

Department of Chemistry and Chemical Sciences CENTRAL UNIVERSITY OF JAMMU

Rahya-Suchani (Bagla), District-Samba, Jammu-181143, (J&K) India

Five-year Integrated M.Sc. Chemistry Teaching Plan (August 2022-Dec 2022)

Semester: V

Course: Physical Chemistry IV (ICHE5C002T)

Course Teacher: Dr. Tapta Kanchan Roy

1	Week	Lecture	Topic to be Taught	No of	Suggested
1		No./Day		Hours	Readings
Week III Inadequacy of classical mechanics 1 1, 2, 3, 4, 5 IV Black—body radiation 1 1, 2, 3, 4, 5 II Planck's radiation law, Photoelectric effect 1 1, 2, 3, 4, 5 III Contd. 1 1, 2, 3, 4, 5 Week IIII Heat capacity of solids, Bohr's model of hydrogen atom and its defects, 1 1, 2, 3, 4, 5 IV Contd. 1 1, 2, 3, 4, 5 1 Week III The wave-particle duality Contd. 1 1, 2, 3, 4, 5 Week III The Heisenberg's uncertainty principle 1 1, 2, 3, 4, 5 IV Operator formalism: Linear operator 1 1, 2, 3, 4, 5 IV Operator formalism: Linear operator 1 1, 2, 3, 4, 5 Week III Hermitian operator and angular momentum operator 1 1, 2, 3, 4, 5 Week III Numerical 1 1, 2, 3, 4, 5 IV Commutator and numerical 1 1, 2, 3, 4, 5 Week III Humitian operator			Basic principles of quantum mechanics	1	
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IV Characteristic features of SHO 1 1, 2, 3, 4, 5					
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	9 th	I	Schrödinger wave equation for <i>H</i> -atom	1	1, 2, 3, 4, 5



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Week	II	Transformation of coordinates: Cartesian to polar (without derivation)	1	1, 2, 3, 4, 5
	III	· · · · · · · · · · · · · · · · · · ·	1	1, 2, 3, 4, 5
	111	Separation into three total differential equations in	1	1, 2, 3, 4, 3
	13.7	terms of the variables r , θ , φ	1	1 0 2 4 5
	IV	r , θ , φ ; and their significance for H-atom	1	1, 2, 3, 4, 5 1, 2, 3, 4, 5
	I	Solution of φ equation and emergence of magnetic	1	1, 2, 3, 4, 5
10 th		quantum number 'm' and its interpretation	4	1 2 2 4 7
Week	<u>II</u>	Concept of orbital	1	1, 2, 3, 4, 5
,, JOR	III	Numerical	1	1, 2, 3, 4, 5
	IV	Overview of quantum mechanics	1	1, 2, 3, 4, 5
<u> </u>	I	Class test-II	1	1, 2, 3, 4, 5
	II	Surface chemistry: Ideas	1	1, 2, 3, 4, 5
11 th	III	Structure of solid surfaces: Adsorption and desorption	1	1, 2, 3, 4, 5
Week		of molecules, physisorption and chemisorption		
	IV	Surface reaction kinetics, Langmuir, adsorption	1	1, 2, 3, 4, 5
		isotherms		
	I	BET and Freundlich adsorption isotherms	1	1, 2, 3, 4, 5
	II	Contd. & Numerical	1	1, 2, 3, 4, 5 1, 2, 3, 4, 5
12 th	III	The rates of surface processes, Temperature	1	1, 2, 3, 4, 5
Week		dependence of adsorption		
	IV	Structure of heterogeneous surfaces: Langmuir-	1	1, 2, 3, 4, 5
		Hinshelwood mechanism		
	I	Structure of heterogeneous surfaces: Eley-Rideal	1	1, 2, 3, 4, 5
1 oth	II	Numerical	1	1, 2, 3, 4, 5
13 th	III	Colloidal state: concept	1	6, 8,9
Week	IV	The colloidal systems, general properties, Tyndall	1	6, 8,9
		effect		
	I	Electrical properties (electrical double layer)	1	6, 8,9
	II	electrokinetic properties (electro-osmosis)	1	6, 8,9
14 th	III	Surface active agent, Classification of surface active	1	6, 8,9
Week		agent		, ,,,,
	IV	Critical micelle concentration (CMC), Factor affecting	1	6, 8,9
		the CMC of surfactants	-	0, 0,2
15 th Week	I	Hydrophobic interaction	1	6, 8,9
	II	Thermodynamics approach to CMC and micellization	1	6, 8,9
	III	Contd.	1	6, 8,9
	IV	Class test-III	1	6, 8,9
16 th	I	Tutorial	1	5, 5,5
	II	Tutorial	1	
Week	III	1 dtollal	1	
WCCK	IV		1	
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- 6. P. W. Atkins and J. de Paula, *The Elements of Physical Chemistry*, Oxford, 10th Ed., 2014.
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- 8. B. R. Puri, L. R. Sharma and M. S. Pathania, *Principles of Physical Chemistry*, Vishal Publishing Co., 47th Ed., 2017.
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