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CO - PO MAPPING - M.Sc., ANALYTICAL CHEMISTRY

SEMESTER	COURSE NAME	CO No.	COURSE OUTCOMES	PROGRAMME OUTCOMES														
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
I	GENERAL CHEMISTRY - I	CO1	Recap the limitations of classical mechanics at molecular length scales	2		3	2						3	2				3
		CO2	understand the difference between quantum and classical mechanics	2		3	2	2					2	3			2	
		CO3	apply the principles of quantum mechanics to simple model systems relevance within chemistry		2	3	3	2			3			2				2
		CO4	Analyse for the basic principles and concepts of quantum mechanics	3		3	2	3	2		3		2	2				2
		CO5	Justify different molecular parameters for simple molecules from their electromagnetic spectra	3		2	2	3	2		3		3	3				2
		CO6	to design the general concepts of chemistry and to impart knowledge	3	3	3		2	3	2	3			2		2	2	
	INORGANIC CHEMISTRY-I	CO1	Identify the complex compounds from various inorganic molecules	3		3	2	2			3	2					2	3
		CO2	Illustrate the differences between complexes and cage compounds	2	2	2	3		2		3		2	3			2	3
		CO3	Apply the Principles of Coordination chemistry to natural chemical compounds	3	3	2	3	2	2		2	2	2					3
		CO4	Analyse chemical problems related to Inorganic chemistry	2	2	3	3	2	3	2				2			3	2
		CO5	Evaluate results obtained through structure modelling and analysis of inorganic molecules	2	2	2	3		2		3		2	3			2	3
		CO6	Synthesise compounds of structural importance	3		3	2	2			3	2					2	3

		CO No.	COURSE OUTCOMES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	ORGANIC CHEMISTRY-I	CO1	Identify the aromatic compounds and non-aromatic compounds			3	2											
		CO2	Explain the basic polarisation effects	2		3	2	2					2	3			2	
		CO3	Determine the reactivity of functional groups	2	2	2	3		2		3		2	3			2	3
		CO4	Sketch the mechanisms of single step organic reactions	2	2	2	3		2		3		2	3			2	3
		CO5	Predict the stereochemistry of organic molecules	3		3	2	2			3	2					2	3
		CO6	Synthetic methods of heterocyclic compounds	2	2	2	3		2		3		2	3			2	3
	PHYSICAL CHEMISTRY - I	CO1	Recall the definitions of thermodynamics and physical properties of molecules	3	3	3		2	3	2	3			2		2	2	
		CO2	Explain the dependency of temperature and pressure on phase titrations	2		3	2						3	2				3
		CO3	Apply the principles and laws of equilibrium thermodynamics to multicomponent system	2		3	2	2					2	3			2	
		CO4	Characterise elementary laws of chemical kinetics	2	2	2	3		2		3		2	3			2	3
		CO5	Justify the laws of thermodynamics	2	2	2	3		2		3		2	3			2	3
		CO6	Formulate equations and functions representing kinetic behaviour of the chemical systems	3		3	2	2			3	2					2	3
II	GENERAL CHEMISTRY - II	CO1	Recall the symmetry elements	2	2	2	3		2		3		2	3			2	3
		CO2	Recognise the structure of atom, radial and angular probability	3		3	2	2			3	2					2	3
		CO3	Determine the symmetry operations of small and medium sized molecules	2	2	2	3		2		3		2	3			2	3
		CO4	Analyse the statistical parameters of analytical data	2	2	3	3	2	3	2				2			3	2
		CO5	Justify between accuracy and precession	2	2	2	3		2		3		2	3			2	3
		CO6	Develop elementary programs in Fortran for performing scientific calculations.	3		3	2	2			3	2					2	3
	INORGANIC CHEMISTRY-II	CO1	List the properties of organometallic compounds	3		2	2	3	2		3		3	3				2
		CO2	Demonstrate advanced concepts of Inorganic chemistry	3	3	3		2	3	2	3			2		2	2	
		CO3	Test the role of inorganic molecules in biological processes	3		3	2	2			3	2					2	3
		CO4	Differentiate between quantitative experiments and qualitative experiments	2	2	2	3		2		3		2	3			2	3

		CO No.	COURSE OUTCOMES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		CO5	Evaluate the reaction mechanisms predicted for inorganic reactions	2	2	3	3	2	3	2				2			3	2
		CO6	Synthesise inert and labile complexes	2	2	2	3		2		3		2	3			2	3
	ORGANIC CHEMISTRY-II	CO1	State various named reactions involved in carbonyl chemistry	3		3	2	2			3	2					2	3
		CO2	Explain the reaction mechanism of organic reactions	3		3	2	2			3	2					2	3
		CO3	Apply the idea about protection and deprotection of functional groups	2		3	2	2					2	3			2	
		CO4	Analyse the organic molecules using spectroscopic methods	2	2	2	3		2		3		2	3			2	3
		CO5	Conclude the functional groups by separation of organic molecules	2	2	2	3		2		3		2	3			2	3
		CO6	Prepare derivatives of organic compounds with specific functional groups	3		3	2	2			3	2					2	3
	PHYSICAL CHEMISTRY - I	CO1	Identify the fundamental principle of magnetic resonance through theory and implement to simple examples	2	2	2	3		2		3		2	3			2	3
		CO2	Recognise the fundamental principles of statistical thermodynamics	3		3	2	2			3	2					2	3
		CO3	Applications of equations representing electrochemical cell	2	2	2	3		2		3		2	3			2	3
		CO4	Analyse thermodynamic parameters using partition functions	2	2	3	3	2	3	2				2			3	2
		CO5	Justify the thermodynamic parameters using emf data	2	2	2	3		2		3		2	3			2	3
		CO6	Develop applications using electrochemical cells	2	2	3	3	2	3	2				2			3	2
III	SEPARATION METHODS-I	CO1	Remember the basic separation techniques of chemical molecules	2	2	2	3		2		3		2	3			2	3
		CO2	Explain the basic components of instruments like GC, HPLC	3		3	2	2			3	2					2	3
		CO3	Apply the principles of HPLC,GC for separation of molecules			3	2											
		CO4	Compare the separation techniques like GC MS and LC MS	2		3	2	2					2	3			2	
		CO5	Evaluate the separations done by affinity chromatography and outer current separation techniques	2	2	2	3		2		3		2	3			2	3
		CO6	Formulate the principle of liquid liquid partition chromatography, super fluid chromatography	2	2	2	3		2		3		2	3			2	3

		CO No.	COURSE OUTCOMES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	QUALITY CONTROL AND TRADITIONAL METHODS OF ANALYSIS - I	CO1	List the confidence limits and confidence levels	3		3	2	2			3	2					2	3
		CO2	Demonstrate the applications and uses of analytical methods in chemistry	2	2	2	3		2		3		2	3			2	3
		CO3	Determine mean, standard deviation, variance, coefficient of variance	3	3	3		2	3	2	3			2		2	2	
		CO4	Differentiate quality control, quality assurance and total quality management	2		3	2						3	2				3
		CO5	Evaluate the concepts of GLP, elements and series of ISO 9000 and ISO 14000	2		3	2	2					2	3			2	
		CO6	Generate the applications of different oxidant systems.	2	2	2	3		2		3		2	3			2	3
	APPLIED ANALYSIS - I	CO1	State the chemicals present in steel, cosmetics, paints.	2	2	2	3		2		3		2	3			2	3
		CO2	Discuss about water quality parameters such as DO, BOD, and COD	3		3	2	2			3	2					2	3
		CO3	Determine the concepts of sampling, dissolution, separation and estimation of constituents	2	2	2	3		2		3		2	3			2	3
		CO4	Analyse different industrial products like oils, soaps, and face powder	3		3	2	2			3	2					2	3
		CO5	Justify the analysis of different toxic metals present in waste materials from different techniques	2	2	2	3		2		3		2	3			2	3
		CO6	Design the methods for the analysis of cations and anions	2	2	3	3	2	3	2				2			3	2
	INSTRUMENTAL METHODS OF ANALYSIS - I	CO1	Identify the basic components of instruments like XRD,IR, NMR, ESR	2	2	2	3		2		3		2	3			2	3
		CO2	Explain the applications of NMR, IR, Colorimetric titrations	3		3	2	2			3	2					2	3
		CO3	Determine the importance of electro analytical methods like voltammetry, coulometry	3		2	2	3	2		3		3	3				2
		CO4	Compare the structures determined by various spectral techniques	3	3	3		2	3	2	3			2		2	2	
		CO5	Assess the structure of different organic compounds using IR and Raman spectrometers	2		3	2						3	2				3
		CO6	Design the applicative methods of radiometric methods of analysis in investigating of lunar surface	2		3	2	2					2	3			2	
IV	SEPARATION METHODS-II	CO1	Define the principles of solvent extraction and ion exchange	2	2	2	3		2		3		2	3			2	3
		CO2	Summarise the components in instruments like GC, HPLC	2	2	2	3		2		3		2	3			2	3

		CO No.	COURSE OUTCOMES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		CO3	Apply the principles of Paper, TLC, in separation of bio molecules	3		3	2	2			3	2					2	3
		CO4	Analyse the use of brown ethers in extraction, and solvents in chromatography	2	2	2	3		2		3		2	3			2	3
		CO5	Evaluate the dynamics of chromatography	3		3	2	2			3	2					2	1
		CO6	Develop the techniques to separate molecules in pharma and bio industries	2	2	2	3		2		3		2	3			2	3
	TRADITIONAL METHODS OF ANALYSIS -II	CO1	Recall different analytical methods for separation of molecules	2	2	2	3		2		3		2	3			2	3
		CO2	Understand different gravimetric methods of analysis, errors in chemical analysis	2	2	2	3		2		3		2	3			2	2
		CO3	Compute the sources of errors in chemical analysis	3		3	2	2			3	2					2	3
		CO4	Analyse the crystal behaviour, formation of impurities formed during the precipitation process	2	2	2	3		2		3		2	3			2	3
		CO5	Predict the organic functional groups like mercaptans, amines, diols etc.,	3	3	3		2	3	2	3			2		2	2	
		CO6	Formulate the mean, standard deviation, variance and total quality.	2		3	2						3	2				2
	APPLIED ANALYSIS - II	CO1	Identify water quality parameters such as DO, BOD, COF	2		3	2	2					2	3			2	
		CO2	Compare the measured values with standard values	2	2	2	3		2		3		2	3			2	3
		CO3	Tests for the identification of drug samples	2	2	2	3		2		3		2	3			2	3
		CO4	Analysis of ores, cement, rock, trace elements	3		3	2	2			3	2					2	2
		CO5	Evaluate the constituents present in the given chemical sample	2	2	2	3		2		3		2	3			2	3
		CO6	Methods used to prepare various drug samples	3		3	2	2			3	2					2	3
	INSTRUMENTAL METHODS OF ANALYSIS - II	CO1	Define the principles and working process of XRD, IR	2	2	2	3		2		3		2	3			2	2
		CO2	Differentiate between the values of tabulated and measured by using spectroscopy	2	2	2	3		2		3		2	3			2	3
		CO3	experimental method applied for analysis of quality of samples	3		3	2	2			3	2					2	3
		CO4	Compare the qualitative and quantitative methods of various samples	2	2	2	3		2		3		2	3			2	3
		CO5	Predict the experimental values are accurate or not	3		3	2	2			3	2					2	3
		CO6	Prepare various samples for analysis to identify quality	2	2	2	3		2		3		2	3			2	3