Test Booklet No. _____

This booklet consists of 100 questions and __ printed pages.

RGUCET/2025/SL

Series A

RGUCET 2025
Common Entrance Test, 2025
MASTER OF SCIENCE IN CHEMISTRY

Full Marks: 100 **Time: 2 Hours**

Roll No. | | | | | | | | |

Day and Date of Examination: _____

Signature of Invigilator(s) _____

Signature of Candidate _____

General Instructions:

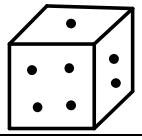
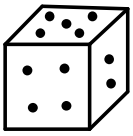
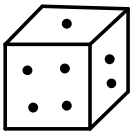
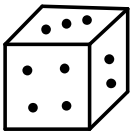
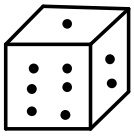
PLEASE READ ALL THE INSTRUCTIONS CAREFULLY BEFORE MAKING ANY ENTRY.

1. DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.
2. Candidate must write his/her Roll Number on the space provided.
3. This Test Booklet contains 100 Multiple Choice Questions (MCQs) from the concerned subject. Each question carries 1 mark. There shall be negative marking of 0.25 against each wrong attempt.
4. Please check the Test Booklet to verify that the total pages and total number of questions contained in the test booklet are the same as those printed on the top of the first page. Also check whether the questions are in sequential order or not.
5. Candidates are not permitted to enter into the examination hall after the commencement of the entrance test or leave the examination hall before completion of Examination.
6. Making any identification mark in the OMR Answer Sheet or writing Roll Number anywhere other than the specified places will lead to disqualification of the candidate.
7. Candidates shall maintain silence inside and outside the examination hall. If candidates are found violating the instructions mentioned herein or announced in the examination hall, they will be summarily disqualified from the entrance test.

8. In case of any dispute, the decision of the Entrance Test Committee shall be final and binding.
9. The OMR Answer Sheet consists of two copies, the Original copy and the Student's copy

1	Correct form of indirect speech of the following. Ram said, "I may leave tomorrow."				Ram said that he might leave the next day.
	a) Ram said that she might leave the next day.	b) Ram said that he might leave the next day.	c) Ram said that he might leave tomorrow.	d) Ram said that he would leave tomorrow.	(b)
2	Identify the sentence with the correct tense usage:				I visited Paris last summer.
	a) I visited Paris last summer.	b) I have visited Paris last summer.	c) I visit Paris last summer.	d) I will visit Paris last summer.	(a)
3	Complete the sentence. No profit accrued _____ me from this business.				to
	a) to	b) with	c) on	d) of	(a)
4	Match the types of sentences with their examples: A. Declarative — i. What a beautiful sunset! B. Interrogative — ii. Close the door. C. Imperative — iii. The sky is blue. D. Exclamatory — iv. Are you coming to the party?				Answer
	a) A-i, B-iv, C-ii, D-iii.	b)A-iii, B-iv, C-ii, D-i.	c) A-iii, B-iv, C-i, D-ii.	d) A-iv, B-iii, C-i, D-ii.	(b)
5	Which of the following was invented by Alfred Bernhard Nobel?				Dynamite
	a) X-Ray	b) Polonium	c) Dynamite	d)Heroin	(c)
6	"Origin of Species" - the famous book was written by				Charles Darwin
	a) Acharya P. C. Ray	b) Keplar	c) Plato	d) Charles Darwin	(d)
7	Match the name of the players to their respective games: A. Major Dhyan Chand — i. Boxing B. Mary Kom — ii. Chess C. Talimeren Ao — iii. Hockey D. Viswanathan Anand — iv. Football				A-iii, B-i, C-iv, D-ii
	a) A-iv, B-i, C-iii, D-ii	b) A-iii, B-i, C-iv, D-ii	c) A-iii, B-i, C-ii, D-iv	d) A-i, B-iii, C-iv, D-ii	(b)

8	In the “BHIM-UPI”, “BHIM” stands for				Bharat Interface for Money
	a) Bharat Interface for Money	b) Bharat International Money	c) Bharat India Merchandise	d) Bharat Interface for Management	(a)
9	Namdapha National Park is in				Arunachal Pradesh
	a) Assam	b) Manipur	c) Arunachal Pradesh	d) Bhutan	(c)
10	The number of States and Union territories in India repectively, are-				28 and 8
	a) 28 and 8	b) 29 and 8	c) 28 and 6	d) 29 and 6	(a)
11	2026 FIFA World Cup will be hosted by-				Canada, USA, Mexico
	a) Canada, USA, Mexico	b) Canada, USA, Brazil	c) Brazil, USA, Mexico	d) Mexico, Argentina, Brazil	(a)
12	The discoveries awarded with the 2024 Nobel Prize in Chemistry are about				Protein structure
	a) RNA vaccine	b) Protein structure	c) Quantum dots	d) Green energy	(b)
13	The first-ever Arunachal GI Mahotsav 2025 was held in				New Delhi
	a) Itanagar	b) New Delhi	c) Guwahati	d) Kolkata	(b)
14	The ‘Sen index’ is a-				Poverty measurement tool
	a) Poverty measurement tool	b) Pollution measurement tool	c) Power measurement tool	d) Tea taste measurement tool	(a)
15	Who presides over the joint seating of the Parliament of India?				Speaker of the Lok Sabha
	a) President of India	b) Vice-President of India	c) Speaker of the Lok Sabha	d) Chairman of the Rajya Sabha	(c)
16	Select the one that is different from the rest.				book
	a) book	b) index	c) glossary	d) chapter	(a)
17	In a certain coding, GAP is represented as FZO. How FREEZE will be represented in the same coding?				EQDDYD

	a) GTDDYF	b) EQFFAF	c) GTFFAF	d) EQDDYD	(d)
18	Kunal is facing East. He turns 100° in the anticlockwise direction and then 145° in the clockwise direction. Which direction he is facing now?				South-East
	a) North	b) North-East	c) South-East	d) South-West	(c)
19	For the Assertion (**A**) and Reason (**R**) below, choose the correct alternative from the following : A: Vaccines prevent diseases. R: Vaccines must be given to children.				Both **A** and **R** are true but R is NOT the correct explanation of **A**.
	a) Both **A** and **R** are true and R is the correct explanation of **A**.	b) Both **A** and **R** are true but **R** is NOT the correct explanation of A.	c) **A** is true but **R**is false.	d) **A** is false but **R** is true	(b)
20	If the total number of dots on opposite faces of a cubical block is always 7, find the correct figure.				
	 a)	 b)	 c)	 d)	(b)
21	The two wave functions Ψ_i and Ψ_j are said to be orthogonal if they satisfy the following condition.				$\int \Psi_i^* \Psi_j d\tau = 0$
	a) $\int \Psi_i^* \Psi_j d\tau = 0$	b) $\int \Psi_i^* \Psi_j d\tau = 1$	c) $\int \Psi_i^* \Psi_j d\tau = 2$	d) $\int \Psi_i^* \Psi_j d\tau = 3$	a
22	Two electrons present in the same orbital can be distinguished by which of the following quantum number?				m_s
	a) m_s	b) l	c) n	d)m_l	a
23	"The ionization energy of Be atom is greater than that of B atom". The reason is:				Greater penetration power of *s*-orbitals compared to *p*-orbitals.
	a) Greater penetration power of *s*-orbitals compared to *p*-orbitals.	b) Greater penetration power of *p*-orbitals compared to *s*-	c) Smaller size of B atom.	d) Larger size of Be atom.	a

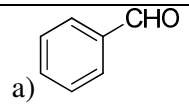
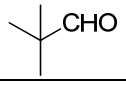
		orbitals.			
24	In polar molecules, ***van der Waals' forces*** are mainly due to.				Dipole-Dipole interaction
	a) Hydrogen bonding interction	b) Dipole-Dipole interaction	c) Dipole-Induced Dipole interaction	d) Induced Dipole-Induced Dipole interaction	b
25	Given below are two statements: One is labelled as **Assertion** (**A**) and the other is labelled as **Reason** (**R**). **Assertion** (**A**): Water (H_2O) has a higher boiling point than hydrogen sulphide (H_2S). **Reason** (**R**): Hydrogen bonding is stronger in H_2S than in H_2O. Based on the above two statements, choose the most appropriate answer.				A is true, but R is false
	a) Both **A** and **R** are true, and **R** is the correct explanation of**A.**	b) Both **A** and **R** are true, but **R** is not the correct explanation of **A**.	c) **A** is true, but **R** is false.	d) **A** is false, but **R** is true.	c
26	Match the following materials with their correct classifications: **Material**: A) Silicon; B) Diamond; C) Doped Silicon (with P) **Type**: i) Insulator; ii) Elemental Semiconductor; iii) Intrinsic Semiconductor; iv) Extrinsic Semiconductor				A-ii; B-i; C-iv
	a) A-i; B-ii; C-iii	b) A-i; B-ii; C-iv	c) A-ii; B-iv; C-i	d) A-ii; B-i; C-iv	d
27	Calculate the electrode potential of a zinc electrode in a 0.01 M Zn^{2+} solution at 25 °C. (Standard reduction potential for Zn^{2+}/Zn = –0.76 V)				– 0.82 V
	a) – 0.67 V	b) – 0.82 V	c) – 0.91 V	d) – 0.98 V	b
28	Match the following metal purification/extraction processes with the metals involved: **Process**: A) Electrolytic Kroll Process; B) Parting Process; C) Mond's Process; D) Zone Refining **Metal**: i) Nickel; ii) Titanium; iii) Silicon; iv) Gold; v) Zirconium				A-ii; B-iv; C-i; D-iii
	a) A-ii; B-iii; C-i; D-iv	b) A-ii; B-iv; C-i; D-iii	c) A-i; B-v; C-ii; D-iii	d) A-i; B-ii; C-iv; D-v	b
29	Which among the following statements related to ***inert pair effect*** are true/false?				Statements A, B and D are true;

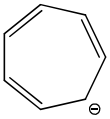
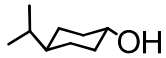
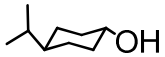
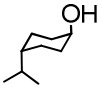
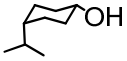
	A. It is the reluctance of ns^2 electrons to participate in bond formation. B. The cause of the inert pair effect is the poor shielding of inner *d*- and *f*-electrons. C. Tin (Sn) exhibits +4 oxidation state more commonly than +2 due to a strong inert pair effect. D. It results in the stability of lower oxidation states down a group.				Statement C is false.
	a) Statements A, B and C are true; Statement D is false.	b) Statements A and B are true; StatementsC and Dare false.	c) Statements A and B are false; Statements C and D aretrue.	d) Statements A, B and D are true; Statement C is false.	d
30	Given below are two statements: One is labelled as **Assertion** (**A**) and the other is labelled as **Reason** (**R**). Assertion (**A**): Lithium shows a diagonal relationship with magnesium in the periodic table. **Reason 1** (**R1**): Both lithium and magnesium form nitrides and show comparable polarising power. **Reason 2**(**R2**)**:** Diagonal relationship arises due to similar atomic size, charge density, and electronegativity. Based on the above statements, choose the most appropriate answer.				**A**, **R1**, and **R2** are true, but only **R2** correctly explains **A**.
	a) **A**, **R1**, and **R2** are true, and both **R1** and **R2** correctly explain **A**.	b) **A**, **R1**, and **R2** are true, but only **R2** correctly explains **A**.	c) **A** and **R1** are true, **R2** is false.	d) **A** is false, **R1** and **R2** are true.	b
31	The correct statement about the structure and bonding in ***diborane (B_2H_6)*** is.				The B–H–B bridges in B_2H_6 involve (3c–2e) bonding.
	a) The B–H–B bridges in B_2H_6 involve (3c–2e) bonding.	b) Each B atom in B_2H_6 forms four conventional (2c–2e)bonds.	c) B_2H_6 has a planar structure with all atoms lying in the same plane.	d) All B–H bonds in B_2H_6 are of equal length and strength.	a
32	Which among the following statements are true and false. A. Calcium carbide (CaC_2) is a covalent carbide and conducts electricity by metallic conduction. B. Aluminium carbide (Al_4C_3) is an ionic carbide and a non-conductor of electricity. C. Silicon carbide (SiC) is a covalent carbide and is chemically inert.				A is false, but B and C are true.
	a) A, B and C are true.	b) A, B and C are false.	c) A is false, but B and C are true.	d) B is false, but A and C are true.	c

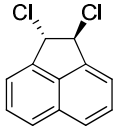
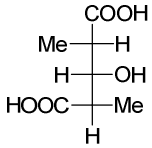
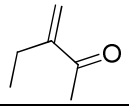
33	Which of the following correctly represents the percentage of vacant space in a ***Body-Centered Cubic (BCC)*** unit cell?				32%
	a) 23%	b) 26%	c) 32%	d) 68%	c
34*	In the emission spectrum of the hydrogen atom, the ***Paschen series*** is observed in:				Near-infrared region
	a) Ultraviolet region	a) Near-infrared region	c) Visible region	d) Microwave region	b
35	Which one of the following noble gases is least polarizable?				Helium
	a) Helium	b) Xenon	c) Argon	d) Neon	(a)
36	A: Assertion: Krypton can form compounds like KrF_2 under specific conditions. B: Justification: Krypton has a very low ionisation energy compared to fluorine.				A is true, but B is false.
	a) Both A and B are true, and B is the correct explanation of A.	b) Both A and B are true, but B is not the correct explanation of A.	c) A is true, but B is false.	d) A is false, but B is true.	(c)
37	Match the following compounds with their geometries. A. $XeOF_4$ — i. Linear. B. XeF_2 — ii. Octahedral. C. XeF_6 — iii. Square Planar. D. XeF_4 — iv. Trigonal Bipyramidal.				A-iv, B-i, C-ii, D-iii.
	a) A-iv, B-i, C-ii, D-iii.	b)A-iii, B-i, C-ii, D-iv.	c) A-iii, B-iv, C-i, D-ii.	d) A-iv, B-i, C-ii, D-iii.	(d)
38	Which inorganic polymer exhibits alternating P=N bonds in its backbone?				Polyphosphazene
	a) Polysiloxane	b) Borazine	c) Polythiazyl	d) Polyphosphazene	(d)
39	Identify the correct True/False Statements: A. Silicones are also called polysiloxanes because of their –Si–O–Si– backbone. B. Polyphosphazenes contain alternating phosphorus and oxygen atoms in their main chain. C. Boron nitride (BN) is structurally similar to graphite and is used as a high-temperature lubricant. D. Inorganic polymers are generally less thermally stable than organic				A and C are true

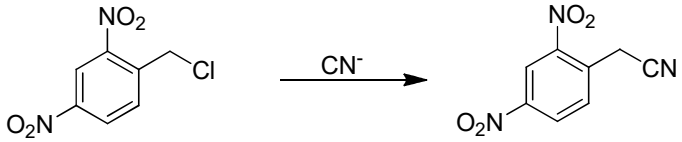
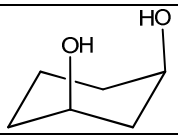
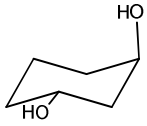
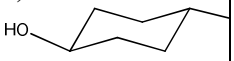
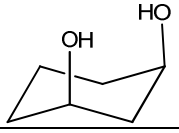
	polymers.				
	a) A and C are true	b) B and C are true	c) A and D are true	d) B and C are false	(a)
40	A: Assertion: Borax bead test is used for identification of metal cations. B: Justification: On heating, borax forms a glassy bead that can dissolve metal oxides to give characteristic colours.				Both A and B are true, and B is the correct explanation of A.
	a) Both A and B are true, and B is the correct explanation of A.	b) Both A and B are true, but B is not the correct explanation of A.	c) A is true, but B is false.	d) A is false, but B is true.	(a)
41	Match List-I with List-II: List-I: A. $[Fe(CN)_6]^{3-}$; B. $[Fe(H_2O)_6]^{3+}$; C. $[Fe(CN)_6]^{4-}$; D. $[Fe(H_2O)_6]^{2+}$ List-II: i. 92 BM; ii. 0 BM; iii. 4.90 BM; iv. 1.73 BM				A-iv, B-i, C-ii, D-iii.
	a) A-iv, B-i, C-ii, D-iii.	b) A-iv, B-i, C-ii, D-iii.	c) A-iii, B-iv, C-i, D-ii.	d) A-iv, B-iii, C-ii, D-i.	(b)
42	Urea reacts with water to form A, which will decompose to form B. B when passed through Cu^{2+} (aq), deep blue colour solution C is formed. What is the formula of C from the following?				$[Cu(NH_3)_4]^{2+}$
	a) $Cu(OH)_2$	b) $CuCO_3 \cdot Cu(OH)_2$	c) $CuSO_4$	d) $[Cu(NH_3)_4]^{2+}$	(d)
43	An example of a sigma-bonded organometallic compound is:				Grignard's reagent
	a) Grignard's reagent	b) ferrocene	c) cobaltocene	d) ruthenocene	(a)
44	Given below are two statements: A: Statement I: Cr^{2+} is oxidising and Mn^{3+} is reducing in nature. B: Statement II: Sc^{3+} compounds are repelled by the applied magnetic field. In light of the above statements, choose the most appropriate answer from the options given below:				A is false, but B is true.
	a) A is true, but	b) A and B are	c) A and B are	d) A is false, but	(d)

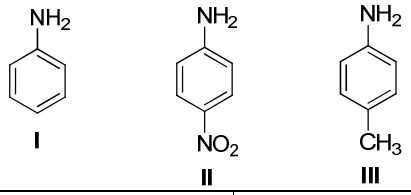
	B is false.	true.	false.	B is true.	
45	Zr (Z = 40) and Hf (Z = 72) have similar atomic and ionic radii because of:				Lanthanide contraction
	a) Lanthanide contraction	b) Having the same chemical properties.	c) Belonging to the same group.	d) Diagonal relationship	(a)
46	Name the gas that can readily decolorize acidified $KMnO_4$ solution.				SO_2
	a) SO_2	b) NO_2	c) CO_2	d) P_2O_5	(a)
47	$HgCl_2$ and I_2, both when dissolved in water containing I^-ions, a pair of species formed is				HgI_4^{2-}, I_3^-
	a) HgI_2, I_3-	b) Hg_2I_2, I_3-	c) HgI_4^{2-}, I_3^-	d) HgI_2, I^-	(c)
48	Match List-I with List-II: List-I: A. Haematite; B. Magnetite; C. Calamine; D. Kaolinite List-II: i. Fe_3O_4; ii. $ZnCO_3$; iii. Fe_2O_3; iv. $[Al_2(OH)_4Si_2O_5]$				A-iii, B-i, C-ii, d-iv.
	a) A-iv, B-i, C-ii, d-iii.	b) A-iii, B-ii, C-i, d-iv.	c) A-i, B-iii, C-ii, d-iv.	d) A-iii, B-i, C-ii, d-iv.	(d)

49	The IUPAC name for benzophenone is:				diphenyl ketone
	a) diphenyl ketone	b) 1-phenyl benzene ketone	c) carbonyl di benzene	d) 1,1-diphenylmethanone	(a)
50	Which of the following heterocyclic compound is not aromatic:				Piperidine
	a) Pyridine	b) Pyrrole	c) Furan	d) Piperidine	(d)
51	Pick out the correct match of reduction and reducing agent:				MPV reduction-$Al[OCH(CH_3)_2]$
	a) Birch reduction-H_2/Ni	b) Wolf-Kishner reduction-Zn/HCl	c) Clemensen reduction-Anh. $AlCl_3$	d) MPV reduction-$Al[OCH(CH_3)_2]$	(d)
52	1. Which of the following would undergo the aldol type of condensation				CH_3CHO
	a) 	b) 	c) HCHO	d) CH_3CHO	(d)

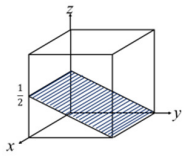
53	Which one of the following is not a correct match: A. Diels Alder reaction — i. Pericyclic reaction B. SN_2 reaction — ii. Racemic product formation C. Allene — iii. Chiral axis D. RNA — iv. Helical structure				B-ii
	a) A-i	b) B-ii	c) C-iii	d) D-iv	(b)
54	2. In S_N2 reaction, the product is:				completely inverted
	a) partly racemised	b) completely racemised	c) partly inverted	d) completely inverted	(d)
55	Wrong statements among the following are: A. Aldol condensation involves carbanion intermediate B. Atropisomerism is a special kind of isomerism C. Cyclobutadiene is an antiaromatic compound D. None of the above are wrong				A& D
	a) A & B	b) A& C	c) A& D	d) none of the above	(c)
56	3. Which of the following substances is an aromatic compound?				
	a) 	b) 	c) 	d) 	(a)
57	The most stable stereoisomer of 4-isopropylcyclohexanol is:				
	a) 	b) 	c) 	d) 	(a)
58	4. The thermal ring opening reactions of cyclobutenes are:				conrotatory
	a) conrotatory	b) disrotatory	c) conrotatory or disrotatory depending on the temperature at which reaction is carried	d) can't be predicted	(a)

59	For the following two compounds, which one of the following statements is correct?  A  B				A is chiral, but B is achiral
	a) Both A & B are chiral	b) A is chiral, but B is achiral	c) A is achiral, but B is chiral	d) Both A & B are achiral	(b)
60	The λ_{max} value of the following compound is: 				225 nm
	a) 230 nm	b) 225 nm	c) 254 nm	d) 215 nm	(b)
61	The vibrational degrees of freedom for HCl, CO_2 and H_2O are:				1, 4, 3 respectively
	a) 1, 4, 3 respectively	b) 1, 3, 4 respectively	c) 4, 1, 3 respectively	d) 3, 1, 4 respectively	(a)
62	Presence of -CN group in an aromatic compound is characterised by an IR band at:				~2250 cm^{-1}
	a) ~1750 cm^{-1}	b)~1950 cm^{-1}	c) ~2150 cm^{-1}	d) ~2250 cm^{-1}	(d)
63	5. Conjugation				lowers absorption frequency, but increases λ_{max}
	a) lowers absorption frequency, but increases λ_{max}	b) increases both absorption frequency, and λ_{max}	c) doesn't effect absorption frequency and λ_{max}	d) lowers absorption frequency as well as λ_{max}	(a)
64	An organic compound *X* having molecular formula $C_5H_{10}O$ yields phenylhydrazone and gives negative response to the iodoform test and Tollen's test. It produces *n*-pentane on reduction. *X* could be:				3-pentanone
	a) Pentanal	b) 2-pentanone	c) 3-pentanone	d) n-amyl alcohol	(c)
65	Rapid introversion of α-D-glucose and β-D-glucose in solution is known as:				mutarotation
	a) asymmetric induction	b) mutarotation	c) racemization	d) isomerization	(b)
66	The most preferable mechanism for the following reaction is:				S_N2

					
	a) S_N2	b) S_N1	c) S_Ni	d) Elimination	(a)
67	Intermediate involved in Curtius rearrangement:				nitrene
	a) carbocation	b) carbanion	c) enolate	d)nitrene	(d)
68	1,3,5-cycloheptatriene can be converted to an aromatic substance by:				hydride abstraction
	a) hydrogen atom abstraction	b) hydride abstraction	c) proton abstraction	d) H_2 elimination	(b)
69	In an enantiomeric mixture of 60% optical purity, % composition of the two enantiomers are:				80% & 20%
	a) 60% & 40%	b) 80% & 20%	c) 40% & 60%	d) Not possible to determine without knowing the specific rotation	(b)
70	The most stable conformer of cyclohexane-2,3-diol is				
	a) 	b) 	c) 	d) 	(c)
71	Which of the following statements are correct? A. A molecule can be chiral without any chiral centre. B. Chiral center is a must needed requirement for chirality. C. A molecule can be chiral in presence of any one of the chiral elements. D. Chiral plane is same with plane of symmetry.				A & C
	a) B & C	b) A & B	c) A & C	d) A, C & D	(c)
72	A pair of enantiomers have:				different reactivity towards a chiral reagent
	a) different melting points	b) different refractive indices	c) different reactivity towards a chiral reagent	d) differen t chiral centres	(c)

73	Choose the correct order of the stability of the different conformations of cyclohexane.				Twist boat form >boat form > half chair
	a) Half Chair form > boat form > twist boat form	b) Twist boat form >boat form > half chair	c) Chair form >half chair> twist boat form	d) Twist boat form > boat form > chair form	(b)
74	The correct order of increasing basic strength for the following compounds is:  I II III				II < I < III
	a) III < I < II	b) II < I < III	c) I < II < III	(d) I < III < II	(b)
75	The average velocity of gas molecules is given by…..				$v_{av} = \sqrt{\frac{8RT}{\pi M}}$
	a) $v_{av} = \sqrt{\frac{RT}{M}}$	b) $v_{av} = \sqrt{\frac{2RT}{M}}$	c) $v_{av} = \sqrt{\frac{3RT}{M}}$	d) $v_{av} = \sqrt{\frac{8RT}{\pi M}}$	(d)
76	A liquid rises in a capillary tube. It is due to …….				surface tension
	a) surface tension	b) viscosity	c) osmosis	d) effusion	(a)
77	The formula used in the drop-number method for the determination of surface tension of liquid is…..				$\frac{\gamma_1}{\gamma_2} = \frac{n_2 \times \rho_1}{n_1 \times \rho_2}$
	a) $\frac{\gamma_2}{\gamma_1} = \frac{n_2 \times \rho_1}{n_1 \times \rho_2}$	b) $\frac{\gamma_1}{\gamma_2} = \frac{n_2 \times \rho_1}{n_1 \times \rho_2}$	c) $\frac{\gamma_1}{\gamma_2} = \frac{n_1 \times \rho_1}{n_2 \times \rho_2}$	d) $\frac{\gamma_1}{\gamma_2} = \frac{n_2 \times \rho_2}{n_1 \times \rho_1}$	(b)
78	In a solid lattice, a cation has left a lattice site and is present in an interstitial position. The lattice defect is…..				Frenkel defect
	a) Schottky defect	b) Frenkel defect	c) plane defect	d) impurity defect	(b)
79	The Bragg's equation for diffraction of X-rays is ……				$n\lambda=2d \sin\theta$
	a) $n\lambda=2d \cos\theta$	b) $n\lambda=d \cos\theta$	c) $n\lambda=2d \sin\theta$	d) $n\lambda=d \sin\theta$	(c)
80	Which of the following statements best describes a four-fold axis of symmetry in a				A line about

	cubic crystal?				which a crystal can be rotated by 90° and appear identical
	a) A line about which a crystal can be rotated by 360° and appear identical	b) A line about which a crystal can be rotated by 180° and appear identical	c) A line about which a crystal can be rotated by 90° and appear identical	d) A plane that divides the crystal into two identical mirror images	(c)
81	The Henderson equation for an acidic buffer is given by …..				$p\text{H} = pK_a + \log(\frac{[Salt]}{[Acid]})$
	a) $p\text{H} = pK_a + \log(\frac{[Salt]}{[Acid]})$	b) $p\text{H} = pK_a + \log\left(\frac{[Acid]}{[Salt]}\right)$	c) $p\text{H} = pK_b + \log(\frac{[Salt]}{[Acid]})$	d) $p\text{H} = -pK_a + \log(\frac{[Salt]}{[Acid]})$	(a)
82	If 's' is the solubility of CaF_2 in water, the solubility product is given by …..				$K_{\text{sp}} = 4\text{s}^3$
	a) $K_{\text{sp}} = \text{s}^2$	b) $K_{\text{sp}} = \text{s}^3$	c) $K_{\text{sp}} = 4\text{s}^3$	d) $K_{\text{sp}} = 4\text{s}^2$	(c)
83	The pH of a solution of a salt of a weak base and a strong acid is …..				less than 7
	a) greater than 7	b) less than 7	c) equal to 7	d) equal to zero	(b)
84	When NH_4Cl is added to a solution of NH_4OH, the equilibrium $NH_4OH \rightleftarrows NH_4^+ + OH^-$ shifts towards ….				left
	a) left	b) right	c) remain unchanged	d) none of these	(a)
85	The conjugate base of H_3O+ is …..				H_2O
	a) H^+	b) H_2O	c) H_2O_2	d) OH^-	(b)
86	The highest osmotic pressure will be observed in ….				0.1 M $Al_2(SO_4)_3$
	a) 0.1 M urea	b) 0.1 M glucose	c) 0.1 M NaCl	d) 0.1 M $Al_2(SO_4)_3$	(d)
87	Abnormal molecular masses are obtained when there exists……				either

					dissociation or association of molecules
	a) dissociation of molecules	b) association of molecules	c) either dissociation or association of molecules	d)none of these	(c)
88	Absorbance of a chemical species at 250 nm is 0.1, and the concentration is 1.0×10^{-5} M. Assuming the cell length as 10 cm, calculate the molar extinction coefficient of this transition at 250 nm.				$1000\ M^{-1}\ cm^{-1}$
	a) $1000\ M^{-1}\ cm^{-1}$	b) $100\ M^{-1}\ cm^{-1}$	c) $10\ M^{-1}\ cm^{-1}$	d) $10000\ M^{-1}\ cm^{-1}$	(a)
89	For the reaction,$2A \rightarrow B + C$, the rate of the reaction is- $-\frac{d[A]}{dt} = k[A]^2$, the value of $t_{1/2}$ is				$\frac{1}{k[A]_o}$
	a) $\frac{1}{k}$	b) $\frac{1}{k[A]_o}$	c) $\frac{1}{k[A]_o^2}$	d) $\frac{1}{k[A]_o^3}$	(b)
90	A catalyst does not affect the - I. rate of reaction II. equilibrium constant of a reaction III. Gibbs energy IV. activation energy. The correct option is …….				II and III
	a) I, II and III	b) II and III	c) only II	d) II, III and IV	(b)
91	Which Miller index plane is shown below …… 				(0 1 2)
	a) (0 2 1)	b) (0 4 1)	c) (0 1 2)	d) (0 0 0)	(c)
92	For a first-order reaction, A → P, the half-life is 50 sec. Identify the correct statement from the following.				The quantity of **A** remaining after 100 sec is half of what remains after 50 sec
	a) The reaction complet es in	b) The reaction begins after 50 sec	c) The quantity of **A** remaining after 100 sec is half of what remains after	d) The same quantity of **A** is consumed for every 50 sec of the reaction	(c)

	100 sec		50 sec		
93	Based on the Freundlich isotherm, a plot of log x/m versus log p for the adsorption of a gas on a solid gives a straight line with slope equal to ….				$1/n$; $(n>1)$
	a) n ; $(n>1)$	b) $1/n$; $(n>1)$	c) log k	d) –log k	(b)
94	The Nernst distribution law/ equation, $K_D = C_1/C_2$ applies when …..				the molecular state of the solute is the same in both solvents
	a) the molecular state of the solute is the same in both solvents	b) the molecular state of the solute is different in both solvents	c) the molecular state of the solute may be the same or different in both solvents	d) unpredictable	(a)
95	Water has three phases-ice, water and vapour. The number of components in the system is …..				one
	a) one	b) two	c) three	d) four	(a)
96	Specific conductance is the conductance of …..				one centimetre cube of solution of an electrolyte
	a) one centimetre cube of solution of an electrolyte	b) one centimetre cube of a solid electrolyte	c) one gram of the solution of an electrolyte	d) one gram of the solid electrolyte	(a)
97	Standard cell potential is …….				all of the above
	a) measured at a temperature of 25 °C	b) measured when the ion concentration of aqueous reactants is 1.0 M	c) measured under the condition of 1.0 atm for gaseous reactants	d) all of the above	(d)
98	The normalized wave function, ψ_n of a particle of mass, m moving in a one-dimensional box of length, a is ……				$\psi_n = \sqrt{\frac{2}{a}} \sin\left(\frac{n\pi}{a}x\right)$

	a) $\psi_n =$ $\sqrt{\frac{2}{a}}\sin\left(\frac{n}{a}\right.$	b) $\psi_n =$ $\sqrt{\frac{2}{a}}\ a\sin(n\pi x)$	c) $\psi_n =$ $\sqrt{\frac{2}{a}}\sin\left(\frac{n\pi}{a}\right)$	d) $\psi_n = \sqrt{\frac{2}{a}}\ x\sin(n\pi a)$	(a)
99	The energy expression of a rigid rotator (in cm^{-1}) is given by $BJ(J+1)$. The value of the rotational constant, B is…..				$\frac{h}{8\pi^2 Ic}$
	a) $\frac{h^2}{8\pi^2 Ic}$	b) $\frac{h}{2\pi Ic}$	c) $\frac{h}{8\pi^2 Ic}$	d) $\frac{h}{8\pi^2 I}$	(c)
100	The zero-point energy of a diatomic vibrating molecule is				$\frac{1}{2}h\nu$
	(a) 0	(b) $h\nu$	(c) $\frac{1}{2}h\nu$	(d) $\frac{3}{2}h\nu$	(c)

* Q 34 Forwarded for Grievance Committee Decision