INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**BACHELOR OF SCIENCE (CHEMISTRY)**
SEMESTER	**5**
COURSE TITLE	**PHYSICAL CHEMISTRY**
COURSE CODE	**02CY0303**
COURSE CREDITS	**6**

Course Outcomes: After completion of this course, student will be able to:

1 Understand the Electrolysis and electrical conductance.

2 Be aware of the basics of pH and potentiometry.

3 Obtain the information regarding third law of thermodynamics, free energy and chemical equilibrium

4 Understand the basic of conductometry and colorimetry.

Pre-requisite of course: Understand essential concepts in physical chemistry.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
5	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Electrolysis and electrical conductance** Introduction, types of electrolytes mechanism of electrolysis, Faraday's law, importance of Faraday' law, Conductance of electrolytes, specific conductance, equivalent conductance, molar conductance, variation of equivalent conductance with concentration, variation of conductance with temperature, measurement of electrolytic conductance, determination of cell constant, Applications of emf measurements numerical.	15

Contents : Unit	Topics	Contact Hours
2	**pH and Potentiometry** Introduction and interpretation of pH metry and potentiometry, Importance of indicator and reference electrode in the measurement of EMF and pH, E.M.F. method: Study of acid – base Titration, Redox Titration, Argentometric Titration include mixture of Cl^- , Br^- , I^- with graph and proper explanation. pH metry : Definition, Interpretation of various methods of determining pH value like pH paper method (Demonstration only), potentiometric method using only hydrogen electrode as indicator electrode and calomel electrode as reference electrode to determine pH value. Weak acid strong base Titration with curve and determination of dissociation constant (Ka) of weak acid.	20
3	**Free energy and Chemical equilibrium** Concept of entropy, entropy change in an ideal gas, entropy change in mixture of ideal gas, physical significance of entropy, concept of free energy and work function, physical significance of work function, equation for chemical affinity, Derivation of Gibbs Helmholtz equation, application of Gibbs Helmholtz equation, Third law of thermodynamics, Nernst's theorem, residual entropy, numerical.	10
4	**Conductometry and Colorimetry** Introduction, difference between thermal and photochemical reactions, Grothus Draper law, Lambert's law, Beer's law, Beer-Lambert's law, Transmittance, absorbance, molar absorptivity, Deviation from Beer- Lambert's law, spectrophotometric estimation, Conductometric Titration : Strong acid - strong base, Strong acid - Weak base, Weak acid – Strong base, Weak acid – Weak base, Mixture of strong acid + Weak acid - strong base, Precipitation Titration : $AgNO_3$ – NaCl, $BaCl_2$– K_2SO_4,$Ba(OH)_2$–$MgSO_4$,numerical.	15
Total Hours		**60**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Experiments** Experiment-1, Experiment-2, Experiment-3, Experiment-4, Experiment-5, Experiment-6, Experiment-7, Experiment-8	
Total Hours		

References:

1 Physical Chemistry; G. W. Castellan, 3rdEdition,Narosa Publishing House, NewDelhi
2 Physical Chemistry; ArunBahl& J. D. Tuli, S. Chand Publishing
3 Principles of physical chemistry; B.R. Puri, L.R. Sharma, M.S. Pathania.

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking**
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory
5. Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
6. All students in the laboratory must wear safety goggles and lab coats during lab session.

Supplementary Resources:

1. http://nptel.ac.in/course.php?disciplineId=104
2. http://ocw.mit.edu/courses/chemistry/
3. http://vlab.amrita.edu/index.php?sub=2
4. http://www.vlab.co.in/ba_labs_all.php?id=9
5. https://www.youtube.com/user/TMPChem
6. https://www.youtube.com/playlist?list=PL166048DD75B05C0D
7. https://www.youtube.com/channel/UCqk-dmk3AOFtikaFDpsZorg
8. https://www.youtube.com/user/PradeepKshetrapal