## Evaluation/Scheme of Examination M.Sc. (Chemistry) 1<sup>st</sup>Semester

S. No.	Course	Course Title	Type of Paper	Per l	Period nr/week	/sem	I	Evaluatio	n Scheme	2	Sub.	Credit	Total
	coue			L	Т	Р	СТ	TA	Total	ESE	TOLAI		Creat
THEO	RIES												
1.	CH401	Physical Chemistry	Foundation Course	03	01	00				40	100	3:1:0	4
2.	CH402	Inorganic Chemistry	Foundation Course	03	01	00	40	20	60	40	100	3:1:0	4
3.	CH403	Organic Chemistry	Foundation Course	03	01	00	40	20	60	40	100	3:1:0	4
4.	CH404	Environmental Chemistry	Core	03	01	00	40	20	60	40	100	3:1:0	4
5.	CH405	Modern Analytical Techniques	Core	03	01	00	40	20	60	40	100	3:1:0	4
PRAC	TICAL												
6.	6. CH419 Chemistry Lab Practical-1 C		Core	00	00	08	40	20	60	40	100	0:0:4	4
			Total	15	05	08	240	120	360	240	600	24	24

## 2<sup>nd</sup>Semester

S. No.	Course	Course Title	Type of Papor	Per l	Period hr/week	/sem	I	Evaluatio	n Scheme	!	Sub.	Credit	Total
	coue		rapei	L	Т	Р	СТ	TA	Total	ESE	TOLAI		creat
THEO	RIES												
1.	CH408	MIMA & Computational Techniques	Core	03	01	00	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			40	100	3:1:0	4
2.	CH409	Chemistry of Natural Products	Core	03	01	00	0 40 20 60			40	100	3:1:0	4
3.	CH411	Pharmaceutical Chemistry	Core	03	01	00	40 20 60		40	100	3:1:0	4	
4.	CH420	Surface Chemistry and Electrochemistry	Core	03	01	00	40	20	60	40	100	3:1:0	4
5.	5. CH421 Coordination and Organomettalic Chemistr of Transition Elements		Core	03	01	00	40	20	60	40	100	3:1:0	4
PRAC	PRACTICAL												
6.	CH422	Chemistry Lab Practical-2	Core	03	01	00	0 40 20 60 40			40	100	0:0:4	4
			Total	15	05	08	240	120	360	240	600	24	24

	3 <sup>re</sup> Semester													
	Cour	Course Title	Type of	Per l	Period nr/week	/sem	I	Evaluatio	n Scheme	!	Sub.	Credit	Total	
S. No.	se		Paper	L	т	Р	СТ	TA	Total	ESE	Total		Credit	
	e		-											
THEC	RIES													
1.	CH501	Polymer Chemistry	Core	03	01	00	40	20	60	40	100	3:1:0	4	
2.	CH513	Organic reaction, Reagents & Heterocyclic Chemistry	action, Reagents & Heterocyclic Core 03 01		01	00	40	20	60	40	100	3:1:0	4	
3.	CH514	Chemical Kinetics and Chemical Equilibrium	Core	03	01	00	40	20	60	40	100	3:1:0	4	
4.	CH515	Inorganic Reaction Mechanism and catalysis	Core	03	01	00	40	20	60	40	100	3:1:0	4	
5.	CH516	Quantum Chemistry and Molecular Spectroscopy	Elective	02	01	00	40	20	60	40	100	2.1.0	4	
6.	CH506	Bioinorganic & Supra molecular Chemistry	Elective	03	01	00	40	20	60	40	100	3:1:0	4	
PRAC	TICAL													
6.	CH507	Industrial Chemistry Practical-3	Core	03	01	00	40	20	60	40	100	0:0:4	4	
			Total	15	05	08	240	120	360	240	600	24	24	

	4 <sup>u</sup> Semester												
S. No.	Course	Course Title	Type of	Per l	Period nr/week	/sem	I	Evaluatio	n Scheme	2	Sub.	Credit	Total Crodit
	coue		Paper	L	Т	Р	СТ	TA	Total	ESE	TOLAI		Creuit
THEO	RIES												
1.	CH518	Spectral Techniques in Inorganic Chemistry	y Core 03 01 00 40			40	20	60	40	100	3:1:0	4	
2.	CH509	Green Chemistry	Elective	02	01 00		0 40	20	60	40	100	2.1.0	Λ
3.	CH519	Computational method in Chemistry	Elective	05	01	00	40	20	00	40	100	5.1.0	4
PRAC	TICAL												
4.	CH520	Seminar	Core	00	00	04	00	00	00	100	100	0:0:2	2
5.	CH521	*Project Training & Evaluation	Core	00	00	00	00	00	00	300	300	10	10
			Total	06	02	04	80	40	120	480	600	20	20

CT= Class Test, TA= Teacher's Assessment, ESE= End Semester Examination; Sessional=CT+TA; Subject Total=Sessional+ESE;

Total Credit=24+24+24+20=92

* The Evaluation Scheme for the Project Training:											
Course Title	Course Code	Dissertation	Presentation	Viva/Discussion	Total						
Industrial Training & Project Evaluation	CH512	200	50	50	300						

## <u>SYLLABI</u> <u>SEMESTER – I</u>

1. Nam	L. Name of the Department: Chemistry											
2. Cou	rse Name	PHYSICAL CHEMISTRY		L		Т			Р			
3. Cou	rse Code	CH401		3		1			0			
4. Type	e of Course (use tick	mark)		Core	e ()	DE (	)		FC ( √	)		
5. Pre-	requisite (if any)	B.Sc. with Chemistry	6. Frequency (use tick marks) Even ()	Odd	( <b>√</b> )	Either 9	Sem()	E	verv Se	em ( )		
7. Tota	I Number of Lecture	es. Tutorials. Practicals			<u> </u>					( )		
711000	lectu	ires = 30	Tutorials = 10			Practica	l = Nil					
0.001						· · · · · · · · ·				. 6		
8. COU	a from Chomistry to	history information tachnology	course is to impart basic and fundamental knowled	uge of privs	ical chen	he course t	ppilea li	n almo	st all th	e neids		
Startin	foundation to take u	biology, information technolo	by as well as the engineering. After the successit	iny complet		ne course, i	ne stud	ients a	re prov	lueu a		
sound		p Ph.D. course in the luture.										
9. COUI	RSE OUTCOIVIES (CO)	): completion learners will develo	an fallowing attributory									
			op jonowing attributes.									
COOR												
	01	Students would analyze the id	ealized version of a gas, a perfect gas and shows ho	w its equat	ion of sta	ates may be	assemb	bled ex	perime	ntally.		
	02	Students would able to develo	p the concept of conservation of energy; assess the	e energy cha	anges du	ring physica	i and cr	iemical	proces	ss.		
	603	Students would differentiate b	petween spontaneous and non-spontaneous proces	s and unde	rstand h	ow Gibbs fre	e energ	gy is rel	ated to	)		
		maximum non-expansion wor	K.									
	CO4	Students would explore the ra	te of chemical reactions and analyzed how rate of a	a chemical r	eaction i	s varying wi	th chan	ge of c	oncent	ration,		
		pressure and temperature.			0 11							
	CO5	Students would develop the co	oncept of photochemistry and get inside of Lamber	t-Beer Law,	Grothus	– Drapper I	aw, Sta	rk – Eir	istein la	aw,		
		quantum Efficiency and its det	ermination.									
10. Un	it wise detailed cont	tent										
Unit-1		Number of lectures = 08	Title of the unit: Properties of Gases									
The state	es of gases, gases lav	vs and deviation from ideal bel	navior, Vander Waals equation of state; Critical Phe	nomena: P\	V isother	ms of real g	ases, co	ontinuit	y of sta	ites,		
the isoth	nerms of van der Wa	als equation, relationship betw	een critical constants and vander Waals constants,	the law of o	correspo	nding states	, reduce	ed equ	ation o	fstate.		
Qualitat	ive discussion of the	Maxwell's distribution of mole	cular velocities, collision number, means free path	and collisio	n diamet	er.						
Unit-2		Number of lectures =08	Title of the unit: Classical Thermodynamics									
System a	& surroundings, inte	nsive and extensive properties	s, State and path functions and their differentials,	Thermodyn	iamic pro	ocesses, cor	ncept of	heat a	and wo	rk. First		
Law of 1	aw of Thermodynamics; Statement, definition of internal energy and enthalpy, Heat capacity, heat capacities at constant volume and pressure, Joule's law – Joule-											
Thomso	Phomson coefficient and inversion temperature. Second Law of Thermodynamics: Entropy as a state function, entropy as a function of V & T, entropy as a function of P &											
T, entro	py change in physica	l change, clausius inequality, er	ntropy as a criteria of spontaneity and equilibrium,	Equilibrium	change	in ideal gase	es and m	nixing c	of gases	i,		
Maxwell	's relations.											
Unit-3		Number of lectures = 08	Title of the unit: Entropy and Free energy									
Gibbs fu	nction (G) and Helm	hotz function (A) as thermodyn	amic quantities, A & G as criteria for thermodynam	ic equilibriu	um and s	pontaneity,	their ac	dvantag	ge over			
entropy	change,VariationofG	and A with P, Vand T. Nerns the att	heorem, statement and concept of residual entropy. Ch	nemicalPote	entialand	partialm ola	rprope	rties:				
Gibbs-D	uhem equation, cond	cept of fugacity and its determi	nation.									
Unit-4		Number of lectures = 08	Title of the unit: Chemical Kinetics									
Rate of a	a reaction, factors inf	fluencing the rate of a reaction	; mathematical characteristics of simple chemical re	eactions – z	ero orde	r, first orde	r, secon	d orde	r, pseud	do		
order,ha	lflifeandmeanlife,De	eterminationoftheorderofreacti	on-differentialmethod, methodofintegration, me	odofhalflife	periodar	ndisolationm	nethod.		-			
Radioact	tive decayas a first o	rder phenomenon, Theories of	chemical kinetics: effect of temperature on rate of	reaction, A	rrhenius	equation, c	oncept	of activ	ation e	energy.		
Unit-5		Number of lectures = 08	Title of the unit: Photochemistry									
Interacti	on of radiation with	matter, difference between t	hermal and photochemical processes. Laws of ph	otochemist	rv: Groth	nus – Drapp	er law.	Stark -	– Einste	ein law.		
Jablonsk	i diagram depicting	various processes occurring i	the excited state. Lambert-Beer Law: quantum	Efficiency a	nd its d	eterminatio	n. Oual	itative	descrip	otion of		
fluoresc	ence, phosphorescer	nce, non- radiative processes (i	nternal conversion, intersystem crossing), photoser	sitized read	ctions – e	energy trans	fer prod	cesses	simple			
example	s), Kinetics of Photo	chemical reaction. (Hydrogen-	Bromine, Hydrogen-Chlorine, Decomposition of Hydrogen-Chlorine, Decomposition of Hydrogen-Chlorine, Decomposition of Hydrogen (1997)	drogen Iodi	de and k	inetics of Di	merizat	ion of A	Anthrac	cene).		
11. CO-F	PO mapping											
00		۸+	tributos	PO1	PO2		PO5	POG	PO7	POS		
	Students would an	aluza the idealized version of a	and a perfect ass and shows how its equation of	101	102	105 104	105	100	107	100		
CO1	statos may bo asso	mbled experimentally	gas, a perfect gas and shows now its equation of	3	2	2	1	3	3	3		
	States may be asse	le te develor the concert of co	near stion of onergy process the energy changes									
CO2	during physical app	le to develop the concept of co	iservation of energy; assess the energy changes	3	2	2	1	2	2	2		
	Ctudents would dif	forentiate between coestance	us and non-spontaneous process and understand									
CO3	bow Gibbs from one	rerentiate between spontaneo	as and non-spontaneous process and understand	3	2	3	1	3	2	3		
					_	-	_	-		_		
CO4	Students would exp	plore the rate of chemical react	cions and analyzed now rate of a chemical reaction	3	2	3	1	3	3	2		
	is varying with that	nge of concentration, pressure			-	-	-	-	-			
CO5	Students would de	velop the concept of photoche	mistry and get inside of Lambert-Beer Law, Grothus	5- 3	2	1	1	3	2	1		
	Drapper law, Stark	– Einstein law, quantum Eπicle	ncy and its determination.		-	-	-	•	-			
	3 S <sup>-</sup>	trong contribution, 2 Average	contribution , 1 Low contribution									
12. Bri	ef description of self	f-learning / E-learning compon	ent									
1. http:	://home.iitk.ac.in/~g	tm/thermodynamics/ui/TOC.h	tm									
2. http:	s://nptel.ac.in/cours	es/115103113/										
3. http:	s://nptel.ac.in/conte	nt/storage2/courses/1221010	01/downloads/lec-27.pdf									
4. http:	://www.cdeep.iitb.a	c.in/webpage_data/nptel/Core	%20Science/Engineering%20Chemistry%201/TOC-	mainM6.htr	n							
5.	https://www.you	tube.com/watch?v=SgTuWj9Tj	80									
13. Boo	ks recommended:											
1.	Physical Chemistr	y, P.W. Atkins,ELBS										
2.	Thermodynamics	<ul> <li>– J. Rajaram and J.C. Kuriacose</li> </ul>	<ul> <li>EducationalPublishers.</li> </ul>									
3.	Quantum Chemis	try – Eyring, Walter,Kinball										
4.	Statistical Physics	(Part I) (Course of Theoretical	Physics Vol. 5) – L.D. London. & E.M. Lefshitz Perga	nion Zpress,	London.							
5.	Principles of Phys	ical Chemistry by Puri, Sharma	andPathan.									

1. Name o	Name of the Department: Chemistry											
2. Course	INORGANIC CHEMISTRY           course Code         CH402					L		Т		Р		
3. Course	Code	CH402				3		1		0		
4. Type of	Course (use ti	ck mark)			(	Core ()	0	DE ( )		FC (√	)	
5. Pre-req	quisite (if any)	B.Sc. with Chemistry	6. Frequency (use tick marks)	Even ()	0	dd ( √ )	Eithe	r Sem ( )	E	very Se	m ( )	
7. Total N	umber of Lect	ures, Tutorials, Practicals										
Lectures =	= 30		Tutorials = 10		Practica	al = Nil						
8. COURSE	E OBJECTIVES:	The purpose of this course is	to develop the deep understanding of	general charact	teristic p	properties of	of transitio	n eleme	nts, nor	nenclat	ure and	
isomerism	in coordinatio	on compounds, organometallic	chemistry of transition elements, bioi	norganic chemi	stry and	d process in	human ai	nd to gair	i the kn	owledge	e of	
basics of ir	nstrumental sp	ectroscopic techniques.										
9. COURS	E OUTCOMES	(CO):										
After the su	ICCESSFUL COURS	e completion, learners will de	velop following attributes:									
		Students will be able to under	AI	inibules	fundam	ontal with (		AOT and	its wide	sproad		
c	01	applications.	stand the approaches to the developin		iunuam				its wide	spieau		
		Students will have a firm four	dation in the IUPAC nomenclatures of	the complexes	and und	derstand te	chnical lite	erature re	elated t	o the		
C	:02	discipline.		·								
		Students will be able to know	about the key concepts of inorganic ar	nd organometa	llic cher	nistry inclu	ding those	related t	o synth	iesis, rea	action	
C	.03	chemistry, and structure and	bonding.									
	-04	Students will be able to under	rstand the metal component in protein	structure and	molecul	ar modelin	g, includin	g the use	of the	comput	er	
	.04	program. Transport mechanis	ms across cell membranes.							<u> </u>		
c	:05	Students will be able to under	rstand the basic and advanced instrum	ental technique	es used	in inorganic	synthesis	including	3 spectr	oscopic	and	
10 Unit w	Unit wise detailed content											
Unit-1	1         Number of lectures = 08         Title of the unit: Coordination Compounds											
General cha	racteristic pro	perties of transition elements.	Werner's theory. Effective atomic nun	ber. Shapes of	d orbit	als. Bondin	z in transi	tion meta	al comp	lexes: V	alence	
bond theory	y, Crystal field	theory; Octahedral complexes	, effects of crystal field splitting, tetrah	edral distortion	of octa	hedral com	plexes (Ja	hn-Teller		,		
Distortion),	Square planar	arrangements, tetrahedral co	mplexes, chelates, magnetism, Molecu	lar orbital theo	ry.							
Unit-2		Number of lectures =08	Title of the unit: Nomenclature And	Isomerism In (	Coordin	ation Comp	ounds					
Nomenclatu	ure of co-ordin	ation compounds, isomerism i	n coordination compounds; Polymeriza	ation, Ionizatior	n, Hydra	ite, Linkage	Coordina	tion, Coc	ordi nati	ion posi	tion	
isomerism.	Stereoisomeris	sm; Geometrical and optical is	omerism. Metal carbonyls, metal cluste	ers and sandwid	ch comp	ounds.						
Unit-3		Number of lectures = 08	Title of the unit: Organometallic Ch	emistry Of Trar	nsition E	lements						
Ligand hapt	icity, electron	count for different types of or	ganometallic compounds, 18 and 16 el	ectron rule exce	eptions,	synthesis,	structure	and bond	ling, org	ganome	tallic	
reagents in	organic synthe	sis and in homogeneous catal	ytic reactions (Hydrogenation, hydrofo	rmylation, isom	nerisatio	on and poly	merisation	1).				
Unit-4		Number of lectures = 08	If the of the unit: Bioinorganic Chem	istry	•:	:						
Biomorganic	c chemistry: pr	iotosystems, porphyrins, meta	incenzymes, oxygen transport, electro		uons; n	itrogen fixa	tion, meta	ii comple	xes in n	neuicine	:.	
Unit-5		Number of lectures = 08	Title of the unit: Characterization O	Inorganic Con	npound	s	· .	<u> </u>				
Characteriza	ation of inorga	nic compounds by IR, Raman,	NMR, EPR, Mossbauer, UV-Vis, NQR, N	IS, electron spe	ectrosco	py and mic	oscopic t	echnique	s			
11. CO-PO n	mapping											
COs			Attributes		PO1	PO2 PO	3 PO4	PO5	P06	P07	PO8	
CO1	Students will	be able to understand the app	proaches to the development of d block	< Comparison of the second sec	3	1 1		2	1			
	fundamental	with CFT/VBT/MOT and its wi	de spread applications.									
CO2	Students will	have a firm foundation in the	IUPAC nomenclatures of the complexe	s and	3	2 1		2	2			
			ne discipline.									
CO3	Students will	be able to know about the key	concepts of inorganic and organomet	allic	3	2 2		2	2			
	Chemistry inc	he able to understand the me	tal component in protoin structure a	na bonaing.								
604	modeling inc	Juding the use of the compute	ar program and transport mechanisms		3	2 2		2	2		1	
04	membranes.	adding the use of the compute				-   -		-	-			
	Students will	be able to understand the bas	ic and advanced instrumental techniqu	ies used in								
CO5	inorganic syn	thesis including spectroscopic	and analytical techniques for identification	ition and	3	2 1		2	2			
	characterizat	ion of complex molecules.										
		3 Stro	ng contribution, 2 Average contributio	on , 1 Low conti	ribution	1						
12. Brief d	lescription of s	self-learning / E-learning com	ponent									
1. https:/	//freevideolect	cures.com/course/3412/co-or	dination-chemistry									
2. http://	/www.chem.uw //potal.ac.in/or	vimona.edu.jm/courses/IC10K	iso.pdf									
<ol> <li>nttps://</li> <li>https:////integrationalized.com/linearized.com</li></ol>	//nptel.ac.in/co	Durses/104101091/										
5. http	s://nptel.ac.in/	/content/storage2/nptel data	3/html/mhrd/ict/text/104106074/lec2	4.pdf								
13. Books	recommended	l:										
1. F. Alb	oert Cotton, Ge	offery Wilkinson, Carlos A. Mu	urillo and Manfred Bochmann. Advance	d Inorganic che	emistry,	Sixth editio	n, Wiley	ndia Pvt.l	td.			
2. J. D. L	Lee, Concise In	organic Chemistry, Fifth editio	n, Wiley India Pvt.Ltd.									
3. JHHu	uheey, Inorgan	ic Chemisry - Principles, struct	ture and reactivity, Harper and Row Pu	blisher, Inc. Nev	w York(2	1972).						

1. Name of	the Departme	nt: Chemistry				<b>_</b>						
2. Course Na	ame		L			т		Р				
3. Course Co	ode	CH403		3			1		0			
4. Type of C	ourse (use tic	k mark)			Core (	)	DE	:()		FC (√	)	
5 Pre-requi	isite (if any)	B Sc with Chemistry	6 Frequency (use tick marks)	Even ()	bbO	<b>)</b>	Fithe	()	F	verv Se	, em ()	
7 Total Nur	where of least up	D.St. With Chemistry	o. Trequency (use tick marks)	LVen ()	Ouu	v)	Little	Jenn ()		very Je	()	
7. Total Nur	mber of Lectur	es, lutoriais, Practicais										
Lectures = 3	30		Tutorials = 10		Practical = N	11						
8. COURSE 0	OBJECTIVES: S shift and mini	tudents will be able to gain know mize environmental pollution th	rledge of Generation, stability and rough without use of solvents co	reactivity of in incepts of ster	termediates, eochemistry	Name r of acycl	eactions. ic & cycli	pericycli ic compo	c react ounds, s	ions, co stereo (	ncerted chemica	
properties a	and their applic	cations.										
9. COURSE	OUTCOMES (	CO):										
After the succ	cessful course	completion, learners will develop	o following attributes:									
COURSE OUT	COME (CO)		A	TTRIBUTES								
C	201	Analyze and compare reactivity	and stability of carbocations, carb	anions, free rac	licals, carben	es, nitre	nes and b	penzynes	and ac	dition		
0	:02	Comprehension of types of Orga	anic reaction mechanisms involving	g elimination ar	nd substitutio	on reacti	ons with	electropl	hilic,			
		nucleophilic or radical species.	- <b>C</b> N I	•								
C	.03	Able to evaluate different types	of Name reactions and its mechar	iism.								
C	:04	Know about Pericyclic reactions, rearrangement.	, types of Pericyclic reactions, ster	eochemistry, th	ermal and pl	notoche	nical cycl	lisation, (	Cope ar	nd Clais	en	
C	:05	Understand the Principles of ste stereogenicity, stereoselectivity,	reochemistry, Configurational and , enantioselectivity and diastereos	conformationa electivity.	al isomerism	in acycli	c and cyc	lic compo	ounds,			
10. Unit wis	se detailed cor	itent										
Unit-1		Number of lectures = 08	Title of the unit: Reactive inter	mediates								
Generation, s	tability and realist	activity of carbocations, carbanio	ns, free radicals, carbenes, nitrene	s and benzynes	a. Organic rea	iction m	echanism	is involvi	ng addi	tion rea	actions	
Unit 2			Title of the unit. Depatien most	and and and Ma		_						
Unit-2		Number of lectures =08	Title of the unit: Reaction mech	anisms and Na	me reaction	S						
Organic react	ction mechanisms; involving, elimination and substitution reactions with electrophilic, nucleophilic or radical species. Neighbouring group participation,											
elimination: E	E2 vs E1, elimination vs substitution. Aldol condensation, Cannizzaro reaction, Hofmann, Beckmann and Fries rearrangements, Reimer-Tiemann reaction.											
Unit-3		Number of lectures = 08	Title of the unit: Name reaction	S								
Reformatsky a Meerwein-Po	and Grignard r onndorf Verley	eactions, Michael addition, Fried reduction and birch reduction, hy	el-Crafts reaction, Witting reactior droboration-oxidation, oxymercu	, Oppenaur oxi ration and deo	dation, Clem symercuration	mensen n.	reductio	n, Wolff-	Kishnei	r reduct	ion,	
Unit-4		Number of lectures = 08	Title of the unit: Pericyclic. Elec	trocyclic. Cyclo	addition rea	ctions a	nd Sigma	tropic re	arrange	ements		
Pericyclic read	ctions: Introdu	ction, $\pi$ molecular orbital of ethy	lene and 1.3-butadiene. Electrocy	lic reactions: lu	ntroduction.	stereoch	emistry f	or the ri	ng oper	ning and	d ring	
closing oloctr	ocyclic roactio	ns, thormal and photochomical of	clication of $(4n)$ and $(4n+2)$ system	o Cycloadditio	n roactions: I	ntroduc	ion Thor	mal and	nhotocl	homical	1	
closing electro						ntiouuc	.1011, 11101	illai allu	μποτοτι	lienncai	·	
induced (2+2)	) and (4+2) cyc	loaddition reactions. Sigmatropic	rearrangements: Introduction, cla	ssification, Cop	e and Claise	n rearrai	igement.	•				
Unit-5		Number of lectures = 08	Title of the unit: Principles of st	ereochemistry								
Configuration	al and conforr	national isomerism in acyclic and	cyclic compounds; stereogenicity,	stereoselectivi	ty, enantiose	lectivity	and dias	tereosele	ectivity.			
11. CO-PO ma	apping											
0		Δttri	hutes		PO1 PO	PO3	PO4	PO5	POG	PO7	POS	
003				P I.	101 102	. 105	104	105	100	107	100	
CO1	Analyze and c carbenes, nit radicalspecies	compare reactivity and stability of renes and benzynes and additic 5.	n reactions, carbanions, free raises of the reactions with electrophilic, no	ucleophilic or	3 1	2	1		2	2	2	
	Comprehensi	on of types of Organic reaction m	echanisms involving elimination a	nd		-						
CO2	substitution r	eactions with electrophilic, nucle	ophilic or radicalspecies		3 1	2	1		2	2	2	
	Substitution		oprime of rudicuspecies.			_			-	-		
CO3	Able to evaluate	ate different types of Name react	ions and its mechanism.		3 1	2	1		2	2	2	
CO4	KnowaboutPe emical cyclisa	ricyclicreactions, types of Pericyclicre tion, Cope and Claisen rearrange	eactions, stere och em istry, thermalan ment.	dphotoch	3 1	2	1		3	3	2	
	Understand +	he Principles of storoochomistry	Configurational and conformation	al isomorism								
	in accelia and	avalia associate at a star a sta		di isoniensin		-			-	-		
CO5	in acyclic and	cyclic compounds, stereogenicity	, stereoselectivity, enantioselectiv	ity and	3 1	2	1		2	2	2	
	diastereosele	ctivity.										
		3 Strong o	contribution, 2 Average contribut	on , 1 Low con	tribution							
12. Brief de	scription of se	If-learning / E-learning compone	nt									
1 https://u	nntel ac in/cou	urses/104105104/										
2 https://i	nptel.ac.in/cou	rses/104101005/										
3. https://	notel ac in/cou	urses/104103023/										
4 https://u	nntel ac in/cou	rses/104106077/										
5. https://	//nptel.ac.in/c	content/storage2/courses/104102	3071/pdf/mod8.pdf									
13. Books rec	commended		71 7 FFF									
1 01						(iles 1st		Dublinet				
1. Advance	ed Organic Che	emistry (Reactions, Mechanisms a	the Structure): Michel B. Smith and	Jerry March, 4	full Edition, V	viley Inte	erscience	rublicati	on.			
2. A Guide	Charriet	Packart Thornton Manistry by Pe	eter sykes, six edition, Pearsonpub	hottochering C	ou on the sector	De De c	opentit	otica				
5. Organic	Chemistry by	Robert Inornton Morrison, Robe	nt ivelison Boyd, and Salbai Kanti B	nattacharjee, S	eventh ealtic	m, Pears	onpublic	ation.				
4. Organic	Chemistry by	Jonathan Clayden, Nick Greeves,	and Stuart warren, Second editio	n, OxfordPublic	ation.							
5. Organic	nic Chemistry by T.W.Graham Solomons, and Craig B. Fryhle, Ninth edition, WileyPublication.											

1. Name of the	e Department: C	hemistry									
2. Course Nam	Irse Name ENVIRONMENTAL CHEMISTRY Irse Code CH404						Т			Р	
3. Course Code	2	CH404			3			1		0	
4. Type of Cou	rse (use tick ma	rk)		C	ore ( √ )	)	DE	=()		FC ( )	
5. Pre-requisit	e (if any)	B.Sc. with Chemistry	6. Frequency (use tick marks) Even ()	C	Odd ( √ )		Either	Sem ( )	Ev	very Ser	n()
7. Total Numb	er of Lectures, T	utorials, Practicals									
Lectures = 30			Tutorials = 10	Practic	cal = Nil						
8. COURSE OB	JECTIVES: The m	ain objectives of this course	e is to study various types of pollutants, their sou	irces, eff	fects on	living	and non	living s	pecies	and rela	ated
control measu	res.										
9. COURSE OU	TCOMES (CO):		<b>. .</b>								
After the succes	sful course com	pletion, learners will develo	p following attributes:								
COURSE OUTCO	ME (CO)		ATTRIBUTES								
co	L Ev	valuate different types of air arming, Green House Effect	pollutants, their harmful effects on living and n and Ozone Layer Depletion.	on living	species	s, their	control	measur	es; Stu	dy of Gl	obal
coa	2 Ar	nalyze the various factors of ater treatment processes.	water quality assessment parameters, water po	ollutants	and the	eir sour	ces and	differe	nt type:	s of was	te
CO	<b>3</b> Ui	nderstand the importance o	f soil composition; Analyze various types of soil	pollutan	ts, their	r contro	ol and re	elated st	tandard	s.	
CO4	1 Ev	valuate the various types of	waste and their toxicity aspects and manageme	nt.							
CO	5 Ui	nderstand the sources of he	avy metals and their health hazards								
10. Unit wise o	letailed content										
Unit-1	1	lumber of lectures = 08	Title of the unit: Air pollutants								
CO, CO2, ozone, pollutants, inter	CFC, & NOx, ozo national and nat	one depletion, global warminional standards.	ng, Harmful effects of pollutants on living and no	on-living	species	s, Analy	/tical me	ethods f	or mon	itoring	air
Unit-2	nit-2 Number of lectures =08 Title of the unit: Physical, chemical and biological water quality parameters										
Physical, chemic	ical, chemical and biological water quality parameters; their assessment; Water pollution; water pollutants; toxicity aspects; international and national standards;										
control; Water s	ampling techniq	ues; Water treatment proce	esses: aeration, solid purification, nanofiltration,	chemica	al treatr	nents,	reverses	s osmos	is, desa	linatior	า.
Waste water tre	atment processe	es. Water table maintenance	e & harvesting methods.								
Unit-3	1	lumber of lectures = 08	Title of the unit: Composition of soil								
Inorganic and or aspects; interna	ganic componer tional and natior	nts, micro and macronutrien nal standards; control.	ts; Soil pollution; Fertilizers, insecticides, pestici	des, plas	stics, to	xic met	als, dye:	s, surfa	ctants;	toxicity	
Unit-4	Γ	lumber of lectures = 08	Title of the unit: Industrial waste								
Toxic aspects, m	anagement and	disposal; Radioactive, muni	cipal, agricultural and biomedical waste – toxici	y hazaro	ds. Bhop	oal gas	tragedy	, Cherno	obyl dis	aster.	
Unit-5		Number of lectures = 08	Title of the unit: Heavy metal in the environr	nent							
Sources of heav	y metals; Poison	ing of heavy metals in every	bite; Mercury, Copper, Chromium, Cadmium, C	obalt, Le	ead, Ars	enic.					
11. CO-PO map	oing										
COs		Attribut	tes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C01	Evaluate different species, their co	ent types of air pollutants, ontrol measures; Study of G	their harmful effects on living and non living Global Warming, Green House Effect and Ozone	3	2	3	3	3	3	3	2
CO2	LayerDepletion Analyze the var	ious factors of water quality	y assessment parameters, water pollutants and	3	2	3	3	3	3	3	2
СОЗ	their sources ar Understand the	importance of soil composi	water treatmentprocesses. ition; Analyze various types of soil pollutants	3	1	3	3	3	3	3	3
<u> </u>	their control an	d relatedstandards.	air toxicity aspects and management	2	2	2	2	2	2	2	2
C04	Understand the	sources of heavy metals an	ind their health hazards.	3	2	3	3	2	3	3	2
	3 Strong contribution 2 Average contribution 1 Low contribution										
12. Brief descr	intion of self-lea	arning / F-learning compone	ent								
1 https://ppte	Lac in/content/s	storage2/courses/10510208	89/air%20pollution%20(Civil)/Module-1/2 htm								_
2. https://www	v.youtube.com/v	watch?v=xw9FPlq0sJ8									
3. https://wwv	v.youtube.com/v	watch?v=7kizaNBowrw									
4. https://www	v.youtube.com/v	watch?v=dnQjYXXX17A									
5. https	://www.ukessay	vs.com/essays/environment	al-sciences/the-issue-of-heavy-metals-contamin	ation-er	nvironm	iental-s	ciences	-essay.p	hp		
13. BOOKS reco	ommended:	inter Manahar, Charles 5, 20									
1. Envir	Concepts of En	vironmental Chemistry Deel	JU4, Taylor & Francislia.								
3. Envir	onmental Chem	istry: A Global Perspective.	Gary W. Vanloon Stephen J. Duffy . Oxford Univ	Pr(Sd).							
4. Intro	Introduction To Environmental Chemistry, Reid, Brian J. Blackwell ScienceLtd.										
5. Chen	Introduction To Environmental Chemistry, Reid, Brian J. Blackwell ScienceLtd. Chemistry of the Environment, Thomas G. Spiro, William M. Stigliani, 2nd Edition, Prentice Hallpublication.										

1.Name	.Name of the Department: Chemistry .Course Name MODERN ANALYTICAL TECHNIQUES L T P												
2.Cours	2.Course Name         MODERN ANALYTICAL TECHNIQUES         L         T         P           2. Course Code												
3.Cours	e Code	CH405				3			1		0		
4.Type of	of Course (use tick n	nark)			Co	ore( √ )		DE	()		FC( )	)	
5.Pre	-requisite(if any)	B.Sc. with Chemistry	6.Frequency (use tick marks)	Even ( )	0	dd (√ )	E	Either S	iem ( )	E١	/erySe	m( )	
7.Total	Number of Lectures	, Tutorials, Practicals											
Lectures	s=30		Tutorials=10		Prac	tical=N	il						
8. COUF spectror	RSE OBJECTIVES: The metry. Make the stu	e course aims at providing dents able to interpret an	knowledge of principles and instru d assign spectroscopic data as a too	mentations of UV, IR, NMR, A I for structural elucidation.	tomic	absorp	otion sp	pectros	copy an	d Mas	SS		
9. COUR	SE OUTCOMES (CO)	:											
After the	successful course co	ompletion, learners will de	evelop following attributes:										
COURS	E OUTCOME (CO)			ATTRIBUTES									
	CO1	Explain the effect of conju spectroscopy as a qualitat absorption of organic com	gation, solvent polarity and non-bc ive and quantitative method. Appli apounds.	nding electrons on a UV/Vis cation of correct Woodward-	absorı Fieser	otion sp rules t	oectrur o calcu	n. Eval Ilate w	uate the aveleng	e utilit th of r	y of U\ naximi	J/Vis um	
	CO2	Comprehension of factors acids, anhydrides, interpre	affecting vibrational, frequencies, set and assign IR spectroscopic data	vibrational frequencies of car as a tool for structural elucid	bonyl ation.	compo	ounds (	ketone	es, aldeh	ydes,	esters	,	
	CO3	Argue how nuclear spins Identify the number of pr spectrum of a compound spectrum to specific proto	are affected by a magnetic field, and oton and carbon NMR signals expo- given its structure, to assign peaks work and carbons in a compound.	nd be able to explain what h ected from a compound give with the aid of a chart of che	appen en its s mical s	is wher structur shifts fr	n radio re, spli om 1H	freque tting p and 13	ncy radi attern ir 3C NMR	ation n the in an	is abso proton NMR	orbed. 1 NMR	
	CO4	Become familiar with the spectrometer and functio mass spectra	mass spectrometric technique, diffens of each. Application of a mass sp	erent types of ionization tech ectrometric technique, distir	nique: Iguish	s and sl fragme	ketch c entatio	compor n meth	nents of Iods. Int	a mas erpret	ss tation	of	
	CO5	Comprehension of princip	le, instrumentation, interferences a	and Sample preparation, App	licatio	ns of A	AS						
10.Unit	wisedetailedconten	t											
Unit-1		Number of lectures=08	Title of the unit: UV Spectros	сору									
Wave-like	e propagation of ligh	t, absorption of electroma	ignetic radiation by organic molecu	les allowed and forbidden tra	nsitio	ns, inst	rumen	itation,	effect c	of solv	ents o	n	
electronic	sectronic transitions, formation and designation of absorption bands, conjugated systems and transition energies, unsaturated carbonyl compounds, dienes and njugated polyenes, Woodward – Fieser rules												
Linit-2	Jnit-2 Number of lectures= 08 Title of the unit: IR Spectroscopy												
Introducti	roduction, absorption in the infrared region, theory of infrared spectroscopy, instrumentation, molecular vibrations, calculation of vibrational frequencies, factors												
affecting	fecting vibrational frequencies, characteristic absorptions in common classes of compounds, fingerprint region, characteristic vibrational frequencies of alkanes, alkenes,												
alkynes, a	aromatic compounds	s, alcohols, ether, phenols	and amines. Detailed study of vibra	tional frequencies of carbon	yl com	pound	s (keto	nes, al	dehydes	s, este	rs, acio	ds,	
anhydride	es), applications of ir	nfrared spectroscopy.											
Unit-3		Number of lectures=08	Title of the unit: NMR Spectro	oscopy									
Introducti	ion, theory of NMR	spectroscopy, Instrumenta	ition, chemical shift, equivalent and	nonequivalent protons, s pi	n-spin	splittin	ig, vicir	nal cou	pling an	d ster	eostru	cture,	
proton ex	change reactions, n	uclear overhauser effect (I	NOE), shift reagents, principle of C-2	13 NMR spectroscopy, Relaxa	ation a	nd dyn	amic p	rocess	es - Spin	lattic	e relax	ation	
(11) and 3	spin - spin relaxation	Number of loctures-08	Title of the unit: Mass Spectra	metry									
Introducti	ion hasic theory ins	strumentation important	useful terms in mass spectrometry	various modes of ionization		ED and	I FAR)	and th	eir annli	cation	15		
fragment	ation patterns of var	rious functional groups (al	kanes. alkenes. alkvnes. alcohols. et	her, phenols, amines, ketone	es. ald	ehvdes	. esters	s. acids	and anl	hvdrid	les).		
molecular	r ion peak, metastab	ole peak, Mclafferty rearra	ngements, Nitrogen rule.	· · · · · · · · · · · · · · · · · · ·				,			//		
Unit-5		Number of lectures=08	Title of the unit: Atomic Abso	rption									
Spectroph	hotometry: Introduc	tion, Principle, Instrument	ation, Interferences- Spectral, Ioniz	ation, Physical and Refractor	y com	pound	format	tion, Sa	mple pr	epara	ition,		
Internal s	tandard and standar	rd addition calibration and	applications of AAS.										
11. CO-PC	D mapping		Attuibut on		<b>DO1</b>	<b>DO</b> 2	<b>DO3</b>	<b>DO</b> 4	DOL	DOC	007	000	
COS	Explain the effect of	f conjugation solvent not	Attributes	a LIV/Vis absorption	104	PUZ	PU3	P04	P05	PU6	PU/	PU8	
CO1	spectrum. Evaluate of correct Woodwa	the utility of UV/Vis spect rd-Fieser rules to calculate	roscopy as a qualitative and quantit wavelength of maximum absorptic	a covy vis absorption tative method. Application on of organic compounds.	3	2	1	1		3	2	2	
CO2	Comprehension of f (ketones, aldehydes structural elucidation	factors affecting vibration s, esters, acids, anhydrides on.	al, frequencies, vibrational frequences, interpret and assign IR spectrosco	cies of carbonyl compounds pic data as a tool for	3	2	1	1		3	2	2	
	Argue how nuclear radiofrequency rad	r spins are affected by a iation is absorbed. Identify	magnetic field, and be able to e the number of proton and carbon	xplain what happens when NMR signals expected from									
CO3	a compound given	its structure, splitting pa	ttern in the proton NMR spectru	m of a compound given its	3	2	1	1		3	2	2	
	structure, to assign	peaks with the aid of a ch	art of chemical shifts from 1H and 1	.3C NMR in an NMR									
	spectrum to specific	c protons and carbons in a	compound.										
CO4	components of a m distinguish fragmen	ass spectrometer and fund ntation methods. Interpret	ctions of each. Application of a mass ation of mass spectra	s spectrometric technique,	3	2	1	1		3	2	2	
CO5	Comprehension of	principle, instrumentation	, interferences and Sample prepara	tion, Applications of AAS	3	2	2	2	1	3	2	2	
		3 S	trong contribution, 2 Average cont	ribution , 1 Low contributior	1								
12.Brief	description of self-	learning /E-learning comp	oonent										
1. http	s://www.youtube.c	om/watch?v=tbUx-RaZS7I	M										
2. http 3 http	s://nptel.ac.in/cours	ses/103108139/ ses/104108078/											
4. http	s://nptel.ac.in/cour	ses/102101050/											
5. http	s://www.youtube.c	om/watch?v=xOKoVOMKI	HN8										
13. Boo	ks recommended:												
1. Intro	oduction to spectros	scopy: Pavia, Lampman &	Kriz, 3rd Ed, Books/cole.										
2. Spec	ctroscopic methods	in organic chemistry: H. W	/illiams and Ian fleminig, V EditionTa	ata Mc Grawhills									
4. Fun	damentals of Analyt	ical chemistry, Douglas A.	Faigrave publications. Skoog, Donald M. West, F. James Ho	oller, 7th edition, Harcourt co	ollege	publica	tions.						

4. Fundamentals of Analytical chemistry, Douglas A. Skoog, Donald M. West, F. James Holler, 7th edition, Harcourt college publications.

1. Name of the De	lame of the Department: Chemistry ourse Name CHEMISTRY LAB PRACTICAL-1 L T P												
2. Course Name		CHEMISTRY LAB PRACTICAL	-1		L			т		Р			
3. Course Code		CH419			0			0		8			
4. Type of Course	(use tick mark)				Core (	√)	[	DE ( )		FC (	)		
5. Pre-requisite (if	fany)	B.Sc. with Chemistry	6. Frequency (use tick marks) Even	()	Odd (	√)	Eith	er Sem (	)	Every S	iem ( )		
7. Total Number o	f Lectures, Tuto	orials, Practicals											
Lectures = 00			Tutorials = 00	Practi	cal = 08								
8. COURSE OBJECT	IVES: To develo	op practical and technical skill	s for better understanding of theory. To dev	elop tran	sferrabl	e skills a	ind enha	ancing co	ommuni	ication s	skills of		
students.													
9. COURSE OUTCO	MES (CO):	tion learners will develop fol	llowing attributes:										
COURSE OUTCOME	(CO)	ion, learners will develop joi	ATTRIBUT	FS									
CO1	(00)	Perform accurate and precise	e analysis in the field of industrial chemistry										
(02		Able to examine water qualit	ty parameters (DO, COD, BOD and TDS) and	arguo ah		ar qualit							
C02		Explain the principles of chro	matographic techniques LIV spectroscopy a	angue abo	ity mea	sureme	y. ntc						
CO4		Organize the records of all n	erformed experiments in the manner which		d in lab	oratory	11.5.						
CO4		Analyze the importance of p	erronal safety and care of equipments and c	homicals		oratory.							
10 List of ovnorimo	ntc			Tiernicais									
10. List of experime	ints	ful a state of the											
1. To determine the	percentage con	nposition of the given mixture	e consisting of two liquids A and B by viscosi	tymethod	1.								
2. To determine the	relative surface	tension of a liquid bystalagn	ometer.										
4. Soloctivo oxtractic	n of iron motal	int of non-volatile solute cryst	copically using water assorvent.	sportivor	oncontr	ration							
5 Paper chromatog	ranhy senaratio	n of metalion	and magnesium for determination of their re	spectived	Juncenti	ation.							
6 Determination of	conner and nick	kel in the givensamnle											
7 Separation of ami	. Separation of amino acid by thinlayerchromatography.												
8. Separation of mix	Separation of amino acid by thinlayerchromatography. Separation of mixture of carbohydrate by thin layerchromatography.												
9. Separation of mi	xture of dyes by	y columnchromatography.	, - P										
10. Oxime and 2, 4 c	linitrophenylhy	drazone ofaldehyde/ketone.											
11. Determination o	f Dissolved Oxy	gen (D.O.) in the given waters	sample.										
12. Determination o	f Conductivity o	of the watersample.											
13. Determination o	f Total Dissolve	d Solid (T.D.S.) in the given wa	atersample.										
14. Determination o	f concentration	of KMnO4 by UV-VisibleSpec	ctrophotometer.										
15. Determination o	f iron content ir	n the given water sample by L	JV-VisibleSpectrophotometer.										
16. Determination o	f Chlorophyll in	olive oil by UV-Visible Spectre	oscopy.										
17. Separation of pla	ant pigment fro	m green leaves by columnchr	omatography.										
11. CO-PO mapping													
COs		Attri	ibutes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	Perform accura	ate and precise analysis in the	e field of industrial chemistry.	3	2	2	1	3	3	3	2		
CO2	Able to examir water quality	ne water quality parameters (	DO, COD, BOD and TDS) and argue about	3	2	3	3	3	3	3	2		
CO3	Explain the prin measurements	nciples of chromatographic te 3.	echniques, UV spectroscopy and viscosity	3	2	2	2	3	3	3	2		
CO4	Organize the re laboratory.	ecords of all performed exper	riments in the manner which is required in	3	3	2	2	3	1	3	2		
CO5	Analyze the im	portance of personal safety a	and care of equipments and chemicals.	3	1	2	2	3	3	3	2		
	3 Strong	contribution, 2 Average cont	ribution , 1 Low contribution										
12. Brief description	of self-learnin	ig / E-learning component							. ,				
1. https://w	/ww.fondriest.c	om/environmental-measurer	nents/measurements/measuring-water-qua	lity/disso	lved-ox	ygen-sei	nsors-an	d-metho	ods/				
3. https://w	/ww.voutube.co	om/watch?v=8wmQ_xWqZbo											
4. https://w	/ww.youtube.co	om/watch?v=kXI_Om-2XYk											
5. https://w	/ww.youtube.co	om/watch?v=YBeZZwNSeb8											
7. https://w	/ww.youtube.cc /ww.voutube.cc	om/watch?v=V16USbiKZXw											
13. Books recomme	nded:	,											
1. Advance Practic	al Chemistry: Ja	gdamba Singh, L.D.S Yadav, Ja	aya Singh, I.R. Siddiqui, PragatiEdition.										
2. Practical Organic	c ChemistryA.I.V	/ogel.											
3. Practical Physica	l Chemistry : B.	Viswanathan and P.S.Raghav	van.										
4. Experimental Ind	organic Chemist	try –W.G.Palmer.											

## **SEMESTER-II**

1.Name of	Name of the Department: Chemistry Course Name MODERN INSTRUMENTAL METHODS OF ANALYSIS AND COMPLITATIONAL												
2.Course Na	ame	MODERN INSTRUMENTAL METHODS OF ANALYSIS AND COMPUTATIONAL TECHNIQUESLTPCH408310											
3.Course Co	ode	CH408			3		1		0				
4.Type of C	Course (use tio	k mark)		(	Core(√)		DE( )		FC(	)			
5.Pre-requi	isite (if any)	B.Sc. with Chemistry 6.Frequency (us	se tick marks) Even ( v )		Odd ()	Eithe	er Sem (	)	EveryS	em()			
7.Total Nun	mber of Lectu	res, Tutorials, Practicals											
Lectures=30	0		Tutorials=10	Pract	ical=Nil								
8. COURSE	OBJECTIVES:	This course is designed for postgraduate stude	ents of chemistry and industrial chemistry as a	broad	base introdu	iction to	analytic	cal inst	rument	tation			
techniques	for the meas	urement of different chemical and physical pr	roperties of compounds and materials (compo	sition,	structure, e	.c.). After	succes	sfully	comple	tion of			
course, the		ble understand the working principal and app	dications of various modern analytical techniq	ues as v	well as their	operatio	n.						
After the suc	cessful course	completion. learners will develop following	attributes:										
COURSE OU	TCOME (CO)		ATTRIBUTES							_			
cc	01	Students would able to analyze the data by ap	pplying different type of statistical methods ar	id woul	d also undei	stand th	e differ	ent bet	tween				
		systematic and random errors.	amietry and recognize the electrophomical are		Thou got co	und incia	lo of dif	foront	turne of	c			
CC	02	polarographic and voltammetric methods and	their applications.	cesses.	They got so	una insia	e or ain	rerent	type of				
		Students would develop the concept of therm	nogravimetric analysis, differential analysis and	d differe	ential scanni	ng calori	metry n	nethod	ds and t	heir			
u	03	applications.	2 , ,			5							
	04	Students would restate difference between d	ifferent modes of chromatographic separation	i; apply	knowledge	of qualita	ative an	d quar	ntitative	Ş			
		analysis in various fields of chemical, pharmac	ceutical industry etc.	<u> </u>			<u> </u>						
	05	Students would able to illustrate how the com	nputer and software are used in analytical labo	oratory	and got spri	ngboard	for furt	her stu	idy.				
10.Unit Wis	se detalled co	Number of lost uses 09	Title of the unit. France and Fuel untion										
Definition of	torms moon a	nd median, presidian, standard deviation, rela	ative standard deviation, accuracy, absolute or	ror rol	ativo orror	tupos of	orror in	ovnori	imontal	Idata			
determinate interval estim	(systematic), nation. metho	indeterminate (random) and gross, sources of ds of least squares.	f errors and their effects upon the analytical re	sults, st	tatistical eva	luation c	of data-	norma	l distrib	oution,			
Unit-2	Number of lectures= 08         Title of the unit: Polarographic Techniques and Voltammetry												
Polarography	hy; Theory, Instrumentation and its working; Advantages of using dropping mercury electrode, Derivation of Ilkovic equation, Factors affecting the limiting current,												
The half wave	half wave potential, Criterion of reversibility, Applications of polarography, Square-wave polarography, Differential pulse polarography and cyclic voltammetry showing												
cyclic voltami	metric excitat	ion.											
Unit-3		Number of lectures=08	Title of the unit: Thermal Methods										
Differential s	metric analysi	s, instrumentation and Applications, Different	liai thermai analysis, General principles and ap	mnens	ated DSC in	strumen	ence to r Heat i	polym flux DS	iers; C instru	ument			
and modulate	ed DSC instru	ment, DSC data analysis and applications.	i searning calorineery, instrantenes, rower ee	mpens		, and a second	, near i		e morre	ament			
Unit-4		Number of lectures=08 T	Title of the unit: Chromatography										
Chromatogra	aphic mechani	sm, Classification of chromatography, principl	les, types, techniques of column chromatogra	ohy and	l techniques	of elutio	n, thin '	layer					
chromatogra	phy, Gas chro	matography, Applications of gel permeation a	and ion exchange chromatography. Introduction	on of HP	PLC, instrum	entation,	reverse	e phase	e HPLC,				
industrial app	plications of H	PLC.											
Unit-5	computor au	Number of lectures=08	Itie of the unit: Computer application		norconnol o	omputor		fturar	o nacka				
introduction	disk operat	ng system and windows text processing s	software introduction to a spreadsheet soft	tware	creation of	snreads	s, PC-sc sheet so	oftwar	e crea	tion of			
spreadsheet	applications,	range, formulas, function, data base function	ns in spreadsheets, graphics on spreadsheet,	present	tation graph	ics, creat	ting a p	resent	ation o	n a PC			
data commu	inications, ne	working: Lan & Wans, software system, sof	ftw are development process, file design &	report d	design, Data	files: ty	pes/org	ganizat	ion, m	aster 8			
transaction fi	ile, relevance	of database management systems and integra	ation of applications, basic of data processing,	flow ch	arting, inpu	t-process	- outpu	it analy	/sis, rep	ort			
generation ar	nd label gene	ration.											
11. CO-PO m	lapping	Attributos		DO1			POF	POG	PO7	DOS			
	Students wo	Id able to analyze the data by applying different	ent type of statistical methods and would also	101	102 10.	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	105	100	10/	100			
CO1	understand t	he different between systematic and random	errors.	3	1 1		2	3	2	3			
CO2	Students eva	luate fundamentals of electrochemistry and re-	ecognize the electrochemical processes. They	3	1 1		1	3	2	3			
	Students we	Id develop the concent of thermogravimetric	analysis differential analysis and differential			+			-				
CO3	scanning cal	primetry methods and their applications.	analysis, unterential analysis and unterential	3	1 1		1	3	2	2			
	Students wo	uld restate difference between different mode	es of chromatographic separation; apply										
CO4	knowledge o	f qualitative and quantitative analysis in vario	us fields of chemical, pharmaceutical industry	3	2 1		2	3	1	2			
	etc.												
CO5	Students wo	uld able to illustrate how the computer and so ard for further study.	offware are used in analytical laboratory and	3	2 1		3	3	1	2			
	8p8	3 Strong contributi	ion, 2 Average contribution , 1 Low contribut	ion		_	- 1						
12.Brief des	scription of s	elf-learning /E-learning component											
1. https://	/www.youtub	e.com/watch?v=HEgl0JyX80U											
2. https://	/www.youtub	e.com/watch?v=d1vv7ww8xtA											
3. https://	/www.youtub /pptol.ac.in/	e.com/watch?v=NzbDEjl8lKE	dE odf										
5. https://	/www.voutub	e.com/watch?v=Cu_WeVvOaHI	us.pui										
13. Books r	ecommended	::											
1. Fundam	nentals of Ana	lytical chemistry, Douglas A. Skoog, Donald M	1. West, F. James Holler, 7th edition, Harcourt	college	publications								
2. Principle	les and praction	e of analytical chemistry, F. W. Fifield, D. Keal	ley, 5th edition, Blackwell publication.										
3. Analytic	cal chemistry,	Gary D. Christian, 6th edition, Wiley and sons	publication.										

4. Basic concepts of analytical chemistry, S. M. Kopper, New Age International Publishers.

1. Name o	of the Departme	ent: Cher	nistry											
2. Course	Name	CHEM	ISTRY OF NATURAL PROD	UCTS			L			т		Р		
3. Course	Code	CH4	09				3			1		0		
4. Type of	Course (use tic	k mark)					Core (	/)	C	DE ( )		FC (	)	
5. Pre-req	uisite (if any)		B.Sc. with Chemistry	6. Frequency (use tick marks)	Even (v)		Odd (	)	Eithe	r Sem ( )	1	Every Se	m ( )	
7. Total N	umber of Lectur	res. Tuto	rials. Practicals			-		·					.,	
Lectures =	= 30		,	Tutorials = 10		Prac	tical = N	il						
		Students	gain the knowledge of sec	ondary plant metabolites such as te	ernenoids alka	loids o	arhohvo	Irates A		rid Pent	ides &	Proteins		
steroids. S	Synthesis and me	edicinal	uses of: caffeine, theophyl	line, theobromine and Phytopharma	aceuticals.	10103, 0	unborryc	nuces, r		ciu, i cpi	lucs a	roteins	,	
9. COURSE	FOUTCOMES (C	<u>:0):</u>												
After the su	ccessful course	complet	tion, learners will develop	following attributes:										
COURSE OU	JTCOME (CO)	-		AT	TRIBUTES									
C01		Create t Stereoch	he concept of secondary p nemistry, constitution and	lant metabolites; terpenoids and its synthesis of Citral and Menthol.	s general meth	ods of	structur	e deteri	minatior	n, isoprei	ne rule;	;		
CO2	22 Evaluate the general method of isolation, structure elucidation of alkaloid, specially based on nitrogen heterocyclic ring (Hofmann's exhaustive methylation, Emde's degradation and Von Braun's method).													
CO3	<ul> <li>Analyze general reactions, constitution of glucose &amp; fructose; Conformations of monosaccharide's. Stereochemistry and configuration of the nucleus of steroids.</li> </ul>									:he				
CO4		Know at determi	pout, classification, general nation of structure of poly	method of preparation, properties	and reactions	of ami rv stru	ino acids cture of	, genera proteins	al metho	od of syn	thesis 8	š		
		Underst	and the Synthesis and med	licinal uses of; caffeine, theophyllin	e, theobromin	e.								
CO5		Phytoph	hytopharmaceuticals: Recent development and commercialization of plant derived natural products. Strategies for rapid identi fication of novel											
		therape	nerapeutic leads from natural products.											
10. Unit w	vise detailed cor	ntent												
Unit-1			Number of lectures = 08	Title of the unit: Terpenoids										
Introductior Stereochemi	n, nomenclature istry,constitution	e, occurr nandsyntl	ence, general properties, on nesisofCitralandMenthol.Ca	classification, isolation and general rotenoids;Introduction,classification,	methods of st isolationandger	ructure eralme	e detern ethodofs	nination tructure	of terpo determin	enoids, i nationof	soprene	e rule;		
Linit 2			Number of lectures -09	Title of the unit: Alkalaide										
Unit-2	nomonolaturo o	lassificat	ion isolation physiologicalor	tion occurrenceand concrelmethodes	fetructure clus	dation	falkalai	denosia	llubacad	oppitrog				
heterocyclic	ring (Hofmann'	's exhau	stive methylation, Emde's	degradation and Von Braun's methods	od).	uation	JIAIKAIOI	i,specia	nybaseu	onnitrog	en			
Unit-3			Number of lectures = 08	Title of the unit: Carbobydrates	& Steroids									
Introduction	classification ge	eneralrea	ctions constitutionofglucose	& fructose: Conformations of monosac	charide's Stero	ids∙Intr	oduc tio	n Diel'sh	vdrocarl	non				
nomenclature, stereochemistry and configuration of the nucleus of steroids.								.,	.,					
Unit-4			Number of lectures = 08	Title of the unit: Amino Acid, Pe	ptides & Prote	ins								
Introduction	n,nomenclature,	,classific	ation,generalmethodofpre	paration, properties and reactions of	aminoacids.Int	roduct	ion,occu	irrenc e	,nomen	clature,g	eneral			
method of s	synthesis & dete	erminatio	on of structure of polypept	ides. Primary, secondary, tertiary &	quaternary st	ructure	e of prot	eins.		,0				
Unit-5			Number of lectures = 08	Title of the unit: Phytopharmac	euticals									
Synthesis ar	nd medicinal use	es of: caf	feine, theophylline, theob	romine. Phytopharmaceuticals: Rec	ent developm	ent and	d comme	ercializa	tion of r	lant der	ived na	tural pro	oducts.	
Strategies fo	or rapid identific	cation of	novel therapeutic leads fr	om natural products.										
11. CO-PO n	mapping													
COs			Attrib	utes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	
C01	Create the con- structure deter Menthol.	cept of s rminatio	econdary plant metabolite n, isoprene rule; Stereoch	es; terpenoids and its general metho emistry, constitution and synthesis	ods of of Citral and	3	1	2	1		2	2	2	
CO2	Evaluate the ge nitrogen hetero Braun'smethoo	eneral m ocyclic ri d).	ethod of isolation, structu ng (Hofmann's exhaustive	re elucidation of alkaloid, specially methylation, Emde's degradation a	based on and Von	3	1	2	1		2	2	2	
СОЗ	Analyze genera monosaccharid	al reaction des. Stere	ns, constitution of glucose eochemistry and configura	& fructose; Conformations of the nucleus of steroids.		3	1	2	1		2	2	2	
	Know about. cl	lassificat	ion, general method of pre	paration, properties and reactions	of amino									
CO4	acids, general i	method	of synthesis & determinat	ion of structure of polypeptides. Pr	rimary,	3	1	2	1		2	1	2	
	Secondary, tert		laternary structure of prot	enis.								<sup> </sup>		
CO5	Phytopharmaco products. Strat	euticals: egies for	Recent development an rapid identification of nov	d commercialization of plant development of vel therapeutic leads from natural p	rived natural products.	3	1	2	1		2	2	2	
	3	Strong	contribution, 2 Average co	ontribution , 1 Low contribution										
12. Brief d	lescription of se	elf-learni	ng / E-learning componen	t										
1. https://v	www.intechope	en.com/b	ooks/terpenes-and-terper	noids/introductory-chapter-terpene	es-and-terpend	oids								
2. https://v	www.intechope	en.com/b	ooks/alkaloids-their-impo	rtance-in-nature-and-human-life/in	ntroductory-ch	apter-a	alkaloids							
3. https://study.com/academy/lesson/steroids-structure-function.html														
4. http://cl	hemistry.creight	ton.edu/	/~jksoukup/lec5-aminoacic ago2 /pptcl_data2 /html/m	isSTUD.pdf brd/ict/toxt/127106000/local.sdf										
3. https://l	inprenacin/cont	ent/stor	agez/nptel_uata3/ntml/m	111 a) ICU (EXU 127 100009/16C4.pdf										
13. Books	recommended:				2 11				_					
<ol> <li>Natural</li> <li>Organic</li> <li>Channel</li> </ol>	products: Chem Chemistry, Vol 2	11stry and 2, I. L. Fi	d Biological Significance, J.I nar, ELBS.	viann, R.S.Davidson, J.B.Hobbs, d.V.	Banthrope and	1 B.Har	borne, L	ongmar	n,Essex.	entern 11		Appel		
3. Chemist Publishe	ers.	id Pharm	acological Properties of M	edicinal Plants from the Americas,	Ed. Kurt Hoste	ıtmanr	1, M.P. C	upta Ai	ida. Ma	rston, Ha	arwood	Academ	ιιC	
4. Chemist	try of natural pro	oducts, S	.v.Bhat, B.A.Nagasampagi	, IVI. Sivakumar.										

- Natural products from plants, Peter B. Kaufman, Leland J. Creke, Sara Warber, James A. Dupe, Harry L. Brielmann , CRC publication
   Organic chemistry of natural products, Vol. I and II , Gurdeep Chatwal, Himalya Publishing house.

1. Na	me of the Department:	Chemistry												
2.Cou	rse Name	CORROSION, LUBRICA	TION AND PAIN	T TECHNOLOGY			L			Т			Р	
3.Cou	rse Code	CH410					3			1			0	
4.Typ	e of Course (use tick ma	ark)				Co	re( √ )		D	E( )			FC( )	
5.Pre-	requisite (if any)	B.Sc. with Chemistry	6.Frequency (ι	ise tick marks)	Even ( V )	C	)dd ()		Either	Sem ( )		Ev	rySen	n( )
7.Tota	al Number of Lectures,T	futorials, Practicals												
Lectu	res=30			Tutorials=10			Pract	ical=Ni	il					
8. CO formu	JRSE OBJECTIVES: Mair lation of industrial pain	n objective includes dee ts, dyes and varnishes.	o understanding	of mechanism of cor	rosion, lubricatio	n and acti	ion of l	ubricar	nts, prop	erties, o	consti	tuents	and	
9. COU	9. COURSE OUTCOMES (CO):													
After th	e successful course con	npletion, learners will d	evelop following	g attributes:	ATTRIDUTE	~								
		Explain the theories an	d mochanisms o	f corrosion Doscribo		o and com	noro c	lifforon	t corrosi	on type	E For	mulato	induc	tny
	CO1	relevant surface treatm	nent methods fo	r metals and alloys ar	nd corrosion prot	ection str	ategies	5.			· · ·			
	CO2 requirements, as well as on the lubricants properties. Know how to recommend a lubricant and how to identify the causes of in-service issue and their solutions, defend the selection of an appropriate lubricant for perfect lubrication.										issues			
	CO3 Describe the ingredients and characteristics of paint. Evaluate the properties (adhesion, hardness, thickness, extent of cure, etc.) of the c film. Will be familiar with the composition of paints and coatings and modern technologies used in the preparation of paint/coa formulations.										e cured oatings			
	CO4	Comprehension of pro action and applications	perties, constitu	ents and formulatio	ns of pigments a	and dyes,	differe	entiate	dyes an	d pigm	ents, †	their m	nechan	isms of
	CO5	Comprehensive unders material (paint, pigmer	standing of prop nt, dye or varnish	perties, constituents, a) based on the natur	formulations an e of the substrate	id uses of e.	f varni	shes. D	Develop a	ın appı	opria	te choi	ice of	coating
10.Un	it wise detailed conten	t												
Unit-1		Number of lectures=0	8	Title of the unit: C	orrosion									
Introdu	ction to corrosion, caus	se of corrosion, Theorie	s of Corrosion, N	Mechanism of Electro	ochemical or Wet	t corrosio	n, dry	corrosi	on, Facto	ors influ	uencin	ng corro	osion; <sup>-</sup>	Types of
corrosio	on- Galvanic corrosion,	, Erosion Corrosion, C	revice corrosion	, Pitting corrosion,	Intergranular co	rrosion,	Waterl	ine Co	rrosion,	Stress	corro	sion, I	Microb	iologica
corrosio Galvani	on, Fatigue Corrosion, Fi zing Tinning and Electro	retting Corrosion; Protein onlating Pourbiax (P <sup>H</sup> pr	ction from corro	sion: Design and Mat	erial selection, Ca	athodic &	Anodi	c prote	ction, Co	rrosion	inhib	itors, P	assivit	у,
Unit-2		Number of lectures=0	8	Title of the unit: Lub	rication									
Introdu	- ction. Friction and wear	. Lubricants. Theories of	f Friction. Lubrica	ation and wear. Mech	nanism of lubricat	tion- Fluic	l or Hv	drodvn	amic: lut	ricatio	n. Bou	indarv	and ex	treme
pressur	e lubrication; Classifica	tion of lubricants: Solid	, Semisolid, Syn	thetic lubricants, lub	ricating oils - ve	getable o	ils, ani	mal oil	s, minera	al oils,	blend	ed oils,	, lubric	ating
emulsic	n, greases; Properties c	of lubricating oils, cutting	g fluids, selection	n of lubricants.										
Unit-3	}	Number of lectures=0	8	Title of the unit: Pair	nt Technology									
Introduction to paint, ingredient and classification; Essential concepts of paint formulation, formulation of coating for mas onry, steel work, aircrafts, automobile, distempers,														
etc., Fai	lure of paint film; Testir	ng and evaluation tests of	of liquids films, d	ry films, performance	e and weathering	test, wor	ld stan	dard sp	ecificatio	on for p	aints	and ma	aterials	•
Unit-4	tion to nigmonts, gong	Number of lectures=u	ios: Droparation	proportion and user	of Black pigmont	Carbon	hlack)	Vollow	nigmon	(chror		low) P	od pig	mont
(Red lea	ad) Green nigment (Ch	ran anu priysicai propert rome green) White nigi	ment (7nO) Blue	, properties and uses a nigment (Elltramari	of Black pignent	ies of Coa	bidCK), ating s	olvent	nlasticiz	rs Dve	s: Intr	iow), R oducti	.eu pigi on	nent
Classific	ation, Methods of dyein	ng, Basic operations in d	lyeing, Study of F	Phenolphthalein, Met	thyl orange and C	rystal vio	let. Dif	ference	e betwee	n pigm	ent ar	nd dye.	011,	
Unit-5	;	Number of lectures=	08	Title of the unit: Vari	nishes									
Introdu	ction to varnishes, phys	sical properties of varni	shes; Constituen	its of varnishes, class	ification and form	mulation (	of indu	istrial v	varnishes	; Chara	cteris	tics of	good v	arnish;
Applica	tions of varnish.													
11. CO-	PO mapping		0.44v:lb4.e.e				<b>DO1</b>	002	002			DOC	007	DOG
COS	Evalain the theories on	d machanisms of source	Attributes	antifu analyza and a	ampara different	-	P01	POZ	PO3	PO4	P05	PO6	P07	P08
CO1	corrosion types. Formu	ilate industry relevant si	urface treatment	t methods for metals	and alloys and co	orrosion	3	2	2	2		2	2	2
	protection strategies.						•	_	-	-		_	-	_
	Comprehension of the	e fundamentals of lubri	cants, lubricatio	n and the lubricants	operating requi	rements,					İ			
<b>CO2</b>	relationship with the	lubrication requirement	nts, as well as	on the lubricants p	roperties. Know	how to	3	2	2	2		2	1	2
001	recommend a lubricant	t and how to identify the	e causes of in-se	rvice issues and their	solutions, defend	d the	•	- 1	-	-		-	-	-
	selection of an appropi	riate lubricant for perfec	t lubrication.	he much entire (e dhe e										
соз	extent of cure, etc.) of	the cured film. Will be f	amiliar with the	composition of paints	s and coatings an	d	3	2	2			2	1	2
<u> </u>	modern technologies u Comprehension of pro	ised in the preparation of perties, constituents and	of paint/coatings d formulations o	formulations. f pigments and dyes,	differentiate dye	s and	3	2	1			1	2	2
	pigments, their mechai Comprehensive unders	nisms of action and application and applications of properties.	lications. onstituents, forr	nulations and uses of	varnishes. Devel	op an	J	2	-			-	-	2
CO5	appropriate choice of c	coating material (paint, p	bigment, dye or	varnish) based on the	nature of the su	bstrate.	3 ion	2	1			1	1	2
12 Bri	ef description of self-le	arning /F-learning com	nonent	tion, 2 Average cont		contributi								
1. ht	tps://www.voutube.co	m/watch?v=50xdXg91T	V0											
2. ht	tps://www.youtube.com	m/watch?v=WQ8v-UcA0	CTE											
3. ht	tps://www.youtube.com	m/watch?v=Keff0zA7Zq	8											
4. ht	tps://nptel.ac.in/conter	nt/storage2/nptel_data	3/html/mhrd/ict	/text/116102052/lec	3.pd									
5. ht	ups://www.oreilly.com/	nibrary/view/basic-civil-	engineering/978	0131/29885/xhtml/	chapter010.xhtm	1								
1	iction and Lubrication of	f Solids Roudon E.D. a	nd D. Tabor Part	1 & II Clare den Bree	c Oxford (10E4)									
2. Δι	Introduction to Metall	ic Corrosion – 3rd Ed. L	llick R. Evans Ed	ward Arnold Ltd. And	ASM (1981)									
3. Co	prrosion and Corrosion (	Control 3rd Ed., H.H. Uh	ling & R.Winston	Revie, Wiley- Inter S	ciences, New Yor	<sup>-</sup> k (1985)								
4. Co	Corrosion Engineering, 3rd, Ed., M.G. Fontana, McGraw Hill, New York (1986).													

1. Name of the Department: Chemistry												
2. Cours	se Name	PHARMACEUTICAL CHEM	ISTRY		I	L			Т			Р
3. Cours	se Code	CH411				3		1			0	
4. Type	of Course (use t	ick mark)			Co	re (			DE (	)		FC ( )
5. Pre-re	equisite (if any)	B.Sc. with Chemistry	6. Frequency (use tick marks)	Even (√)	Od	d ( )		Eithe	r Sem	()	Every	/ Sem ( )
7. Total	Number of Lect	ures, Tutorials, Practicals										
Lectures	Lectures = 30     Tutorials = 10     Practical = Nil											
8. COU cardiov	8. COURSE OBJECTIVES: Students to understand the Synthesis, uses and mode of action of Antibiotics and Sulpha Drugs , Antipyretics analgesics, Anesthetic drugs, cardiovascular drugs, Drug Design.											
9. COU After the	9. COURSE OUTCOMES (CO): Ifter the successful course completion, learners will develop following attributes:											
COURSE O	OUTCOME (CO)		ATI	TRIBUTES								
	<b>CO1</b> Evaluate the concept of antibiotics. Classification, synthesis, mode of action and uses of different types of antibiotics.											
	CO2 Analyze classification, structure, synthesis and uses of analogues of p-aminophenol, Salicylic acid, Pyrazolones and Pyrazolodinones.											
	CO3	Create the basic knowledge, Cl	assification, Synthesis and mode of act	tion of Inhalatic	on, Intrave	nous and	esthe	tics an	d Basa	lanes	thetics	
	CO4	Analyze classes, structure, synt Antiarrhythmic agents.	hesis and mode of action of cardiac gl	ycosides Digoxi	n, and Digi	toxin; A	nti-hy	/pertei	nsive a	nd hyp	otensi	ve drugs,
	CO5	Comprehension of analogues a drug discovery, research and d	nd prodrugs; concept of lead; factors ¿ evelopment strategies.	governing drug	design; rat	tional ap	proa	ch to d	rug de	esign; r	evoluti	ons in
10. Unit	wise detailed co	ontent										
Unit-1	N	umber of lectures = 08	Title of the unit: Antibiotics and Su	lpha Drugs			_					
Introducti structure Neomycir sulphame	ntroduction and classification of antibiotics; beta lactam antibiotics: penicillins, its structure and mode of action, synthesis of Penicillin-v. Cephalosporins: classification, structure and mode of action of first, second, third and fourth generation cephalosporins. Aminoglycoside antibiotics: structure and mode of action of streptomycin, Neomycin and Kenamycin. Chloramphenicol: its structure, synthesis and mode of action. Synthesis and uses of sulphathiazole, sulphaguanidine, sulphadiazine, sulphamethazine and sulphaacetamide.											
Unit-2		umber of lectures =08	Title of the unit: Antipyretics analge	esics								
Introduct	troduction, classification, structure, synthesis and uses of analogues of p-aminophenol: Paracetamol, Phenacetinandantifebrin; Salicylicacidanalogues: Aspirin, Salol,											
Linit_3		umber of lectures = 08	Title of the unit: Anesthetic drugs	Sipyrone, rhen	yibutazone	с, охурп	enbu	1020110		uipiiii	pyrazo	lic
Introducti	ion Classification	Synthesis and mode of action	of: Inhalation anesthetics: Vinyl ether	Cyclopropane	and Eluoro	vono: Ir	ntrave	anous	anosth	otics	Thione	ntal
Sodium&	MethohexitalSoc	lium:Basalanesthetics:Procaning	ehvdrochloride. Tetracainehvdrochlorid	de.Butacainehv	drochlorid	e.Benzai	mineł	hvdroc	hloride	eand	mope	iitai
Pyrocanin	e hydrochloride					0,000,000		.,		24114		
Unit-4	Unit-4 Number of lectures = 08 Title of the unit: Cardiovascular drugs											
Introducti	ion, classificatior	, structure and mode of action	of cardiac glycosides Digoxin, and Digit	toxin; Anti-hype	ertensive a	nd hypo	tensi	ve dru	gs: stri	ucture	, synth	esis and
modeofad	ctionofLosartan,	Clonidine,Hydralazine,Methyldo	paandDiazoxide;Antiarrhythmicagents	structure, synt	hesisandm	odeofad	tiono	ofDiiso	pyram	ide,		
Procainar	nide, Propranolo	l, Beritylium Tosilate;Vasopress	or drugs: structure, synthesis and mod	le of action of Is	oxsupurin	e, Pr en	yl ami	ine.				
Unit-5		lumber of lectures = 08	Title of the unit: Drug Design									
Introducti	ion: analogues a	nd prodrugs: concept of lead: fa	ctors governing drug design: rational a	approach to dru	g design: [	Drug des	ign: t	the me	thod c	of varia	tion: D	rug
design an	d development:	preamble, revolutions in drug d	iscovery, research and development st	trategies.	0 · · · 0 /		0				,	.0
11. CO-PC	O mapping											
COs			Attributes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	Evaluate the cor of antibiotics.	ncept of antibiotics. Classificatio	n, synthesis, mode of action and uses	of different typ	<sup>es</sup> 3	1	2	2	2	3	2	2
CO2	Analyze classific Pyrazolones and	ation, structure, synthesis and u I Pyrazolodinones.	uses of analogues of p-aminophenol, S	alicylic acid,	3	1	2	2	2	3	2	2
(0)3	Create the basic	knowledge, Classification, Synt	hesis and mode of action of Inhalation	, Intravenous	2	1	2	2	2	2	2	2
203	anesthetics and	Basal anesthetics.			3	1	2	2	2	3	2	2
CO4	Analyze classes, Anti-hypertensi	structure, synthesis and mode ve and hypotensive drugs, Antia	of action of cardiac glycosides Digoxin, rrhythmic agents.	and Digitoxin;	3	1	2	2	2	3	3	2
	Comprehension	of analogues and prodrugs: cor	ncept of lead; factors governing drug d	esign; rational								
CO5	approach to dru	g design; revolutions in drug dis	covery, research and development str	ategies.	3	1	2	2	2	3	2	2
12 D	f docorintion of	strong contribution, 2 Averag	e contribution, I Low contribution									
12. Brie	https://www.	outube com/unteh211 NC: D47										
1.	https://www.y	outube.com/watch?v=NGWP4/	ino 6 vk									
3.	https://www.y	outube.com/watch?v=-UD0v4ir	IKuc									
4.	http://nptel.ac	.in/courses/104101006/downlo	ads/lecture-notes/mod10/lec3.pdf									
5.	https://www.y	outube.com/watch?v=2vLDzMS	o2Tc&list=PLg8Xhs-vwgxLSKf7XRqynIr	Y6aGHseZry&ir	ndex=43							
13. Books	recommended:											
1.	Burger's Medic	inal Chemistry: Mangrove E. W	olff, 4th Edition, John Wiley and Sons									
2.	Medicinal Cher	nistry by Asutosh Kar , New Age	International publication									
3.	Principles of M	edicinal Chemistry: W.O.Foye.	0									
4.	The Pharmacol	ogical Basis of Theraputics : L.S.	Goodman and A.Gilman	nd LA Mitcohe	-							
5.	5. Wilson's Medicinal Chemistry The Organic Chemistry of Drug Synthesis: D. Lednicer and L.A.Mitscher											

1.Name of the Department: Chemistry												
2.Cour	se Name	SURFACE CHEMISTRY AND EL	ECTROCHEMISTRY		L		1	Г			Ρ	
3.Cour	se Code	CH420			3		1	1			0	
4.Type	of Course (use tick	( mark)			Core( v	)	DE	E()		I	•C( )	
5.Pre-	requisite (If any)	B.Sc. with Chemistry	6.Frequency(usetickmarks)	Even (v)	Odd (	)	Either	Sem ( )		Evei	y Sen	n()
7.Tota	I Number of Lectur	es, Tutorials, Practicals			L							
Lectur	es=30		Tutorials=10		Practical=Nil							
8. COL	JRSE OBJECTIVES: S	tudents gain the knowledge of s	econdary plant metabolites such as te	rpenoids, all	kaloids, carb	ohydrat	es, Amii	no Acid	, Pept	ides 8	k Prot	eins,
steroid	ls, Synthesis and me	edicinal uses of; caffeine, theoph	nylline, theobromine and Phytopharm	aceuticals.		,			· ·			
9. COUR	. COURSE OUTCOMES (CO):											
After th	e successful course	completion, learners will develo	op following attributes:									
COURSE	OUTCOME (CO)	ATTRIBUTES										
	CO1	Students would develop concep Freundlich and Gibbs adsorption characterize surface of differen	nt of monolayer and multilayer adsorp n isotherm and their applications. The t system.	tion; perceiv y also got ins	e the differe sight the imp	nt theo ortance	ry of ads of vario	sorption ous tecl	n <i>viz,</i> l hnique	Langn es to	nuir,	
	CO2	Students would able to recognize the role of surface active reagents and thermodynamics of micellization, stabilization, microemulsion, reverse micelles and get sound insight of potential develop between solid and liquid i.e. zeta potential.										
	СО3	Students would able to differentiate between ionic and molar conductivity for strong and weak electrolyte and understand the concept of electrical double layer and Butler – Volmer equation										pt of
	CO4	Students would able to distingut	ish difference between galvanic and e	lectrolytic ce	ell; perceive t	he cond	cept of N	vernst e	equati	ion an	d	
	CO5	Students would able to underst	and the role of electrochemistry for a	nalysis of cor	rosion phene	omenor	n and ide	entify tl	he diff	ferent		
10 Uni	it wise detailed con	tent										
Lipit 1	it wise detailed con	Number of lectures=08	Title of the unit: Process at Solid S	urfaco								
Growth	and structures of so	hid surfaces Physisorption and	Chemisorntion Freundlich Langmuir	and RET isoth	herms Gibbs	Adsorr	tion iso	therm	disso	riative	,	
adsorpti tempera	on, temperature de ature programmed t	pendence of adsorption, stickin echniques, Surface imaging elec	g probability. Surface analytical techn ctron microscopy.	iques, spectr	roscopies (Au	ger, ph	otoelect	tron an	d vibr	ationa	al)	
Unit-2		Number of lectures=08	Title of the unit: Surface and Interf	ace								
Surface	active reagents, clas	ssification of surface active reag	ents, micellization, hydrophobic and h	ydrophilic in	iteraction, cr	itical mi	icelle co	ncentra	ation(	CMC),	kraft	
tempera	ature, factors affecti	ing CMC of surfactant, counter i	on binding to micelle, thermodynamic	s of micelliza	ation, stabiliz	ation, n	nicroem	ulsion,	revers	se mio	elles,	
surface	surface films(electrokinetics phenomenon) Zeta potential.											
Unit-3		Number of lectures=08	Title of the unit: Conductance and	lonization								
Ionic coi Kohlrau:	nductance, drift spe sh's law, Ostwald's (	ed, electrical force, molar condu dilution law, conductometric an	uctivity, strong and weak electrolytes and weak electrolytes and potentiometric titrations. Electrical of	and their mo double layer,	olar conducta , ficks first an	nce, lav d secor	v of inde nd law o	epende f diffus	nt mig ion, Ta	gratio afel pl	n of ic ot, pr	ons: ocess
at electr	ode-Butler-Volmer	equation and its applications.										
Unit-4		Number of lectures=08	Title of the unit: Electrochemical Ce	ells								
Daniell r	eversible and irrev	ersible cells, cell representation	s and half cell reactions, E.M.FF., The	rmodynamic	s of electrocl	nemical	system	s: Nern	ıst equ	uatior	is, vai	rieties
of elect	rodes, standard e	lectrode potential. Type of b	oundary between half cell and liq	uid junction	potentials,	Conce	ntration	cells,	Appli	icatio	ns of	EMF
measure electrod	ements-determinati les), Polarization, Ov	on of activity coefficient, compo vervoltage.	osition of complex ions, solubility prod	ucts, measu	rement of p⊦	l and pk	(a (Hydr	ogen, C	Quinhy	dron	e, Gla	SS
Unit-5		Number of lectures=08	Title of the unit: Corrosion and Cor	version of E	lectrochemi	al Ener	gy					
Introduc	ction, definition and	types, mechanism of electroche	emical corrosion, methods of preventi	on of corrosi	ion , dry cells	, lead b	atteries	, alkalir	ne cell	s (Edi	son ce	ell),
Fuel cell	s, Biological energy	and conversions.										
11. CO-I	PO mapping								201	200		
COs			Attributes		PC	D1 PO	2 PO3	PO4	PO5	PO6	PO7	PO8
CO1	Students would dev adsorption viz, Lang insight the importa	velop concept of monolayer and gmuir, Freundlich and Gibbs ads nce of various techniques to cha	I multilayer adsorption; perceive the d orption isotherm and their applicatior aracterize surface of different system.	ifferent theo is. They also	got 3	1	3	1		3	3	3
<u> </u>	Students would abl	e to recognize the role of surfac	e active reagents and thermodynamic	s of micelliza	ation,	1	3	1		2	2	3
	liquid i.e. zeta pote	ntial			roluto			-		5	-	
CO3	and understand the	e concept of electrical double lay	yer and Butler –Volmer equation.			8 1	2	1		3	2	2
CO4	Nernst equation an	e to distinguish difference betw d thermodynamics of electroch ervoltage.	een galvanic and electrolytic cell; perc emical cell. They also got the sound ur	derstanding	s of	8 1	2	1		2	1	3
CO5	Students would abl identify the differe	e to understand the role of elec nt electrochemical energy resou	trochemistry for analysis of corrosion rces.	phenomeno	n and	3 1	3	1		2	2	3
	,	3 Strong	contribution, 2 Average contribution.	1 Low contr	ibution							
12.Brie	ef description of se	If learning/E-learning component	nt									
1. https://nptel.ac.in/content/storage2/courses/103103026/pdf/mod2.pdf												
2. https://www.youtube.com/watch?v=zdhDei1Joll												
3. https://www.youtube.com/watch?v=R2UhAdqiXbs												
4.	http://www.umi	ch.edu/~chem260/fall01/lectur	e37.pdf									
).	oka roosena da l	Lac.III/IIOUES/EC_UNII_2.pdf										
13. BO	Bard A L Faulter	r I.B. Electrochemical Mathematic	Eundomontols and ADDUCATIONS and	Edition Lab		New Y	ork 2001	2				
1.	Bockris LO M P	addy A K N. Modern Electrochen	nistry 1: Ionic 2 <sup>nd</sup> Edition Springer 100		willy & Sons	new r	UTK 2002	۷.				
3.	Atkins P. Paula I	Diver and Atkins Physical Chemi	istry 8 <sup>th</sup> Edition Oxford 2016.									
4.	4. Puri, Sharma, L.R., and Pathania, M.S., Principles of Physical Chemistry 50 <sup>th</sup> Edition, Vishal publishing Co.											

1.Name of the Department: Chemistry												
2.Cou	rse Name	COORDINATION AND ORGANOMETALLIC CHEMISTRY OF TRANSITION ELEMENTS						T	-		Р	
3.Cou	rse Code	CH421				3		1	l		0	
4.Туре	e of Course(use tick	mark)			Co	re( √ )		DE	()		FC( )	
5.Pre-	requisite (if any)	B.Sc. with Chemistry	6.Frequency (use tick marks)	Even (V)	Odd ()		E	ither Se	em ( )	Ever	ySem(	)
7.Tota	al Number of Lecture	es, Tutorials, Practicals										
Lectur	res=30		Tutorials=10	1	Practical	=Nil						
8. COURSE OBJECTIVES: Students gain the knowledge of secondary plant metabolites such as terpenoids, alkaloids, carbohydrates, Amino Acid, Peptides & Prote											teins,	
steroio	ds, Synthesis and me	dicinal uses of; caffeine, theophyl	line, theobromine and Phytopharma	ceuticals.								
9. COUR	RSE OUTCOMES (CO)	): completion learners will develop	following attributos:									
		completion, learners will develop	Johowing attributes. ATTRIB	LITES								
	CO1	Students will have a firm foundati periodic table.	on in the approaches of fundamenta	l atomic str	ucture a	nd the p	eriodi	city of	transitio	n elem	ents in	the
	CO2	udents will have a firm foundation in have a basic understanding of nomenclature for transition metal complexes, chelate / chelation, IoT of the octahedral complxes, prediction of molecular geometries of selected molecular species.										
	CO3	Students will have a firm foundati	on in have a basic understanding of r	nagnetism	of the co	mplexe	s.					
	CO4	Students will be able understand t	the knowledge in fundamentals of or	ganometall	ic compo	ounds.						
	005	Students will be able to create the	e pathways for the organometallic co	- mpounds a:	s industr	ial catal	ytic ap	plicatio	ons in th	e vario	us orga	inic
	105	synthesis.		-				-			_	
10.Un	it wise detailed cont	tent										
Unit-1	L	Number of lectures=08	Title of the unit: Basics of Coordin	nation Cher	nistry							
General characteristics properties of transition elements werner's theory effective atomic number shape of d orbitals bonding in transition metal complexes nomenclature of coordination compounds isomerism in coordination compounds polymerization ionisation hydrate linkage coordination position isomerism												
Linit 2	omensm geometrica	Number of loctures-09	Title of the unit: d Block Motal Ch	omistry								
Valonco	bond theory and by	chomical se	arios and	loffoct	of cov		Crystal E	iold sta	bilizati	on		
energy	high and low spin o	ctahedral complexes John teller	distortion that crystal field and the	square plar	har Cryst	al Field	crysta	al field	theory i	ises ar	d limit	ation
microsta	ates and term symbo	ols Russell saunders coupling i.e sp	bin orbit coupling ground state of ele	ment with z	z=1-10, s	spin Cro	ssover	·. ······	cheery c			ation
Unit-3	}	Number of lectures=08	Title of the unit: Bonding and Prop	perties of C	omplexe	s						
High an	d low spin states, mo	olecular orbital theory, octahedra	l complexes, nephelauxetic series ba	ck bonding	involvin	g pi don	or and	l accep	tor ligan	ds pi in	seo2 a	and o3
sf6 and	HF to organ and te	nable sugano diagram electronic	absorption spectra of octahedral a	nd tetrahed	dral com	plexes	charge	transf	er spect	ra inte	rpretat	ion of
electror	electronic absorption spectra of use of reach parameters magnetic properties of transition metal complexes spin-orbit coupling the effect of temperature on											
terroma	agnetism and antifer	romagnetism and ferrimagnetism			-							
Unit-4		Number of lectures=08	Title of the unit: Organometallic C	hemistry of	f Transit	ion Elen	nents					
Organoi magnitu eliminat	metallic compounds, ude of stretching free tions. Alkyl. carbine	ligand hapticity ,18 electron rule quency synthesis and structure of alkane, alking alking and buts 1-3 c	In metal carbonyls: homiletic and he Fe carbonyl complexes fruits of unity liene complexes	reaction o	omplexe f organo	es syner metallic	comp	ound o	actor aff xidative	additic	the on redu	ictive
Unit-5		Number of lectures=08	Title of the unit: Application of Or	ganometal	lic Chem	istrv						
Applicat	, tion of Organometall	ic Chemistry:- organometallics: or	ganolithium magnesium zinc copper	and titaniu	m reage	nts . Cat	alvtic	cycle o	fwacker	proces	S.	
Homoge	enneuos catalysis: all	kene (olefin) and alkaline metal, V	Vikinsons catalytic cycle, hydroformy	lation (oxo-	-process)	),	larytic	cycic o	Wacher	proces		
Heterog	, geneous catalysis: co	mmercial application: Ziegler-Nat	ta catalysis and haber process.	,	. ,							
11. CO-	PO mapping											
COs		Attribu	tes		PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8
CO1	Students will have a periodicity of transi	firm foundation in the approache tion elements in the periodic table	es of fundamental atomic structure a e.	nd the	3	2	1	2	2	1	1	2
CO2	Students will have a complexes, chelate of selected molecul	i firm foundation in the basic unde / chelation, MoT of the octahedra ar species	erstanding of nomenclature for trans al complexes, prediction of molecular	ition metal geometrie	s <b>3</b>	2	1	2	2	1	1	2
CO3	Students will have a	firm foundation in basic underst	anding of magnetism of the complexe	25	3	1	1	2	2	2	1	2
CO4	Students will be abl	e understand the knowledge in fu	ndamentals of organometallic complexe	ounds.	3	1	1	2	2	2	1	2
CO5	Students will be abl applications in the v	e to create the pathways for the c various organic syntheses.	organometallic compounds as industr	ial catalytic	3	1	1	2	2	2	1	2
		3 Strong co	ntribution, 2 Average contribution , 1	Low contr	ibution							
12.Bri	ef description of sel	f learning/E-learning component										
1. ht	tps://nptel.ac.in/cou	rses/104/101/104101121/										
2. ht	tps://nptel.ac.in/con	tent/syllabus_pdf/104101090.pd	f									
3. ht	tp://www.ncert.nic.i	n/ncerts/l/lech109.pdf										
4. https://nptel.ac.in/courses/104103022/ 5. https://nptel.ac.in/courses/104103071/												
13. Books recommended:												
1. F. All	bert cotton. Geoffrey	Wikinson, Carlos A.Murillo and M	Anfred Bochmann, Advanced inorga	nic chemist	rv. 6th e	dition. v	vilev Ir	ndia Pvi	t LTD.			
2. J.D Le	e. Concise inorganic	Chemistry, 5th edition, Wiley Ind	ia Pvt LTD.		<i>,,</i>		, "					
3. JH Hu	heey, inorganic che	mistry- principles, structure and r	eactivity, Harper and Row publisher	Inc . New Y	ork (1972	2).						

1 Namo	of the Department: (	Chomistry												
2 Course	Name													
3 Course	e Name	CHA22	CHCAL-2		0			0		۲ ۵				
4 Type c	of Course (use tick ma	ark)		_		1	וח	= ( )						
5. Pre-re	quisite (if any)	B Sc with Chemistry	6. Frequency (use tick marks) Even (v	)	() bb0	,	Fithe	<u>r Sem ()</u>	-	Every S	em ()			
7. Total I	Number of Lectures, 1	Futorials, Practicals		/	000()		2.11.10				()			
Lectures	= 00		Tutorials = 00	Pract	tical = 08	3								
8. COURSE	8. COURSE OBJECTIVES: Imparting of scientific methodology, Development of practical/technical skills, The ability to work effectively and safely in a laboratory environm													
Developing	g transferable skills (te	eam work, time manag	ement), Enhancing communication skill.											
9. COURSE	OUTCOMES (CO):													
After the s	successful course com	pletion, learners will d	evelop following attributes:											
COURSE O			ATTRIBUTES											
	C01	Understand the basic	nderstand the basic analytical and technical skills to work effectively in the various fields of chemistry											
	CO2	Able to detect adulte	erants in the given food sample.				tal		1 1 1 - 1					
	CO3	lycopene, nicotine, la	actose and casein, lecithin Caffeine from tea. Preparatic	aponifica n of Acet	anilide, J	ue of oil Aspirin,	Paracet	anue of ol amol.	I. ISOIA	tion of				
	CO4	Remember to keep r	ecords of all performed experiments in the manner, wh	ich is req	uired in	laborat	ory.							
	CO5	Analyze the importar	nce of personal safety and care of equipment's and che	nicals.										
10. List of	experiments													
1. Dete	rmination of strength	of acid against strong b	base by pH meter.											
2. Meas	surement of surface to	ension of a liquid by car	pillary rise method											
3. Dete	rmination of optical re	otation of cane sugar.	n cil											
4. Dete	rmination of saponing	ie in the given oil	n on.											
6. Estim	nation of amino acid.	e in the Siven on.												
7. Estim	nation of Glucose.													
8. Sepa	ration of essential oils	by soxhlet extractor.												
9. Isolat	tion of Lycopene from	tomato.												
10. Isolat	tion of Nicotine from t	cobacco.												
11. Isolat	tion of Lactose and ca	esin from milk.												
13. Isolat	tion of Caffeine from t	tea.												
14. Prepa	aration of Magnesium	i bisilicate (antacid).												
15. Prep	aration of Paracetamo	ol.												
16. To pr	repare the iron(III) eth	nylenediaminetetraacet	alato complex, Na[Fe(EDTA)]·3H₂O											
11. CO-PO	mapping													
COs		Attributes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8			
CO1	Understand the bas	ic analytical and techni	cal skills and to work effectively in the various fields of	3	1	1	1		2	1	2			
CO2	chemistry					-	-		-	-	-			
	Able to detect adult	terants in the given roo		3	1	3	1		3	5	2			
<b>CO3</b>	Know the determin	ation of strength of aci	d, optical rotation of cane sugar. Saponification value of		1		1		2	1	<b>_</b>			
03	Caffeine from tea	. Isolation of lycopene, Prenaration of Acetanili	de Aspirin Paracetamol	3	1	1	1		2	T	2			
CO4	Remember to keep	records of all performe	ed experiments in the manner, which is required in	3	1	1	1		2					
CO5	laboratory.		and care of equipment's and shemicals		-	-	-		-	1	2			
	Analyze the importa	ance of personal safety		3	1	1	1		2	1	3			
12 Briefd	ascription of self- lea	rning / E-learning com	nonent											
1 https://		watch?v=MTsn1-ToKa												
2. http://	www.bellevuecollege	e.edu/wp-content/uplo	ads/sites/140/2014/06/aspirin tablets titration.pdf											
3. https:/	//www.frontiersin.org	/articles/10.3389/fonc	.2015.00196/full											
4. https:/	//www.youtube.com/	watch?v=1tmqUVSVPo	4											
5. https://	//www.youtube.com/ //www.youtube.com/	watch?v=KZ35KU5SA/g watch?v=249FNCSR-Cv												
7. https:/	/www.niser.ac.in/sps	/sites/default/files/bas	ic_page/Surface%20tension%20by%20capillary%20rise	%20meth	nod_%20	)2018.p	df							
<b>13.</b> Book	s recommended:													
1. Advan	ce Practical Chemistry	/: Jagdamba Singh, L.D.	S Yadav, Jaya Singh, I.R. Siddiqui, Pragati Edition.											
2. Practic	cal Organic Chemistry	A.I. Vogel.												
3. Practic	cal Physical Chemistry	: B. Viswanathan and P	.S. Kagnavan.											
4. Experi	mental Inorganic Chei	mistry – W.G.Palmer.												