SET–"X" (Total No. of printed pages : 25)

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PG-EE-July, 2025 (Chemistry)

Sr. No. 10089

Code **A**

Time : 1¼ Hours | Total Questions : 100 | Max. Marks : 100

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

Name : _____ Date of Birth : _____

Father's Name : _____ Mother's Name : _____

Date of Examination : _____

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

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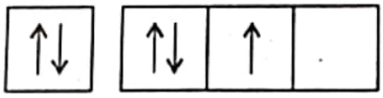
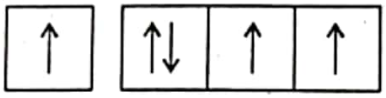
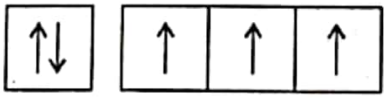
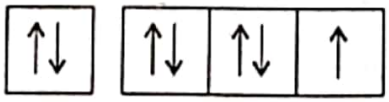
1. **All questions are compulsory.**
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along-with answer key of all the A,B,C and D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case will be considered.
5. 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.
6. **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.**
7. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
8. 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 electrons present in K-shell of the atom will differ in (1) Principal quantum number (2) Azimuthal quantum number (3) Magnetic quantum number (4) Spin quantum number
2.	Wave nature of electron was demonstrated by (1) Schrodinger (2) de-Broglie (3) Davisson (4) Heisenberg
3.	Which of the following does not have any unit? (1) Electronegativity (2) Electron affinity (3) Ionisation potential (4) Atomic radii
4.	The orbital diagram in which Aufbau principle is violated is (1)  (2)  (3)  (4) 

Question No.	Questions
5.	According of VSEPR theory, the molecular geometry of the water molecule is (1) octahedral (2) distorted tetrahedral (3) planar triangle (4) linear
6.	NaCl crystal belongs to the crystal system (1) hexagonal (2) cubic (3) tetragonal (4) orthorhombic
7.	H-bonding is not present in (1) Glycerine (2) Water (3) Hydrogen Sulphide (4) Hydrogen Fluoride
8.	According to Fazan's rule, covalent bond is favoured by (1) Large cation and small anion (2) Large cation and large anion (3) Small cation and small anion (4) Small cation and large anion
9.	Lithium shows diagonal relationship with (1) Magnesium (2) Beryllium (3) Aluminium (4) Boron

Question No.	Questions
10.	Which of the following metal is present in chlorophyll? (1) Chromium (2) Cobalt (3) Magnesium (4) Iron
11.	The type of hybridisation of boron in diborane is (1) Sp-hybridisation (2) Sp^2-hybridisation (3) Sp^3-hybridisation (4) Sp^3d^2-hybridisation
12.	The silicates which contain extended anions are (1) Pyro silicates (2) Three dimensional silicates (3) Chains silicates (4) Cyclic silicates
13.	Orthophosphoric acid is (1) Monobasic (2) Dibasic (3) Tribasic (4) Tetrabasic
14.	Oleum is chemically known as (1) H_2SO_3 (2) H_2SO_5 (3) $H_2S_2O_7$ (4) $H_2S_2O_8$

Question No.	Questions
15.	The correct order of the increasing acidic strengths of $HClO$, $HClO_2$, $HClO_3$ and $HClO_4$ is (1) $HClO > HClO_2 > HClO_3 > HClO_4$ (2) $HClO_3 > HClO_4 > HClO_2 > HClO$ (3) $HClO_4 > HClO_3 > HClO_2 > HClO$ (4) $HClO_2 > HClO > HClO_3 > HClO_4$
16.	The shape of XeF_4 is (1) Square planar (2) Tetrahedral (3) Octahedral (4) Trigonal planar
17.	Which of the following atoms in the given oxidation state has partially filled d-orbitals (1) V(I) (2) Ti (IV) (3) Zn (II) (4) Cu (I)
18.	Which of the two have almost similar size (1) $_{22}$Ii and $_{40}$Zr (2) $_{41}$Nb and $_{73}$Ta (3) $_{39}$Y and $_{57}$La (4) $_{20}$Ca and $_{31}$Ir
19.	$[CO(NH_3)_5 Br] SO_4$ and $[CO(NH_3)_5 SO_4] Br$ are example of which type of isomersim? (1) Linkage (2) Geometrical (3) Ionisation (4) Optical

Question No.	Questions
20.	The Crystal Field Stabilisation Energy (CFSE) will be highest for (1) $[COF_6]^{3-}$ (2) $[CO(CNS)_4]^{2-}$ (3) $[Mn(H_2O)_6]^{2+}$ (4) $[CO(NH_3)_6]^{3+}$
21.	Considering H_2O as a weak field ligand, the number of unpaired electron in $[Mn(H_2O)_6]^{2+}$ will be (1) three (2) five (3) two (4) four
22.	The expected spin-only magnetic moments for $[Fe(CN)_6]^{4-}$ and $[FeF_6]^{3-}$ respectively are (1) 1.73 and 1.73 B.M. (2) 1.73 and 5.92 B.M. (3) 0.0 and 1.73 B.M. (4) 0.0 and 5.92 B.M.
23.	The lowest energy transition in Orgel diagram of octahedral Ni^{II} complex is (1) $^3A_2g \rightarrow {}^3T_1g(F)$ (2) $^3A_2g \rightarrow {}^3T_1g(P)$ (3) $^3A_2g \rightarrow {}^3T_2g(F)$ (4) None of these
24.	General Electronic Configuration of lanthanides is (1) $(n-2)\,f^{1-14}\,(n-1)\,s^2\,p^6\,d^{0-1}\,ns^2$ (2) $(n-2)\,f^{0-14}\,(n-1)\,d^{0-1}\,ns^2$ (3) $(n-2)\,f^{0-14}\,(n-1)\,d^{10}\,ns^2$ (4) $(n-2)\,d^{0-1}\,(n-1)\,f^{0-14}\,ns^1$

Question No.	Questions
25.	The brown ring test for NO_3^- is due to the formation of the complex ion with formula (1) $[Fe(H_2O)_6]^{2+}$ (2) $Fe[NO(CN)_5]^{2-}$ (3) $[Fe(H_2O)_5 NO]^{2+}$ (4) $[Fe(H_2O)(NO)_5]^{2+}$
26.	Nessler's reagent is used to detect (1) CrO_4^{2-} (2) PO_4^{3-} (3) MnO_4^- (4) NH_4^+
27.	Actinides are (1) oxidising agents (2) weak reducing agents (3) strong reducing agents (4) none of these
28.	CH_3 HgOH is classified as (1) Soft - Soft (2) Hard - Hard (3) Soft - Hard (4) Hard - Soft
29.	Heme is a Porphyrin complex of which metal ion? (1) Fe(II) (2) Fe(III) (3) Mg(II) (4) Zn(II)
30.	Which one of the following is the weakest Lewis base? (1) NH_2^- (2) CH_3^- (3) OH^- (4) F^-

Question No.	Questions
31.	Which one of the following compounds will behave as ammono base in ammonia? (1) NH_4OH (2) $NaNH_2$ (3) $(NH_4)_2SO_2$ (4) $(NH_4)_2CO_3$
32.	Formula of Zeise's salt is (1) $[PtCl_3(\eta^2\text{-}C_2H_4)^-]$ (2) $[PtCl_4]^{2-}$ (3) H_2PtCl_6 (4) $[ZnCl_4]^{2-}$
33.	Silicon is an important constituent of (1) Rocks (2) Minerals (3) Alloys (4) Vegetables
34.	In Schrodinger's equation, ∇^2 is, (1) Hermitian operator (2) Laplacian operator (3) Reciprocal of Δ (4) None of the above
35.	De broglie's concept of duality applies, (1) only to the electrons in an atom (2) only to a moving car (3) only to a ball in speed (4) all of above

Question No.	Questions
36.	Ka X Kb = 10^{-14}, relation is valid for conjugate acid-base pair at, (1) 25° C only (2) 90° C only (3) At every temperature as Kw is a constant for water (4) At 37°C only
37.	'The lattice energy of FeO is less than that of Fe_2O_3' - This statement is, (1) True (2) False (3) Sometimes true (4) Unpredictable
38.	A catalyst is : (1) Specific to the reaction (2) Specific to temperature (3) Specific to the factory in which it is produced (4) Specific to the country in which it is produced
39.	Suppose, H_2S gas is introduced into an industrial chamber to decrease the efficiency of an unwanted catalyst, H_2S shall be termed as : (1) Catalytic inhibitor (2) Catalytic poison (3) Catalytic promotor (4) All correct
40.	"In Thermodynamically spontaneous processes, the entropy increases" - This statement is : (1) Always true (2) Always false (3) Sometimes true (4) All wrong

Question No.	Questions
41.	Which of the following is the law of helplessness of mankind : (1) 1st law of thermodynamics (2) 2nd law of thermodynamics (3) 3rd law of thermodynamics (4) all of these
42.	A catalyst and photosensitizer are : (1) Different substances (2) Same substances (3) Both true (4) Both false
43.	For an elementary reaction, (1) Order and molecularity are always the same (2) Order and molecularity may or may not be the same (3) Order and molecularity are always different (4) All false
44.	With respect to the reactant taken in excess, (1) Order becomes zero but molecularity remains uninfluenced (2) Order and molecularity both become zero (3) Molecularity becomes zero but order remains uninfluenced (4) None of these

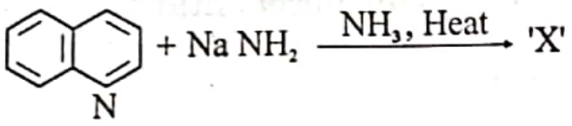
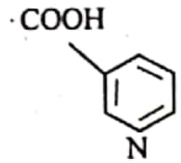
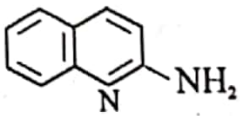
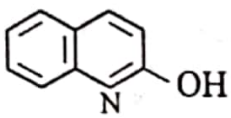
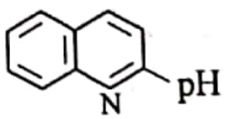
Question No.	Questions
45.	Mixture of ethyl alcohol and water is an example of : (1) Non-ideal solution with positive deviation (2) Non-ideal solution with negative deviation (3) Ideal solution (4) None of these
46.	Which is true: (1) Dilute solutions produce no heat on addition of more solvent (2) Dilute solutions absorb no heat on addition of more solvent (3) Dilute solutions are ideal solutions (4) All correct
47.	When a positive catalyst is added to a reversible reaction, it effect on rate of forward reaction (Rf) and backward reaction (Rb) is given by: (1) An increase in Rf and decrease in Rb (2) An increase in Rf and Rb both (3) An increase in Rb and decrease in Rf (4) A decrease in Ff and Rb both
48.	In the theory of absolute reaction rates, which of the following terms represents the complexity of reactants and the steric factor? (1) $\Delta S^{\#}$ (2) $\Delta H^{\#}$ (3) $\Delta G^{\#}$ (4) $\Delta A^{\#}$

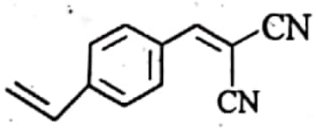
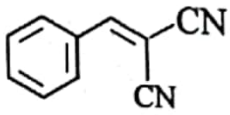
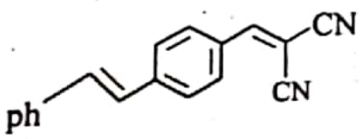
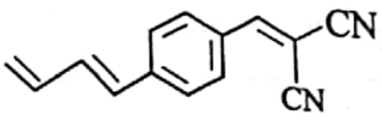
Question No.	Questions
49.	Osmotic pressure is used for the determination of : (1) Weight average molecular weight (2) Number average molecular weight (3) Both (4) None
50.	Which is a necessary requirement for the salt used in salt bridge? (1) It should react with agar-agar gel (2) Transport numbers of its anion and cation should be nearly the same (3) Transport numbers of its anion and cation should be different (4) It should not be water soluble
51.	One of the methods used for determination of lowering of vapor pressure was given by: (1) Rast (2) Beckmann (3) Cottrell (4) Smith and Menzie
52.	Which of the following is successfully explained by First Law of Thermodynamics: (1) The direction of all spontaneous processes (2) The condition required for all spontaneous processes (3) The extent of all spontaneous processes (4) The growth of a child

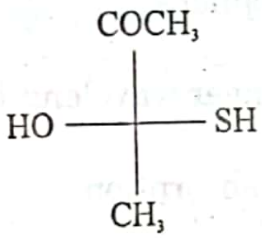
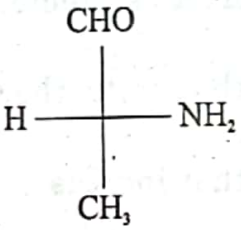
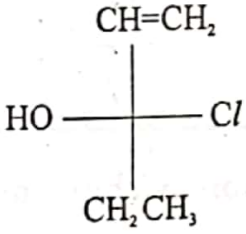
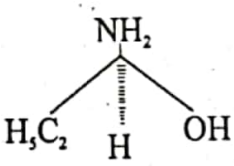
Question No.	Questions
53.	Which of the points of kinetic molecular theory of gases was found to be wrong especially at low temperature and high pressure? (1) Particles are point masses (2) Particles undergo elastic collisions (3) Gravitational force is absent in gases (4) Particles undergo zigzag motion
54.	The temperature above which a gas cannot be liquified by applying and pressure, is called as: (1) Critical temperature (2) Inversion temperature (3) Boyle's temperature (4) Absolute temperature
55.	Thermodynamic equilibrium is a mix of the following: (1) Thermal equilibrium and chemical equilibrium (2) Mechanical equilibrium and thermal equilibrium (3) Mechanical equilibrium and chemical equilibrium (4) All of these
56.	pH of 1M HCl is : (1) 0 (2) –0 (3) 1 (4) None of these

Question No.	Questions
57.	The Na^+ present in 1 M NaCl or 2 M CH_3COONa, or 5 M Na_2SO_4 (all at infinite dilution), shows: (1) Same ionic conductance at constant temperature (2) Same ionic conductance at different temperatures (3) Different ionic conductances at constant temperature (4) None of these
58.	When a gas is passed from high pressure area into low pressure area through a minor aperture adiabatically, it warms up if the temperature before the start of the process was above: (1) Inversion temperature (2) Boyle's temperature (3) Critical temperature (4) All of these
59.	At high pressures, the compressibility factor of a real gas is: (1) > 1 (2) < 1 (3) ≤ 1 (4) $= 1$
60.	Which of the following is true at thermodynamic equilibrium? (1) $\Delta G = 0$ (2) $\Delta G > 0$ (3) $\Delta G^o = 0$ (4) $\Delta G^o < 0$
61.	On increasing the temperature, the rate of a reaction increases by : (1) 2 to 3 times (2) 2 times (3) 3 times (4) Can not be predicted as the data are unavailable

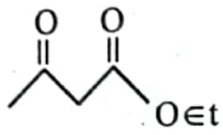
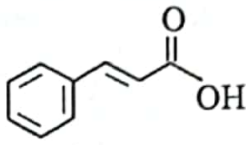
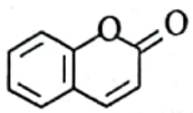
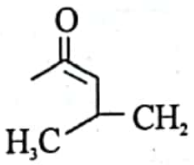
Question No.	Questions
62.	Common feature of Galvanic and electrolytic cells is: (1) Cathode is positive (2) Anode is negative (3) Both produce current (4) Oxidation takes place at anode
63.	Conductivity is: (1) Specific conductance (2) Molar conductance (3) Equivalent conductance (4) All of these
64.	The normality of 0.1 M solution of $K_2Cr_2O_7$ in acidic medium shall be: (1) 0.6 (2) 0.0166 (3) 0.5 (4) 0.1
65.	On doubling initial concentration of reactant, the half-life period doubles. The order of reaction is : (1) 1 (2) 2 (3) 0 (4) 3
66.	A substance is named as 'A'. At absolute zero temperature, the entropy of this substance is Y. What are X and Y ? (1) X = Crystalline, Y = 0 (2) X = Perfectly Crystalline, Y = 0 (3) X = Perfectly Crystalline, Y > 0 (4) X = Crystalline, Y > 0

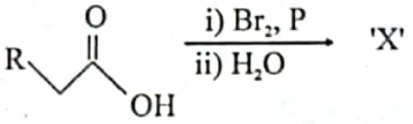
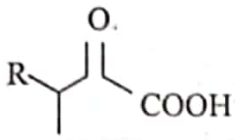
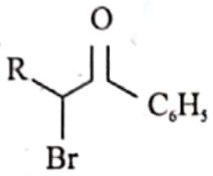
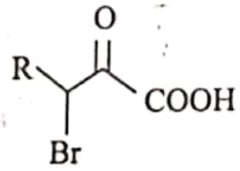
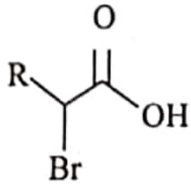
Question No.	Questions
67.	Hyper conjugation is also known as : (1) Baker - Nathan - effect (2) Mesomeric - effect (3) Inductive - effect (4) Resonance - effect
68.	α -D- glucose and β -D- glucose are : (1) Anomers (2) Keto - aldopairs (3) Epimer (4) Stereoisomers
69.	In the given reaction,  'X' is : (1)  (2)  (3)  (4) 

Question No.	Questions
70.	Which of the following is incorrect Statements? (1) Pyrrole and furan, each have 6 Pi electrons (2) Pyrrole and furan satisfied Huckel's rule (3) Both Pyrrole and furan have a planar, five membered ring structure (4) Pyrrole is considered less aromatic than furan
71.	Which of the following carbohydrates does not have any chiral carbon atoms? (1) Glyceraldehyde (2) Erythrose (3) Dihydroxyacetone (4) Erythrulose
72.	The number of peaks observed in the 'HNMR of CHD_2OD are : (1) Triplet (2) Doublet (3) Pentet (4) Septet
73.	How many stereoisomers does have 2, 3– dichloropentane? (1) 2 (2) 3 (3) 4 (4) 5
74.	Which of the following will have higher λ max? (1)  (2)  (3)  (4) 

Question No.	Questions
75.	Which of the following statements is correct? (1) All alcohols are much stronger acids than terminal alkynes (2) Most alkoxide ions are weaker bases than hydroxidation (3) Hydroxylation of epoxides gives 1, 2–cyclohexanediol (4) Ethane –1, 2– diol is obtained by the biomolecular reaction of carbonyl compounds.
76.	Which of the following structures assigned S-configuration? (1)  (2)  (3)  (4) 
77.	Ziegler-Natta Catalyst is used in polymerization of : (1) Epoxy resins (2) Polyurathanes (3) Polyamide (4) Alpha-Olifins Polymers

Question No.	Questions
78.	The correct IUPAC Name for thiol is : (1) Butane-1-ol (2) Butanol (3) Butyl mercaptan (4) Butanethiol
79.	Unfolding of protein can be termed as (1) Reduction (2) Oxidation (3) Denaturation (4) Renaturation
80.	Choose the correct statement about chromophore (1) A group that shifts the absorption to longer wavelength (2) A group that increases the intensity of absorption (3) A group that has no effect on absorption (4) A group that absorbs UV or visible light
81.	Which of the following is involved in E_1 reaction mechanism? (1) Carbene (2) Nitrene (3) Carbocation (4) Carbanion
82.	The equation $\log Io/I = \epsilon.c.x$ is an expression of : (1) Beer's Law (2) Lambert's Law (3) Beer-Lambert's Law (4) Hess's Law

Question No.	Questions
83.	When two esters having α-hydroxy atoms is treated with strong base, the product will be : (1)  (2)  (3)  (4) 
84.	Which of the following carboxylic acid is more acidic? (1) p-nitrobenzoic acid (2) p-aminobenzoic acid (3) p-methoxybenzoic acid (4) p-fluorobenzoic acid
85.	Finger print region in IR spectroscopy consists : (1) 1660-1730 cm^{-1} (2) 600-1400 cm^{-1} (3) 100-400 cm^{-1} (4) 2800-3200 cm^{-1}

Question No.	Questions
86.	In the given reaction,  'X' is : (1)  (2)  (3)  (4) 
87.	In the IR spectrum, primary amines show two bands around the region : (1) 1670 cm^{-1} (2) 2850 cm^{-1} (3) 3350 cm^{-1} (4) 2200 cm^{-1}

Question No.	Questions
88.	Match the list-I and list-II and select the correct answer using codes given below : **List-I** — **List-II** (i) Grignard reagents — (a) Ethylene oxide (ii) C_6H_5 Mg Br — (b) 1-Ethoxy-2-propanol (iii) Oxirane — (c) C_6H_5 CH_2 CH CH_3 (iv) Methyl oxirane — (d) very strong bases (1) i–d, ii–c, iii–a, iv–b (2) i–c, ii–b, iii–d, iv–a (3) i–b, ii–a, iii–d, iv–c (4) i–a, ii–d, iii–b, iv–d
89.	Halogenation of alkanes is an example of : (1) Nucleophilic substitution (2) Electrophilic substitution (3) Elimination (4) Free radical substitution
90.	Which of the following reagents is used to convert nitrobenzene into aniline? (1) DDQ (2) PPA (3) PCl_5 (4) SN/HCl

Question No.	Questions
91.	The product formed in the reaction of primary amine with nitrous acid is : (1) Alcohol (2) Nitroalkene (3) Tert. amine (4) Alkyl nitrile
92.	Which of the following reactions is used for the synthesis of Azo dyes? (1) Perkin reaction (2) Azo coupling reaction (3) Diels-Alder reaction (4) Wittig reaction
93.	The oxidation of acetylene by $KMnO_4$ give : (1) Oxalic acid (2) Propanoic acid (3) Ethyl alcohol (4) Formaldehyde
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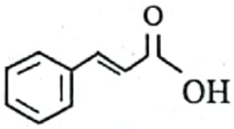
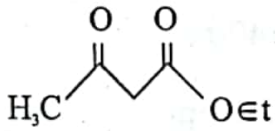
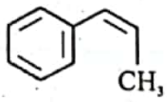
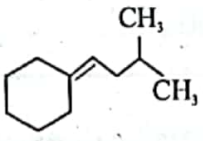
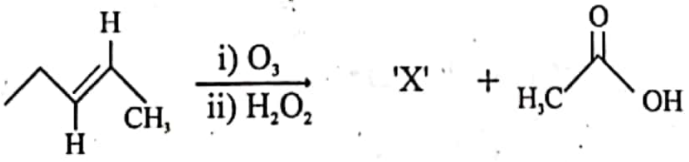
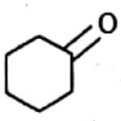
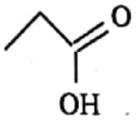
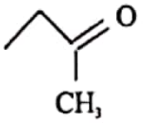
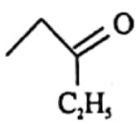
95.	The reaction of benzaldehyde with acetic anhydride in presence of sodium acetate and sodium hydroxide will give : (1)  (2)  (3)  (4) 
96.	An organic reaction where an enolizable carbonyl compound react with formaldehyde and a secondary amine to form β-aminocarbonyl compound is known as : (1) Cannizzaro reaction (2) Peckmann Condensation (3) Mannich reaction (4) Aldol Condensation
97.	In the following reaction,  'X' is : (1)  (2)  (3)  (4) 

Question No.	Questions
98.	What is the wavelength range for UV spectrum? (1) 400 nm – 800 nm (2) 10 nm – 400 nm (3) 800 nm – 1 nm (4) 0.01 nm – 400 nm
99.	What type of signals does chloroethane (CH_3CH_2Cl) have in HNMR spectrum ? (1) A triplet and a quartet (2) A doublet and a triplet (3) A singlet and doublet (4) A doublet and quartet
100.	Which of the following alkylhalide has the highest reactivity towards SN_2 reaction? (1) $CH_3 - I$ (2) $CH_3 - Br$ (3) $CH_3 - Cl$ (4) $CH_3 - F$

SET–"X" (Total No. of printed pages : 25)

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

PG-EE-July, 2025 (Chemistry)

Code **B**

Sr. No 10098

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

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

Name : _____ Date of Birth : _____

Father's Name : _____ Mother's Name : _____

Date of Examination : _____

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

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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 / mis-behaviour 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. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along-with answer key of all the A,B,C and D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case will be considered.
5. 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.
6. **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.**
7. Use only Black or Blue <u>BALL POINT PEN</u> of good quality in the OMR Answer-Sheet.
8. 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 type of hybridisation of boron in diborane is (1) Sp-hybridisation (2) Sp^2-hybridisation (3) Sp^3-hybridisation (4) Sp^3d^2-hybridisation
2.	The silicates which contain extended anions are (1) Pyro silicates (2) Three dimensional silicates (3) Chains silicates (4) Cyclic silicates
3.	Orthophosphoric acid is (1) Monobasic (2) Dibasic (3) Tribasic (4) Tetrabasic
4.	Oleum is chemically known as (1) H_2SO_3 (2) H_2SO_5 (3) $H_2S_2O_7$ (4) $H_2S_2O_8$

Question No.	Questions
5.	The correct order of the increasing acidic strengths of $HClO$, $HClO_2$, $HClO_3$ and $HClO_4$ is (1) $HClO > HClO_2 > HClO_3 > HClO_4$ (2) $HClO_3 > HClO_4 > HClO_2 > HClO$ (3) $HClO_4 > HClO_3 > HClO_2 > HClO$ (4) $HClO_2 > HClO > HClO_3 > HClO_4$
6.	The shape of XeF_4 is (1) Square planar (2) Tetrahedral (3) Octahedral (4) Trigonal planar
7.	Which of the following atoms in the given oxidation state has partially filled d-orbitals (1) V(I) (2) Ti (IV) (3) Zn (II) (4) Cu (I)
8.	Which of the two have almost similar size (1) $_{22}$Ii and $_{40}$Zr (2) $_{41}$Nb and $_{73}$Ta (3) $_{39}$Y and $_{57}$La (4) $_{20}$Ca and $_{31}$Ir

Question No.	Questions
9.	$[CO(NH_3)_5 Br] SO_4$ and $[CO(NH_3)_5 SO_4] Br$ are example of which type of isomersim? (1) Linkage (2) Geometrical (3) Ionisation (4) Optical
10.	The Crystal Field Stabilisation Energy (CFSE) will be highest for (1) $[COF_6]^{3-}$ (2) $[CO(CNS)_4]^{2-}$ (3) $[Mn(H_2O)_6]^{2+}$ (4) $[CO(NH_3)_6]^{3+}$
11.	The product formed in the reaction of primary amine with nitrous acid is : (1) Alcohol (2) Nitroalkene (3) Tert. amine (4) Alkyl nitrile
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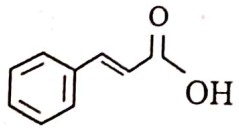
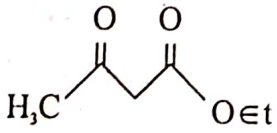
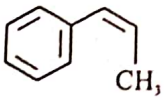
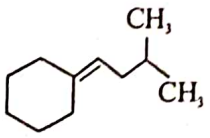
15.	The reaction of benzaldehyde with acetic anhydride in presence of sodium acetate and sodium hydroxide will give : (1)  (2)  (3)  (4) 
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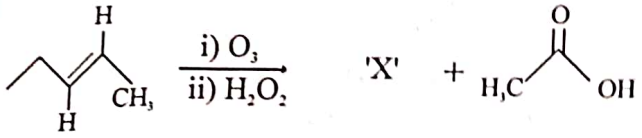
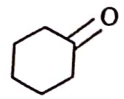
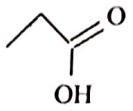
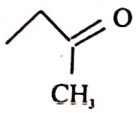
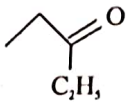
17.	In the following reaction,  'X' is : (1)  (2)  (3)  (4) 
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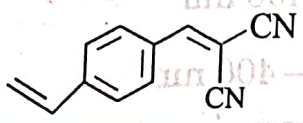
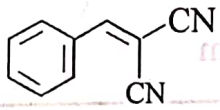
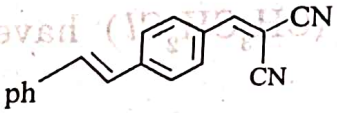
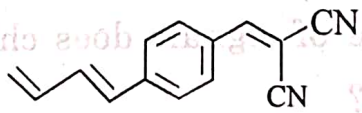
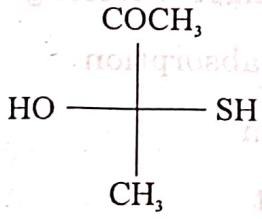
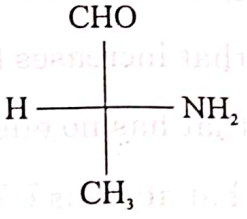
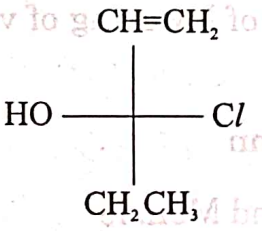
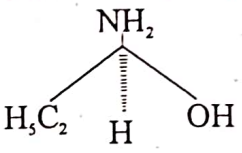
Question No.	Questions
21.	Which of the following carbohydrates does not have any chiral carbon atoms? (1) Glyceraldehyde (2) Erythrose (3) Dihydroxyacetone (4) Erythrulose
22.	The number of peaks observed in the 'HNMR of CHD_2OD are : (1) Triplet (2) Doublet (3) Pentet (4) Septet
23.	How many stereoisomers does have 2, 3– dichloropentane? (1) 2 (2) 3 (3) 4 (4) 5
24.	Which of the following will have higher λ max? (1)  (2)  (3)  (4) 
25.	Which of the following statements is correct? (1) All alcohols are much stronger acids than terminal alkynes (2) Most alkoxide ions are weaker bases than hydroxidation (3) Hydroxylation of epoxides gives 1, 2–cyclohexanediol (4) Ethane –1, 2– diol is obtained by the biomolecular reaction of carbonyl compounds.

Question No.	Questions
26.	Which of the following structures assigned S-configuration? (1)  (2)  (3)  (4) 
27.	Ziegler-Natta Catalyst is used in polymerization of : (1) Epoxy resins (2) Polyurathanes (3) Polyamide (4) Alpha-Olifins Polymers
28.	The correct IUPAC Name for thiol is : (1) Butane-1-ol (2) Butanol (3) Butyl mercaptan (4) Butanethiol
29.	Unfolding of protein can be termed as (1) Reduction (2) Oxidation (3) Denaturation (4) Renaturation

Question No.	Questions
30.	Choose the correct statement about chromophore (1) A group that shifts the absorption to longer wavelength (2) A group that increases the intensity of absorption (3) A group that has no effect on absorption (4) A group that absorbs UV or visible light
31.	One of the methods used for determination of lowering of vapor pressure was given by: (1) Rast (2) Beckmann (3) Cottrell (4) Smith and Menzie
32.	Which of the following is successfully explained by First Law of Thermodynamics: (1) The direction of all spontaneous processes (2) The condition required for all spontaneous processes (3) The extent of all spontaneous processes (4) The growth of a child
33.	Which of the points of kinetic molecular theory of gases was found to be wrong especially at low temperature and high pressure? (1) Particles are point masses (2) Particles undergo elastic collisions (3) Gravitational force is absent in gases (4) Particles undergo zigzag motion

Question No.	Questions
34.	The temperature above which a gas cannot be liquified by applying and pressure, is called as: (1) Critical temperature (2) Inversion temperature (3) Boyle's temperature (4) Absolute temperature
35.	Thermodynamic equilibrium is a mix of the following: (1) Thermal equilibrium and chemical equilibrium (2) Mechanical equilibrium and thermal equilibrium (3) Mechanical equilibrium and chemical equilibrium (4) All of these
36.	pH of 1M HCl is : (1) 0 (2) –0 (3) 1 (4) None of these
37.	The Na^+ present in 1 M NaCl or 2 M CH_3COONa, or 5 M Na_2SO_4 (all at infinite dilution), shows: (1) Same ionic conductance at constant temperature (2) Same ionic conductance at different temperatures (3) Different ionic conductances at constant temperature (4) None of these

Question No.	Questions
38.	When a gas is passed from high pressure area into low pressure area through a minor aperture adiabatically, it warms up if the temperature before the start of the process was above: (1) Inversion temperature (2) Boyle's temperature (3) Critical temperature (4) All of these
39.	At high pressures, the compressibility factor of a real gas is: (1) >1 (2) <1 (3) ≤ 1 (4) $=1$
40.	Which of the following is true at thermodynamic equilibrium? (1) $\Delta G = 0$ (2) $\Delta G > 0$ (3) $\Delta G^\circ = 0$ (4) $\Delta G^\circ < 0$
41.	Which one of the following compounds will behave as ammono base in ammonia? (1) NH_4OH (2) $NaNH_2$ (3) $(NH_4)_2 SO_2$ (4) $(NH_4)_2 CO_3$
42.	Formula of Zeise's salt is (1) $[PtCl_3 (\eta^2\text{-}C_2H_4)^-]$ (2) $[PtCl_4]^{2-}$ (3) H_2PtCl_6 (4) $[ZnCl_4]^{2-}$

Question No.	Questions
43.	Silicon is an important constituent of (1) Rocks (2) Minerals (3) Alloys (4) Vegetables
44.	In Schrodinger's equation, ∇^2 is, (1) Hermitian operator (2) Laplacian operator (3) Reciprocal of Δ (4) None of the above
45.	De broglie's concept of duality applies, (1) only to the electrons in an atom (2) only to a moving car (3) only to a ball in speed (4) all of above
46.	Ka X Kb = 10^{-14}, relation is valid for conjugate acid-base pair at, (1) 25° C only (2) 90° C only (3) At every temperature as Kw is a constant for water (4) At 37°C only
47.	'The lattice energy of FeO is less than that of Fe_2O_3' - This statement is, (1) True (2) False (3) Sometimes true (4) Unpredictable

Question No.	Questions
48.	A catalyst is : (1) Specific to the reaction (2) Specific to temperature (3) Specific to the factory in which it is produced (4) Specific to the country in which it is produced
49.	Suppose, H_2S gas is introduced into an industrial chamber to decrease the efficiency of an unwanted catalyst, H_2S shall be termed as : (1) Catalytic inhibitor (2) Catalytic poison (3) Catalytic promotor (4) All correct
50.	"In Thermodynamically spontaneous processes, the entropy increases" - This statement is : (1) Always true (2) Always false (3) Sometimes true (4) All wrong
51.	Considering H_2O as a weak field ligand, the number of unpaired electron in $[Mn(H_2O)_6]^{2+}$ will be (1) three (2) five (3) two (4) four
52.	The expected spin-only magnetic moments for $[Fe(CN)_6]^{4-}$ and $[FeF_6]^{3-}$ respectively are (1) 1.73 and 1.73 B.M. (2) 1.73 and 5.92 B.M. (3) 0.0 and 1.73 B.M. (4) 0.0 and 5.92 B.M.

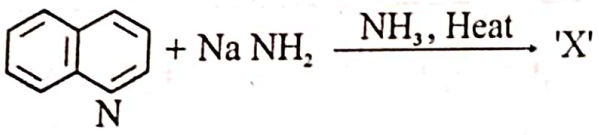
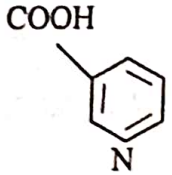
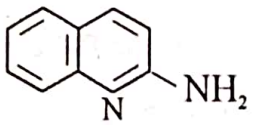
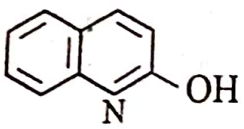
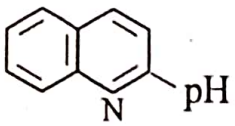
Question No.	Questions
53.	The lowest energy transition in Orgel diagram of octahedral Ni^{2+} complex is (1) $^3A_2g \rightarrow {}^3T_1g(F)$ (2) $^3A_2g \rightarrow {}^3T_1g(P)$ (3) $^3A_2g \rightarrow {}^3T_2g(F)$ (4) None of these
54.	General Electronic Configuration of lanthanides is (1) $(n-2)\ f^{1-14}\ (n-1)\ s^2\ p^6\ d^{0-1}\ ns^2$ (2) $(n-2)\ f^{0-14}\ (n-1)\ d^{0-1}\ ns^2$ (3) $(n-2)\ f^{0-14}\ (n-1)\ d^{10}\ ns^2$ (4) $(n-2)\ d^{0-1}\ (n-1)\ f^{0-14}\ ns^1$
55.	The brown ring test for NO_3^- is due to the formation of the complex ion with formula (1) $[Fe(H_2O)_6]^{2+}$ (2) $Fe[NO(CN)_5]^{2-}$ (3) $[Fe(H_2O)_5NO]^{2+}$ (4) $[Fe(H_2O)(NO)_5]^{2+}$
56.	Nessler's reagent is used to detect (1) CrO_4^{2-} (2) PO_4^{3-} (3) MnO_4^- (4) NH_4^+
57.	Actinides are (1) oxidising agents (2) weak reducing agents (3) strong reducing agents (4) none of these

Question No.	Questions
58.	CH_3HgOH is classified as (1) Soft - Soft (2) Hard - Hard (3) Soft - Hard (4) Hard - Soft
59.	Heme is a Porphyrin complex of which metal ion? (1) Fe(II) (2) Fe(III) (3) Mg(II) (4) Zn(II)
60.	Which one of the following is the weakest Lewis base? (1) NH_2^- (2) CH_3^- (3) OH^- (4) F^-
61.	Which of the following is the law of helplessness of mankind : (1) 1st law of thermodynamics (2) 2nd law of thermodynamics (3) 3rd law of thermodynamics (4) all of these
62.	A catalyst and photosensitizer are : (1) Different substances (2) Same substances (3) Both true (4) Both false

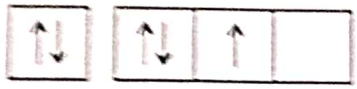
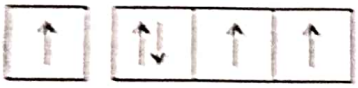
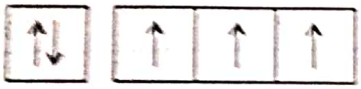
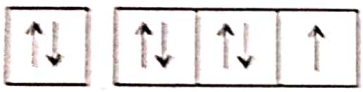
Question No.	Questions
63.	For an elementary reaction, (1) Order and molecularity are always the same (2) Order and molecularity may or may not be the same (3) Order and molecularity are always different (4) All false
64.	With respect to the reactant taken in excess, (1) Order becomes zero but molecularity remains uninfluenced (2) Order and molecularity both become zero (3) Molecularity becomes zero but order remains uninfluenced (4) None of these
65.	Mixture of ethyl alcohol and water is an example of : (1) Non-ideal solution with positive deviation (2) Non-ideal solution with negative deviation (3) Ideal solution (4) None of these
66.	Which is true: (1) Dilute solutions produce no heat on addition of more solvent (2) Dilute solutions absorb no heat on addition of more solvent (3) Dilute solutions are ideal solutions (4) All correct

Question No.	Questions
67.	When a positive catalyst is added to a reversible reaction, it effect on rate of forward reaction (Rf) and backward reaction (Rb) is given by: (1) An increase in Rf and decrease in Rb (2) An increase in Rf and Rb both (3) An increase in Rb and decrease in Rf (4) A decrease in Ff and Rb both
68.	In the theory of absolute reaction rates, which of the following terms represents the complexity of reactants and the steric factor? (1) $\Delta S^{\#}$ (2) $\Delta H^{\#}$ (3) $\Delta G^{\#}$ (4) $\Delta A^{\#}$
69.	Osmotic pressure is used for the determination of : (1) Weight average molecular weight (2) Number average molecular weight (3) Both (4) None
70.	Which is a necessary requirement for the salt used in salt bridge? (1) It should react with agar-agar gel (2) Transport numbers of its anion and cation should be nearly the same (3) Transport numbers of its anion and cation should be different (4) It should not be water soluble

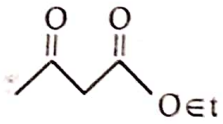
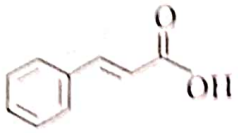
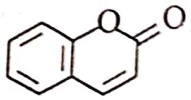
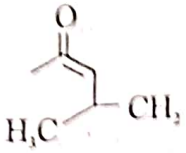
Question No.	Questions
71.	On increasing the temperature, the rate of a reaction increases by : (1) 2 to 3 times (2) 2 times (3) 3 times (4) Can not be predicted as the data are unavailable
72.	Common feature of Galvanic and electrolytic cells is: (1) Cathode is positive (2) Anode is negative (3) Both produce current (4) Oxidation takes place at anode
73.	Conductivity is: (1) Specific conductance (2) Molar conductance (3) Equivalent conductance (4) All of these
74.	The normality of 0.1 M solution of $K_2Cr_2O_7$ in acidic medium shall be: (1) 0.6 (2) 0.0166 (3) 0.5 (4) 0.1
75.	On doubling initial concentration of reactant, the half-life period doubles. The order of reaction is : (1) 1 (2) 2 (3) 0 (4) 3

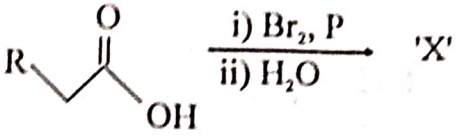
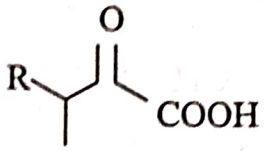
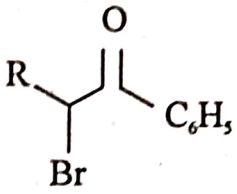
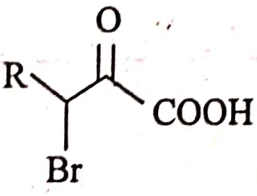
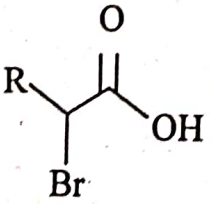
Question No.	Questions
76.	A substance is named as 'A'. At absolute zero temperature, the entropy of this substance is Y. What are X and Y ? (1) X = Crystalline, Y = 0 (2) X = Perfectly Crystalline, Y = 0 (3) X = Perfectly Crystalline, Y > 0 (4) X = Crystalline, Y > 0
77.	Hyper conjugation is also known as : (1) Baker - Nathan - effect (2) Mesomeric - effect (3) Inductive - effect (4) Resonance - effect
78.	α -D- glucose and β -D- glucose are : (1) Anomers (2) Keto - aldopairs (3) Epimer (4) Stereoisomers
79.	In the given reaction,  'X' is : (1)  (2)  (3)  (4) 

Question No.	Questions
80.	Which of the following is incorrect Statements? (1) Pyrrole and furan, each have 6 Pi electrons (2) Pyrrole and furan satisfied Huckel's rule (3) Both Pyrrole and furan have a planar, five membered ring structure (4) Pyrrole is considered less aromatic than furan
81.	The electrons present in K-shell of the atom will differ in (1) Principal quantum number (2) Azimuthal quantum number (3) Magnetic quantum number (4) Spin quantum number
82.	Wave nature of electron was demonstrated by (1) Schrodinger (2) de-Broglie (3) Davisson (4) Heisenberg
83.	Which of the following does not have any unit? (1) Electronegativity (2) Electron affinity (3) Ionisation potential (4) Atomic radii

Question No.	Questions
84.	The orbital diagram in which Aufbau principle is violated is (1)  (2)  (3)  (4) 
85.	According of VSEPR theory, the molecular geometry of the water molecule is (1) octahedral (2) distorted tetrahedral (3) planar triangle (4) linear
86.	NaCl crystal belongs to the crystal system (1) hexagonal (2) cubic (3) tetragonal (4) orthorhombic
87.	H-bonding is not present in (1) Glycerine (2) Water (3) Hydrogen Sulphide (4) Hydrogen Fluoride

Question No.	Questions
88.	According to Fazan's rule, covalent bond is favoured by (1) Large cation and small anion (2) Large cation and large anion (3) Small cation and small anion (4) Small cation and large anion
89.	Lithium shows diagonal relationship with (1) Magnesium (2) Beryllium (3) Aluminium (4) Boron
90.	Which of the following metal is present in chlorophyll? (1) Chromium (2) Cobalt (3) Magnesium (4) Iron
91.	Which of the following is involved in E_1 reaction mechanism? (1) Carbene (2) Nitrene (3) Carbocation (4) Carbanion
92.	The equation $\log Io/I = \epsilon.c.x$ is an expression of : (1) Beer's Law (2) Lambert's Law (3) Beer-Lambert's Law (4) Hess's Law

Question No.	Questions
93.	When two esters having α-hydroxy atoms is treated with strong base, the product will be : (1)  (2)  (3)  (4) 
94.	Which of the following carboxylic acid is more acidic? (1) p-nitrobenzoic acid (2) p-aminobenzoic acid (3) p-methoxybenzoic acid (4) p-fluorobenzoic acid
95.	Finger print region in IR spectroscopy consists : (1) 1660-1730 cm^{-1} (2) 600-1400 cm^{-1} (3) 100-400 cm^{-1} (4) 2800-3200 cm^{-1}

Question No.	Questions
96.	In the given reaction,  'X' is : (1)  (2)  (3)  (4) 
97.	In the IR spectrum, primary amines show two bands around the region : (1) 1670 cm^{-1} (2) 2850 cm^{-1} (3) 3350 cm^{-1} (4) 2200 cm^{-1}

Question No.	Questions
98.	Match the list-I and list-II and select the correct answer using codes given below : **List-I** — **List-II** (i) Grignard reagents — (a) Ethylene oxide (ii) C_6H_5 Mg Br — (b) 1-Ethoxy-2-propanol (iii) Oxirane — (c) C_6H_5 CH_2 CH CH_3 (iv) Methyl oxirane — (d) very strong bases (1) i–d, ii–c, iii–a, iv–b (2) i–c, ii–b, iii–d, iv–a (3) i–b, ii–a, iii–d, iv–c (4) i–a, ii–d, iii–b, iv–d
99.	Halogenation of alkanes is an example of : (1) Nucleophilic substitution (2) Electrophilic substitution (3) Elimination (4) Free radical substitution
100.	Which of the following reagents is used to convert nitrobenzene into aniline? (1) DDQ (2) PPA (3) PCl_5 (4) SN/HCl

SET–"X" (Total No. of printed pages : 25)

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PG-EE-July, 2025 (Chemistry)

Sr. No 10099

Code C

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

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

Name : _____ Date of Birth : _____

Father's Name : _____ Mother's Name : _____ _____

Date of Examination : _____

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

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3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along-with answer key of all the A,B,C and D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case will be considered.
5. 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.
6. **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.**
7. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
8. 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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1.	Which of the following is the law of helplessness of mankind : (1) 1st law of thermodynamics (2) 2nd law of thermodynamics (3) 3rd law of thermodynamics (4) all of these
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6.	Which is true: (1) Dilute solutions produce no heat on addition of more solvent (2) Dilute solutions absorb no heat on addition of more solvent (3) Dilute solutions are ideal solutions (4) All correct
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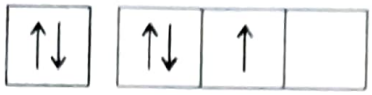
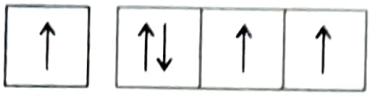
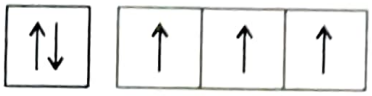
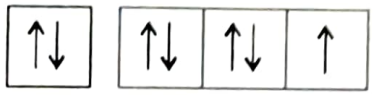
24.	The orbital diagram in which Aufbau principle is violated is (1)  (2)  (3)  (4) 
25.	According of VSEPR theory, the molecular geometry of the water molecule is (1) octahedral (2) distorted tetrahedral (3) planar triangle (4) linear
26.	NaC*l* crystal belongs to the crystal system (1) hexagonal (2) cubic (3) tetragonal (4) orthorhombic
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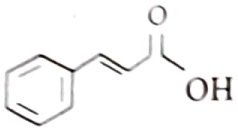
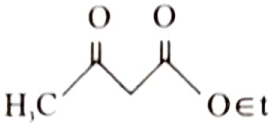
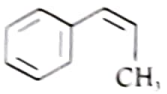
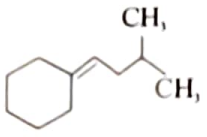
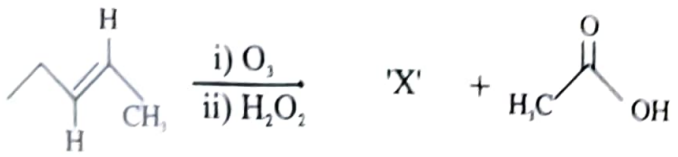
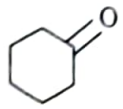
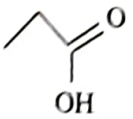
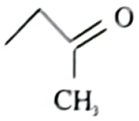
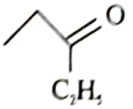
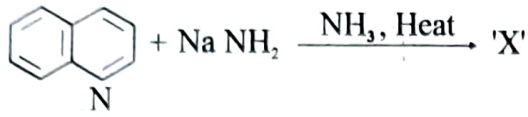
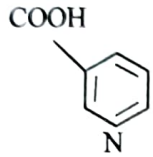
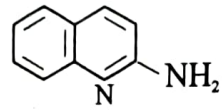
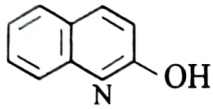
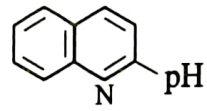
29.	Lithium shows diagonal relationship with (1) Magnesium (2) Beryllium (3) Aluminium (4) Boron
30.	Which of the following metal is present in chlorophyll? (1) Chromium (2) Cobalt (3) Magnesium (4) Iron
31.	The product formed in the reaction of primary amine with nitrous acid is : (1) Alcohol (2) Nitroalkene (3) Tert. amine (4) Alkyl nitrile
32.	Which of the following reactions is used for the synthesis of Azo dyes? (1) Perkin reaction (2) Azo coupling reaction (3) Diels-Alder reaction (4) Wittig reaction

Question No.	Questions
33.	The oxidation of acetylene by $KMnO_4$ give : (1) Oxalic acid (2) Propanoic acid (3) Ethyl alcohol (4) Formaldehyde
34.	Which of the following is least reactive towards a nucleophilic attack? (1) Propanone (2) Di-isopropyl ketone (3) Di-tertbutyl ketone (4) Propanaldehyde
35.	The reaction of benzaldehyde with acetic anhydride in presence of sodium acetate and sodium hydroxide will give : (1)  (2)  (3)  (4) 
36.	An organic reaction where an enolizable carbonyl compound react with formaldehyde and a secondary amine to form β-aminocarbonyl compound is known as : (1) Cannizzaro reaction (2) Peckmann Condensation (3) Mannich reaction (4) Aldol Condensation

Question No.	Questions
37.	In the following reaction,  'X' is : (1)  (2)  (3)  (4) 
38.	What is the wavelength range for UV spectrum? (1) 400 nm – 800 nm (2) 10 nm – 400 nm (3) 800 nm – 1 nm (4) 0.01 nm – 400 nm
39.	What type of signals does chloroethane (CH_3CH_2Cl) have in HNMR spectrum ? (1) A triplet and a quartet (2) A doublet and a triplet (3) A singlet and doublet (4) A doublet and quartet

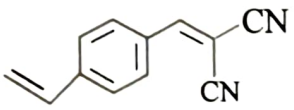
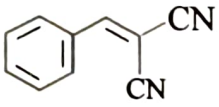
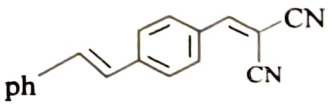
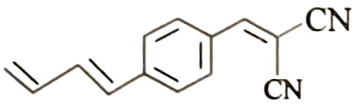
Question No.	Questions
40.	Which of the following alkylhalide has the highest reactivity towards SN_2 reaction? (1) $CH_3 - I$ (2) $CH_3 - Br$ (3) $CH_3 - Cl$ (4) $CH_3 - F$
41.	On increasing the temperature, the rate of a reaction increases by : (1) 2 to 3 times (2) 2 times (3) 3 times (4) Can not be predicted as the data are unavailable
42.	Common feature of Galvanic and electrolytic cells is: (1) Cathode is positive (2) Anode is negative (3) Both produce current (4) Oxidation takes place at anode
43.	Conductivity is: (1) Specific conductance (2) Molar conductance (3) Equivalent conductance (4) All of these
44.	The normality of 0.1 M solution of $K_2Cr_2O_7$ in acidic medium shall be: (1) 0.6 (2) 0.0166 (3) 0.5 (4) 0.1

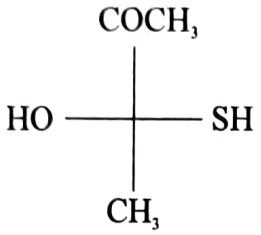
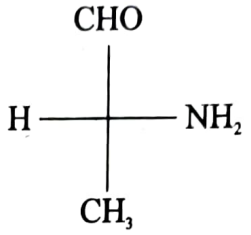
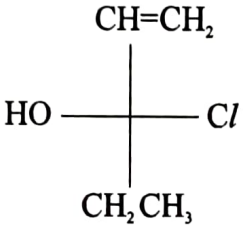
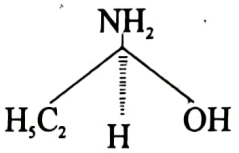
Question No.	Questions
45.	On doubling initial concentration of reactant, the half-life period doubles. The order of reaction is : (1) 1 (2) 2 (3) 0 (4) 3
46.	A substance is named as 'A'. At absolute zero temperature, the entropy of this substance is Y. What are X and Y ? (1) X = Crystalline, Y = 0 (2) X = Perfectly Crystalline, Y = 0 (3) X = Perfectly Crystalline, Y > 0 (4) X = Crystalline, Y > 0
47.	Hyper conjugation is also known as : (1) Baker - Nathan - effect (2) Mesomeric - effect (3) Inductive - effect (4) Resonance - effect
48.	α -D- glucose and β -D- glucose are : (1) Anomers (2) Keto - aldopairs (3) Epimer (4) Stereoisomers

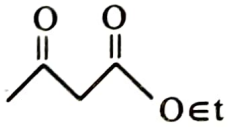
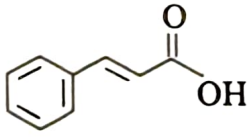
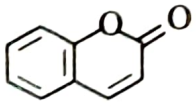
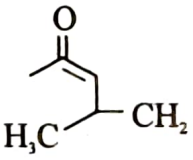
Question No.	Questions
49.	In the given reaction,  'X' is : (1)  (2)  (3)  (4) 
50.	Which of the following is incorrect Statements? (1) Pyrrole and furan, each have 6 Pi electrons (2) Pyrrole and furan satisfied Huckel's rule (3) Both Pyrrole and furan have a planar, five membered ring structure (4) Pyrrole is considered less aromatic than furan
51.	Which one of the following compounds will behave as ammono base in ammonia? (1) NH_4OH (2) $NaNH_2$ (3) $(NH_4)_2SO_2$ (4) $(NH_4)_2CO_3$
52.	Formula of Zeise's salt is (1) $[PtCl_3(\eta^2\text{-}C_2H_4)^-]$ (2) $[PtCl_4]^{2-}$ (3) H_2PtCl_6 (4) $[ZnCl_4]^{2-}$

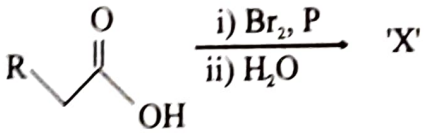
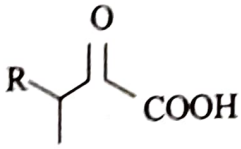
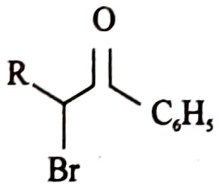
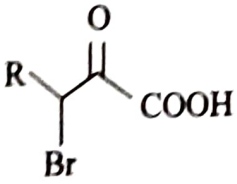
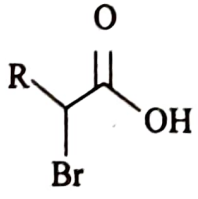
Question No.	Questions
53.	Silicon is an important constituent of (1) Rocks (2) Minerals (3) Alloys (4) Vegetables
54.	In Schrodinger's equation, ∇^2 is, (1) Hermitian operator (2) Laplacian operator (3) Reciprocal of Δ (4) None of the above
55.	De broglie's concept of duality applies, (1) only to the electrons in an atom (2) only to a moving car (3) only to a ball in speed (4) all of above
56.	Ka X Kb = 10^{-14}, relation is valid for conjugate acid-base pair at, (1) 25° C only (2) 90° C only (3) At every temperature as Kw is a constant for water (4) At 37°C only
57.	'The lattice energy of FeO is less than that of Fe_2O_3' - This statement is, (1) True (2) False (3) Sometimes true (4) Unpredictable

Question No.	Questions
58.	A catalyst is : (1) Specific to the reaction (2) Specific to temperature (3) Specific to the factory in which it is produced (4) Specific to the country in which it is produced
59.	Suppose, H_2S gas is introduced into an industrial chamber to decrease the efficiency of an unwanted catalyst, H_2S shall be termed as : (1) Catalytic inhibitor (2) Catalytic poison (3) Catalytic promotor (4) All correct
60.	"In Thermodynamically spontaneous processes, the entropy increases" - This statement is : (1) Always true (2) Always false (3) Sometimes true (4) All wrong
61.	Which of the following carbohydrates does not have any chiral carbon atoms? (1) Glyceraldehyde (2) Erythrose (3) Dihydroxyacetone (4) Erythrulose
62.	The number of peaks observed in the 'HNMR of CHD_2OD are : (1) Triplet (2) Doublet (3) Pentet (4) Septet

Question No.	Questions
63.	How many stereoisomers does have 2, 3– dichloropentane? (1) 2 (2) 3 (3) 4 (4) 5
64.	Which of the following will have higher λ max? (1)  (2)  (3)  (4) 
65.	Which of the following statements is correct? (1) All alcohols are much stronger acids than terminal alkynes (2) Most alkoxide ions are weaker bases than hydroxidation (3) Hydroxylation of epoxides gives 1, 2–cyclohexanediol (4) Ethane –1, 2– diol is obtained by the biomolecular reaction of carbonyl compounds.

Question No.	Questions
66.	Which of the following structures assigned S-configuration? (1)  (2)  (3)  (4) 
67.	Ziegler-Natta Catalyst is used in polymerization of : (1) Epoxy resins (2) Polyurathanes (3) Polyamide (4) Alpha-Olifins Polymers
68.	The correct IUPAC Name for thiol is : (1) Butane-1-ol (2) Butanol (3) Butyl mercaptan (4) Butanethiol
69.	Unfolding of protein can be termed as (1) Reduction (2) Oxidation (3) Denaturation (4) Renaturation

Question No.	Questions
70.	Choose the correct statement about chromophore (1) A group that shifts the absorption to longer wavelength (2) A group that increases the intensity of absorption (3) A group that has no effect on absorption (4) A group that absorbs UV or visible light
71.	Which of the following is involved in E_1 reaction mechanism? (1) Carbene (2) Nitrene (3) Carbocation (4) Carbanion
72.	The equation $\log Io/I = \epsilon.c.x$ is an expression of : (1) Beer's Law (2) Lambert's Law (3) Beer-Lambert's Law (4) Hess's Law
73.	When two esters having α-hydroxy atoms is treated with strong base, the product will be : (1)  (2)  (3)  (4) 

Question No.	Questions
74.	Which of the following carboxylic acid is more acidic? (1) p-nitrobenzoic acid (2) p-aminobenzoic acid (3) p-methoxybenzoic acid (4) p-fluorobenzoic acid
75.	Finger print region in IR spectroscopy consists : (1) 1660-1730 cm^{-1} (2) 600-1400 cm^{-1} (3) 100-400 cm^{-1} (4) 2800-3200 cm^{-1}
76.	In the given reaction,  'X' is : (1)  (2)  (3)  (4) 

Question No.	Questions
77.	In the IR spectrum, primary amines show two bands around the region : (1) $1670\ cm^{-1}$ (2) $2850\ cm^{-1}$ (3) $3350\ cm^{-1}$ (4) $2200\ cm^{-1}$
78.	Match the list-I and list-II and select the correct answer using codes given below : **List-I** **List-II** (i) Grignard reagents (a) Ethylene oxide (ii) C_6H_5 Mg Br (b) 1-Ethoxy-2-propanol (iii) Oxirane (c) $C_6H_5\ CH_2\ CH\ CH_3$ (iv) Methyl oxirane (d) very strong bases (1) i–d, ii–c, iii–a, iv–b (2) i–c, ii–b, iii–d, iv–a (3) i–b, ii–a, iii–d, iv–c (4) i–a, ii–d, iii–b, iv–d
79.	Halogenation of alkanes is an example of : (1) Nucleophilic substitution (2) Electrophilic substitution (3) Elimination (4) Free radical substitution

Question No.	Questions
80.	Which of the following reagents is used to convert nitrobenzene into aniline? (1) DDQ (2) PPA (3) PCl_5 (4) SN/HCl
81.	The type of hybridisation of boron in diborane is (1) Sp-hybridisation (2) Sp^2-hybridisation (3) Sp^3-hybridisation (4) Sp^3d^2-hybridisation
82.	The silicates which contain extended anions are (1) Pyro silicates (2) Three dimensional silicates (3) Chains silicates (4) Cyclic silicates
83.	Orthophosphoric acid is (1) Monobasic (2) Dibasic (3) Tribasic (4) Tetrabasic
84.	Oleum is chemically known as (1) H_2SO_3 (2) H_2SO_5 (3) $H_2S_2O_7$ (4) $H_2S_2O_8$

Question No.	Questions
85.	The correct order of the increasing acidic strengths of $HClO$, $HClO_2$, $HClO_3$ and $HClO_4$ is (1) $HClO > HClO_2 > HClO_3 > HClO_4$ (2) $HClO_3 > HClO_4 > HClO_2 > HClO$ (3) $HClO_4 > HClO_3 > HClO_2 > HClO$ (4) $HClO_2 > HClO > HClO_3 > HClO_4$
86.	The shape of XeF_4 is (1) Square planar (2) Tetrahedral (3) Octahedral (4) Trigonal planar
87.	Which of the following atoms in the given oxidation state has partially filled d-orbitals (1) V(I) (2) Ti (IV) (3) Zn (II) (4) Cu (I)
88.	Which of the two have almost similar size (1) $_{22}$Ii and $_{40}$Zr (2) $_{41}$Nb and $_{73}$Ta (3) $_{39}$Y and $_{57}$La (4) $_{20}$Ca and $_{31}$Ir
89.	$[CO(NH_3)_5 Br] SO_4$ and $[CO(NH_3)_5 SO_4] Br$ are example of which type of isomersim? (1) Linkage (2) Geometrical (3) Ionisation (4) Optical

Question No.	Questions
90.	The Crystal Field Stabilisation Energy (CFSE) will be highest for (1) $[COF_6]^{3-}$ (2) $[CO(CNS)_4]^{2-}$ (3) $[Mn(H_2O)_6]^{2+}$ (4) $[CO(NH_3)_6]^{3+}$
91.	One of the methods used for determination of lowering of vapor pressure was given by: (1) Rast (2) Beckmann (3) Cottrell (4) Smith and Menzie
92.	Which of the following is successfully explained by First Law of Thermodynamics: (1) The direction of all spontaneous processes (2) The condition required for all spontaneous processes (3) The extent of all spontaneous processes (4) The growth of a child
93.	Which of the points of kinetic molecular theory of gases was found to be wrong especially at low temperature and high pressure? (1) Particles are point masses (2) Particles undergo elastic collisions (3) Gravitational force is absent in gases (4) Particles undergo zigzag motion

Question No.	Questions
94.	The temperature above which a gas cannot be liquified by applying and pressure, is called as: (1) Critical temperature (2) Inversion temperature (3) Boyle's temperature (4) Absolute temperature
95.	Thermodynamic equilibrium is a mix of the following: (1) Thermal equilibrium and chemical equilibrium (2) Mechanical equilibrium and thermal equilibrium (3) Mechanical equilibrium and chemical equilibrium (4) All of these
96.	pH of 1M HCl is : (1) 0 (2) –0 (3) 1 (4) None of these
97.	The Na^+ present in 1 M NaCl or 2 M CH_3COONa, or 5 M Na_2SO_4 (all at infinite dilution), shows: (1) Same ionic conductance at constant temperature (2) Same ionic conductance at different temperatures (3) Different ionic conductances at constant temperature (4) None of these

Question No.	Questions
98.	When a gas is passed from high pressure area into low pressure area through a minor aperture adiabatically, it warms up if the temperature before the start of the process was above: (1) Inversion temperature (2) Boyle's temperature (3) Critical temperature (4) All of these
99.	At high pressures, the compressibility factor of a real gas is: (1) > 1 (2) < 1 (3) ≤ 1 (4) $= 1$
100.	Which of the following is true at thermodynamic equilibrium? (1) $\Delta G = 0$ (2) $\Delta G > 0$ (3) $\Delta G^{\circ} = 0$ (4) $\Delta G^{\circ} < 0$

SET–"X" (Total No. of printed pages : 25)

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PG-EE-July, 2025 (Chemistry)

Code **D**

Sr. No. 10104

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

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

Name : _____ Date of Birth : _____

Father's Name : _____ Mother's Name : _____

Date of Examination : _____

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

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3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
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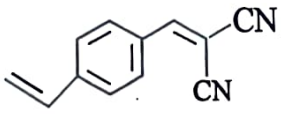
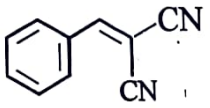
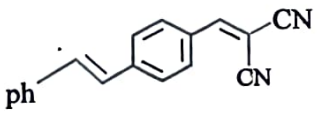
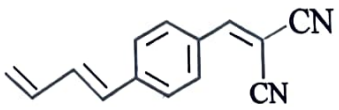
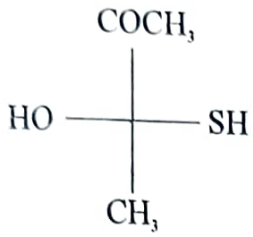
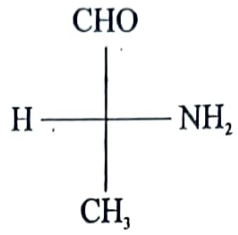
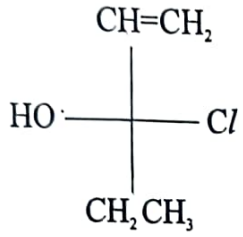
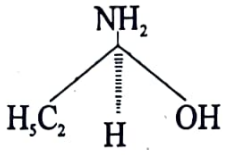
6. **There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.**
7. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
8. BEFORE 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 carbohydrates does not have any chiral carbon atoms? (1) Glyceraldehyde (2) Erythrose (3) Dihydroxyacetone (4) Erythrulose
2.	The number of peaks observed in the 'HNMR of CHD_2OD are : (1) Triplet (2) Doublet (3) Pentet (4) Septet
3.	How many stereoisomers does have 2, 3– dichloropentane? (1) 2 (2) 3 (3) 4 (4) 5
4.	Which of the following will have higher λ max? (1)  (2)  (3)  (4) 
5.	Which of the following statements is correct? (1) All alcohols are much stronger acids than terminal alkynes (2) Most alkoxide ions are weaker bases than hydroxidation (3) Hydroxylation of epoxides gives 1, 2–cyclohexanediol (4) Ethane –1, 2– diol is obtained by the biomolecular reaction of carbonyl compounds.

Question No.	Questions
6.	Which of the following structures assigned S-configuration? (1)  (2)  (3)  (4) 
7.	Ziegler-Natta Catalyst is used in polymerization of : (1) Epoxy resins (2) Polyurathanes (3) Polyamide (4) Alpha-Olifins Polymers
8.	The correct IUPAC Name for thiol is : (1) Butane-1-ol (2) Butanol (3) Butyl mercaptan (4) Butanethiol
9.	Unfolding of protein can be termed as (1) Reduction (2) Oxidation (3) Denaturation (4) Renaturation

Question No.	Questions
10.	Choose the correct statement about chromophore (1) A group that shifts the absorption to longer wavelength (2) A group that increases the intensity of absorption (3) A group that has no effect on absorption (4) A group that absorbs UV or visible light
11.	One of the methods used for determination of lowering of vapor pressure was given by: (1) Rast (2) Beckmann (3) Cottrell (4) Smith and Menzie
12.	Which of the following is successfully explained by First Law of Thermodynamics: (1) The direction of all spontaneous processes (2) The condition required for all spontaneous processes (3) The extent of all spontaneous processes (4) The growth of a child
13.	Which of the points of kinetic molecular theory of gases was found to be wrong especially at low temperature and high pressure? (1) Particles are point masses (2) Particles undergo elastic collisions (3) Gravitational force is absent in gases (4) Particles undergo zigzag motion

Question No.	Questions
14.	The temperature above which a gas cannot be liquified by applying and pressure, is called as: (1) Critical temperature (2) Inversion temperature (3) Boyle's temperature (4) Absolute temperature
15.	Thermodynamic equilibrium is a mix of the following: (1) Thermal equilibrium and chemical equilibrium (2) Mechanical equilibrium and thermal equilibrium (3) Mechanical equilibrium and chemical equilibrium (4) All of these
16.	pH of 1M HC*l* is : (1) 0 (2) –0 (3) 1 (4) None of these
17.	The Na^+ present in 1 M NaC*l* or 2 M CH_3COONa, or 5 M Na_2SO_4 (all at infinite dilution), shows: (1) Same ionic conductance at constant temperature (2) Same ionic conductance at different temperatures (3) Different ionic conductances at constant temperature (4) None of these

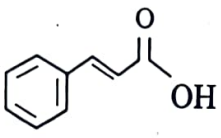
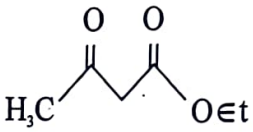
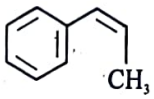
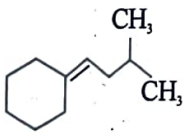
Question No.	Questions
18.	When a gas is passed from high pressure area into low pressure area through a minor aperture adiabatically, it warms up if the temperature before the start of the process was above: (1) Inversion temperature (2) Boyle's temperature (3) Critical temperature (4) All of these
19.	At high pressures, the compressibility factor of a real gas is: (1) >1 (2) <1 (3) ≤ 1 (4) $=1$
20.	Which of the following is true at thermodynamic equilibrium? (1) $\Delta G = 0$ (2) $\Delta G > 0$ (3) $\Delta G^{\circ} = 0$ (4) $\Delta G^{\circ} < 0$
21.	Which one of the following compounds will behave as ammono base in ammonia? (1) NH_4OH (2) $NaNH_2$ (3) $(NH_4)_2SO_2$ (4) $(NH_4)_2CO_3$
22.	Formula of Zeise's salt is (1) $[PtCl_3(\eta^2\text{-}C_2H_4)^-]$ (2) $[PtCl_4]^{2-}$ (3) H_2PtCl_6 (4) $[ZnCl_4]^{2-}$
23.	Silicon is an important constituent of (1) Rocks (2) Minerals (3) Alloys (4) Vegetables

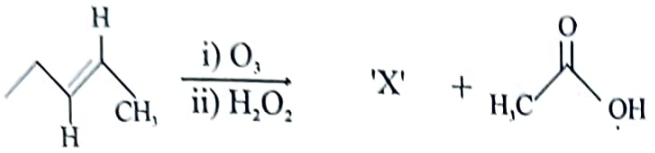
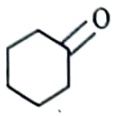
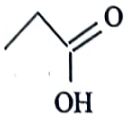
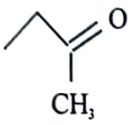
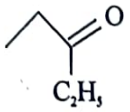
Question No.	Questions
24.	In Schrodinger's equation, ∇^2 is, (1) Hermitian operator (2) Laplacian operator (3) Reciprocal of Δ (4) None of the above
25.	De broglie's concept of duality applies, (1) only to the electrons in an atom (2) only to a moving car (3) only to a ball in speed (4) all of above
26.	Ka X Kb = 10^{-14}, relation is valid for conjugate acid-base pair at, (1) 25° C only (2) 90° C only (3) At every temperature as Kw is a constant for water (4) At 37°C only
27.	'The lattice energy of FeO is less than that of Fe_2O_3' - This statement is, (1) True (2) False (3) Sometimes true (4) Unpredictable
28.	A catalyst is : (1) Specific to the reaction (2) Specific to temperature (3) Specific to the factory in which it is produced (4) Specific to the country in which it is produced

Question No.	Questions
29.	Suppose, H_2S gas is introduced into an industrial chamber to decrease the efficiency of an unwanted catalyst, H_2S shall be termed as : (1) Catalytic inhibitor (2) Catalytic poison (3) Catalytic promotor (4) All correct
30.	"In Thermodynamically spontaneous processes, the entropy increases" - This statement is : (1) Always true (2) Always false (3) Sometimes true (4) All wrong
31.	The type of hybridisation of boron in diborane is (1) Sp-hybridisation (2) Sp^2-hybridisation (3) Sp^3-hybridisation (4) Sp^3d^2-hybridisation
32.	The silicates which contain extended anions are (1) Pyro silicates (2) Three dimensional silicates (3) Chains silicates (4) Cyclic silicates
33.	Orthophosphoric acid is (1) Monobasic (2) Dibasic (3) Tribasic (4) Tetrabasic

Question No.	Questions
34.	Oleum is chemically known as (1) H_2SO_3 (2) H_2SO_5 (3) $H_2S_2O_7$ (4) $H_2S_2O_8$
35.	The correct order of the increasing acidic strengths of $HClO$, $HClO_2$, $HClO_3$ and $HClO_4$ is (1) $HClO > HClO_2 > HClO_3 > HClO_4$ (2) $HClO_3 > HClO_4 > HClO_2 > HClO$ (3) $HClO_4 > HClO_3 > HClO_2 > HClO$ (4) $HClO_2 > HClO > HClO_3 > HClO_4$
36.	The shape of XeF_4 is (1) Square planar (2) Tetrahedral (3) Octahedral (4) Trigonal planar
37.	Which of the following atoms in the given oxidation state has partially filled d-orbitals (1) V(I) (2) Ti (IV) (3) Zn (II) (4) Cu (I)
38.	Which of the two have almost similar size (1) $_{22}$Ii and $_{40}$Zr (2) $_{41}$Nb and $_{73}$Ta (3) $_{39}$Y and $_{57}$La (4) $_{20}$Ca and $_{31}$Ir

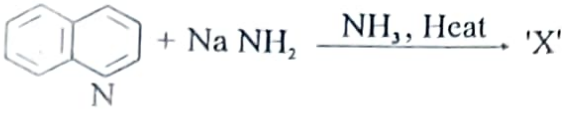
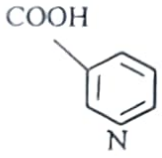
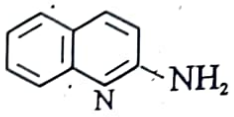
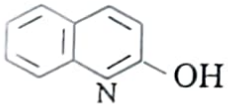
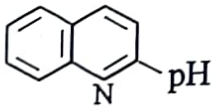
Question No.	Questions
39.	$[CO(NH_3)_5 Br] SO_4$ and $[CO(NH_3)_5 SO_4] Br$ are example of which type of isomersim? (1) Linkage (2) Geometrical (3) Ionisation (4) Optical
40.	The Crystal Field Stabilisation Energy (CFSE) will be highest for (1) $[COF_6]^{3-}$ (2) $[CO(CNS)_4]^{2-}$ (3) $[Mn(H_2O)_6]^{2+}$ (4) $[CO(NH_3)_6]^{3+}$
41.	The product formed in the reaction of primary amine with nitrous acid is : (1) Alcohol (2) Nitroalkene (3) Tert. amine (4) Alkyl nitrile
42.	Which of the following reactions is used for the synthesis of Azo dyes? (1) Perkin reaction (2) Azo coupling reaction (3) Diels-Alder reaction (4) Wittig reaction
43.	The oxidation of acetylene by $KMnO_4$ give : (1) Oxalic acid (2) Propanoic acid (3) Ethyl alcohol (4) Formaldehyde

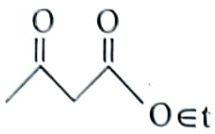
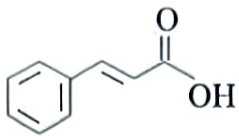
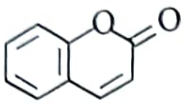
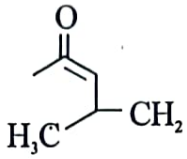
Question No.	Questions
44.	Which of the following is least reactive towards a nucleophilic attack? (1) Propanone (2) Di-isopropyl ketone (3) Di-tertbutyl ketone (4) Propanaldehyde
45.	The reaction of benzaldehyde with acetic anhydride in presence of sodium acetate and sodium hydroxide will give : (1)  (2)  (3)  (4) 
46.	An organic reaction where an enolizable carbonyl compound react with formaldehyde and a secondary amine to form β-aminocarbonyl compound is known as : (1) Cannizzaro reaction (2) Peckmann Condensation (3) Mannich reaction (4) Aldol Condensation

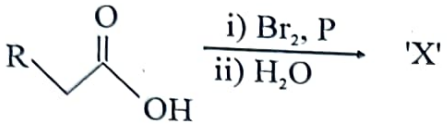
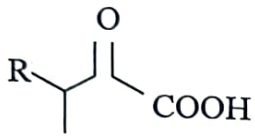
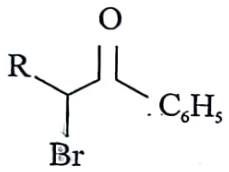
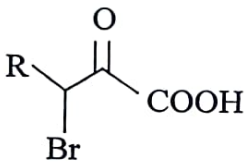
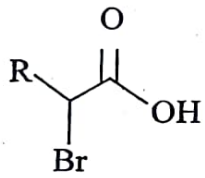
Question No.	Questions
47.	In the following reaction,  'X' is : (1)  (2)  (3)  (4) 
48.	What is the wavelength range for UV spectrum? (1) 400 nm – 800 nm (2) 10 nm – 400 nm (3) 800 nm – 1 nm (4) 0.01 nm – 400 nm
49.	What type of signals does chloroethane (CH_3CH_2Cl) have in HNMR spectrum ? (1) A triplet and a quartet (2) A doublet and a triplet (3) A singlet and doublet (4) A doublet and quartet

Question No.	Questions
50.	Which of the following alkylhalide has the highest reactivity towards SN_2 reaction? (1) $CH_3 - I$ (2) $CH_3 - Br$ (3) $CH_3 - Cl$ (4) $CH_3 - F$
51.	On increasing the temperature, the rate of a reaction increases by : (1) 2 to 3 times (2) 2 times (3) 3 times (4) Can not be predicted as the data are unavailable
52.	Common feature of Galvanic and electrolytic cells is: (1) Cathode is positive (2) Anode is negative (3) Both produce current (4) Oxidation takes place at anode
53.	Conductivity is: (1) Specific conductance (2) Molar conductance (3) Equivalent conductance (4) All of these
54.	The normality of 0.1 M solution of $K_2Cr_2O_7$ in acidic medium shall be: (1) 0.6 (2) 0.0166 (3) 0.5 (4) 0.1

Question No.	Questions
55.	On doubling initial concentration of reactant, the half-life period doubles. The order of reaction is : (1) 1 (2) 2 (3) 0 (4) 3
56.	A substance is named as 'A'. At absolute zero temperature, the entropy of this substance is Y. What are X and Y ? (1) X = Crystalline, Y = 0 (2) X = Perfectly Crystalline, Y = 0 (3) X = Perfectly Crystalline, Y > 0 (4) X = Crystalline, Y > 0
57.	Hyper conjugation is also known as : (1) Baker - Nathan - effect (2) Mesomeric - effect (3) Inductive - effect (4) Resonance - effect
58.	α-D- glucose and β-D- glucose are : (1) Anomers (2) Keto - aldopairs (3) Epimer (4) Stereoisomers

Question No.	Questions
59.	In the given reaction,  'X' is : (1)  (2)  (3)  (4) 
60.	Which of the following is incorrect Statements? (1) Pyrrole and furan, each have 6 Pi electrons (2) Pyrrole and furan satisfied Huckel's rule (3) Both Pyrrole and furan have a planar, five membered ring structure (4) Pyrrole is considered less aromatic than furan
61.	Which of the following is involved in E_1 reaction mechanism? (1) Carbene (2) Nitrene (3) Carbocation (4) Carbanion
62.	The equation $\log Io/I = \epsilon.c.x$ is an expression of : (1) Beer's Law (2) Lambert's Law (3) Beer-Lambert's Law (4) Hess's Law

Question No.	Questions
63.	When two esters having α-hydroxy atoms is treated with strong base, the product will be : (1)  (2)  (3)  (4) 
64.	Which of the following carboxylic acid is more acidic? (1) p-nitrobenzoic acid (2) p-aminobenzoic acid (3) p-methoxybenzoic acid (4) p-fluorobenzoic acid
65.	Finger print region in IR spectroscopy consists : (1) 1660-1730 cm^{-1} (2) 600-1400 cm^{-1} (3) 100-400 cm^{-1} (4) 2800-3200 cm^{-1}

Question No.	Questions
66.	In the given reaction,  'X' is : (1)  (2)  (3)  (4) 
67.	In the IR spectrum, primary amines show two bands around the region : (1) 1670 cm^{-1} (2) 2850 cm^{-1} (3) 3350 cm^{-1} (4) 2200 cm^{-1}

Question No.	Questions
68.	Match the list-I and list-II and select the correct answer using codes given below : **List-I** — **List-II** (i) Grignard reagents — (a) Ethylene oxide (ii) C_6H_5 Mg Br — (b) 1-Ethoxy-2-propanol (iii) Oxirane — (c) C_6H_5 CH_2 CH CH_3 (iv) Methyl oxirane — (d) very strong bases (1) i–d, ii–c, iii–a, iv–b (2) i–c, ii–b, iii–d, iv–a (3) i–b, ii–a, iii–d, iv–c (4) i–a, ii–d, iii–b, iv–d
69.	Halogenation of alkanes is an example of : (1) Nucleophilic substitution (2) Electrophilic substitution (3) Elimination (4) Free radical substitution
70.	Which of the following reagents is used to convert nitrobenzene into aniline? (1) DDQ (2) PPA (3) PCl_5 (4) SN/HCl

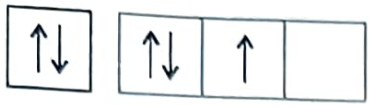
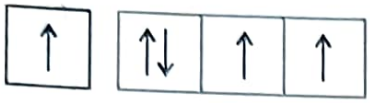
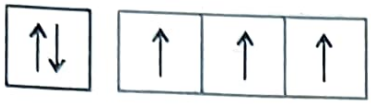
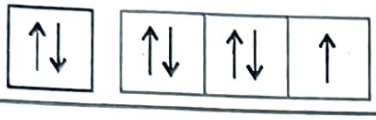
Question No.	Questions
71.	Which of the following is the law of helplessness of mankind : (1) 1st law of thermodynamics (2) 2nd law of thermodynamics (3) 3rd law of thermodynamics (4) all of these
72.	A catalyst and photosensitizer are : (1) Different substances (2) Same substances (3) Both true (4) Both false
73.	For an elementary reaction, (1) Order and molecularity are always the same (2) Order and molecularity may or may not be the same (3) Order and molecularity are always different (4) All false
74.	With respect to the reactant taken in excess, (1) Order becomes zero but molecularity remains uninfluenced (2) Order and molecularity both become zero (3) Molecularity becomes zero but order remains uninfluenced (4) None of these

Question No.	Questions
75.	Mixture of ethyl alcohol and water is an example of : (1) Non-ideal solution with positive deviation (2) Non-ideal solution with negative deviation (3) Ideal solution (4) None of these
76.	Which is true: (1) Dilute solutions produce no heat on addition of more solvent (2) Dilute solutions absorb no heat on addition of more solvent (3) Dilute solutions are ideal solutions (4) All correct
77.	When a positive catalyst is added to a reversible reaction, it effect on rate of forward reaction (Rf) and backward reaction (Rb) is given by: (1) An increase in Rf and decrease in Rb (2) An increase in Rf and Rb both (3) An increase in Rb and decrease in Rf (4) A decrease in Ff and Rb both
78.	In the theory of absolute reaction rates, which of the following terms represents the complexity of reactants and the steric factor? (1) $\Delta S^{\#}$ (2) $\Delta H^{\#}$ (3) $\Delta G^{\#}$ (4) $\Delta A^{\#}$

Question No.	Questions
79.	Osmotic pressure is used for the determination of : (1) Weight average molecular weight (2) Number average molecular weight (3) Both (4) None
80.	Which is a necessary requirement for the salt used in salt bridge? (1) It should react with agar-agar gel (2) Transport numbers of its anion and cation should be nearly the same (3) Transport numbers of its anion and cation should be different (4) It should not be water soluble
81.	Considering H_2O as a weak field ligand, the number of unpaired electron in $[Mn(H_2O)_6]^{2+}$ will be (1) three (2) five (3) two (4) four
82.	The expected spin-only magnetic moments for $[Fe(CN)_6]^{4-}$ and $[FeF_6]^{3-}$ respectively are (1) 1.73 and 1.73 B.M. (2) 1.73 and 5.92 B.M. (3) 0.0 and 1.73 B.M. (4) 0.0 and 5.92 B.M.

Question No.	Questions
83.	The lowest energy transition in Orgel diagram of octahedral Ni^{II} complex is (1) $^3A_2g \rightarrow {}^3T_1g(F)$ (2) $^3A_2g \rightarrow {}^3T_1g(P)$ (3) $^3A_2g \rightarrow {}^3T_2g(F)$ (4) None of these
84.	General Electronic Configuration of lanthanides is (1) $(n-2)\ f^{1-14}\ (n-1)\ s^2\ p^6\ d^{0-1}\ ns^2$ (2) $(n-2)\ f^{0-14}\ (n-1)\ d^{0-1}\ ns^2$ (3) $(n-2)\ f^{0-14}\ (n-1)\ d^{10}\ ns^2$ (4) $(n-2)\ d^{0-1}\ (n-1)\ f^{0-14}\ ns^1$
85.	The brown ring test for NO_3^- is due to the formation of the complex ion with formula (1) $[Fe(H_2O)_6]^{2+}$ (2) $Fe[NO(CN)_5]^{2-}$ (3) $[Fe(H_2O)_5\ NO]^{2+}$ (4) $[Fe(H_2O)\ (NO)_5]^{2+}$
86.	Nessler's reagent is used to detect (1) CrO_4^{2-} (2) PO_4^{3-} (3) MnO_4^- (4) NH_4^+
87.	Actinides are (1) oxidising agents (2) weak reducing agents (3) strong reducing agents (4) none of these

Question No.	Questions
88.	CH_3HgOH is classified as (1) Soft - Soft (2) Hard - Hard (3) Soft - Hard (4) Hard - Soft
89.	Heme is a Porphyrin complex of which metal ion? (1) Fe(II) (2) Fe(III) (3) Mg(II) (4) Zn(II)
90.	Which one of the following is the weakest Lewis base? (1) NH_2^- (2) CH_3^- (3) OH^- (4) F^-
91.	The electrons present in K-shell of the atom will differ in (1) Principal quantum number (2) Azimuthal quantum number (3) Magnetic quantum number (4) Spin quantum number
92.	Wave nature of electron was demonstrated by (1) Schrodinger (2) de-Broglie (3) Davisson (4) Heisenberg
93.	Which of the following does not have any unit? (1) Electronegativity (2) Electron affinity (3) Ionisation potential (4) Atomic radii

Question No.	Questions
94.	The orbital diagram in which Aufbau principle is violated is (1)  (2)  (3)  (4) 
95.	According of VSEPR theory, the molecular geometry of the water molecule is (1) octahedral (2) distorted tetrahedral (3) planar triangle (4) linear
96.	NaCl crystal belongs to the crystal system (1) hexagonal (2) cubic (3) tetragonal (4) orthorhombic
97.	H-bonding is not present in (1) Glycerine (2) Water (3) Hydrogen Sulphide (4) Hydrogen Fluoride

Question No.	Questions
98.	According to Fazan's rule, covalent bond is favoured by (1) Large cation and small anion (2) Large cation and large anion (3) Small cation and small anion (4) Small cation and large anion
99.	Lithium shows diagonal relationship with (1) Magnesium (2) Beryllium (3) Aluminium (4) Boron
100.	Which of the following metal is present in chlorophyll? (1) Chromium (2) Cobalt (3) Magnesium (4) Iron

Answer keys of M.Sc. (Chemistry) entrance exam dated 16.07.2025				
Q. NO.	A	B	C	D
1	4	3	2	3
2	2	3	1	3
3	1	3	1	3
4	2	3	1	3
5	2	3	1	1
6	2	1	4	4
7	3	1	2	4
8	4	2	1	4
9	1	3	2	3
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35	4	4	1	3
36	1	4	3	1
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38	1	1	2	2
39	1	1	1	3
40	3	1	1	4
41	2	2	4	1
42	1	1	4	2
43	1	1	1	1
44	1	2	1	3
45	1	4	3	1
46	4	1	2	3
47	2	1	1	2
48	1	1	1	2
49	2	1	2	1
50	2	3	4	1

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Answer keys of M.Sc. (Chemistry) entrance exam dated 16.07.2025				
Q. NO.	A	B	C	D
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53	1	3	1	1
54	1	1	2	1
55	4	3	4	3
56	4	4	1	2
57	1	3	1	1
58	1	3	1	1
59	1	1	1	2
60	1	4	3	4
61	4	2	3	3
62	4	1	3	3
63	1	1	3	1
64	1	1	3	1
65	3	1	1	2
66	2	4	4	4
67	1	2	4	3
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88	1	4	2	3
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90	4	3	4	4
91	1	3	4	4
92	2	3	4	2
93	1	1	1	1
94	3	1	1	2
95	1	2	4	2
96	3	4	4	2
97	2	3	1	3
98	2	1	1	4
99	1	4	1	1
100	1	4	1	3

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