

KU2DSCCHE113: GENERAL CHEMISTRY-II

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
II	DSC	100	KU2DSCCHE113	4	75

Learning Approach (Hours/ Week)		Marks Distribution			Duration of ESE (Hours)
Lecture/ Tutorial	Practical/ Internship	CE	ESE	Total	
3	2	35	65	100	1.5

Course Description: The course comprises of modules on liquid state, solutions, Instrumental techniques in analytical chemistry, chemical equilibrium, corrosion, environmental chemistry and a module on practicals.

Course Prerequisite: NIL

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Comprehensive understanding of the properties of liquid state and solutions	U
2	Understanding about the various instrumental techniques in analytical chemistry	U
3	A comprehensive understanding of the laws and theories of chemical equilibrium and corrosion and analyse them to apply in real life situations.	An
4	Analyse the environmental issues and develop habits to protect our environment.	An

5	Acquire proficiency in analytical chemistry techniques, chromatographic separation techniques, solvent extraction and in virtual lab titrations	A
---	---	---

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	0	2	0	1	2	2
CO 2	3	1	2	0	1	2	2
CO 3	3	0	2	0	1	2	2
CO 4	3	1	2	1	3	3	2
CO 5	3	1	2	1	2	3	2

Course Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HO UR S
1	LIQUID STATE &SOLUTIONS		13
	1	Liquid State: Introduction - Vapour pressure – Raoult's law- ideal and non-ideal solutions-.	
	2	Surface tension and viscosity –Explanation of these properties based on intermolecular attraction.	
	3	Solutions: Kinds of solutions – Concentration of solutions-molarity, normality, mole fraction. percentage by mass-Solubility of gases in liquids – Henry's law and its applications	

	4	Colligative properties - Determination of molecular mass using colligative properties-Abnormal molecular mass	
	INSTRUMENTAL TECHNIQUES IN ANALYTICAL CHEMISTRY		10
2	1	Thermogravimetric analysis – introduction – instrumentation – factors affecting TGA –application of TGA.	
	2	Differential thermal analysis – introduction – instrumentation – principle of working – factors affecting DTA- application.	
	3	Thermometric titrations – a brief study- Spectrophotometry	
	4	Potentiometric Titration and their applications	
	CHEMICAL EQUILIBRIUM &CORROSION		12
3	1	Reversible reactions-Law of mass action-relationship between K_c , K_p and K_x - Thermodynamic derivation of chemical equilibrium	
	2	Le Chatelier's Principle-Effects of temperature, pressure and concentration	
	3	Corrosion Introduction. Causes of corrosion-types of corrosion	
	4	Theories of corrosion- (Direct chemical attack or drycorrosion. Electrochemical theory or wet corrosion- Factors influencing corrosion- nature of the metal- nature of the environment. Corrosion control	
	ENVIRONMENTAL CHEMISTRY		10
4	1	Introduction-environment and segments- Pollutants of water – sewage, industrial effluents, soap and detergents, pesticides, fertilizers, heavy metals, biological magnification and bioaccumulation, Toxic effect of pollutants	
	2	Water quality parameters – DO, BOD and COD, Water purification- sedimentation, coagulation, filtration, disinfection, ionexchange, desalination	

	3	Air pollution – major regions of atmosphere, pollution by oxides of N, S, C, hydrocarbons and other organic chemicals, automobile exhausts, their physiological effects on vegetation and living organisms, Ozone layer – importance – depletion of ozone –consequences,	
	4	Greenhouse effect – global warming – acid rain, Toxicity and environmental hazards of pesticides, Radiation pollution and noise pollution.	
	TEACHER SPECIFIC MODULE-PRACTICALS		30
	Quantitative and Chromatographic Analysis Practicals Total 7 experiments must be done. Out of this 2 must be from permanganometry and 2 from dichrometry. Remaining 3 experiments can be from surface tension/Viscosity/chromatography.		
5	1.Permanganometry a. Estimation of oxalic acid. b. Estimation of Fe^{2+} c. Estimation of Nitrite 2.Dichrometry 1.Estimation of Fe^{2+} , $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ /Mohr's salt using internal indicator 2.Estimation of Fe^{2+} , $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ /Mohr's salt using external indicator		
	Teacher specific (suggestions) Surface tension-Measurement using Stalagmeter Viscosity-Using Ostwald viscometer		
	3.Chromatography Experiments. a) Setting up a thin layer plate, Iodine chamber for chromatographic separation b) Setting up paper (both horizontal and vertical) chromatography c) Column packing and elution in Column chromatography. d) Separation of simple organic compounds (o-nitrophenol and p-nitrophenol) using different chromatographic techniques e) Separation of plant pigments using TLC, Paper and Column		

	Chromatography	
--	----------------	--

Essential Readings:

1. P. W. Atkins and Julio de Paula, "Physical Chemistry," Oxford University Press
2. Physical Chemistry: Puri, Sharma and Pathania, Vishal Publishing Co.
3. A Textbook of Physical Chemistry: A S Negi and S C Anand, New Age International Publishers.
4. A Textbook of Physical chemistry: K. L. Kapoor, Volumes 2 &3, Macmillan India Ltd
5. Textbook of Physical Chemistry: Samuel Glasstone, McMillan Press
6. Environmental Chemistry A.K.De
7. Pragathi's Instrumental Methods of Analysis: H.Kau
8. Textbook of Physical Chemistry: Samuel Glasstone, McMillan Press
9. Advanced Physical Chemistry: Gurdeep Raj, Goel Publishing House, Meerut.
10. Physical Chemistry: W.J. Moore, Orient Longmans.
11. Physical Chemistry: N. Kundu & S.K. Jain, S.Chand & Company.
12. Chemical Thermodynamics: J.Rajaram and J.C.kuriacose, Pearson.
13. Physical Chemistry: A Molecular Approach by Donald A Mc Qurrie
14. Physical chemistry by G W Castellan.
15. Environmental Chemistry, A.K.De.
16. Douglas A. Skoog, F. James Holler, and Stanley R. Crouch, "Principles of Instrumental Analysis," Cengage Learning

Assessment Rubrics:

Evaluation Type		Marks
End Semester Evaluation (ESE)		65 (50T+15P)
Continuous Evaluation (CCA)		35 (25T+10P)
Theory		25
a)	Test Paper*	10
b)	Assignment	5
c)	Viva-Voce	5
d)	Seminar	5
Practical10		
a)	Skill	4
b)	Record	4
c)	Punctuality	2
Total		100

*Average mark of the best two written tests may be considered for internal mark.