Name of the Department: Chemical Sciences Programme: M.Sc. Chemistry

	Paper	CHL404-18	Spectroscopy-I
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Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Areas and Table to Man Area a
CO1: Solve structural problems based on UV-Vis, IR, 1H-NMR, 13C	-							rocus on improvability / indepreneurship	Assessment Tools to Measure Attainment of CC
IMR and mass spectral data.	V	V	V	V	V		Evaluation	Yes	
CO 2: Elucidate the structures of various organic compounds on								163	Mid semester tests, End Term Exams
he basis of spectral data.	V	v	v	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
D 3: Understand various involved processes responsible for NMR nemical shifts and splitting patterns and mass spectrometry.	V	V	V	V	1	1	Understanding		
0 4: Illustrate the mechanisms that give rise to the infrared and	-	1		1	-	V		Yes	Mid semester tests, End Term Exams
V-Visible absorption bands and identify to which functional					12.23	1			
roups each correspond.	V	V	V	V	V		Evaluation	Yes	
0 5:	1 1 1 1 1 1	10000		1					Mid semester tests, End Term Exams
	1	1	_	1	1			Yes	Mid semester tests, End Term Exams

Paper CHP407-18 Inorganic Chemistry Lab

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Anne the second se
CO1: Preparation of different inorganic complexes.	1	1	1	1					Assessment Tools to Measure Attainment of CO
CO 2: Purification and crystallisation of inorganic compounds.		V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
co 2. Furnication and crystallisation of inorganic compounds.	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 3: Interpretation of compounds using UV-Vis, FT-IR techniques.	v	V	V	V	v	V	Evaluation	Yes	Mid semester tests, End Term Exams
CO 4: Measurement of various physical properties such as magnetic moment of complexes.	v	V	V	V	V	V	Evaluation	Yes	
CO 5: Gravimetric analysis of various cations.	V	V	V	V	V		Applying	Yes	Mid semester tests, End Term Exams
	COLUMN TO T			-	1.	and the second second	, appring	Tes	Mid semester tests, End Term Exams

Paper CHP408-18 Organic Chemistry Lab

Course Dutcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Annual Table 11
CO1: Apply various methods techniques in organic synthesis to								rocco on ampioyaninty / Encienciedi sing	Assessment Tools to Measure Attainment of CO
build organic molecules.	V	V	V	V	V	V	Applying	Yes	
CO 2: Understand the fundamental mechanistic pathways of					No. of Contraction	1.	in pointing	Tes	Mid semester tests, End Term Exams
organic synthesis involving various practical lab techniques	1998		1.15	1 1 1 1 1 1	Sec. 1				
together.	v	V	V	V			Understanding	Yes	
CO 3: Apply the spectroscopic techniques for the determination of						1000	onderstanding	Tes	Mid semester tests, End Term Exams
molecular structures of organic molecules.	V	V	V	V	V		Applying	Yes	
CO 4: Present their work with practical skills and the awareness of	2.2.6.8		-	1			Abbiling	res	Mid semester tests, End Term Exams
health and safety procedures.	v	v	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams

Paper CHL414-18 Spectroscopy-II

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Bernard Task to Mt
CO1: Learn the fundamental and advanced concepts of	20.000							received an amprogrammer / and contined ship	Assessment Tools to Measure Attainment of CO
Microwave, Infrared Vibration-rotation Raman and infra-red	1000			12125					
Spectroscopy and their applications for	13.50		No.	1 1 2 2 3		1			
chemical analysis	V	V	V	V	V		Understanding	Yes	
CO 2: Understand Electronic spectroscopy of different element	s			2 10000102	-	The state	onderstanding	Tes	Mid semester tests, End Term Exams
and simple molecules.	V	V	V	V	V		Understanding	Yes	
CO 3: Study the concepts and principles of Mössbauer						1	onderstanding	Tes	Mid semester tests, End Term Exams
Spectroscopy and its application.	V	V	V	V	V	V	Understanding	Yes	
CO 4: Apply Nuclear Quadruple Resonance and Electron Spin	1269.574	9 7 2 8 C S	1. 1. 1. 1. 1.	1	-	-	onderstunding	Tes	Mid semester tests, End Term Exams
Resonance Spectroscopy for organic compounds analysis.	V	V	V	V	V	V	Applying	Yes	
CO 5: Solve structural problems based on these techniques.	V	V	1	1	1	1			Mid semester tests, End Term Exams
, and on these teeningdes.	1.			1.	IV.	V	Evaluation	Yes	Mid semester tests, End Term Exams

Paper CHL416P-18 Physical Chemistry Lab

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the basic procedures for carrying out a physical									
chemistry practical like preparation and standardisation of solutions, handling the equipments and measuring with precision.		V					Understanding,		
CO 2: Correlate the theoretical and practical aspects and know	-			-30 -3.55	V		Apply	Yes	Mid semester tests, End Term Exams
about the limits of the experimental error.	V	V	V		v	V	Understanding, Apply	Yes	
								Tes	Mid semester tests, End Term Exams

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	(iical Scie	al Univer	Punjab
1	5	of Cherr	Fechnic	- 144603 Punjab
		neau Denariment of Chemical Sciences	IKG Puniab Technical University	Kanurhala -
	1000	Dang	A CY	Nen N

CO 3: Determine the various physical parameters for the various	102102	1000			100	1121121	T		
problems under study.	V	V	V	V		V	Evaluate	Vac	Mid semester tests, End Term Exams
CO 4: Verify various laws studied in the theory part.	1	1	1.1	1.1	1.100.200.2			105	wild semester tests, End Term Exams
ter in terry function and statute in the theory part.	I.v.	V	V	IV .	and the second second	V	Analyse	Yes	Mid semester tests, End Term Exams

Paper CHP417P-18 Advanced Chemistry Lab-I

Course Outcome	PO 1	POZ	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Preparation of different inorganic complexes.	V	V	V	V		2/	Understanding		
O 2: Purification and crystallisation of inorganic compounds.	1.	1.	1.		-	v		Yes	Mid semester tests, End Term Exams
to z. Partication and crystallisation of morganic compounds.	V	V	V	V		V	Applying	Yes	Mid semester tests, End Term Exams
:O 3: Interpretation of compounds using UV-Vis, FT-IR techniques	V	V	V	V	V	V	Evaluation	Yes	
O 4: Measurement of various physical properties such as								165	Mid semester tests, End Term Exams
nagnetic moment of complexes.	V	V	V	V		v	Applying	Yes	Mid semester tests, End Term Exams
O 5: Applying related experiments for their research work.	V	V	11	11	11	1		165	
FF / O				1.	V	IV.	Applying	Yes	Mid semester tests, End Term Exams

Paper CHL504-18 Advanced Characterization Techniques

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the topography, morphology, composition,					1			record on Employation of Cherepreneurship	Assessment roois to measure Attainment of CO
relationship between composition and material properties.	1.1.1				1 1 1 1 1 1				
	V			V	V		Understanding	Yes	
CO 2: Learn the functioning of the X-ray diffractometer, about its	1.0					100510		165	Mid semester tests, End Term Exams
components and would be able to determine the crystal structure	1.11				1.5.16				
of a material, find impurity in the material, different phases	1999.24	100.00	S Status		1714	10000	a state to be		and the second
present in the mixture of compound qualitative as well as	1.1.1	1.1	1000	1			Understanding		
functionalities	V	V	V	V		V	and Analyzing	Yes	
CO 3: Understand the instrumentation of TGA and also to	2.292.24			-		12.00	und / und / cmg	163	Mid semester tests, End Term Exams
calculate the weight loss with temperature, types of changes	12000					a state			
occurring in the material/substances during thermal breading,	1000	1.00					A CONTRACTOR		
enthalpy changes during heat treatment of a compound.	V	V	V	V	1.3.3.5	V	Understanding ar	Yes	
CO 4: Apply the knowledge of various characterization techniques	2835	200.00					on or other standing of	165	Mid semester tests, End Term Exams
in material industries, metallurgy industries, electronic industries,	200	1.18	Cherry Starting		0.01.55	Dec. 2			
civil Engineering.	V	V	V	V .	V	V	Understanding, A	Yes	
CO 5: Apply the quantitative and qualitative separation					1	1	in a crocarraing, /	165	Mid semester tests, End Term Exams
techniques in purification			13.30	1000			1 2 2 2 2 3 3		
and its applications in food industry, pharmaceutical industry,				1000	138.1	and the second	Understanding.		
purification, removal of pollutants, medicinal chemistry and		1	1000	1000	Liber at		Analyzing and		
essential oils.	V	V	V	V	V	V	applying	Yes	
						1	1-1-1-0	165	Mid semester tests, End Term Exams

Paper CHP506-18 Advanced Chemistry Lab-II

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
			THE REAL			1000	Understanding,		
CO1: Emphasize the importance of different techniques used for				anes	S Sheek	1000	Apply, Analyse,		
titration viz. potentiometery, pHmetry and amperometry .	V	V	V	V	V	V	Create	Yes	Mid semester tests, End Term Exams
CO 2: Correlate the theoretical and practical aspects and know			1.0				Understanding,		this series certes cs, end renn exams
about the limits of the experimental error.	V	V	V		V	V	Apply	Yes	Mid semester tests, End Term Exams
CO 3: Determine the various physical parameters for the various	1200				Constanting of the	1000	11.7		wild semester tests, End Term Exams
problems under study.	V	V	V	V		v	Evaluate	Yes	Mid semester tests, End Term Exams
CO 4: Verify various laws studied in the theory part.	V	V	V	V		V	Analyse	Yes	
							raidiyse	Tes	Mid semester tests, End Term Exams

Paper CHL512A-18 Advanced Physical Chemistry

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	POG	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand major aspects of chemical terminology related	0.22						Understand.		Assessment roots to measure Attainment of CO
to surface science, polymers and electrode processes.	V	V	V	V	V	V	Remember	Yes	Mid consistent and Town France
CO 2: Develop insights in the micelle formation process and			1.		10000			103	Mid semester tests, End Term Exams
emphasize its application in daily life.				12/2/3	D. C. K.	1000	1		
	V	V	V	V	V	V	Apply, Analyse	Yes	Mid semester tests, End Term Exams
CO 3: Know about polymers in detail.	V	V	V	V	1.1.1	V	Remember	Yes	Mid semester tests, End Term Exams
CO 4: Correlate various types of voltammetric techniques and	12000				1.5.15		Apply, Analyse,		wild semester tests, End Term Exams
their importance in sensing field.	V	V	V	V	Contraction in	V	Evaluate	Yes	Mid semester tests, End Term Exams

Paper CHL512E-18 Green Chemistry

Course Outcome PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 Skill Focus on Employability / Entrepreneurship Assessment Tools to Measure Attainment of CO	Outcome PO 1	PO1 PO2 PO3 PO4 PO	0.5 PO.6 Skill Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
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r		120200						
V	V	V	V	V	1.000	Understanding	Vec	Mideren to the Cold To an
							163	Mid semester tests, End Term Exams
	1.000	a Maxim	1	1	1.740			
V	V	V	V	V		Evaluation	Vec	Mid anna tarta ta da an
								Mid semester tests, End Term Exams
V	V	V	V	V		Understanding	Vec	
	1 2						165	Mid semester tests, End Term Exams
V	V	V	V	V	V	Applying	Ver	
				-		1. the start	165	Mid semester tests, End Term Exams
V	V	V	V	V	1.1.1	Applying	Vec	Mid semester tests, End Term Exams
	r v v v	v v v v v v	V V V V V V V V V				V V V V V Understanding V V V V V Evaluation V V V V Understanding V V V V Understanding	V V V V V Understanding Yes V V V V Evaluation Yes V V V V Understanding Yes V V V V Understanding Yes V V V V Applying Yes

Head Department of Chemical Sciences IKG Punjab Technical University Kapurthala - 144603 Punjab (INDIA) 5

Name of the Department: Chemical Sciences Programme: B.Sc. Honours Chemistry

Paper BHHL105-19 Communicative English-I

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	POG	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Students will acquire basic proficiency in reading	1233				0022600				
&listening, writing and speaking skills.	V	V	V	V	V	V	Understanding	Yes	Mid semester tests, End Term Exams
CO 2: Students will be able to understand spoken and written	1.1					11162			
English language, particularly the language of their chosen			and the				1.2.2.2.2.2.2		
technical field.	V	V	V	V	V	V	Understanding	Yes	Mid semester tests, End Term Exams
CO 3: They will be able to converse fluently and produce on their			1000			100000			
own clear and coherent texts.	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 4: Students will become proficient in professional					1000				
communication such as interviews, group discussions, office	10.00	12.420		12.00	1.3.5	1000			
environments, important reading skills as well as writing skills	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams

Paper BHCP107-19 Inorganic Chemistry Lab-I

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand to calibrate and run the instruments for analysis.	. v	V	V	V				Yes	Mid semester tests, End Term Exams
CO 2: Learn to the quantitative analysis of various metal		1828				4.4.1.1.1.1			
ions/cations and anions.	V	V	V	V	V	V		Yes	Mid semester tests, End Term Exams
CO 3: Understand the various principles of different techniques						1 Julian	1.1		
involved in the quantitative analysis.	V	V	V	V	V	V		Yes	Mid semester tests, End Term Exams
CO 4: Learn to prepare various inorganic compounds.	V	V	V	V	1		and the course	Yes	Mid semester tests. End Term Exams

Paper BHCP108-19 Organic Chemistry Lab-I

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: To check the purity of organic compounds by determining							and the second second	, , , , , , , , , , , , , , , , ,	
the melting or boiling points	V	V	V	V	V		Understand	Yes	Mid semester tests, End Term Exams
CO 2: To develop preparative skills for purification of organic		1000					Understand and		
compounds by crystallization method.	V	V	V	V	V		apply	Yes	Mid semester tests, End Term Exams
CO 3: To determine the element or functional groups present in		1111					Understand and		
organic compound by organic qualitative analysis.	V	V	V	V	V		apply	Yes	Mid semester tests, End Term Exams
CO 4: To present their work with practical skills and the awareness	s			1000	11240				
of health and safety procedures.	V	V	V	V	V	V	Apply	Yes	Mid semester tests, End Term Exams
CO 5: To apply related experiments for their research work	V	V	V	V	V	V	Apply	Yes	Mid semester tests, End Term Exams

Paper BHHL115-19 Communicative English-II

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Students will acquire basic proficiency in LSRW skills-									
listening, speaking, reading, and writing.	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 2: Students will be able to develop their vocabulary so that						1000			
they can understand spoken and written English language,					Colling and				
particularly the language of their chosen technical field	V	V	V	V	V	V	Understanding	Yes	Mid semester tests, End Term Exams
CO 3: Students will be introduced to the skills and strategies of		1				1000			
reading and writing by identifying organizational patterns,		1.000							
spotting classification systems and understanding associations		12120	1.1			100.00			
between ideas through study of literary texts.	V	V	V	V	V	V	Understanding	Yes	Mid semester tests, End Term Exams
CO 4: Students will be able to converse fluently and produce on				0.000					
their own clear and coherent texts.	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 5: Students will be able to improve the employability of		1 Section		121.1	1			and the second	
students and make them proficient in professional	1 1 1 1 1 1	1 1 1 1 1							
communication through understanding of career documents; job		10.00	1.8.1	196.18		100.00			
interviews; group discussions; internal communication in office	1		1199		1000				
environments etc.	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams

Paper BHCP117-19 Inorganic Chemistry Lab-II

Course Outcome PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 Skill Focus on Employability / Entrepreneurship Assessment Tools to Measure Attainment of CO

CO1: CO1. Understand the concept of qualitative analysis.	V	V	V	V			Understanding	Yes	Mid semester tests, End Term Exams
CO 2: CO2. Learn to identify present cations and anions through		1000			11111111				
qualitative analysis of various metal ions/cations and anions.	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 3: CO3. Understand the various techniques/principles involved	1								
in the qualitative analysis of mixtures in presence or absence of			1 274		100 C				
interfering ions.	V	V	V	V			Understanding	Yes	Mid semester tests, End Term Exams
CO 4: CO4. Learn to separate and identify less familiar ions	1					1			
through qualitative analysis.	V	V	V	V	V	V	Understanding	Yes	Mid semester tests, End Term Exams

Paper BHCP118-19 Physical Chemistry Lab-I

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the basic procedures for carrying out a physical				a server	1000				
chemistry practical like preparation and standardisation of	100			a sector	a starter	13.00	Understanding,		
solutions, handling the equipments and measuring with precision.	V	V	V	· 新闻意	V	V	Apply	Yes	Mid semester tests, End Term Exams
CO 2: Correlate the theoretical and practical aspects and know	1.				10 10 M		Understanding,		
about the limits of the experimental error.	V	V	V	Sec. 1	V	V	Apply	Yes	Mid semester tests, End Term Exams
CO 3: Determine the various physical parameters for the various			10.2.21	1.1.1.1.1.1.1		1000			
problems under study.	V	V	V	V		v	Evaluate	Yes	Mid semester tests, End Term Exams
CO 4: Verify various laws studied in the theory part.	٧	V	V	٧		V	Analyse	Yes	Mid semester tests, End Term Exams
	13.071	A Start		12.5588				Yes	Mid semester tests. End Term Exams

Paper UC-BSHP-125-19 Physics Lab-II

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Able to verify the theoretical concepts/laws learnt in theory									
courses.	V	V	V	V	V	V.	understand	Yes	Mid semester tests, End Term Exams
CO 2: Trained in carrying out precise measurements and handling			1.2						
sensitive equipment.	V	V	V	V	V	V	understand	Yes	Mid semester tests, End Term Exams
CO 3: Understand the methods used for estimating and dealing	1.200			1000					
with experimental uncertainties and systematic "errors".	V	V	V	V	V	V	apply	Yes	Mid semester tests, End Term Exams
CO 4: Learn to draw conclusions from data and develop skills in							1.1.1		
experimental design.	V	V	V	V	V	V	apply	Yes	Mid semester tests, End Term Exams
CO 5: Document a technical report which communicates scientific									
nformation in a clear and concise manner.	V	V	V	V	V	v	apply	Yes	Mid semester tests. End Term Exams

Paper BHCL203-19 Spectroscopy

Course Outcome	PO 1	POZ	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the fundamental principles and theories of							Sec. 1		
various spectroscopic techniques	V	V	V	V	V	Acres 1	Understanding	Yes	Mid semester tests, End Term Exams
CO 2: Learn the interaction of various electromagnetic radiations			0.00						
with matter	V	V	V	V	V		Applying	Yes	Mid semester tests, End Term Exams
CO 3: Learn about the behaviour of different types of compounds			1978	12.00	1				
towards different electromagnetic radiations	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 4: Understand the applications of interaction of light in their	12.00		3.8			and the state		100	
characterization	V	V	V	V	V	100	Understanding	Yes	Mid semester tests, End Term Exams
CO 5: Learn about the role of different techniques in the				10000					
characterization of different compounds	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams

Paper BHCP206-19 Organic Chemistry Lab-II

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: To synthesise organic compounds by conventional and	1999	a al a ser			1		Understanding		
greener approach.	V	V	V	V	V		and Apply	Yes	Mid semester tests, End Term Exams
CO 2: To develop preparative skills for purification of organic	19.000	1000700	C. Barres	0.000			Understanding		
compounds by crystallization method.	V	V	V	V	V	Name: 1	and Apply	Yes	Mid semester tests, End Term Exams
CO 3: To separate the organic compound by thin layer	1.1.1.1					The second	Understanding		
chromatography technique.	V	V	V	V	V		and Apply	Yes	Mid semester tests, End Term Exams
CO 4: To present their work with practical skills and the awareness		19955		10.8325	0				
of health and safety procedures.	V	V	V	V	V	V	Apply	Yes	Mid semester tests, End Term Exams
CO 5: To apply related experiments for their research work	V	V	V	V	V	V	Apply	Yes	Mid semester tests, End Term Exams

Paper BHCP207-19 Physical Chemistry Lab-II

Course Outcome	PO1	PO2 P	PO 3 4	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
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O1: Understand the basic procedures for carrying out a physical hemistry practical like preparation and standardisation of							Understanding.		
olutions, handling the equipments and measuring with precision.	V	V	V		V	V	Apply	Yes	Mid semester tests, End Term Exams
CO 2: Correlate the theoretical and practical aspects and know	1000	1.1			19992	1. 1. 2	Understanding,		
bout the limits of the experimental error.	V	V	V		V	V	Apply	Yes	Mid semester tests, End Term Exams
CO 3: Determine the various physical parameters for the various	18.20	100			E me				
problems under study.	V	V	V	V		V	Evaluate	Yes	Mid semester tests, End Term Exams
O 4: Verify various laws studied in the theory part.	V	V	V	V	and the	V	Analyse	Yes	Mid semester tests, End Term Exams
				10.00				Yes	Mid semester tests, End Term Exams

Paper BHCL213-19 Green Chemistry

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: CO1. Understand the fundamental concepts of green									
chemistry	V	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 2: CO2. Learn the use of these fundamental principles for the									
designing of various chemical reactions	V	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 3: CO3. Understand the various techniques available and their		1.1.1.1	N States	1	1. 2.5				
present applications in different green reactions	V	V	V	V	V	V	Understanding	Yes	Mid semester tests, End Term Exams
CO 4: CO4. Learn about the various applications of the green						10.800	A Second Second		
chemistry	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 5: CO5. Understand the various expected future trends of the	1000			1.2028	186.5	2 2 2 3 2 3 3			
green chemistry	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams

Paper BHCL214-19 Polymer Chemistry

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Study the nomenclature, classifications and bonding in				No. Constant					
polymers	V	V	V	V			Understanding	Yes	Mid semester tests, End Term Exams
CO 2: Learn the criteria for the synthesis of polymers and	1.2.2.2		1.4.5.12	1.5			a second second		
mechanism involved in polymerization	V	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 3: Understand the morphology, kinetics and their structure	10.500		1.2.2.2.2	1.	1.8.520				
property relationship	V	V	V	V	V	V	Understanding	Yes	Mid semester tests, End Term Exams
CO 4: Learn the various techniques used for determining the		1.26.2					Understanding		
molecular weight of polymeric compounds	V	V	V	V	V	V	and Evaluation	Yes	Mid semester tests, End Term Exams
CO 5: Study the physical, thermal, Flow and Mechanical Propertie	s		1000	-	-	1. A. P. S. S. S.	Understanding		
of Polymers	V	V	V	V	V	V	and Analysis	Yes	Mid semester tests, End Term Exams

Paper BHCL216-19 Basic Analytical Chemistry

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the basics of analytical chemistry.									
	V	V	V	V	V	V	Understanding	Yes	Mid semester tests, End Term Exams
CO 2:Know abou t soil and water, their sampling, analysis &	10000	10.22	5 m2514	10000					
purification methods.	V	V	V	V	V	V	Understanding a	Yes	Mid semester tests, End Term Exams
CO 3: Familarise with the principles and techniques of		1 2.539.7	0 3 2 6 9 9	1 1 1 1 1		8 832 Sec. 6			
chromatography.	V	V	V	V		V	Understanding	Yes	Mid semester tests, End Term Exams
CO 4: Aware of the nutritional value of various food items and									
concept of food processing and adulteration.	V	V	V	V	V	V	Understanding	Yes	Mid semester tests, End Term Exams
CO 5: Understand the functions of various constituents present in		1111			1 martin	in the second			
cosmetics.	V	V	V	V	V	V	Understanding	Yes	Mid semester tests, End Term Exams

Paper BHCP217-19 Inorganic Chemistry Lab-III

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the concept of qualntitative analysis.	V	V	V	V	V	1000	Understanding	Yes	Mid semester tests, End Term Exams
CO 2: Understand the various techniques/principles involved in	1.000		10000				and the second		
the quantitative analysis for present metal ions.	V	V	V	V	V	1.00	Understanding	Yes	Mid semester tests, End Term Exams
CO 3: Learn to synthesize various inorganic compounds	V	v	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 4: Understand the principles involved in chromatographic						S. Miller	and the second second second		
separations	V	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 5: Learn to estimate the cations present, through quantitative	1000	Neo-Care	10000		1999		and the second second		
analysis	V	V	V	V	V	1. 1980 IS	Applying	Yes	Mid semester tests, End Term Exams

Paper BHCP218-19 Physical Chemistry Lab-III

Course Outcome	PO1 PO2	PO 3 PI	04 PO 5	PO 6 Skil	II F	Focus on Employability / Ent	trepreneurship	Assessment Tools to Measure Attainment of CO
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CO1: Understand the basic procedures for carrying out a physical hemistry practical like preparation and standardisation of							Understanding,		
olutions, handling the equipments and measuring with precision.	V	V	V		V	V	Apply	Yes	Mid semester tests, End Term Exams
CO 2: Correlate the theoretical and practical aspects and know	14.5	1.1		1.5		24	Understanding,		
bout the limits of the experimental error.	V	V	V	State.	V	V	Apply	Yes	Mid semester tests, End Term Exams
O 3: Determine the various physical parameters for the various	1.000	1	1			1.0.0			
problems under study.	V	V	V	V		V	Evaluate	Yes	Mid semester tests, End Term Exams
O 4: Verify various laws studied in the theory part.	V	V	V	V	Sec.	V	Analyse	Yes	Mid semester tests, End Term Exams
				11 11 113				Yes	Mid semester tests, End Term Exams

Paper BHCP219-19 Basic Analytical Chemistry Lab

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Identify the adulterants in common food items.	1900				Contraction of the second		Understanding		
	V	V	and a state		V	V	and Analyzing	Yes	Mid semester tests, End Term Exams
CO 2: Analyse samples of soil (pH) and water (pH, acidity,	13/3/3				1.0		Understanding		and the second second second second second
alkalinity etc)	V	V	V	V	V	V	and Analyzing	Yes	Mid semester tests, End Term Exams
CO 3: Learn the paper chromatographic technique for separation	1997	A Stored	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1			R. S. Der	Understanding		
of metal ions.	V	V	V			V	and Analyzing	Yes	Mid semester tests, End Term Exams
CO 4: Learn the spectrpphotometric determination of compounds	1	1.	4 2 4 4 4 4			1	Understanding		
in commercial products.	V	V	V	V	V	V	and Analyzing	Yes	Mid semester tests, End Term Exams
	100		13200	1111					

Paper BHCL304-19 Analytical Clinical Biochemistry

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the structure & functions of Biomolecules.	V	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 2: An advanced understanding and applied knowledge of the							Contraction of the second		
theory of clinical biochemistry.	V	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 3: A critical understanding of how biochemical investigations	1			102.00					
are employed to develop a clinical diagnosis.	V	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 4: To gain knowledge and understanding of clinical disorders.	v	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 5: To gain knowledge of biological samples and their collection	1			1		1.25			
procedures.	V	V	V	V	V	and the second	Applying	Yes	Mid semester tests, End Term Exams

Paper BHCL305-19 Inductrial Chemicals and the Environment

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: understand different toxic gases and their toxicity hazards, Safe design systems for large scale production of Industrial gases.	v	V	v		v	v	Understand, Analyze and Apply	Yes	Mid semester tests, End Term Exams
CO 2: Understand manufacturing processes, handling and storage of inorganic chemicals and knowledge of Hazardous effects of the inorganic chemicals on human beings and vegetation.	v	V			v	V	Understanding	Yes	Mid semester tests, End Term Exams
CO 3: understand the requirement of ultra-pure metals for the semiconducting technologies.				v	v		undersatnding	Yes	Mid semester tests, End Term Exams
CO 4: understand different sources, effects and control measures of air, water pollutants, water quality parameters, different methods of Treatment of effluents from different sources.	v	v	V	v	V	v	Understand and Analyze	Yes	Mid semester tests, End Term Exams
CO 5: understand different sources of energy, source of nuclear waste and its disposal. Use of biocatalyst in chemical industries.			v	v	V	V	Understand and Analyze	Yes	Mid semester tests, End Term Exams

Paper BHCL306-19 Ligand Field Theory

Course Outcome	PO 1	PO 2	PO 3	PO 4	POS	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the fundamental concepts of various aspects of									
Ligand Field Theory	V	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 2: Learn the different aspects of crystal field theory	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 3: Understand the effect of weak , medium and strong crystal	1999			1000	1.000		A CARLON CONTRACTOR		
field on free ions	V	V	V	V	V		Understand	Yes	Mid semester tests, End Term Exams
CO 4: Learn about the electronic spectra of transition metal									
complexes	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 5: Understand the factors affecting the electronic spectra of	100	1155				1 5 1 2	and the second		
the complexes	V	V	V	V	V		Understand	Yes	Mid semester tests, End Term Exams



Paper BHCP307-19 Inorganic Chemistry Lab-IV

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the concept of quantitative analysis.	V	V	V	V	V		Understand	Yes	Mid semester tests, End Term Exams
CO 2: Learn to estimate the present cations through quantitative		1							
analysis	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 3: Understand the various techniques/principles involved in	1.								
the quantitative analysis present metal ions.	V	V	V	V	V	123	Understand	Yes	Mid semester tests, End Term Exams
CO 4: Learn to perform the volumetric analysis using different		1100				135,889			
methods.	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams

Paper BHCP308-19 Organic Chemistry Lab-III

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: To synthesise organic compounds by various approach.	V	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 2: To develop preparative skills for purification of organic		Nº Sam		-			Understanding		
compounds by crystallization method.	V	V	V	V	V	ALC: NO	and evaluation	Yes	Mid semester tests, End Term Exams
CO 3: To separate the organic compound by thin layer		1.1.1				a the second	Analysis and		
chromatography technique.	V	V	V	V	V		Evaluation	Yes	Mid semester tests, End Term Exams
CO 4: To present their work with practical skills and the awareness	14.0				1 1 1 1 1				
of health and safety procedures.	V	V	V	V	V	V	Analysis	Yes	Mid semester tests, End Term Exams
CO 5: To apply related experiments for their research work	V	V	V	V	V	V	Analysis	Yes	Mid semester tests, End Term Exams

Paper BHCL313-19 Catalysis

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the Organometallic chemistry	V	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 2: Understand the fundamental concepts of various concepts									
involved in catalysis.	V	V	V	V	V	2. Theorem	Understanding	Yes	Mid semester tests, End Term Exams
CO 3: Learn different application of catalysis in the synthesis of		0.000		1.200		126.0	A CONTRACTOR		
organic compounds.	V	V	V	v	V		Apply	Yes	Mid semester tests, End Term Exams
CO 4: To Understand role of catalysis in biological model	V	V	V	V	V	V	Apply	Yes	Mid semester tests, End Term Exams

Paper BHCL314-19 Analytical Methods in Chemistry

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: explain the fundamentals of analytical chemistry and steps									
of a characteristic analysis.	V	V	V		V	V	Understanding	Yes	Mid semester tests, End Term Exams
	A STATE OF THE STATE	er v staanster geveenter		-			Apply, Analyse,		
CO 2: estimate kinds of errors in chemical analysis.	V	V	V	V	V	V	Evaluate	Yes	Mid semester tests, End Term Exams
CO 3: identify quality of experimental measurements.	V	V	V	V	V	V	Remember	Yes	Mid semester tests, End Term Exams
CO 4: interpret the sources of random errors and effects of	1000	1.11	1.1.1.1		12200		Understanding,		
random errors on analytical results.	V	V	V	V	v	V	Apply, Evaluate	Yes	Mid semester tests, End Term Exams
CO 5: Familiarise with various analytical techniques and compare	1.020		1000	1 1 1 1 1	1.5.5		Understanding,		
them.	V	V	V	V	V		Remember	Yes	Mid semester tests, End Term Exams

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CC
CO1: Understand the fundamental concepts of nanomaterials.	V	٧	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 2: Learn the different methods of chemical synthesis of	1	1.0			1.000				
nanoparticles.	V	V	V	V	V		Applying	Yes	Mid semester tests, End Term Exams
CO 3: Understand the basic techniques about the organic		1			-				
nanoparticles.	V	V	V	V	V		Understanding	Yes	Mid semester tests, End Term Exams
CO 4: Learn about the various characterization techniques.	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams
CO 5: Understand the various applications of nanomaterials.	V	V	V	V	V	V	Understanding	Yes	Mid semester tests End Term Exams

Paper BHCL316-19 Molecular Modelling and Drug Design

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the fundamental concepts of molecular		-		7	the second second	1			
modelling.	V	V	V	V	V	and the	Understanding	Yes	Mid semester tests, End Term Exams
CO 2: Learn the different methods of energy minimization and	10 10 10 10	6 - 19 A	5 22.00	1. 5.5.0	1.1				
computer simulation.	V	V	V	V	V	1.1	Applying	Yes	Mid semester tests, End Term Exams
CO 3: Understand the basic concepts of molecular dyanamics.	V	V	V	V	V	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Understanding	Yes	Mid semester tests, End Term Exams
CO 4: Learn about the various concepts of drug designing and	1000		12/52/16						
molecular modelling.	V	V	V	V	V	V	Applying	Yes	Mid semester tests, End Term Exams



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Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: To study about properties of amino acids/proteins/enzymes.	v	V	v	V	v		Understanding	Yes	Mid semester tests, End Term Exams
CO 2: To estimate amino acids/proteins by various methods.	V	V	V	V	V		Analysis	Yes	Mid semester tests, End Term Exams
CO 3: To understand the isolation and characterisation of DNA.	V	V ·	V	V	V	V	Understanding	Yes	Mid semester tests, End Term Exams
CO 4: To present their work with practical skills and the awareness			100				163.00		
of health and safety procedures.	V	V	V	V	V	V	Analysis	Yes	Mid semester tests, End Term Exams
CO 5: To apply related experiments for their research work	V	V	V	V	V	V	Analysis	Yes	Mid semester tests, End Term Exams

Paper BHCP319-19 Physical Chemistry Lab-IV

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the basic procedures for carrying out a physical chemistry practical like preparation and standardisation of									
		1.500	1.		1.000		Understanding,		
olutions, handling the equipments and measuring with precision.	V	V	V	ALC: NOT THE OWNER OF	V	V	Apply	Yes	Mid semester tests, End Term Exams
CO 2: Correlate the theoretical and practical aspects and know	10000					1 1 1 1 1	Understanding,		
bout the limits of the experimental error.	V	V	V		V	V	Apply	Yes	Mid semester tests, End Term Exams
O 3: Determine the various physical parameters for the various					and the second second	10-10-1			wild semester tests, End Term Exams
roblems under study.	v	V	V	V		V	Evaluate	Yes	Mid semester tests, End Term Exams
O 4: Verify various laws studied in the theory part.	V	V	V	V		٧	Analyse	Yes	Mid semester tests, End Term Exams