

CC-1/ MCC-1

Session: 2023-24			
Part A - Introduction			
Subject	Chemistry		
Semester	I		
Name of the Course	Chemistry-I		
Course Code	B23-CHE-101		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC/MCC		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	4.0		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Enable to understand the basis of quantum mechanics and structural idea and relevance in describing shapes of s, p and d orbitals. 2. To learn about role of temperature and pressure to establish the state of gases and describe the concept of critical constants of real gases. 3. Get knowledge about the electrophile/nucleophile and its role in mechanism of preparation of organic compounds. 4. To know the physical properties, morphology and crystalline study of liquid and different type of solids. 5*. Hand on practice in preparation of solutions, compounds, estimation and determination of physical properties of some compounds.		
Credits	Theory	Practical	Total
	3	1	4

Contact Hours	45	30	75
Max. Marks:70+30* Internal Assessment Marks:20+10* End Term Exam Marks: 50+20*		Time:03 + 03*	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
Note: The examiner is requested to set nine questions in all, selecting two questions from each SECTION and one question (Question No.1 based on entire syllabus will consist of short answer type. All questions carry equal marks. The candidate is required to attempt five questions in all selecting one from each SECTION. Question No.1 is compulsory. Log table and non-programmable calculator is allowed.			
Unit	Topics	Contact Hours	
I	Atomic Structure Dual behaviour of matter and radiation, de Broglie’s relation, Heisenberg’s uncertainty principle, concept of atomic orbitals, significance of quantum numbers, radial and angular wave functions, normal and orthogonal wave functions, significance of Ψ and Ψ^2 , shapes of s, p, d, f orbitals, Rules for filling electrons in various orbitals, effective nuclear charge, Slater’s rules. Periodic table and atomic properties Classification of periodic table, definition of atomic and ionic radii, ionisation energy, electron affinity and electronegativity, trend in periodic table (in s and p-block elements), Pauling, Mulliken, Allred Rachow and Mulliken Jaffe’s electronegativity scale, Sanderson’s electron density ratio.	12	
II	Gaseous State Kinetic theory of gases, Maxwell’s distribution of velocities and energies (derivation excluded) Calculation of root mean square velocity, average velocity, and most probable velocity. Collision diameter, collision number, collision frequency and mean free path (Derivations excluded), Deviation of Real gases from ideal behaviour, Derivation of Van der Waal’ s Equation of State, its application in the calculation of Boyle’ s temperature (compression	11	

	factor) Critical Phenomenon Concept of Critical temperature, critical pressure, critical volume, relationship between critical constants and Van der Waal' s constants (Derivation excluded).	
III	Structure and Bonding Localized and delocalized chemical bond, Van der Waals interactions. Concept of resonance and its applications, hyperconjugation, inductive effect, Electromeric effect and their comparison. Mechanism of Organic Reactions Curved arrow notation, homolytic and heterolytic bond fission. Types of reagents: electrophiles and nucleophiles. Types of organic reactions: Substitution, Addition, Condensation, Elimination, Rearrangement, Isomerization and Pericyclic reactions. Reactive intermediates: Carbocations, carbanions, free radicals, carbenes (structure & stability).	11
IV	Liquid State Structure of liquids, Properties of liquids – surface tension, refractive index, viscosity, vapour pressure and optical rotation. Solid State Classification of solids, Law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry and symmetry elements, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of Laue method, rotating crystal method and powder pattern method.	11
V*	Acid/Base titration: Determination of strength of oxalic acid using NaOH. Redox titrations: Determination of Fe^{2+} ions using KMnO_4. - To determine the surface tension of given liquid using Stalagmometer by drop no. methods. - Preparation of <i>m</i>-Dinitrobenzene from Nitrobenzene (use 1:2 conc. HNO_3-H_2SO_4 mixture if fuming HNO_3 is not available)	30

	5. Preparation of p-Bromoacetanilide from Acetanilide	
Suggested Evaluation Methods		
Internal Assessment: 20+10* ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quizz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA	End Term Examination:	50+20*
Part C-Learning Resources		
Recommended Books/e-resources/LMS: 1. Lee, J.D.; (2010), Concise Inorganic Chemistry , Wiley India. 2. Kapoor, K.L. (2015), A Textbook of Physical Chemistry , Vol 1, 6 th Edition, McGraw Hill Education. 3. Clayden, J.; Greeves, N.; Warren, S. (2012), Organic Chemistry , Oxford. 4. Morrison, R. N.; Boyd, R. N. Organic Chemistry , Dorling Kindersley (India) Pvt. Ltd. (Pearson Education). 5. Khosla, B.D.; Garg, V.C.; Gulati, A. (2015), Senior Practical Physical Chemistry , R. Chand &Co, New Delhi. 6. Jeffery, G.H.; Bassett, J.; Mendham, J.; Denney, R.C. (1989), Vogel's Textbook of Quantitative Chemical Analysis , John Wiley and Sons.		

*Applicable for courses having practical component.