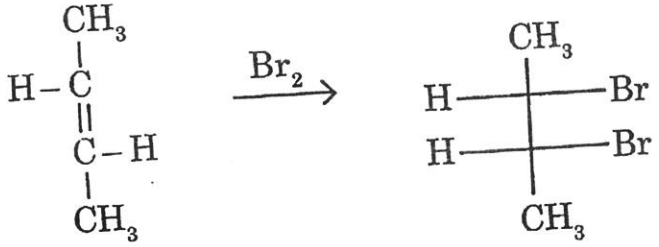
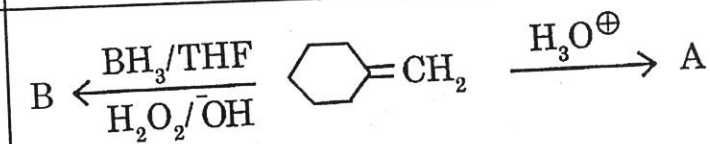
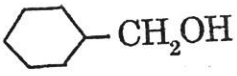
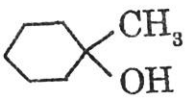
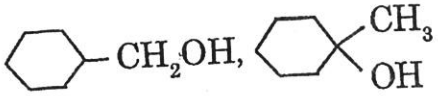
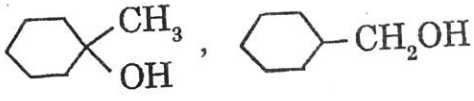
CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

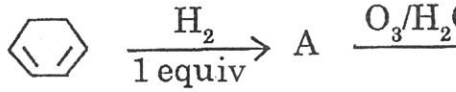
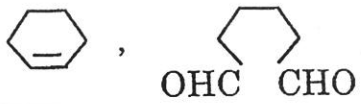
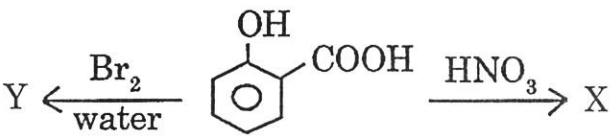
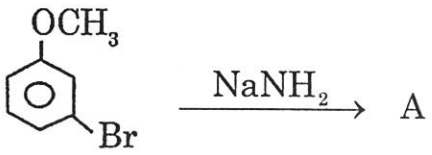
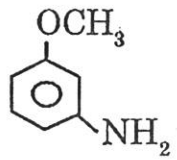
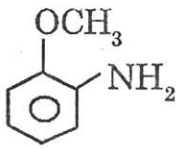
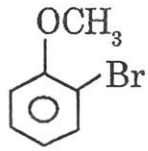
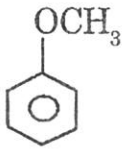
1. **All questions are compulsory.**
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing **within two hours** after the test is over. No such complaint(s) will be entertained thereafter.
4. The candidate MUST NOT do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
5. **There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.**
6. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

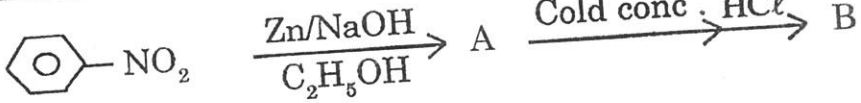
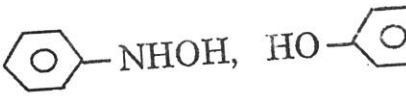
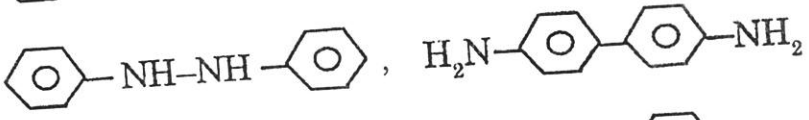
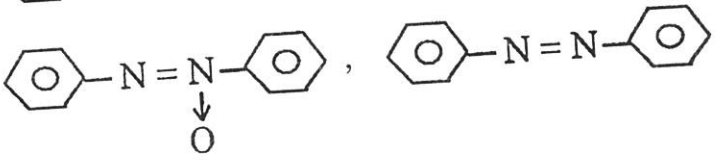
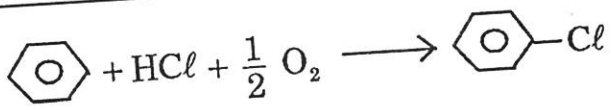
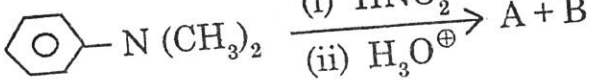
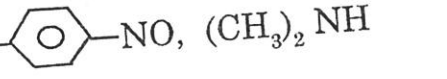
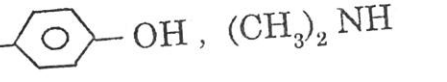
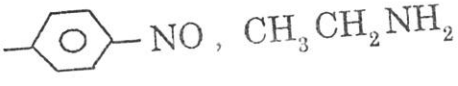
Question No.	Questions
1.	The angles between covalent bonds is maximum in (1) CH_4 (2) BF_3 (3) PF_3 (4) NH_3
2.	Ionic solids with Schottky defects contain in their structure (1) equal number of cation and anion vacancies (2) interstitial anions and anion vacancies (3) cation vacancies only (4) cation vacancies and interstitial cations
3.	The H-Bonds in solid HF can be best represented as (1) H—F ----- H—F ----- H — F (2)  (3)  (4) 
4.	In which of the following molecules the van der Wall's forces is likely to be the most important in determining the m.pt. and b.pt. (1) CO (2) H_2S (3) Br_2 (4) HCl
5.	Alkali metal hydrides react with water to give (1) Acidic solution (2) Basic solution (3) Neutral solution (4) Hydride ion
6.	Which is a planar molecule (1) XeO_4 (2) XeF_4 (3) $XeOF_4$ (4) XeO_2F_2

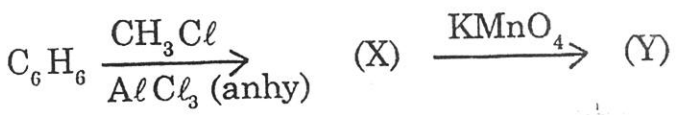
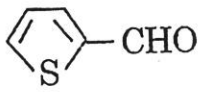
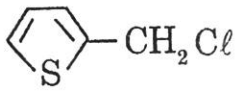
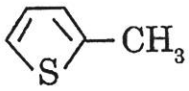
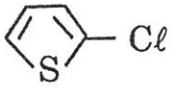
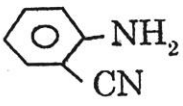
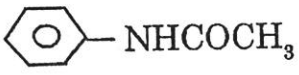
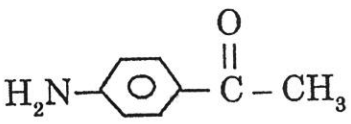
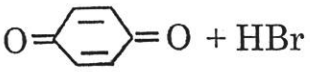
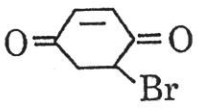
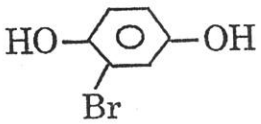
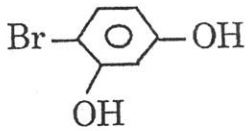
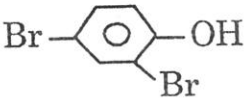
Question No.	Questions
7.	A silicate used in talcum powder (1) consists of planar sheets which can slip over another (2) is known as talc (3) is a pure magnesium silicate of the form 3 $MgO.4\ SiO_2.\ H_2O$ (4) All of these
8.	Which of the following has the stronger bond (1) F – B (2) F – Cl (3) F – Br (4) Cl – Br
9.	Which one of the following metal ions is coloured (1) Cu^+ (2) Zn^{2+} (3) Sc^{3+} (4) V^{4+}
10.	Among the lanthanides the one obtained by synthetic method is (1) Lu (2) Pm (3) Pr (4) Gd
11.	Reagent which can convert an alkyl amine into alkyl chloride (1) Hinsberg's reagent (2) Lucas reagent (3) Tilden reagent (4) None
12.	Which is/are acid salt (1)  (2)  (3) NaH_2PO_2 (4) Na_2HPO_3
13.	Index of unsaturation of C_8H_{10} in six membered structure is (1) 4,  (2) 4,  (3) 4,  (4) All true

Question No.	Questions
14.	The mononitration of acetanilide ($C_6H_5NHCOCH_3$) gives predominantly (1) 3-nitroacetanilide (2) 2-nitroacetanilide (3) 2-, and 3-nitroacetanilide (4) 4-nitroacetanilide
15.	The most unlikely representation of resonance structures of p-nitrophenoxide ion is (1)  (2)  (3)  (4) 
16.	Chirality is lost when (1) $CH_3-\underset{\underset{OH}{|}}{CH}-COOH$ is heated (2)  is heated (3) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2COOH$ is heated (4) $CH_3-\underset{\underset{CH_2\ COOH}{|}}{CH}-COOH$ is heated

Question No.	Questions
17.	 Trans A which is true statement (1) A is formed by anti addition and is meso (2) A is formed by syn addition and is meso (3) A is formed by anti addition and is racemic (4) A is formed by syn addition and is racemic
18.	 A and B are (1) Both  (2) Both  (3)  (4) 
19.	$CH \equiv C-COOH \xrightarrow{Hg\,SO_4/H_2SO_4}$ Product (1) $CH_3-\underset{\underset{O}{\|}}{C}-COOH$ (2) $OHC\,CH_2\,COOH$ (3) $CH_2=\underset{\underset{OH}{\|}}{C}-COOH$ (4) $HO-CH=CH-COOH$

Question No.	Questions
20.	 A and B are (1) , not formed (2) , not formed (3)  (4) None is correct
21.	 X and Y are (1) Picric acid, 2, 4, 6 – tribromophenol (2) 4-nitro salicylic acid, 4-bromo salicylic acid (3) o-nitrophenol, o-bromophenol (4) None is correct
22.	 A is (1)  (2)  (3)  (4) 

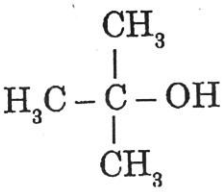
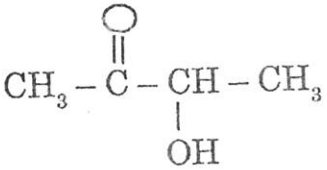
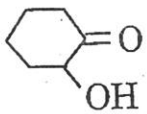
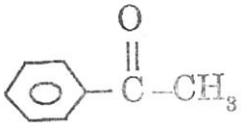
Question No.	Questions
23.	 A and B are (1)  (2)  (3)  (4) None is correct
24.	 This is called ..... reaction (1) Sandmeyer (2) Raschig (3) Gatterman (4) Hofmann
25.	 (1)  (2)  (3)  (4) None is correct

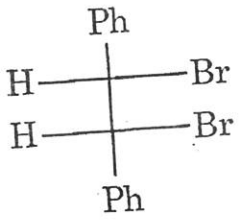
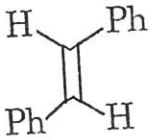
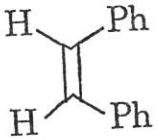
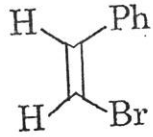
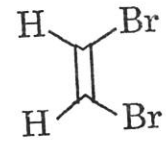
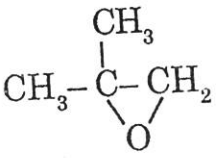
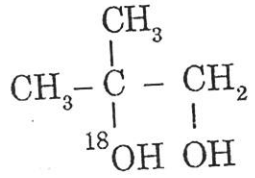
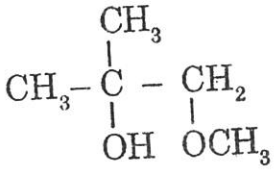
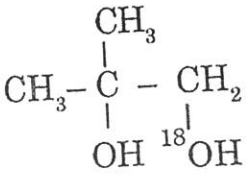
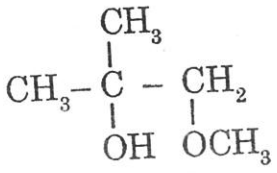
Question No.	Questions
26.	In the reaction sequence  The product (Y) is (1) Chlorobenzene (2) Benzaldehyde (3) Benzoic acid (4) Benzene
27.	Thiophene reacts with HCHO in presence of aqueous HCℓ to give (1)  (2)  (3)  (4) 
28.	Which is weaker base than aniline (1)  (2)  (3)  (4) All
29.	End product of following reaction is  (1)  (2)  (3)  (4) 

Question No.	Questions
30.	The reagent with which both aldehydes and ketones react easily is (1) Fehling's reagent (2) Schiff's reagent (3) Tollen's reagent (4) Grignard reagent
31.	Chromatography is based on (1) Physical absorption of the solute (2) Differential adsorption of different components (3) Chemisorption of the solute (4) Solubility of the solute
32.	A hydrogen electrode and a normal calomel electrode had a voltage of 0.435 V when placed in a certain solution at 298 K. What will be the pH of the solution (1) 2.125 (2) 2.205 (3) 2.622 (4) 2.014
33.	A photon in 'X' region is more energetic than in the visible region. The 'X' is (1) Micro wave (2) Radio wave (3) IR (4) UV
34.	Select the correct statement (1) Composit reactions differ from complex reactions (2) Composit reactions involes more than one elementary reaction (3) Composit reactions involes only one elementary reaction (4) None of the above

Question No.	Questions
35.	The values of van der Waal's constant "a" for gases O_2, N_2, NH_3 and CH_4 are 1.36, 1.39, 4.17 and 2.253 litre^2 atm mole^{-2} respectively. The gas which can most easily be liquified is (1) NH_3 (2) O_2 (3) N_2 (4) CH_4
36.	Frenkel defect appear in crystal in which (1) Size of anion is equal to size of cation (2) Size of anion is less than size of cation (3) Size of anion is much larger than cation (4) None of the above
37.	Molar polarization, P_m, is independent of (1) Pressure (2) Temperature (3) Concentration (4) None of these
38.	At temperature near absolute zero gaseous molecules possess only (1) Translational energy (2) Rotational energy (3) Rotational and translational energy (4) Vibrational energy
39.	The molecule which is IR inactive but Raman active is (1) HCl (2) N_2 (3) SO_2 (4) Protein
40.	The cell potential is a (1) Intensive property (2) Extensive property (3) Thermodynamic property (4) Colligative property

Question No.	Questions
41.	Which of the following carbonyls does not possess bridged CO (1) $Fe_2(CO)_9$ (2) $Fe_3(CO)_{12}$ (3) $Ru_3(CO)_{12}$ (4) $Co_2(CO)_8$
42.	CH_3HgOH is classified as (1) Soft-Soft (2) Hard-Hard (3) Soft-Hard (4) Hard-Soft
43.	Which of the following is not border line acid (1) Bi^{3+} (2) BMe_3 (3) SO_2 (4) CO_2
44.	According to spectrochemical series which ligand will produce greater crystal field splitting (1) F^- (2) NH_3 (3) NO_2^- (4) CO
45.	The transition in $[Cu(H_2O)_6]^{2+}$ complexes is due to (1) Presence of water molecules (2) Intermolecular vibrations (3) Promotion of an electron from T_{2g} to Eg level as the transfer of hole from Eg to T_{2g} level (4) Excitation of electron from 3d to 4s energy level
46.	Vitamin B_{12} contains (1) Selenium (2) Zinc (3) Cobalt (4) Iron

Question No.	Questions
47.	Which complex ion is thermodynamically stable and kinetically labile (1) $[Cu(NH_3)_4]^{2+}$ (2) $[Cr(CN)_6]^{3-}$ (3) $[Mn(CN)_6]^{3-}$ (4) $[Ni(CN)_4]^{2-}$
48.	Radioactivity of a sample (Z = 22) decreases 90% after 10 years. What will be the half life of the sample (1) 5 years (2) 2 years (3) 3 years (4) 10 years
49.	A catalyst is a substance which (1) Supplies energy to the reaction (2) Shortens the time to reach the equilibrium (3) Increases the equilibrium constant of the reaction (4) Increases the equilibrium concentration of the product
50.	The temperature of the system decreases in an (1) Adiabatic compression (2) Isothermal expansion (3) Isothermal compression (4) Adiabatic expansion
51.	Maximum dehydration takes place of (1)  (2)  (3)  (4) 

Question No.	Questions
52.	 $\xrightarrow[\text{Acetone}]{\text{Na I}}$ A A is (1)  (2)  (3)  (4) 
53.	B $\xleftarrow[CH_3ONa]{CH_3OH}$  $\xrightarrow[H^{\oplus}]{H_2O^{18}}$ A A and B are (1)   (2)   (3) Both are correct (4) None is correct

Question No.	Questions
54.	Glycerol + $KHSO_4 \longrightarrow A \xrightarrow{HC\ell O} B$ A and B are (1) $CH_2 = CH - CHO$, $CH_2(C\ell) - CH(OH) - CHO$ (2) $CH_2 = CH - CHO$, $CH_2(OH) - CH(C\ell) - CHO$ (3) $CH_2 = CH - CHO$, $CH_3 - CH(OC\ell) - CHO$ (4) None is correct
55.	The quantum numbers, for the outer electrons of an atom are given by $n = 2$; $\ell = 0$; $m = 0$; $s = + 1/2$ (1) Lithium (2) Beryllium (3) Hydrogen (4) Boron
56.	"The exact path of electron 2p-orbital cannot be determined" The above statement is based upon (1) Hund's rule (2) Bohr's rule (3) Uncertainty principle (4) Aufbau principle
57.	The ground state configuration of Fe^{3+} ion in gaseous state is : (At. No. of Fe = 26) (1) $[Ar]^{18}\ 3d^3\ 4s^2$ (2) $[Ar]^{18}\ 3d^6\ 4s^2$ (3) $[Ar]^{18}\ 3d^5$ (4) $[Ar]^{18}\ 3d^6$

Question No.	Questions
58.	Which of the following is the smallest in size (1) N^{3-} (2) O^{2-} (3) F^{-} (4) Na^{+}
59.	The electronegativity of the following elements increases in the order (1) C, N, Si, P (2) N, Si, C, P (3) Si, P, C, N (4) P, Si, N, C
60.	In ClF_3, Chlorine is (1) sp^2 hybridized (2) sp^3 hybridized (3) sp^3d hybridized (4) sp^3d^2 hybridized
61.	Consider a pure crystalline solid that is heated from absolute zero to a temperature above the boiling point of the liquid. Which of the following processes produces the greatest increase in entropy of the substance (1) Vaporizing the liquid (2) Melting the solid (3) Heating the liquid (4) Heating the gas
62.	Elastic deformation in polymers is due to (1) Slight adjustment of molecular chains (2) Slippage of molecular chains (3) Straightening of molecular chains (4) Severe of covalent bonds
63.	Which of the following process is responsible for the formation of delta at a place where rivers meet the sea (1) Emulsification (2) Coagulation (3) Colloid formation (4) Peptization

Question No.	Questions
64.	Which of the following is correct for lyophillic sols (1) They are Irreversible (2) They are formed by inorganic substances (3) They are self stabilized (4) They are readily coagulated by addition of electrolytes
65.	Buffer solutions have constant acidity and alkalinity because (1) They have large excess of H^+ or OH^- ions (2) They have fixed value of pH (3) Acids and Alkalies in these solutions are shielded from attack by other ions (4) These give unionized acid or base on reaction with added acid or alkali
66.	Automobile steering wheels are normally made of (1) High density polythene (2) Cellulose acetate (3) Cellulose nitrate (4) PVC
67.	The de Broglie wavelength of an electron with kinetic energy of 1.0 eV is (1) 28.7 pm (2) 2.87 pm (3) 12.3 nm (4) 1.23 nm
68.	If moisture and dirt entrapment is a major problem, it would be a good practice to (1) Butt weld (2) Stop weld (3) Skip weld (4) Stitch weld
69.	Iron crystallises in a b.c.c system with a = 2.86 Å . The density of Iron is (1) 79.2 g cm^{-3} (2) 7.92 g cm^{-3} (3) 0.79 g cm^{-3} (4) 792 g cm^{-3}

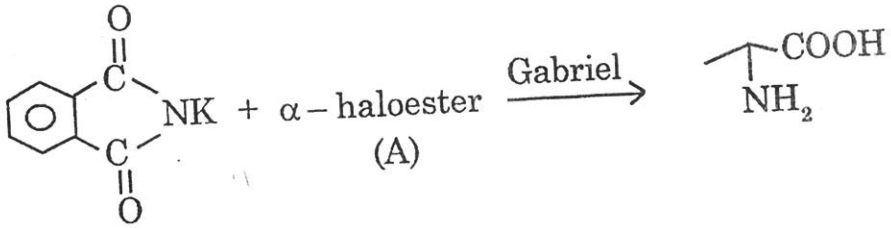
Question No.	Questions
70.	The Born Lande equation for the estimation of lattice energy of an ionic crystal is (1) $U_0 = \frac{MN_A Z_+ e}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (2) $U_0 = \frac{MN_A Z_- e}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (3) $U_0 = \frac{MN_A Z_+ Z_- e^2}{4\pi \in_0 r_0}\left(1-\frac{1}{n}\right)$ (4) None of these
71.	Polydispersity index (P.D.I) of a polymer sample is given by (1) $P.D.I = \overline{M}_m - \overline{M}_n$ (2) $P.D.I = \overline{M}_m + \overline{M}_n$ (3) $P.D.I = \overline{M}_m \overline{M}_n$ (4) $P.D.I = \overline{M}_m / \overline{M}_n$ where $\overline{M}_m, \overline{M}_n$ are mass average and number-average molar masses respectively
72.	The coefficient of thermal expansion, α, is expressed as (1) $\alpha = -\frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$ (2) $\alpha = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$ (3) $\alpha = \frac{1}{T}\left(\frac{\partial V}{\partial T}\right)_P$ (4) $\alpha = -\frac{1}{T}\left(\frac{\partial V}{\partial T}\right)_P$
73.	In B.E.T equation, which of the following statements is not true (1) It does not use the concept of saturated vapour pressure (2) It considers the multilayer adsorption (3) It is not valid for porous adsorbent (4) It uses the concept of latent heat of condensation

Question No.	Questions
74.	Entropy is related to thermodynamic probability, W, by relation (1) $S = R\ell nW$ (2) $S = R - \ell nW$ (3) $S = k\ell nW$ (4) $S = k + \ell nW$
75.	The number of macro states for the distribution of three atoms (having total energy = 3 quanta) among ground, first, second states (possessing zero, one and two quanta of Energy respectively) are (1) one (2) six (3) ten (4) three
76.	The Ilkovic equation for diffusion current is given by (1) $\vec{i}_d = 607\ nDC\ m^{2/3}\ t^{1/2}$ (2) $\vec{i}_d = 607\ nD^{1/2}C\ m^{2/3}\ t^{1/6}$ (3) $\vec{i}_d = 607\ nDC^{1/2}\ m^{2/3}\ t^{1/6}$ (4) $\vec{i}_d = 607\ nD^{1/2}\ m^{2/3}\ t^{1/6}$ All notations have their usual meanings
77.	In the lead acid battery during charging the cathode reaction is (1) Reduction of Pb^{2+} to Pb (2) Formation of $PbSO_4$ (3) Formation of PbO_2 (4) None of these
78.	The fundamental vibrational frequency of carbon mono oxide (CO) molecule is 2050 cm^{-1}. The force constant of CO molecule will be (1) $4\pi^2\ c\mu\ (2050)^2 \times 10^4$ (2) $4\pi^2\ c^2\mu^2\ (2150) \times 10^{-4}$ (3) $4\pi^2\ c^2\mu\ (2050)^2 \times 10^4$ (4) $4\pi^2\ c^2\mu\ (2050) \times 10^2$

Question No.	Questions
79.	The operator for linear momentum of a particle moving in a direction parallel to x-axis is given by (1) $\hat{p}_x = ih\frac{\partial}{\partial x}$ (2) $\hat{p}_x = -ih\frac{\partial}{\partial x}$ (3) $\hat{p}_x = -ih\frac{\partial^2}{\partial x^2}$ (4) $\hat{p}_x = -i\frac{h}{2\pi}\cdot\frac{\partial}{\partial \pi}$
80.	The average of an observable quantity, x, is obtained by (1) $\hat{x} = \frac{<\psi x \psi^{@}>}{<\psi\psi^{@}>}$ (2) $\hat{x} = \frac{<\psi\psi^{@}x>}{<\psi\psi^{@}>}$ (3) $\hat{x} = \frac{<\psi x^2\psi^{@}>}{<\psi\psi^{@}>}$ (4) $\hat{x} = \frac{<\psi\psi^{@}x^2>}{<\psi\psi^{@}>}$ where ψ is the wave function
81.	Which of the following compounds will exhibit geometrical isomerism (1) 1, 1-diphenyl-1-propene (2) 3-phenyl-1-butene (3) 2-phenyl-1-butene (4) 1-phenyl-2-butene
82.	Propyne and propene can be distinguished by (1) Conc. H_2SO_4 (2) Br_2 in CCl_4 (3) Dil. $KMnO_4$ (4) $AgNO_3$ in ammonia
83.	Which of the following has the most acidic hydrogen (1) 3-Hexanone (2) 2, 4-hexanedione (3) 2, 5-hexanedione (4) 2, 3-hexanedione

Question No.	Questions
84.	Ammonia can be dried by (1) Conc. H_2SO_4 (2) P_4O_{11} (3) CaO (4) Anhydrous $CaCl_2$
85.	Amongst H_2O, H_2S, H_2Se and H_2Te, the one with the highest boiling point is (1) H_2O because of hydrogen bonding (2) H_2S because of hydrogen bonding (3) H_2Te because of higher molecular weight (4) H_2Se because of lower molecular weight
86.	When a mixture of one mole of C_6H_5COOH and one mole of C_6H_5OH is treated with one mole of $NaHCO_3$, the product formed will consist of (1) C_6H_5COOH, C_6H_5ONa (2) C_6H_5COONa, C_6H_5ONa (3) C_6H_5COONa, C_6H_5OH (4) None
87.	Addition of ethanol to aqueous hydrolysis of does not increase the rate of hydrolysis but changes only the composition of final products. This indicates that reaction is proceeding through (1) S_N2 (2) S_N1 (3) S_E2 (4) S_E1
88.	Which one of the following is the best method for the preparation of acetophenone (1) Ph COOEt + CH_3MgBr (2) Ph COCl + CH_3Mg Br (3) Ph $CONH_2$ + CH_3Mg Br (4) PhCN + CH_3Mg Br

Question No.	Questions
84.	Ammonia can be dried by (1) Conc. H_2SO_4 (2) P_4O_{11} (3) CaO (4) Anhydrous $CaCl_2$
85.	Amongst H_2O, H_2S, H_2Se and H_2Te, the one with the highest boiling point is (1) H_2O because of hydrogen bonding (2) H_2S because of hydrogen bonding (3) H_2Te because of higher molecular weight (4) H_2Se because of lower molecular weight
86.	When a mixture of one mole of C_6H_5COOH and one mole of C_6H_5OH is treated with one mole of $NaHCO_3$, the product formed will consist of (1) C_6H_5COOH, C_6H_5ONa (2) C_6H_5COONa, C_6H_5ONa (3) C_6H_5COONa, C_6H_5OH (4) None
87.	Addition of ethanol to aqueous hydrolysis of does not increase the rate of hydrolysis but changes only the composition of final products. This indicates that reaction is proceeding through (1) S_N2 (2) S_N1 (3) S_E2 (4) S_E1
88.	Which one of the following is the best method for the preparation of acetophenone (1) Ph COOEt + CH_3MgBr (2) Ph COCl + CH_3MgBr (3) Ph $CONH_2$ + CH_3MgBr (4) PhCN + CH_3MgBr

Question No.	Questions
89.	 Required product is obtained when A is (1) Ethyl-3-Chlorobutyrate (2) Ethyl-3-Chloropropionate (3) Ethyl-2-Chloropropionate (4) Ethyl Chloroacetate
90.	$C_6H_{10} \xrightarrow{\text{Ozonolysis}} HCHO + CH_3CHO + CH_2(CHO)_2$ C_6H_{10} is (1) 1, 2-hexadiene (2) 1, 3-hexadiene (3) 1, 4-hexadiene (4) 2-methyl-1, 3-pentadiene
91.	Thorium element belongs to (1) Alkali metal (2) Transition elements (3) Lanthanides (4) Actinides
92.	H_2S would separate the following at pH < 7 (1) Zn^{2+}, Co^{2+} (2) Cu^{2+}, Cd^{2+} (3) Cu^{2+}, Cr^{3+} (4) Cu^{2+}, As^{3+}
93.	Nitrite (NO_2^-) interferes in the 'ring-test' of nitrate (NO_3^-). Some of the following reagents can be used for the removal of nitrite (I) NH_4Cl (II) $(NH_2)_2$ CS thiourea (III) NH_2SO_3H (sulphamic acid) (IV) Sulphanilic acid Correct choice is (1) I, II (2) I, II, IV (3) I, II, III (4) II, III, IV

Question No.	Questions
94.	The oxidation number of Fe in K_4 [Fe $(CN)_6$] is (1) 3 (2) 2 (3) 0 (4) 1
95.	CFSE value for an octahedral low spin d^6 metal ion complex will be (1) 20 Dq (2) 24 Dq (3) 12 Dq (4) 6 Dq
96.	The number of unpaired electrons in a d^7 tetrahedral complex (1) 3 (2) 2 (3) 1 (4) 7
97.	E.A.N in [Ni $(NH_3)_6$]$^{2+}$ is (1) 38 (2) 36 (3) 40 (4) 37
98.	Term symbol for ground state V^{3+} is (1) $^3F_2$ (2) $^4S_{3/2}$ (3) $^3P_0$ (4) $^3P_2$
99.	How many geometrical isomers are possible for [Co $(NH_3)_4$ Cl_2] (1) two (2) three (3) four (4) six
100.	Which of the following metal-carbonyls is paramagnetic (1) Fe $(CO)_5$ (2) Ni $(CO)_4$ (3) V $(CO)_6$ (4) Cr $(CO)_6$

SET : A

1. 1	16. 3	31. 3	46. 2	61. 3	76. 2	91. 2
2. 2	17. 2	32. 1	47. 4	62. 3	77. 4	92. 3
3. 2	18. 2	33. 1	48. 1	63. 4	78. 1	93. 4
4. 2	19. 3	34. 2	49. 4	64. 4	79. 2	94. 2
5. 1	20. 3	35. 1	50. 2	65. 3	80. 3	95. 1
6. 3	21. 3	36. 3	51. 4	66. 3	81. 4	96. 3
7. 2	22. 2	37. 3	52. 3	67. 4	82. 2	97. 2
8. 4	23. 4	38. 4	53. 3	68. 3	83. 1	98. 4
9. 2	24. 4	39. 3	54. 2	69. 2	84. 3	99. 2
10. 4	25. 3	40. 3	55. 2	70. 4	85. 4	100. 1
11. 4	26. 1	41. 2	56. 1	71. 1	86. 2	
12. 4	27. 1	42. 1	57. 1	72. 1	87. 1	
13. 2	28. 4	43. 3	58. 1	73. 2	88. 3	
14. 3	29. 2	44. 3	59. 1	74. 3	89. 4	
15. 1	30. 1	45. 2	60. 3	75. 4	90. 1	

1. 4	16. 3	31. 4	46. 3	61. 2	76. 3	91. 4
2. 4	17. 2	32. 3	47. 3	62. 1	77. 4	92. 2
3. 2	18. 4	33. 3	48. 4	63. 3	78. 3	93. 1
4. 3	19. 2	34. 2	49. 3	64. 3	79. 2	94. 3
5. 1	20. 1	35. 2	50. 3	65. 2	80. 4	95. 4
6. 3	21. 1	36. 1	51. 3	66. 2	81. 1	96. 2
7. 2	22. 1	37. 1	52. 2	67. 4	82. 2	97. 1
8. 2	23. 2	38. 1	53. 4	68. 1	83. 2	98. 3
9. 3	24. 3	39. 1	54. 4	69. 4	84. 2	99. 4
10. 3	25. 4	40. 3	55. 3	70. 2	85. 1	100. 1
11. 2	26. 2	41. 3	56. 1	71. 3	86. 3	
12. 3	27. 4	42. 1	57. 1	72. 3	87. 2	
13. 4	28. 1	43. 1	58. 4	73. 4	88. 4	
14. 2	29. 2	44. 2	59. 2	74. 4	89. 2	
15. 1	30. 3	45. 1	60. 1	75. 3	90. 4	

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2. 1	17. 1	32. 4	47. 2	62. 2	77. 4	92. 2
3. 2	18. 1	33. 2	48. 4	63. 1	78. 1	93. 2
4. 3	19. 1	34. 3	49. 2	64. 3	79. 4	94. 2
5. 4	20. 3	35. 1	50. 1	65. 4	80. 2	95. 1
6. 2	21. 3	36. 3	51. 3	66. 2	81. 3	96. 3
7. 4	22. 1	37. 2	52. 3	67. 1	82. 2	97. 2
8. 1	23. 1	38. 2	53. 4	68. 3	83. 4	98. 4
9. 2	24. 2	39. 3	54. 4	69. 4	84. 4	99. 2
10. 3	25. 1	40. 3	55. 3	70. 1	85. 3	100. 4
11. 4	26. 3	41. 2	56. 3	71. 2	86. 1	
12. 3	27. 3	42. 3	57. 4	72. 1	87. 1	
13. 3	28. 4	43. 4	58. 3	73. 3	88. 4	
14. 2	29. 3	44. 2	59. 2	74. 3	89. 2	
15. 2	30. 3	45. 1	60. 4	75. 2	90. 1	

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5. 2	20. 1	35. 1	50. 4	65. 4	80. 1	95. 2
6. 2	21. 1	36. 3	51. 3	66. 2	81. 4	96. 1
7. 4	22. 2	37. 2	52. 1	67. 4	82. 4	97. 1
8. 1	23. 2	38. 4	53. 1	68. 1	83. 2	98. 1
9. 4	24. 2	39. 2	54. 2	69. 2	84. 3	99. 1
10. 2	25. 1	40. 1	55. 1	70. 3	85. 1	100. 3
11. 3	26. 3	41. 3	56. 3	71. 4	86. 3	
12. 2	27. 2	42. 3	57. 3	72. 2	87. 2	
13. 4	28. 4	43. 4	58. 4	73. 1	88. 2	
14. 4	29. 2	44. 4	59. 3	74. 3	89. 3	
15. 3	30. 4	45. 3	60. 3	75. 4	90. 3	