

Integral University, Lucknow Department of Chemistry

### **Study and Evaluation Scheme**

### Program: B.Sc. (Hons.) Industrial Chemistry

			Turns of	Per l	Period nr/week	/sem		Eval	uation So	cheme	Sub						Attri	butes		
S. No	Course code	Course Title	Type of Paper	L	т	Р	UE	CA TA	Total	ESE	Tot.	Credit	Total Credits	Employa bility	Entrepre neurship	Skill Develop ment	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
THE	ORIES																			
1.	LN104	Essential Professional Communication	Foundation	3	1	0	40	20	60	40	100	3:1:0	4	~	~				~	~
2.	MT108	Elementary Mathematics	Foundation	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
3.	CH103	Physical Chemistry-I	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~		~		
4.	CH104	Inorganic Chemistry –I	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
5.	CH105	Organic Chemistry-I	Core	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~		~		
PRA	CTICALS																			
6.	CH106	Industrial Chemistry Lab-1	Core	0	0	8	40	20	60	40	100	0:0:4	4	~	~	~		~		~
			Total	15	5	8	240	120	360	240	600	15:5:4	24							

#### Program: B.Sc. (Hons.) Industrial Chemistry

# Semester: Second

			Turns of	Perl	Period hr/week			Eval	uation So	cheme	Sub						Attri	butes		
S. No	Course code	Course Title	Type of Paper	L	т	Р	UE	CA TA	Total	ESE	Tot.	Credit	Total Credits		Entrepre	Skill Develop	Gender	Environment &	Human	Professional Ethics
							UE	IA						Dility	neurship	ment	Equality	& Sustainability	Value	Ethics
THE	ORIES	1	<b>.</b>		1	1	1	1			1		F	1			r	r		
1.	CS110	Basics of Computer	Foundation	3	1	0	40	20	60	40	100	3:1:0	4	✓	~	~		✓		~
2.	CH107	Environmental Pollution	Foundation	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~		$\checkmark$	~	
3.	CH108	Physical Chemistry-II	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~		✓		
4.	CH109	Inorganic Chemistry-II	Core	3	1	0	40	20	60	40	100	3:1:0	4	~						
5.	CH110	Organic Chemistry-II	Core	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~		✓		
PRA	CTICALS	•																		
6.	CH111	Industrial Chemistry Lab-2	Core	0	0	8	40	20	60	40	100	0:0:4	4	~	~	~		~		
		•	Total	15	5	8	240	120	360	240	600	15:5:4	24							

Semester: First



Integral University, Lucknow Department of Chemistry

### Study and Evaluation Scheme

### Program: B.Sc. (Hons.) Industrial Chemistry

			Turno of	Per	Period hr/week			Eval	uation So	heme	Sub						Attri	butes		
S. No.	Course code	Course Title	Type of Paper	L	т	Р	UE	CA TA	Total	ESE	Tot.	Credit	Total Credits		Entrepre neurship	Skill Develop ment	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
THEC	ORIES																			
1.	(H201	Industrial Aspects of Physical Chemistry	Core	3	1	0	40	20	60	40	100	3:1:0	4			~				
2.		Industrial Aspects of Inorganic Chemistry	Core	3	1	0	40	20	60	40	100	3:1:0	4	~	~					
3.	CH203	Industrial Aspects of Organic Chemistry	Core	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~				
4.	CH204	Materials & Energy Balance	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				~
5.	CH205	Industrial Aspects of Microbiology	Elective	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~		~	~	✓
5.	CH206	Biochemistry	Elective	3	1	0	40	20	60	40	100	5.1.0	4	$\checkmark$		~			~	
PRAG	TICALS																			
6.	CH207	Industrial Chemistry Lab-3	Core	0	0	8	40	20	60	40	100	0:0:4	4	~	~	~			~	~
			Total	15	5	8	240	120	360	240	600	15:5:4	24							

### Program: B.Sc. (Hons.) Industrial Chemistry

**Semester: Fourth** 

			Turne of	Perl	Period hr/week			Eval	uation So	heme	Sub						Attri	butes		
S. No		Course Title	Type of Paper				0	CA				Credit	Total	Employa	Entrepre	Skill	Gender	Environment	Human	Professional
	code		ruper	L	т	Р	UE	ТА	Total	ESE	Tot.	creat	Credits		neurship	Develop ment	Equality	& Sustainability	Value	Ethics
THE	ORIES				-															
1.	CH208	Polymer Science	Core	3	1	0	40	20	60	40	100	3:1:0	4	✓	~	$\checkmark$				
2.	CH209	Medicinal Drugs Chemistry	Core	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~			~	~
3.	CH210	Petro-chemicals	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
4.	CH211	Agro-chemicals	Core	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~		$\checkmark$		
5.	CH212	Industrial Waste Treatment	Elective	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~		$\checkmark$	~	
5.	CH213	Water treatment and analysis	Elective	3	1	0	40	20	60	40	100	5.1.0	4	~	~	~		$\checkmark$	~	
PR/	CTICALS																			
6.	CH214	Industrial Chemistry Lab-4	Core	0	0	8	40	20	60	40	100	0:0:4	4	~	~	~		$\checkmark$	~	
			Total	15	5	8	240	120	360	240	600	15:5:4	24							

Semester: Third



Integral University, Lucknow Department of Chemistry

#### **Study and Evaluation Scheme**

#### Program: B.Sc. (Hons.) Industrial Chemistry

			Turno of	Per	Period hr/week			Eval	uation So	heme	Sub						Attri	butes		
S. No.	Course code	Course Title	Type of Paper		_		0	CA .				Credit	Total Credits	Employa	Entrepre neurship	Skill	Gender	Environment	Human	Professional
	couc			L		Р	UE	TA	Total	ESE	Tot.		cicuits	bility	neurship	Develop ment	Equality	& Sustainability	Value	Ethics
THE	DRIES	-									-			-						
1.	CH301	Chromatographic Techniques	Core	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~		~		
2.	CH302	Process in Organic Chemicals Manufacture	Core	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~				
3.	CH303	Phytochemistry	Core	3	1	0	40	20	60	40	100	3:1:0	4	$\checkmark$				$\checkmark$	~	$\checkmark$
4.	CH304	Unit Operations in Chemical Industry	Core	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~				~
5.	CH305	Pulp, Paper, Leather and Textile Industry	Elective	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~		~		
51	CH306	Dyes	Elective	3	1	0	40	20	60	40	100	0.110	•	~	~	~		~		
PRA	TICALS	·																		
6.	CH307	Industrial Chemistry Lab-5	Core	0	0	8	40	20	60	40	100	0:0:4	4	~	~	~				
	•	•	Total	15	5	8	240	120	360	240	600	15:5:4	24							

#### Program: B.Sc. (Hons.) Industrial Chemistry

Semester: Sixth

			Turno of	Per	Period hr/week			Eval	uation So	heme	Sub						Attri	ibutes		
S. No	Course code	Course Title	Type of Paper	L	т	Р	UE	са ТА	Total	ESE	Tot.	Credit	Total Credits	Employa	Entrepre	Skill Develop	Gender	Environment & Sustainability	Human Value	Professional Ethics
							UE	ТА						Dility	neursnip	ment	Equality	Sustainability	value	Ethics
THE	ORIES				•	•	•	r							<b>1</b>	•			<b>1</b>	
1.	CH308	Spectroscopic Techniques	Core	3	1	0	40	20	60	40	100	3:1:0	4	✓	✓	~				
2.	CH309	Chemical Process Industry	Core	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~				✓
2	CH310	Fundamentals of Food Chemistry	Elective	3	1	0	40	20	60	40	100	2:1:0	4	✓	~	~			✓	
3.	CH311	Dairy Chemistry	Elective	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~			✓	
PRO	<b>JECT/ PRESI</b>	ENTATION																		
4.	* CH312	Project Training (3 months)	Core	00	00	00	00	00	00	300	300	10	10	~	✓	~			~	✓
5.	CH313	Oral Presentation	Core	00	00	08	00	00	00	100	100	0:0:4	4			~			~	
	•	•	Total	9	3	8	120	60	180	520	700	9:3:14	26							
						*	The Ev	aluatio	n schem	e for th	e Projec	tl Training	g:							
															Tata					

		The Evaluation serie	ine for the frojecti f		
	Course Code	Dissertation	Presentation	Viva/Discussion	Total
Project & Training	CH312	200	50	50	300

L= Lecture, T= Tutorial, P = Practical, CA= Continuous Assessment, UE= Unit Exam. TA= Teacher's Assessment, ESE= End Semester Examination; Sessional=CT+TA; Subject Total= Sessional+ESE

#### Semester: Fifth

	urse Code       LN104       3       1       0         pe of Course (use tick mark)       Core ()       DE ()       FC (V)         e-requisite (if any)       10+2 with Chemistry       6. Frequency (use tick marks)       Even ()       Odd (V)       Either Sem ()       Every Sem ()         ial Number of Lectures, Tutorials, Practicals       Even ()       Odd (V)       Either Sem ()       Every Sem ()         Ial Number of Lectures, Tutorials, Practicals       Even ()       Odd (V)       Either Sem ()       Every Sem ()         Ial Number of Lectures, Tutorials, Practicals       Even ()       Odd (V)       Either Sem ()       Every Sem ()         Interview of the art of communication and learning language though literature       Knowledge of Professional, Cultural and Cross-Cultural Communication       Basic concept of structural and functional grammar; meaning and process of communication, verbal and nonverbal communication       Knowledge of Reading and Comprehension of general and technical articles, precise writing, summarizing, abstracting       Basic concepts of group discussion, organizing seminars and conferences         Development of Listening , Speaking ,Reading & Writing skills (LSRW)       Interview of the structural and functional grammar. Learning Language through literature.       Example         CO1       Basic Understanding of communication and Professional Communication       Example       Example       Example         CO2<										
1. Name of the Departme									-		
2. Course Name	ESSENTIAL PROFESSIONAL C	сомми	NICATION		L		1	Γ		Р	
3. Course Code	LN104				3		1	L		0	
4. Type of Course (use tick	k mark)				Core ( )		DE	()		FC ( √	)
5. Pre-requisite (if any)		6.	Frequency (use tick marks)	Even ( )	Odd (√)		Either	Sem (	) E	very Sei	m()
7. Total Number of Lectur	es, Tutorials, Practicals	-									
Lect	ures = 30		Tutorials = 10				Practic	al = Nil			
8. COURSE OBJECTIVES:											
				· · · · · · · · · · · · · · · · · · ·							
•	•	-	• .				unicatio	n			
-			-	viiting, suiiina	inzing, abstracti	iig					
9. COURSE OUTCOMES (CC											
After the successful course	completion, learners will devel	lop follov	ving attributes:								
COURSE OUTCOME (CO)				TRIBUTES							
CO1	Basic Understanding of comm	nunicatio	n and Professional Communic	ation							
CO2	Basic knowledge of structural	l and fund	ctional grammar. Learning Lar	nguage throug	h literature.						
CO3	Basic tools of communication	and imp	rovement in communicative of	competence.							
CO4	Understanding the basic gram	nmar and	basic structure of language								
CO5	Enhancement of writing skills	in Englis	h i.e. writing application, repo	ort and various	types of letters	•					
10. Unit wise detailed con											
Unit-1	Number of lectures = 08	Title	of the unit: PROFESSIONAL C	OMMUNICAT	ION						
	e , .	Essential	s of Effective Communication	n, Barriers to E	ffective Comm	unicati	on, The	Cross (	Cultural	Dimen	ions of
Professional Communication											
Unit-2						Dilai					
	ing Pool" by Ruskin Bond "The Po				es by woody E.	Prior					
Unit-3	Number of lectures = 08		of the unit: BASIC VOCABULA								
	bstitution, Synonyms, Antonyn				nistakes. Confus	able v	vords a	nd expr	essions	. Portm	anteau
words, Foreign words and e								ia cripi	200.0110	,	
Unit-4	Number of lectures = 08	Title o	of the unit: BASIC GRAMMER								
Articles, Prepositions, Tense	es, Concord (Subject-Verb agree	ement), N	/lodal Auxiliaries, Verbs: its Ki	nd & Uses, De	grees of Compa	rison, l	Punctua	tion.			
Unit-5	Number of lectures = 08	Title	of the unit: BASIC COMPOSIT	ION							
	eport? Kinds and objectives of				Introduction to	busin	ess lette	ers. typ	es of b	usiness	letters.
	etter of Enquiry / Complaint Pro										,
11. CO-PO mapping											
COs		Attribut	es		PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1 Basic Understandi	ng of communication and Profe	essional (	Communication		3	1	1		2	1	1
CO2 Basic knowledge o	f structural and functional gran	mmar. Le	arning Language through liter	rature.	3	1	1		2	1	1
CO3 Basic tools of com	munication and improvement in	in comm	unicative competence.		3	1	2		2	1	1
CO4 Understanding the	e basic grammar and basic struc	cture of l	anguage		3	1	2		2	1	1
CO5 Enhancement of w	vriting skills in English i.e. writin	ng applica	ation, report and various type	s of letters.	2	1	2		2	1	1
	3 Strong	ng contrik	oution, 2 Average contributio	n , 1 Low cont	ribution						
12. Brief description of se	If-learning / E-learning compor	nent									
13. Books recommended:											

	( .)													
	e of the Departmer		· ·						-	_		-	_	
-	se Name	ELEMENTARY MATHEMATIC	S				L		_	1			P	
	se Code	MT108					3		_	1		_	0	<u>,                                     </u>
	of Course (use tick requisite (if any)	10+2 with Mathematics	6.	Frequency (use	tick marks)	Even ( )	Core	≥ <b>()</b>  (√)		DE Either S	<u> </u>	) 5	FC ( V very Ser	
		es, Tutorials, Practicals	0.	Frequency (use	lick marks)	Even()	Out	( v )		Either .	seni (	) [	very ser	II()
7.100		ures = 30		Tuto	rials = 10					Practic	al = Nil			
8. COUR		e course is aimed to develop t	the sk			ecessary for g	rooming th	nem in				gradu	ate. The	topics
		c tools for specialized studies in			,							0		
	SE OUTCOMES (CO													
		ompletion, learners will develo	op foll	owing attributes:										
COUR	SE OUTCOME (CO)				AT	TRIBUTES								
	CO1	Apply Numerical analysis whic	h has e	enormous applicat	tion in the fie	ld of Science a	nd some fi	elds o	f Engir	neering.				
	CO2	Familiar with numerical solution	ons of	nonlinear equatio	ons in a single	variable.								
	CO3	Familiar with finite difference	and di	fferent type interr	nolation tech	nique								
				<i>·</i> · ·		•								
	CO4	Familiar with calculation and in	nterpr	etation of errors in	n numerical n	nethod.								
	CO5	Familiar with statistical analysi	s.											
10. Uni	t wise detailed con	tent												
Unit-1		Number of lectures = 08	-	e of the unit:										
		ns, definition of differential coe	fficien	t, differentiation of	of functions ir	ncluding functi	ion of a fu	nction	, differ	entiatio	on of pa	arametr	ic form,	simple
	essive differentiatio													
Unit-2		Number of lectures =08		of the unit:	1 1 6 1									
-	on: Integration as on of definite integra	inverse of differentiation, Ind	efinite	integrals of star	ndard form, I	integration by	parts, su	bstitut	ion m	ethod	and pa	rtial fra	iction n	iethod
Unit-3	in or definite integra	Number of lectures = 08	Title	of the unit:										
	Basic concepts of	simple random sampling and			oling, measure	es of central to	endency (r	nean.	media	n and r	node).	measur	es of v	ariatio
		rd deviation). Covariance, Karl F												
Unit-4		Number of lectures = 08	Title	of the unit:										
		and Binomial Theorem: Fu					permuta	tions	under	certai	n cond	itions.	Combir	nations
	torial identities. Bin	omial theorem (without proof)			Binomial theo	rem.								
Unit-5 Drobabili	itu Bandom ovnoriu	Number of lectures = 08 ment and associated sample s		e of the unit:	of probability	algobra of o	vonte add	ition a	nd m	ultiplica	tion th	oromo	on pro	habilita
		bisson and Normal distributions				, algebra or e	vents, auu		ina m	иприса	tion the	eorems	on pro	Dabiiit
	O mapping		anary	0.01										
COs			Attribu	utes			F	201	PO2	PO3	PO4	PO5	PO6	PO7
	Apply Numerical a	analysis which has enormous	appli	cation in the fiel	ld of Science	and some f	ields of							
CO1	Engineering.	•						3	2	2	1	1	3	1
CO2	Familiar with nume	erical solutions of nonlinear equ	ation	s in a single variab	ole.			2	2	2	1	1	2	2
CO3	Familiar with finite	difference and different type in	nterno	lation technique				3	2	3	1	1	2	1
				•				-						
CO4	Familiar with calcu	lation and interpretation of err	ors in	numerical method	d.			3	2	3	1	1	3	2
CO5	Familiar with statis	tical analysis.						3	2	1	1	1	2	1
		3 Strong	g conti	ribution, 2 Averag	ge contributio	n , 1 Low cont	ribution							
12. Brie	ef description of sel	f-learning / E-learning compon	ent											
1.		n/content/storage2/nptel_data				c6.pdf								
2.		n/content/storage2/courses/12	221040	018/node114.htm	I									
3. 4.		n/courses/111107062/ 1pu.com/en/document/view/80	56277	8/derivation of m	ingo-kutto m	athod_natal								
4. 5.		tube.com/watch?v=ntWKMkX4		o, aei wation-oi-fu	inge-kulld-fff	- indu-inplei								
	ks recommended:													
1.		l, 1980, Probability and Statistic	s, Sch	aum's (Outline Se	ries) McGraw	-Hill Book Co.								
2.	Q. S. Ahmad, V. Is	mail and S. A. Khan: Biostatistic	cs, Lax	mi Publications Pv	vt. Ltd.									
3.		anced Engineering Mathematics	s", 5th	Edition, Wiley Eas	stern, 1985.									
4. F	Mathematics, NC		Tat- •	AcCrow Lill Dut !!	hore									
5.	Higner Engineerir	ng Mathematics, B. V. Ramana.	i ata N	licgraw Hill Publis	ners									

5. Pre-requisite (if any)       1042 with Chemistry       6. Frequency (use tick marks)       Even ( )       Odd ( V)       Either Sem ( )       Even         7. Total Number of Lectures = 30       Tutorials = 10       Practical = NII         8. COURSE OBJECTIVES: The purpose of this undergraduate course is to impart basic and key knowledge of physical chemistry. By using the principal of number of tool course, the student will able exite the respective dimensions.       9. COURSE OUTCOMES (CO):         After the successful course completion, learners will develop following attributes:       COURSE OUTCOMES (CO):         COURSE OUTCOME (CO)       Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas to pressure, amount, and volume.         CO2       Students would able to understand the interfacial phenomena and behaviour of colloidal systems.         CO3       Students would able to understand the interfacial phenomena and behaviour of colloidal systems.         CO4       Students would able to understand the titer (CO):         Attributes       Number of lectures = 08       Title of the unit: GASEOUS TATE         Postulates of kinetic theory of gases, and environ of quastion for their collocial systems.       Importance of phase diagram in field in didustry.         10. Unit wise detailed content       Unit-1       Number of lectures = 08       Title of the unit: GASEOUS TATE         Postulates of kinetic theory of gases, deviation of colloidal solutions, Aptoci	unic o											
1. Course Code       CH103       1       1         4. Type of Course (use tick mark)       Core (V)       DE ( )       Extended of the course is the marks)       Even ( )       Core (V)       DE ( )       Even ( )         5. Free-requisitie (If any)       10-2 with Chemistry       6. Frequency (use tick marks)       Even ( )       Cod (V)       DE ( )       Even ( )         8. COURSE OBECTIVES: The purpose of this undergraduate course is to import basic and key knowledge of physical chemistry. By using the principal of another set were important for higher studies. After successful (vompletion of course, the student will able on the time respective dimensions.       9. COURSE COURCINES (CO)       After the successful course completion, learners will develop following attributes:         COURSE OUTCOME (CO)       Students would able to understand the interfacial phenomena and behaviour of colicial systems.       CO3       Students would able to apply First law of thermodynamics and Hers kaw of heat summation and parceive the concept of Enthalphic and industry.         CO3       Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         0. Unit wise detailed content       Number of lectures = 08       Title of the unit: GASEOUSTATE         0. Unit wise detailed content       Number of lectures = 08       Title of the unit: GASEOUSTATE         0. Unit wise detailed content       Number of lectures =	oursel	-								Р		
4. Type of Course (use tick mark)         Core {(1)         DE{(1)           5. Pre-requisite (if any)         10-2 with Chemistry         6. Frequency (use tick marks)         Eve (1)         Odd (V)         Either Sem (1)         Eve           7. Total Number of Lectures, Totorias, Practical =         Totorias = 10         Practical = NII         Eventorias = 10         Practical = NII           6. COURSE OUECOMES (Co): After the successful course completion, learners will develop following attributes: After the successful course completion, learners will develop following attributes:         ATTRIBUTES         Eventorias = 10           COURSE OUTCOMES (CO): After the successful course completion, learners will develop following attributes:         ATTRIBUTES         Eventorias = 10           COURSE OUTCOME (CO)         Students would able to understand the interfacial phenomena and behaviour of colloidal systems.         COI         Students would able to understand the basic definitions and terms in a phase diagram and importance of phase dagram in field and industry.           CO3         Students would able to anderstand the basic definitions and terms in a phase diagram and importance of phase dagram in field and industry.         Toto of same dagram in field and industry.           10. Unit wise detailed content         Unit - 1         Number of lectures = 08         Tote of the unit: CASEOUS STATE           Dispersion systems, Types and dassification of colloidal systems.         Tote of the unit: CASEOUS STATE           Dini -										<u>г</u> 0		
F. Pre-requisite (if any)       10-2 with chemistry       6.       Frequency (use tick marks)       Even (1)       Odd (V)       Either Sem (1)       Even (1)         7. Total Number of Lectures = 30       Totorials = 10       Practical = Nil         8. COURSE OBJECTIVES: The purpose of this undergraduate course is to impart basic and key knowledge of physical chemistry. By using the principal of the presention.       9.										FC (	<u>,                                     </u>	
Total Number of Lectures, Tutorials, Practicals       Tutorials = 10       Practical = NII         6. COURSE ODECTIVES: The purpose of this undergraduate course is to impart basic and key knowledge of physical chemistry. By using the principal of mathematics to obtain quantitative relations which are very important for higher studies. After successfully completion of course, the student will able exploring the their respective dimensions.         9. COURSE OUTCOMES (CO)       After the successful course completion, Learners will develop following attributes:         COURSE OUTCOMES (CO)       After the successful course completion, Learners will develop following attributes:         COURSE OUTCOMES (CO)       After the successful course completion, Learners will develop following attributes:         CO1       Students would able to anderstand the interfacial phenomena and behaviour of colloidal systems.         CO2       Students would able to anderstand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         10. Unit vise detailed content       Number of lectures = 08       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation for algaes based on lower Tompicates of colloidal solutions, Aproperties.       Intermodynamics and purprise probable velocities. Liquification of gases thesed on lower Tompicates of colloidal solutions, Properties of colloidal solutions, Aproperties.         I0. Int Vise detailed content       Number of lectures = 08       Title of the unit: COLUDAL STATE				6 Fraguancy (use tick marks) Even ( )		<u>۱</u>			) 5	very Sei		
letures = 30         Tutorials = 10         Practical = NII           8. COURSE OBJECTVES: The purpose of this undergraduate course is to impart basic and key knowledge of physical chemistry. By using the principal of mathematics to obtain quantitative relations which are very important for higher studies. After successfully completion of course, the student will able explore dimensions.           9. COURSE OUTCOMES (CO):         After insuccessful course completion, learners will develop following attributes:           COURSE OUTCOMES (CO):         After the successful course completion, learners will develop following attributes:           COURSE OUTCOME (CO)         Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas to pressure, amount, and volume.           CO3         Students would able to understand the interfacial phenomena and behaviour of colloidal systems.           CO4         Students would able to understand the basic definitions at terms in a phase diagram and intensive properties.           CO4         Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.           10. Unit wise detailed content         Number of lectures = 08         Title of the unit: GASEOUS STATE           Postulates of theatic theory of gases and derivation of xinetic molecular theory of gases, deviation from ideal behavior, vander Wasls equations, relationship between critical constants and van der Wasls constant           Unit 3         Number of lectures = 08         Title of the unit: COL		,,			Ouu (V	)	Littlei	Sein (	) L	very Ser	II ( )	
8. COURSE OBICTIVES: The purpose of this undergraduate course is to impart basic and key knowledge of physical chemistry. By using the principal of mathematics to obtain quantitative relations which are very important for higher studies. After successfully completion of course, the student will able on their respective dimensions.         9. COURSE OUTCOMES (CO):         After the successful course completion, learners will develop following attributes:         After the successful course completion, learners will develop following attributes:         COI       Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas to pressure, amount, and volume.         CO2       Students would able to understand the interfacial phenomena and behaviour of colloidal systems.         CO3       Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         3. Outlents would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         3. Unit wise detailed content       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases and derivation of quarke, werage and most probable velocities. Liquification of gases (based on Joule Themason)         Dispersion systems, Types and classification of colloidal systems. Preparation and purffication of colloidal solutions, Properties of colloidal solutions, Properties of colloidal solutions, Properties of colloidal solutions, Presonation and their framedymamic terms : system, surrounding etc: Types of systems, intensive and extensive p	Juli		· ·	Tutorials = 10			Dractic	al – Nil				
mathematics to obtain quantitative relations which are very important for higher studies. After successfully completion of course, the student will able expline the timespectrum dimension. 9. COURSE OUTCOME (CO) After the successful course completion, learners will develop following attributes: COUNSE OUTCOME (CO) COURSE OUTCOME (CO) Students would able to understand the interfacial phenomena and behaviour of colloidal systems. CO3 Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalp CO5 Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry. CO4 Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry. CO5 Students would able to understand the basic definitions, relationship between critical constants and van der Waals equation softerns of idea gase, continuity of states, the toothers of vander Waals equations, relationship between critical constants and van der Waals equation corresponding states, reduced equation of states. Root mean square, average and most probable velocities. Liquing the constants and van der Waals equation corresponding states, reduced equation of states. Neot mean square, average and most probable velocities. Liquing the capacity, here Co6 Students would able to work. First Law of Thermodynamics and exensive properties. State and path functions and their formodynamic process. Concept of heat and work. First Law of Thermodynamics of colloidal solutions, Properties of colloidal solutions, Ap colloids, Emulated. Short Mean Mean Mean Mean Mean Mean Mean Mean					hysical sho	nictn			incinal	of phy	icc an	
Note that the second performance of the second knowledge of gas and their properties and examine the relationships between gas to pressure, amount, and volume.         COL       Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas to pressure, amount, and volume.         CO2       Students would able to understand the interfacial phenomena and behaviour of colloidal systems.         CO3       Students would able to understand the basic definition of system, surrounding, closed and open system, extensive and intensive properties.         CO4       Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         10. Unit wise detailed content         Unit:       Number of lectures = 08       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases, deviation from ideal behavior, vander Waals coustant corresponding states, reduced equation of states, the isotherms of vander Waals equations, relationship between curcial constants and van der Waals constant corresponding states, reduced equation of states. The store of reso of gases, deviation of colloidal solutions, Properties of colloidal solutions, Aproperties on systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties of colloidal solutions, Aproperties on system, system and work. First Law of Thermodynamics: Statement, definition of W., q, dl and dH for the expansion counstant volume and pressure and work. F												
9. COURSE OUTCOMES (CO):         After the successful course completion, learners will develop following attributes:         COURSE OUTCOME (CO)         Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas t pressure, amount, and volume.         CO2       Students would able to understand the interfacial phenomena and behaviour of colloidal systems.         CO3       Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalp and industry.         I.O. Unit wise detailed content       Students would advine to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         I.O. Unit wise detailed content       Iftee of the unit: GASEOUS STATE         Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals equations relationship between critical constants and van der Waals constant corresponding states, reduced equation of states. Root mean square, average and most probable velocities. Lugification of gases (based on Jouet Thompson)         Unit-2       Number of lectures = 08       Title of the unit: COLIDIDL STATE         Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties of colloidal solutions, Ap colloids, Emulations         Unit-3       Number of lectures = 08       Title of the unit: CHERMODYNAMICS – 1         Definition of thermodynamic terms :				y important for inglier studies. After successfully con	ipiction of t	Jourse,	the stu			.xpiore	Jubjee	
ATTRIBUTES           CO1         Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas t pressure, amount, and volume.           CO2         Students would able to understand the interfacial phenomena and behaviour of colloidal systems.           CO3         Students would able to understand the interfacial phenomena and behaviour of colloidal system. extensive and intensive properties.           CO3         Students would able to understand the basic definition of system, surrounding, closed and open system, extensive and intensive properties.           CO4         Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.           10. Unit vise detailed content           Number of lectures = 08         Title of the unit: GASEOUS STATE           Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals equation contensing between critical constants and van der Waals equation corresponding states, reduced equation of states. Root mean square, average and most probable velocities. Liquification of gases (based on Joule Thompson.           Number of lectures = 08         Title of the unit: COLIDIAL STATE           Definition of thermodynamics for reversible process.         Concopt heat and yon fr. First Law of Theremodynamics: Statement, definition of W. q. dU and H fo		•										
Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas to pressure, amount, and volume.         CO2       Students would able to understand the interfacial phenomena and behaviour of colloidal systems.         CO3       Students would able to understand the interfacial phenomena and behaviour of colloidal systems.         CO4       Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         CO4       Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         10. Unit wise detailed content         Unit-1       Number of lectures = 08       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases and dirivation of equation for kinetic molecular theory of gases, deviation form ideal behavior, vander Waals equation states, reduced equation of states. Root mean square, average and most probable velocities. Liquification of gases (based on Joule Thompson: Unit-2       Number of lectures = 08       Title of the unit: COLDIDAL STATE         Dispersion systems, Types and classification of colloidal systems, intensive and extensive properties. State and path functions and their facial able process.       Concept of heat and work. First taw of Thermodynamics: Statement, definitition of internal energy and thalpy. Heat capacity, heat and stat	the su	ccessful course co	ompletion, learners will develo	op following attributes:								
CO1       pressure, amount, and volume.         CO2       Students would able to understand the interfacial phenomena and behaviour of colloidal systems.         CO3       Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalp         CO4       Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         10. Unit wise detailed content       Number of lectures = 08       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals equations, relationship between critical constants and van der Waals constant corresponding states, reduced equation of states. Root mean square, average and most probable velocities. Liquification of gases (based on Joule Thompson).         Unit-2       Number of lectures = 08       Title of the unit: COLOIDAL STATE         Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Ap colloids, Emulsions.       Number of lectures = 08       Title of the unit: THERMODYNAMICS – 1         Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and entresive properties. State and path functions and their relationship. Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and dH for the expansion or under isothermodynamics: Statement, definition of internal energy and entaby. Heat capacity, heat constant pressure and at constant pressure and at constant pressure and at constant	URSE (	OUTCOME (CO)		ATTRIBUTES								
pressure, amount, and volume.         CO2       Students would be to understand the interfacial phenomena and behaviour of colloidal systems.         CO3       Students would be to understand the interfacial phenomena and behaviour of colloidal systems.         CO4       Students would be to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         10. Unit wise detailed content         Unit 3       Number of lectures = 08       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases and derivation of quatton for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals constant corresponding states, reduced equation of states, not mean square, average and most probable velocities, liquification of gases (based on loue Thormson or Colloidal systems, Preparation and purification of colloidal solutions, Apcollad, studies and work. First Law of Theor Maynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and dH for the expansion or under isothermal and adiabatic conditions or reversible process.         Winter of lectures = 08       Title of the unit: THERMODYNAMICS – I         Unit 3       Number of lectures = 08       Title of the unit: THERMODYNAMICS – I         Unit 4       Number of l		CO1	Students would get inside the	e sound knowledge of gas and their properties and	examine t	he rela	tionship	s betw	een gas	tempe	erature	
C03       Students would the restate definition of system, surrounding, closed and open system, extensive and intensive properties.         C04       Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalp Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         10. Unit wise detailed content       Number of lectures = 08       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases, and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals equations isotherms of ideal gases, continuity of states, the isotherms of vander Waals equations, relationship between critical constants and van der Waals constant corresponding states, reduced equation of colloidal systems, average and most probable velocities. Liquification of gases (based on Joule Thompson in Unit-2       Number of lectures = 08       Title of the unit: TOLIDIOL STATE         Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties of colloidal solutions, Apc colloids, Emulsion.       Number of lectures = 08       Title of the unit: THERMODYNAMICS - 1         Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their Thermodynamic terms : system, surrounding etc. Types of systems, intensive and etc. Calculation of W, q, dU and dH for the expansion or under isothermal and adiabatic conditions for reversible process.         Unit-4       Number of lectures = 08       Title of the unit: THERMO			pressure, amount, and volume									
CO4       Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalp         CO5       Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         J0. Unit wise detailed content       Number of lectures = 08       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals equations, rostems of vide dag gases, continuity of states, the lisotherms of vander Waals equations, ropeable velocities. Liquification of gases (based on Joule Thompson.         Unit-2       Number of lectures = 08       Title of the unit: COLDIOLAL STATE         Dispersion systems, Types and classification of colloidal systems, preparation and purification of colloidal solutions, Ap colloids, Emulsions.       Number of lectures = 08       Title of the unit: THERMODYNAMICS – 1         Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their Thermodynamics. Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship, Joule-1 Mow of heat summation and its applications. Heat of reaction at constant pressure and their relationship.       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Standard state, standard enthalpy of formations - Heas's Law of heat summation and its applications. Heat of reaction at constant pressure and a torestate stand adiabatic conditions for reversible process		CO2	Students would able to unders	tand the interfacial phenomena and behaviour of collo	oidal system	s.						
CO4       Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy         CO5       Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         10. Unit wise detailed content       Number of lectures = 08       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals equations, relationship between critical constants and van der Waals constant corresponding states, reduced equation of states. Root mean square, average and most probable velocities. Liquification of gases (based on Joule Thompson.         Unit-2       Number of lectures = 08       Title of the unit: COLIDIAL STATE         Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties of colloidal solutions, Ap colloids, Emulsions.       Mumber of lectures = 08       Title of the unit: THERMODYNAMICS - I         Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their Thermodynamic process. Concept of heat and work. First Law of thermodynamics: Statement, definition of word of wad, du and Hafor the expansion curve isober model at a tomstant burger and their relationship, Joule -Thomson effect and inversion temperature. Calculation of W, q, dU and Hf for the expansion cress to volume and pressure and their relationship. Joule -Thomson effect and inversion temperature. Calculation of W, q, dU and Hf for the expansion of the tentes - phase, component and		CO3	Students would the restate de	finition of system, surrounding, closed and open system	n, extensive	and in	tensive	propert	ies.			
COS       Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field and industry.         10. Unit wise detailed content         Unit-1       Number of lectures = 08       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, wander Waals equations softerms of ideal gases, continuity of states, the isotherms of vander Waals equations, relationship between critical constants and van der Waals constant corresponding states, reduced equation of states. Root mean square, average and most probable velocities. Liquification of gases (based on Joule Thompson - Unit-2       Number of lectures = 08       Title of the unit: THERMODYNAMICS - 1         Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties. State and path functions and their Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W. q, dU and H for the expansion or under isothermal and adiabatic conditions for reversible process.       Volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W. q, dU and H for the expansion or under isothermal. Bund industry.         Unit-4       Number of lectures = 08       Title of the unit: THERMODYNAMICS – I         Standard state, standard enthalpy of formation - Hestr's Law of thermodynamics: Statement, Edi										lm.,		
COS       Individuality.         10. Unit wise detailed content         Unit-1       Number of lectures = 08       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals equations, relationship between critical constants and van der Waals constant corresponding states, reduced equation of states. Root mean square, average and most probable velocities. Liquification of gases (based on Joule Thompson - Unit-2         Number of lectures = 08       Title of the unit: COLLOIDAL STATE         Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties of colloidal solutions, and their Thermodynamic process. Concept of heat and work. First taw of Thermodynamic process. Concept of heat and work. First taw of Thermodynamic process. Concept of heat and work. First taw of Thermodynamics and extensive properties. State and path functions and their relationship. Joule-Thomson effect and inversion temperature. Calculation of w, q, dU and dH for the expansion or under isothermal and adiabatic conditions for reversible process.         Unit-4       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Standard enthalpy of formation - Hess's Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship. Joule-Thomson effect and inversion temperature. Calculation of w, q, dU and dH for the expansion or under isothermal and adiabatic conditions for reversible process.         Unit-5       Number of lectures = 08				-				•			<u> </u>	
10. Unit wise detailed content         Unit-1       Number of lectures = 08       Title of the unit: GASEOUS STATE         Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals equation softerms of ideal gases, continuity of states, the isotherms of vander Waals equations, relationship between critical constants and van der Waals constant corresponding states, reduced equation of states. Root mean square, average and most probable velocities. Liquification of gases (based on Joule Thompson - Unit-2         Number of lectures = 08       Title of the unit: THERMODYNAMICS - I         Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and dH for the expansion or under isothermal and adiabatic conditions for reversible process.         Unit-3       Number of lectures = 08       Title of the unit: THERMODYNAMICS - II         Definition of preversible process.         Unit-3       Number of lectures = 08       Title of the unit: PHASE EQUILIBRUM         Standard enthalpy of formation - Hess's Law of Thet unit: THERMODYNAMICS - II         Standard enthalpy of		CO5		stand the basic definitions and terms in a phase diagra	m and impo	rtance	of phase	e diagra	m in fie	ld of ch	emistr	
Unit-1         Number of lectures = 08         Title of the unit: GASEOUS STATE           Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals equation scoresponding states, reduced equation of states. Root mean square, average and most probable velocities. Liquification of gases (based on Joule Thompson - Unit-2           Number of lectures = 08         Title of the unit: COLLOIDAL STATE           Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties of colloidal solutions, Ap colloids, functions           Unit-3         Number of lectures = 08           Title of the unit: THERMODYNAMICS - I           Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their Thermodynamic process. Concept of heat and work, First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and dH for the expansion or under isothermal and adiabatic conditions for reversible process.           Unit-4         Number of lectures = 08         Title of the unit: THERMODYNAMICS - II           Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant pressure and its calculation from thermo-chemical data, temperature dependence of enthalpy.           Unit-5         Number of lectures = 08         Titl	l Init w		1									
Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals equation isotherms of ideal gases, continuity of states, the isotherms of vander Waals equations, relationship between critical constants and van der Waals constant orresponding states, reduced equation of states. Root mean square, average and most probable velocities. Liquification of gases (based on Joule Thompson Unit-2 Number of lectures = 08 Title of the unit: COLOIDAL STATE Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties of colloidal solutions, Ap- colloids, Emulsion. Unit-3 Number of lectures = 08 Title of the unit: THERMODYNAMICS - 1 Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship. Joule-Thomson effect and inversion temperature. Calculation of W., q, U and HI for the expansion of under isothermal and adiabatic conditions for reversible process. Unit-4 Number of lectures = 08 Title of the unit: THERMODYNAMICS - 11 Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at relationship of heutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. <b>Number of lectures = 08</b> Title of the unit: THERMODYNAMICS - 11 Standard state, standard enthalpy of formation - Hess's Law of heat summation and his applications. Heat of reaction at constant pressure and at respense Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. <b>Number of lectures</b>		ise detailed cont		Title of the unit: GASEOUS STATE								
isotherms of ideal gases, continuity of states, the isotherms of vander Waals equations, relationship between critical constants and van der Waals constant corresponding states, reduced equation of states. Root mean square, average and most probable velocities. Liquification of gases (based on Joule Thompson - Unit-2 Number of lectures = 08 Title of the unit: COLIDIDAL STATE Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties of colloidal solutions, Ap colloids, Emulsions. Unit-3 Number of lectures = 08 Title of the unit: THERMODYNAMICS - I Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and dH for the expansion of under isothermal and adiabatic conditions for reversible process. Unit-4 Number of lectures = 08 Title of the unit: THERMODYNAMICS – I Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at const Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Unit-5 Number of lectures = 08 Title of the unit: PHASE EQUILIBRIUM Gibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system. 11. CO-PO mapping COS Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pressure, amount, and volume. COS Students would able to understand the interfacial phenomena and behaviour of colloidal systems. 3 1 2 2 2 2 5 Cod Students would able to		of kinotic theory of			rom ideal h	obavio	vando	r Waalo	oquati	on of St	tato D	
Number of lectures = 08       Title of the unit: COLLODAL STATE         Unit-2       Number of lectures = 08       Title of the unit: COLLODAL STATE         Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties of colloidal solutions, and path functions and their function of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and dH for the expansion or under isothermal and adiabatic conditions for reversible process.       Title of the unit: THERMODYNAMICS – II         Unit-4       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant pressure and ta calculation from thermo-chemical data, temperature dependence of enthalpy.         Unit-5       Number of lectures = 08       Title of the unit: THASSE EQUILIBRIUM         Glibs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.         11. CO-P mapping       COS       Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pr												
Unit-2       Number of lectures =08       Title of the unit: COLLOIDAL STATE         Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties of colloidal solutions, Apcolloids, Emulsions.         Unit-3       Number of lectures = 08       Title of the unit: THERMODYNAMICS – I         Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and dH for the expansion or under isothermal and adiabatic conditions for reversible process.         Unit-4       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Standard state, standard enthalpy of formation - Hess's Law of fheat summation and lis applications. Heat of reaction at constant pressure and at constant pressure and its calculation from thermo-chemical data, temperature dependence of enthalpy.         Unit-5       Number of lectures = 08       Title of the unit: PHASE EQUILIBRIUM         Globs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.         11. CO-PO mapping       COS       Attributes       3       1       1       2       2         CO1       Students would get inside the sound knowledge of g		-										
Inite of the unit: THERMODYNAMICS – I         Unit-3       Number of lectures = 08       Title of the unit: THERMODYNAMICS – I         Definition of thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat capacity, heat capacity, heat isothermal and adiabatic conditions for reversible process.       Unit-4       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and tis calculation from thermo-chemical data, temperature dependence of enthalpy.         Unit-5       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and a torss Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy.         Unit-5       Number of lectures = 08       Title of the unit: PHASE EQUILIBRIUM         Gibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria or or component system - water, system:         Students would get inside the sound knowledge of gas and their properties and examine the relationships a law of lectures and would be to understand the interfacial phenomena and behaviour of coloidal systems.       3       1<		,									<u></u>	
Inite of the unit: THERMODYNAMICS – I         Unit-3       Number of lectures = 08       Title of the unit: THERMODYNAMICS – I         Definition of thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat and adabatic conditions for reversible process.       Itile of the unit: THERMODYNAMICS – II         Unit-3       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and to dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy.         Unit-5       Number of lectures = 08       Title of the unit: PHASE EQUILIBRIUM         Gibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.         Students would get inside the sound knowledge of gas and their properties and examine the relationships as the sound knowledge of gas and their properties and examine the relationships as the sound would get inside the sound knowledge of gas and their properties and examine the relationships as the sound knowledge of system, surrounding, closed and open system, extensive and as tasset of the concept of Enthalpy.       QOI<	rsion s	systems, Types a	nd classification of colloidal s	ystems, Preparation and purification of colloidal solu	utions, Prop	erties o	of colloi	dal solu	itions, /	Applicat	tions o	
Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their         Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat         Constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and H for the expansion or         Unit-4       Number of lectures = 08         Unit-4       Number of lectures = 08         Title of the unit: THERMODYNAMICS – II         Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume.         Unit-5       Number of lectures = 08         Title of the unit: THERMODYNAMICS – II         Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume.         Unit-5       Number of lectures = 08         Title of the unit: PHASE EQUILIBRIUM         Gibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.         11. CO-PO mapping         CO1       Students would get inside the sound knowledge of gas and their properties and examine the relationships as temperature, pressure, amount, and volume.       3       1       2       2         CO2 <td< td=""><td>ds, Emi</td><td>ulsions.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	ds, Emi	ulsions.										
Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and dH for the expansion or under isothermal and alabatic conditions for reversible process.         Unit-4       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant pressure and dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy.         Unit-5       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Unit-5       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Unit-5       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Unit-5       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Gos       PO1       PO2       PO3       PO4       PO5         Cos       Attributes       PO1       PO2       PO3       PO4       PO2 <th col<="" td=""><td>t-3</td><td></td><td>Number of lectures = 08</td><td>Title of the unit: THERMODYNAMICS – I</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th>	<td>t-3</td> <td></td> <td>Number of lectures = 08</td> <td>Title of the unit: THERMODYNAMICS – I</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	t-3		Number of lectures = 08	Title of the unit: THERMODYNAMICS – I							
constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and dH for the expansion of under isothermal and adiabatic conditions for reversible process.         Unit-4       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant pressure and at constant pressure and at constant pressure and scalculation from thermo-chemical data, temperature dependence of enthalpy.         Unit-5       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Unit-5       Number of lectures = 08       Title of the unit: PHASE EQUILIBRIUM         Gibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.         11. CO-P mapping         COs       PO1       PO2       PO3       PO4       PO3       PO4       PO3       PO4       PO2       PO3       PO4       PO3       PO4       PO3       PO4       PO3       PO4       PO3       PO4       PO4												
under isothermal and adiabatic conditions for reversible process.         Unit-4       Number of lectures = 08       Title of the unit: THERMODYNAMICS – II         Standard state, standard enthalpy of formation – Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant pressure and at constant pressure and at constant pressure and its calculation from thermo-chemical data, temperature dependence of enthalpy.         Unit-5       Number of lectures = 08       Title of the unit: PHASE EQUILIBRIUM         Gibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.       Number of lectures = 08       Title of the unit: PHASE EQUILIBRIUM         11. CO-PO mapping         CO2       Students would get inside the sound knowledge of gas and their properties and examine the relationships a transition and volume.       1       1       2	-	•	-	-					-			
Unit-4Number of lectures = 08Title of the unit: THERMODYNAMICS – IIStandard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at const Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy.Unit-5Number of lectures = 08Title of the unit: PHASE EQUILIBRIUMGibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.11. CO-PO mappingCOsAttributesPO1PO2PO3PO4PO5ICO1Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pressure, amount, and volume.31122CO2Students would able to understand the interfacial phenomena and behaviour of colloidal systems.31222CO3Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.3113313CO4Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.31133					ion of W, q	dU an	d dH foi	the ex	pansion	of idea	al gase	
Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant pressure and at constant pressure and its calculation from thermo-chemical data, temperature dependence of enthalpy.         Unit-5       Number of lectures = 08       Title of the unit: PHASE EQUILIBRIUM         Gibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.         11. CO-PO mapping         COs       PO1       PO2       PO3       PO4       PO2       PO3       PO4       PO2       PO3       PO4       PO1       CO       Sudents would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pressure, amount, and volume.       CO2       Students would abl												
Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy.Unit-5Number of lectures = 08Title of the unit: PHASE EQUILIBRIUMGibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.11. CO-PO mappingCO1Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pressure, amount, and volume.901PO2PO3PO4PO5ICO2Students would able to understand the interfacial phenomena and behaviour of colloidal systems.31222CO3Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.31133CO4Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.3113	-	ate standard ent			reaction at	consta	nt nross	uro an	t at cor	nctant v	olume	
Unit-5Number of lectures = 08Title of the unit: PHASE EQUILIBRIUMGibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.11. CO-PO mappingCOsAttributesPO1PO2PO3PO4PO5ICO1Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pressure, amount, and volume.31122CO2Students would able to understand the interfacial phenomena and behaviour of colloidal systems.31222CO3Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.3113313CO5Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.311333133			• •				•				olume	
system.11. CO-PO mappingCOsAttributesPO1PO2PO3PO4PO5PO5C01Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pressure, amount, and volume.3112C02Students would able to understand the interfacial phenomena and behaviour of colloidal systems.3122C03Students would the restate definition of system, surrounding, closed and open system, extensive and intensive properties.3122C04Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.3113C05Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.3113							- 1-7					
11. CO-PO mappingCOsAttributesPO1PO2PO3PO4PO5PO5C01Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pressure, amount, and volume.31122C02Students would able to understand the interfacial phenomena and behaviour of colloidal systems.31222C03Students would the restate definition of system, surrounding, closed and open system, extensive and intensive properties.31222C04Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.31133C05Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.31133	phase	e rule, Statement	and meaning of the terms -	phase, component and degree of freedom, phase eq	uilibria of c	ne com	ponent	system	- wate	er, and	sulphu	
COsAttributesPO1PO2PO3PO4PO5PO5C01Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pressure, amount, and volume.31122C02Students would able to understand the interfacial phenomena and behaviour of colloidal systems.31222C03Students would the restate definition of system, surrounding, closed and open system, extensive and intensive properties.31222C04Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.31133C05Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.31133	•		0				•	,		,	•	
CO1Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pressure, amount, and volume.3112CO2Students would able to understand the interfacial phenomena and behaviour of colloidal systems.3122CO3Students would the restate definition of system, surrounding, closed and open system, extensive and intensive properties.3122CO4Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.3113CO5Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.3113	D-PO m	napping										
CO1between gas temperature, pressure, amount, and volume.3112CO2Students would able to understand the interfacial phenomena and behaviour of colloidal systems.3122CO3Students would the restate definition of system, surrounding, closed and open system, extensive and intensive properties.31222CO4Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.31133CO5Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.31133	s		ł	Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07	
between gas temperature, pressure, amount, and volume.Image: Constant of the stant o	, Stu	udents would get	inside the sound knowledge	of gas and their properties and examine the relations	ships 🦕	1	1		· ·	4		
CO3Students would the restate definition of system, surrounding, closed and open system, extensive and intensive properties.3122CO4Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.31133CO5Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.3113	L be	etween gas tempe	rature, pressure, amount, and	volume.	3	1	1		2	1		
CO3intensive properties.3122CO4Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.3113CO5Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.3113	<b>2</b> Sti	udents would able	e to understand the interfacial	phenomena and behaviour of colloidal systems.	3	1	2		2	1		
Intensive properties.Image: Constraint of the concept of Enthalpy.Image: Constraint of the concept of the concept of Entha	Stu	udents would th	e restate definition of syster	n, surrounding, closed and open system, extensive	and ,	4	2		2	4		
CO4the concept of Enthalpy.3113CO5Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.3113	3 int	tensive properties	5.		3	1	2		2	1		
the concept of Enthalpy.Image: Concept of Enthalpy.Image: Concept of Enthalpy.Image: Concept of Enthalpy.COSStudents would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.Image: Concept of Enthalpy.Image: Concept of Enthalpy.	4			odynamics and Hess law of heat summation and per	ceive a	1	1		2	2		
phase diagram in field of chemistry and industry.	the		17			-	-		,	-		
	5			finitions and terms in a phase diagram and important	ce of 3	1	1		3	2		
	ph	hase diagram in fie	, ,									
3 Strong contribution, 2 Average contribution, 1 Low contribution	Duit (	la annination a far th	-		ution							
12. Brief description of self-learning / E-learning component												
<ol> <li>https://www.fullonstudy.com/bsc-1st-year-chemistry-notes-pdf</li> <li>https://www.docsity.com/en/bsc-1st-year-notes-chemistry/4194474/</li> </ol>				<i>, , , , , , , , , ,</i>								
<ol> <li>https://www.oocsity.com/en/bsc-1sc-year-lotes-chemistry-notes-pdf-sem-i-ii-download-here-db8ebb3b5340</li> <li>https://medium.com/@itsharishjoshi/bsc-1st-year-chemistry-notes-pdf-sem-i-ii-download-here-db8ebb3b5340</li> </ol>		• • • •			b3b5340							
<ol> <li>https://www.youtube.com/watch?v=UVaHSegCPzE</li> </ol>		• • • •		, ,								
13. Books recommended:			,									
1. Chemical Thermodynamics by R.P.Rastogi et al			lynamics by R.P.Rastogi et al									
2. Principles of physical chemistry by Puri Sharma and Pathan	2. P	Principles of physi	cal chemistry by Puri Sharma a									
2 Eccentials of Deviced Chamistry, Dabl & Tuli S. Chand P. Ca. 1td	3. E	Essentials of Physi	cal Chemistry, Bahl & Tuli, S. C	hand & Co. Ltd.								
3. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.			al Chamistry Duri Charma 8	Pathania Vichal Publishing Co								
<ol> <li>Essentials of Physical Chemistry, Bahl &amp; Tull, S. Chand &amp; Co. Ltd.</li> <li>Principles of Physical Chemistry, Puri, Sharma &amp; Pathania, Vishal Publishing Co.</li> <li>Simplified course in Physical Chemistry, Madan &amp; Tuli, S. Chand &amp; Co. Ltd.</li> </ol>	4. P		-	-								

1. Name of the Department: CHEMISTRY       2. Course Name       INORGANIC CHEMISTRY – I	T	1		
	T		P	
	1		0	<u> </u>
4. Type of Course (use tick mark)       Core (√)       DE         5. Pre-requisite (if any)       10+2 with Chemistry       6. Frequency (use tick marks)       Even ( )       Odd (√)       Either	• •	\	FC ( ) very Ser	
7. Total Number of Lectures, Tutorials, Practicals	Selli (	) [	very ser	II()
	al = Nil			
8. COURSE OBJECTIVES: To introduce and explain various properties of atomic structure, periodic table and nuclear chemistry: de Brog		or way	os Hois	onhore
uncertainty, atomic orbitals, quantum numbers, Aufbau's, Pauli's and Hund's multiplicity rules along with VSEPR (Valence Shell Electron I				
Orbital theory.	un nep	aisiony		
9. COURSE OUTCOMES (CO):				
After the successful course completion, learners will develop following attributes:				
COURSE OUTCOME (CO) ATTRIBUTES				
CO1 Students are able to evaluate the atomic structure and their properties along with principles, shapes and electr	onic con	figurati	ons.	
CO2 Understanding of various periodic properties and their variations gives an idea of elemental nature.				
CO3 Students are taught principles, types and strengths of various chemical combinations for effective application o	f bondin	ıg.		
CO4 Analysis and evaluation of hybridization and geometry of molecular system helpful to identify the structure and	their re	activity	<i>'</i> .	
CO5 The study of nuclear chemistry and its application create knowledge about the dating and radiotracer techniq nuclear fission and nuclear fusion.	ues alon	ng with	nuclear	decay
10. Unit wise detailed content				
Unit-1 Number of lectures = 08 Title of the unit: ATOMIC STRUCTURE				
Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, quantum numbers, shapes of s, p, and d orbitals. Aufbau	and Pau	li exclu	sion pri	nciples
Hund's multiplicity rules. Electronic configurations of the elements.				
Unit-2 Number of lectures =08 Title of the unit: PERIODIC PROPERTIES				
An introduction to modern periodic table, periodicity in properties of elements: Atomic and ionic radii, ionization energy, electron Affini	ty, electi	ronega	tivity, el	ffective
nuclear charge, shielding effect.				
Unit-3         Number of lectures = 08         Title of the unit: CHEMICAL BONDING – I           Introduction, causes of chemical combination, electronic theory of valency, general characteristics of: electrovalent bond, covalent bond         covalent bond	ad coor	dinato	hand r	notalli
bonding and hydrogen bonding.	iu, coor	unate	bonu, i	netaiiit
Unit-4 Number of lectures = 08 Title of the unit: CHEMICAL BONDING – II				
Hybridization and shapes of simple molecules and ions. Valence Shell Electron Pair Repulsion (VSEPR) theory to NH3, SF4, CIF3, ICI4- and I	120. Mo	lecular	Orbital	theory
for homonuclear and heteronuclear diatomic molecules, bond length, bond angle and bond energy, resonance.				
Unit-5 Number of lectures = 08 Title of the unit: NUCLEAR CHEMISTRY				
Natural and artificial radioactivity, binding energy, rate equation for nuclear decay, nuclear fission and nuclear fusion and their applicati	ons, gro	up disp	laceme	nt law
isotopes and isobars, applications of radioactivity: radiocarbon dating and radio tracer techniques.				
11. CO-PO mapping	1 1			
COs Attributes PO1 PO2 PO3	PO4	PO5	PO6	P07
CO1 Students are able to evaluate the atomic structure and their properties along with principles, shapes and 2 1 -	2	-	-	2
	2		4	2
CO2 Understanding of various periodic properties and their variations gives an idea of elemental nature. 1 1 -	3	-	1	2
CO3 Students are taught principles, types and strengths of various chemical combinations for effective 2 1 -	2	-	-	3
CO4 Analysis and evaluation of hybridization and geometry of molecular system helpful to identify the structure <b>1 1</b> -	1	-	-	1
CO5 The study of nuclear chemistry and its application create knowledge about the dating and radiotracer 2 1 -	1	-	1	2
3 Strong contribution, 2 Average contribution, 1 Low contribution	<u> </u>			
12. Brief description of self-learning / E-learning component				
1. https://www.youtube.com/watch?v=0ofu2inFF0k				
<ol><li>https://www.youtube.com/watch?v=MCYRhCA7j1s</li></ol>				
3. https://www.wiley.com/en-in/Basic+Inorganic+Chemistry,+3rd+Edition-p-9780471505327				
13. Books recommended:				
1 Advanced Inergenia Chemistry Vol I R II Cetus Drokech C D. Tuli C K. Devy, D D. Mader, C. Chend O. Ce, U.J.				
1. Advanced Inorganic Chemistry Vol-I & II, Satya Prakash, G.D. Tuli, S.K. Basu, R.D. Madan, S. Chand & Co. Ltd.				
2. Test book of Inorganic Chemistry, P.L. Soni, Sultan Chand & Sons				

1. Nam	e of the Departmer	nt: CHEMISTRY										
2. Cou	rse Name	ORGANIC CHEMISTRY – I				L			т		Р	
3. Cou	rse Code	CH105				3			1		0	
4. Type	e of Course (use tick	mark)				Core (√	)	DE	()		FC (	)
5. Pre-	requisite (if any)	10+2 with Chemistry	6	. Frequency (use tick marks)	Even ( )	Odd (v	')	Either	Sem (	) E	ery Se	m ( )
7. Tota	l Number of Lecture	es, Tutorials, Practicals										
		ures = 30		Tutorials = 10					al = Nil			
				o study the nomenclature of org					organic	molecu	les con	sidering
			droge	n bonding etc., and mechanism	of various type	es of organic re	actions.					
	RSE OUTCOMES (CO	•										
	SE OUTCOME (CO)	ompletion, learners will devel	eiop je		TRIBUTES							
	CO1		-	organic molecules considering va		effects such as	inducti	ve effec	t, hyper	conjuga	ation,	
		mesomeric effects, hydrogen		-								
	CO2	Evaluate the different types of	of org	anic reactions and their mechan	sm.							
	CO3	Understand IUPAC nomenclat	ature	of Alkane, Alkenes, Alkynes, fund	ctional groups,	, bifunctional a	nd poly	function	al organ	nic com	pounds.	
	CO4	Analyze Isomerism and its type	pes.									
	CO5	Understand and evaluate the	e mec	hanism of Hoffmann elimination	Markownikof	f's rule, Saytze	ff rule, o	ozonolys	sis and e	poxida	tion.	
10. Un	it wise detailed con	tent										
Unit-1		Number of lectures = 08		itle of the unit: STRUCTURE ANI				-				
		sp hybridization of carbon; B	Bond	lengths, bond angles, bond ene	rgy, resonanc	e, hyperconjug	ation, i	nductive	e, electo	meric	and me	somerio
Unit-2	nydrogen bonding.	Number of lectures =08	т	tle of the unit: ORGANIC REACT					ATEC			
				itution and Elimination reaction						ediates	- carbo	cations
		benes, nitrenes and benzynes.			. Licetropinie		inics, i	cuctive	interni	culates	carbo	cations
Unit-3	· · ·	Number of lectures = 08	Ti	tle of the unit: IUPAC NOMENCI	ATURE							
Classifica	ation of organic con	npounds, Functional group, He	lomo	logous series, IUPAC nomenclat	ure of organio	c compounds (	alkanes	, alkene	s, alkyn	es, cyc	loalkan	es, alky
	alcohols, aldehydes,			ters, anhydrides), bifunctional a		nal organic cor	npound	s.				
Unit-4	<u> </u>	Number of lectures = 08		tle of the unit: STEREOCHEMIST							- <i>(</i>	
				ereoisomerism, E and Z nomer oonds, Newman, Saw horse and I			rism in	alicyclic	compo	unds.	Conform	nationa
Unit-5		Number of lectures = 08		tle of the unit: ALKANES AND A	· · ·	10113.						
	ion of alkanes by hy			eduction of alkyl halides, Grignar		irtz reaction. C	nemical	propert	ies of al	kanes.	Mechar	nisms of
				ides, Saytzeff rule, Hoffmann eli								
		ozonolysis, hydration, hydroxyl	ylatio	n and oxidation with KMnO4.								
11. CO-P	O mapping											
COs				ibutes		PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1		and bonding of organic molecul gation, mesomeric effects, hyd		onsidering various types of effec n bonding etc.	ts such as indu	uctive 3	2	1		1		3
CO2		ent types of organic reactions a				3	2	1		1		3
CO3	Understand IUPAC polyfunctional orga		enes,	Alkynes, functional groups, bifu	nctional and	3	3	1		1		3
CO4	Analyze Isomerism					3	2	1		1		3
CO5	Understand and ev	aluate the mechanism of Hoffr	fmanı	n elimination, Markownikoff's ru	le, Saytzeff rul	e, <b>2</b>	2	1		1		3
	ozonolysis and epo						2	-		-		
12. Bri	ef description of sel	f-learning / E-learning compor	-	ntribution, 2 Average contribution	JII, I LOW COI							
1.		nacademy.org/science/organic										
2.				hemistry/Map%3A_Organic_Che	mistry_(Smith	)/Chapter_06%	3A_Un	derstand	ding_Org	ganic_F	Reaction	s
3.				ogy/the-basics-of-organic-chemi	stry/							
4.		pr.com/guides/chemistry/orga	anic-o	chemistry/								
	ks recommended:	Chamistry, Babl 0, Babl 0, Cl	الم مر ما	9 Co. 14d								
1. 2.	-	c Chemistry, Bahl & Bahl, S. Ch y Vol.I & II, I.L. Finar	nand	& CO. LTO.								
3.	-	Organic Chemistry, Nafis Haide	ler, S.	Chand & Co. Ltd.								
4.	A text book of Or	ganic Chemistry, Bahl & Bahl, S	S. Ch	and & Co. Ltd.								
5	Organic Chamistr	Vol I II & III Dr. Iagdamha Si	ingh	I D S Vaday Pragati Prakashan								

A text book of Organic Chemistry, Bahl & Bahl, S. Chand & Co. Ltd.
 Organic Chemistry Vol.1, II & III, Dr. Jagdamba Singh, L.D.S. Yadav, Pragati Prakashan.

1. Nam	e of the Departmen	: CHEMISTRY								
	se Name	INDUSTRIAL CHEMISTRY LAB – I		L		1	-		Р	
3. Cour	se Code	CH106		0		(			8	
4. Type	of Course (use tick	nark)		Core ( √ )		DE			FC (	)
5. Pre-	requisite (if any)	10+2 with Chemistry 6. Frequency (use tick marks)	Even ( )	Odd (V)		Either	Sem ( )	) Ev	very Ser	m ( )
7. Tota	Number of Lecture	s, Tutorials, Practicals								
	Lectu	res = 00 Tutorials = 00				Practic	al = 08			
		e purpose of the undergraduate chemistry Lab program at the Integ			de the	key kno	owledge	base a	and lab	oratory
		s for careers as professionals in the field of chemistry, and various othe	er industrie:	s.						
	SE OUTCOMES (CO)	mpletion, learners will develop following attributes:								
	SE OUTCOME (CO)		BUTES							
	CO1	Inderstand the basic analytical and technical skills and technical skills		ectively in the v	arious	fields of	chemis	try		
	CO2	Jnderstand the basic titration methods and technical skills to work in t	the differen	t fields of chem	istry.					
	CO3	Able to detect presence of elements and functional group in organic co	ompounds.							
	CO4	Remember to keep records of all performed experiments in the manne	er which is r	equired in labo	ratory					
	CO5	Analyze the importance of personal safety and care of equipment's and	d chemicals							
10. Syll				-						
Exp - 0		Preparation of standard solution related to normality & molarity.								
Exp – 0	2	Preparation of buffer solution, pH measurement.								
Exp – 0	3	Acid - base titration.								
Exp – 0	4	Oxidation-reduction (redox) titrations. a) To determine the strength sulphate (Mohr's salt) solution by using external indicator.	n of oxalic a	acid. b) To det	ermine	the str	ength o	of ferro	us amn	าonium
Exp – 0	5	To determine the strength of potassium permanganate solution by us	ing sodium	thiosulphate so	lution.	lodome	etrically.			
Exp – 0	6	To determine the strength of given copper sulphate solution by using	sodium thic	osulphate soluti	on. Iod	ometric	ally.			
Exp – 0	7	Complexometric titrations. a) To estimate the concentration of calciur with EDTA.	n ions with	EDTA. b) To est	timate	the con	centratio	on of m	agnesiu	ım ions
Exp – 0	8	Detection of element present in the given organic compounds.								
Exp – 0		Detection of functional group present in the given organic compound g) Amine h) Amide	ls. a) Carbo>	vylic b) Phenolio	c c) Alco	oholic d	) Aldehy	dic e) k	Ketonic	f) Ester
	O mapping									
COs		Attributes		PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Understand the ba fields of chemistry	sic analytical and technical skills and technical skills to work effective	vely in the	various 3	2	1		1		3
CO2	Understand the bas	ic titration methods and technical skills to work in the different fields o	of chemistry	/. <b>3</b>	2	1		1		3
CO3	Able to detect pres	nce of elements and functional group in organic compounds.		3	3	1		1		3
CO4	Remember to keep	records of all performed experiments in the manner which is required	in laborato	ry <b>3</b>	2	1		1		3
CO5	Analyze the import	nce of personal safety and care of equipment's and chemicals.		2	2	1		1		3
12 Brid	f description of self	3 Strong contribution, 2 Average contribution, learning / E-learning component	1 Low cont	ribution						
12. Brie 1.		m.edu/uploads/files/79645701812579729-genchem-reference-for-we	b.pdf							
2.		hadhika.ac.id/E-BOOK/12-1213-akfarmahad-16-1-vogelqu-d.pdf								
3.		u.edu.sa/filedownload/doc-6-pdf-f06110ef2e1e1ae119cbacf71dd1773	32-original.	pdf						
4.	https://www.sten s recommended:	.org.uk/resources/collection/3959/practical-chemistry								
15. BOOR 1.		Chemistry: Jagdamba Singh, L.D.S Yadav, Jaya Singh, I.R. Siddiqui, Prag	atiEdition							
2.		hemistry, A.I.Vogel.								
3.	Practical Physical	Chemistry: B. Viswanathan and P.S.Raghavan.								
4.	Experimental Inor	zanic Chemistry –W.G.Palmer.								

1 Nam	e of the Departmer	nt: CHEMISTRY										
	se Name	BASICS OF COMPUTER				L			T		P	
	se Code	CS110				3			1		0	
											-	<u> </u>
	of Course (use tick		6	<b>F</b>	<b>F</b> ( ( ) ( )	Core ()	,	DE	• •	\	FC ( √	
	requisite (if any)	10+2 with Chemistry	6.	Frequency (use tick marks)	Even ( V )	Odd (	)	Either	Sem (	) E	very Se	m()
7. Tota		es, Tutorials, Practicals										
		ures = 30		Tutorials = 10					al = Nil			
				ents of computer system, unders						vices, b	asics of	OS and
	-		ernet	working devices and fundamental	concepts of	Internet and v	veb tec	nnologi	es.			
	SE OUTCOMES (CO	): completion, learners will develo	n fall	owing attributory								
	SE OUTCOME (CO)	inpletion, learners will develo	p jon		IBUTES							
coon												
	CO1	Have a strong foundation of kr	owled	lge about the structure of compu	ter system.							
	CO2	Utilize and configure compute	r perip	heral devices, install and operate	system and	application so	ftware.					
	CO3	Work on MS office(word, pow	er poir	nt and excel) and OS.								
	CO4	Establish a small computer net	work	and utilize resource sharing.								
	CO5	Design and develop a website	with li	mited features.								
	t wise detailed con											
Unit-1		Number of lectures = 08	Title	e of the unit: INTRODUCTION TO	COMPUTER							
	-	istics features of Computer, Ha	rdware	e and Software of Computer, lang	uages of Co	mputers, Appl	cations	, Block	Diagran	n of Cor	nputer	System,
	puter Generations.											
Unit-2	-	Number of lectures =08		of the unit: COMPUTER ORGAN								
				rganization of Computer System i		Devices and i	ts func	tions, N	lemory	manage	ement,	Booting
	BIOS), Memory Mai	Number of lectures = 08	-	vices - Hard disc, Floppy disc, CD-				<del>.</del>				
Unit-3	A duanta and D			of the unit: OPERATING DEVICES					C Office	in Date		d. Euro
		ys used in Word, Excel & Power		ntroduction to Data Processing a	nd Flowchar	t, Operating er	wronn	ient, ivi	s Office	in Deta	all (wor	a, Exce
Unit-4	Tomp, short cut ke	Number of lectures = 08		of the unit: COMPUTER NETWO	RKING							
Introduct	tion to networking,	Modem, Network topology co	ncepts	and types with advantages and o	drawbacks o	f each, compo	nents c	of LAN, V	WAN an	d MAN	, Mediu	m used
in Netwo								-			-	
Unit-5		Number of lectures = 08	Title	of the unit: INTERNET AND WEB	TECHNOLO	GIES						
History a	ind concept, Archite	ecture, Application, Hypertext	Marku	ip Language, DHTML, WWW, Go	pher, FTP, 1	elnet, Web B	rowsers	s, Net S	urfing, S	Search	Engines	, Email
	gnatures, Network,	Security, Firewall.										
11. CO-P	O mapping											
COs			Attribu	ites		PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Have a strong foun	dation of knowledge about the	struct	ture of computer system.								3
602	Litilize and configu	ra computer peripheral devices	incto	ll and anarata system and analisa	tion coftwor				1	2		3
CO2	-			II and operate system and applica	LION SOILWAR	e.			1	2		3
CO3	Work on MS office	(word, power point and excel) a	and OS	5.						3		3
CO4	Establish a small co	omputer network and utilize res	ource	sharing.						3	1	2
CO5	Design and develop	o a website with limited feature	es.							2		1
		3 Strong	; contr	ibution, 2 Average contribution ,	1 Low cont	ribution						
12. Brie	ef description of sel	f-learning / E-learning compon	ent									
1.	https://edu.gcfglo	obal.org/en/computerbasics/w	hat-is-	a-computer/1/								
2.	1 0	e-Learning/Computer-Basicsc		_ !								
3.				id-knowledge/basics-of-computer	s/basic-com	puter-termino	logy/					
4.		ksforgeeks.org/basics-of-comp	uter-a	nd-its-operations/								
13. Bool	ks recommended:											
1.		ion Technology: Breaking News	", TMł	4.								
2.		ntroduction to Computers".										
3.	Nelson, "Data Co	1 /		9 C Drogrommin -" Now Ass								
4. 5	<b>.</b>	A Yadav, "Introduction To Con et 101" Addicion Wesley	iputer	a C Programming", New Age								
5. 6.		et 101", Addision Wesley. Foundation of Information Tec	nolog	vy" Pragati								
6. 7.		mentals- by Sinha. PK and Sinha	-									
7.	compater i unual	incintais by sinna. I it and sinna										

1 Name of the Department											
1. Name of the Departmer 2. Course Name	ENVIRONMENTAL POLLUTIO	N			•		-	r		<b>D</b>	
3. Course Code	CH107				L 3			L	+	<u>Р</u> 0	
4. Type of Course (use tick					Core()		DE		-	0 FC(√	)
5. Pre-requisite (if any)	10+2 with Mathematics	6.	Frequency (use tick marks)	Even ( V )	Odd (		Either		) F	very Sei	
7. Total Number of Lecture		5.	requercy (use tick marks)				LIUICI		, L		
	ures = 30		Tutorials = 10				Practic	al = Nil			
	e main objective of this course	e is to		nts, their sour	ces, control an	d their			on livi	ng spec	ies and
environment.	<b>,</b>				,					0 -1	
9. COURSE OUTCOMES (CO	):										
	ompletion, learners will develo	op foll	owing attributes:								
COURSE OUTCOME (CO)				TRIBUTES							
CO1	Evaluate different types of air   and Ozone Layer Depletion. Ox		ants, their harmful effects on liv nitrogen and carbon cycle.	ving and non-li	ving species; Si	udy of	Global \	Warmin	g, Gree	n House	e Effect
CO2	Analyze the various factors of v	water	quality assessment parameters	, water polluta	ants and Waste	water	reatme	nt proc	esses.		
СО3	Understand the soil composition	on, soi	l pollutants, their control, Natic	onal and Interr	national Standa	rds.					
CO4	Evaluate the various types was	te and	d their toxicity aspects and man	agement.							
CO5	Understand the sources of hea	vy me	tals and their related toxicity.								
10. Unit wise detailed cont		-	,								
Unit-1	Number of lectures = 08	Titl	e of the unit: AIR POLLUTANTS								
CO, CO2, ozone, CFC; ozone	depletion; global warming & N	IOx; H	armful effects of pollutants on	living and nor	-living species;	Oxyge	n, nitro	gen and	CO2 cy	cle, Air	quality
standard, Bhopal gas tragedy		-		Ū.	5.						
Unit-2	Number of lectures =08	Title	of the unit: WATER QUALITY F	PARAMETERS	AND WATER P	OLLUTIO	ON				
Water quality parameters; in techniques, Preservation.	nternational and national stand	dards;	Water quality assessment. Wa	ater pollution	and its contro	; water	polluta	ints; to	kicity. V	Vater sa	ampling
Unit-3	Number of lectures = 08	Title	of the unit: AGRICULTURAL PO	OLLUTANTS							
Fertilizers, insecticides, pesti	cides, plastics, toxic metals, dye	es, sur	factants and their toxicity; inter	rnational and r	national standa	rds; cor	ntrol.				
Unit-4	Number of lectures = 08	Title	of the unit: INDUSTRIAL WAS	TE							
Industrial waste: toxic aspect	ts, management and disposal. R	Radioa	ctive, municipal, and biomedica	al waste – toxi	city hazards, m	anagem	ient and	l dispos	al.		
Unit-5	Number of lectures = 08	Title	of the unit: CHEMICAL TOXICO	DLOGY							
Toxic chemicals in the Enviro	onment, biochemical effects of I	Mercu	ry and Lead, Carcinogens, Vecto	or-borne disea	se, water-born	e disea	se, Pollu	ition an	d Public	: Health	issues.
11. CO-PO mapping											
COs	ŀ	Attribu	ıtes		PO1	PO2	PO3	PO4	PO5	PO6	PO7
Evaluate different t	types of air pollutants, their har			species; Study	of			_			
	reen House Effect and Ozone L				3	2	3	3	3	3	2
co2 Analyze the various treatment processe	s factors of water quality assess es.	ment	parameters, water pollutants a	nd Waste wat	er 3	2	3	3	3	3	2
CO3 Understand the soi	il composition, soil pollutants, t	heir c	ontrol, National and Internation	al Standards.	3	2	3	3	3	3	2
CO4 Evaluate the variou	us types waste and their toxicity	aspe	cts and management.		3	2	3	3	3	3	2
CO5 Understand the so	urces of heavy metals and their	relate	ed toxicity.		3	2	3	3	2	3	2
	3 Strong	conti	ibution, 2 Average contributio	n , 1 Low cont	ribution	1	1	1		1	
12. Brief description of sel	f-learning / E-learning compon	·	,								
	annica.com/science/pollution-e		nment								
	science.com/22728-pollution-fa										
	dawi.com/journals/jeph/2012/3										
4. https://www.com 13. Books recommended:	serve-energy-future.com/cause	es-and	-errects-of-environmental-pollu	ition.php							
	nemistry Manahan, Stanley E, 20	004 T	avlor & Francis Ltd								
	Environmental Chemistry, Des		-								
	nemistry: A Global Perspective,			ford Univ Pr (	Sd)						
	nvironmental Chemistry, Reid, I		1 11	. (.							
-	Environment, Thomas G. Spiro,		-	•	ication.						
6. Environmental Ch	nemistry, Vanloon, Gary W Duff	y, Step	ohen J., Oxford Higher Educatio	n publication							

2. Course 3. Course		+ CUENICTOV										
3. Course	e of the Departmen	PHYSICAL CHEMISTRY – II						-	-			
		CH108				L 3			Г <u> </u>		<u>Р</u> 0	
/1 IVDO (	of Course (use tick					o Core (√	<b>,</b>	DE			FC (	<u>۱</u>
	equisite (if any)	10+2 with Chemistry	6.	Frequency (use tick marks)	Even ( √ )	Odd (	<b>/</b>	Either		) F	very Sei	
		es, Tutorials, Practicals	0.	requerey (use tier marks)	Liteli (1)	ouu (	1	Little		/ -	very ser	
		ures = 30		Tutorials = 10				Practic	al = Nil			
8. COURS			Jate co	urse is to impart basic and key k	nowledge of p	ohysical che	mistry.			incipal	of phys	ics and
				oortant for higher studies. After s								
	respective dimensi											
	SE OUTCOMES (CO)											
		ompletion, learners will deve	op foll									
COOKS	E OUTCOME (CO)	Students get insight knowled	dae of	order of reaction and their dete	IBUTES	lundorstan	d tha fr	octors w	hich co	uld off	oct the	rato o
	CO1	reaction.	ige of	order of reaction and then dete				actors w			ett the	Tale 0
	CO2		oncen	t of entropy; explore the relation	how entrony w	ould be var	ving wit	h resner	rt to P	Γ& V		
											ontono	the of
	CO3	process.	sound	knowledge of Gibbs free energy	and Heimnoitz	z functions;	now th	ey woul	a aeciae	e the sp	ontane	ity of a
			ence b	etween "completions" for irrever	sible chemical	reactions a	nd for re	eversible	chemi	cal reac	tions. T	hev go
	CO4			elier's Principle, how the equilibri								, 0
		Clapeyron Equation.			-					-		
	CO5	Students evaluate fundament	als of e	electrochemistry and understand	the concept of	pH, solubili	ty and it	ts applic	ation.			
10. Unit	wise detailed cont	ent										
Unit-1		Number of lectures = 08	Tit	e of the unit: CHEMICAL KINETIC	S							
Chemical I	kinetics and its sco	pe, rate of a reaction, factor	s influe	ncing the rate of a reaction conc	entration, tem	perature, p	ressure	, solvent	, light,	catalyst	concer	tratio
				mical reactions- zero, First, second								
reaction d	differential method	, method of integration, meth	nod of	half-life period and isolation met	hod. Arrhenius	s equation,	concept	of activ	ation ei	nergy. S	imple o	ollisior
theory.												
Unit-2	<u> </u>	Number of lectures =08		e of the unit: THERMODYNAMICS								
				tatements of the law. Thermody physical change, entropy as a crit								
Unit-3	or vor, entropy as a	Number of lectures = 08		of the unit: FREE ENERGY		leity and eq	unipriu	<u>II, EIIIIO</u>	py chan	geiniu	eal gase	:5.
	e energy (G) and He			namic quantities, A & G as criteria	a for thermody	namic equi	ihrium :	and snor	ntaneity	their a	dvanta	ge ove
		G and A with P, V and T.	mouy		a for the mouy	inanne equi			itaneity	, then e	avanta	
Unit-4		Number of lectures = 08	Title	e of the unit: CHEMICAL EQUILIB	RIUM							
Equilibriur	m constant and fre	e energy. Thermodynamic d	erivati	on of law of mass action. Le Cha	ateliers princip	ole. Reaction	n isothe	rm and	reactio	n isoch	or - Cla	peyro
-	and Clausius -Clape	yron equation, applications.			-							
Unit-5		Number of lectures = 08		e of the unit: ELECTROCHEMISTR	-							
Jalvanic ce	cells, standard elect	rode potential, types of electr	odes, r	measurement of pH; Solubility and	d solubility pro	duct and its	applica	tions.				
11. CO-PO	D mapping											
COs			Attrib	utes		PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1		nt knowledge of order of rea	ation (	المتحد المتحد والمتحد فيتحد والمتحد والمتحد والمتحد	erstand the fa	actors	1					
001				and their determination and und		3		1		2	1	
		the rate of reaction.				3	-	1		2	1	
(02 <sup>S</sup>		velop the concept of entropy		ore the relation how entropy wo	uld be varying	3	1	1 2		2 2	1	
<b>CO2</b>	respect to P, T & V.	velop the concept of entropy	; explo	ore the relation how entropy wo	, ,	with 3	-	-				
CO2	respect to P, T & V. Students would pe	velop the concept of entropy erceive the sound knowledge	; explo		, ,	with 3	-	-				
CO2 r CO3	respect to P, T & V. Students would pe would decide the s	velop the concept of entropy erceive the sound knowledge pontaneity of a process.	y; explo	ore the relation how entropy wo	unctions; how	with 3 they 3	1	2		2	1	
CO2 r CO3	respect to P, T & V. Students would pe would decide the s Students would al	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between "	; explo of Gib	ore the relation how entropy wo obs free energy and Helmholtz f	unctions; how reactions and	with 3 they 3 d for	1	2		2	1	
CO2 r CO3 v CO4 r	respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insightics is of reactants and products	; explo of Gib comple nt sour are shi	ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron	unctions; how reactions an Principle, how Equation.	they 3 d for y the 3	1	2 2		2 2	1	
CO2 r CO3 CO4 r CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5	respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insightics is of reactants and products	; explo of Gib comple nt sour are shi	ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's	unctions; how reactions an Principle, how Equation.	they 3 d for y the 3	1	2 2		2 2	1	
CO2 r CO3 CO4 r CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5	respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit	evelop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- cies of reactants and products fundamentals of electrochem	r; explo of Gik (comple nt sour are shi nistry a	ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron ind understand the concept of p	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
CO2 CO3 CO4 CO5	respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application.	erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh cies of reactants and products fundamentals of electrochem <b>3 Stron</b>	y; explo of Gib (comple nt sour are shi histry a	ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
CO2 r CO3 c CO4 r CO5 c 12. Brief	respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application.	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem <b>3 Stron</b> <b>f-learning / E-learning compo</b>	y; explo of Gib (comple nt sour are shi histry a ng cont nent	ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron ind understand the concept of p	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 12. Brief 1.	respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.your	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem <b>3 Strom</b> <b>f-learning / E-learning compo</b> tube.com/watch?v=UVaHSeg0	y; explo of Gik comple nt sour are shi nistry a ng cont nent CPzE	ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron ind understand the concept of p ribution, 2 Average contribution	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 7 CO5 7	respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.your https://stuvera.cc	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem <b>3 Strom</b> <b>f-learning / E-learning compo</b> tube.com/watch?v=UVaHSeg0 om/bsc-1st-year-chemistry-no	y; explo of Gib comple are shi histry a ng cont nent CPzE tes-pdf	by the relation how entropy wo but free energy and Helmholtz f etions" for irreversible chemical and knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p ribution, 2 Average contribution	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 12. Brief 1.	respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.your https://stuvera.cc http://www.freeb	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem <b>3 Strom</b> <b>f-learning / E-learning compo</b> tube.com/watch?v=UVaHSeg0	y; explo of Gib (comple nt sour are shi nistry a nistry a nent CPzE tes-pdf ysical-C	bre the relation how entropy wo bbs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p <b>ribution, 2 Average contribution</b>	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
CO2 r CO3 c CO4 r CO5 c CO5 c cO5 c cO5 c cO5 c c cO5 c c cO5 c c c c c c c c c c c c c c c c c c c	respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.you https://stuvera.cc http://www.freeb https://www.mot https://examupda	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem <b>3 Strom</b> <b>f-learning / E-learning compo</b> tube.com/watch?v=UVaHSeg0 pm/bsc-1st-year-chemistry-no pookcentre.net/Chemistry/Phy	y; explo of Gib (comple nt sour are shi nistry a nistry a nent CPzE tes-pdf ysical-C	bre the relation how entropy wo bbs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p <b>ribution, 2 Average contribution</b>	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
CO2 r CO3 c CO4 r CO5 c CO5 c cO5 c cO5 c cO5 c c cO5 c c cO5 c c c c c c c c c c c c c c c c c c c	respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. <b>f description of self</b> https://www.your https://stuvera.cc http://www.freeb https://www.mob https://examupda s recommended:	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem <b>3 Strom</b> <b>f-learning / E-learning compo</b> tube.com/watch?v=UVaHSegG om/bsc-1st-year-chemistry-no bookcentre.net/Chemistry/Phy ot3ath.com/uplode/book/boo ates.in/b-sc-books/	y; explo of Gib (comple nt sour are shi nistry a nistry a nent CPzE tes-pdf ysical-C	bre the relation how entropy wo bbs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p <b>ribution, 2 Average contribution</b>	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 7 CO5 7 CO3 CO3 7 CO3 CO3 7 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3	respect to P, T & V. Students would pe would decide the sy Students would al reversible chemica equilibrium quantit Students evaluate application. <b>f description of self</b> https://www.your https://stuvera.cc http://www.freeb https://www.mob https://examupda <b>s recommended:</b> Physical Chemistr	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem <b>3 Strom</b> <b>f-learning / E-learning compo</b> tube.com/watch?v=UVaHSegG om/bsc-1st-year-chemistry-no bookcentre.net/Chemistry/Phy ot3ath.com/uplode/book/boo ates.in/b-sc-books/	r; explo of Gib (comple nt sour are shi nistry a <b>ng cont</b> <b>nent</b> CPzE tes-pdf ysical-C k-6083	by the relation how entropy wo bas free energy and Helmholtz f etions" for irreversible chemical and knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p <b>ribution, 2 Average contribution</b> f/ Chemistry-Books.html 9.pdf	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 7 CO5 7 CO3 CO3 7 CO3 CO3 7 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3	respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. <b>f description of self</b> https://www.your https://www.freet https://www.freet https://www.mot https://examupda <b>s recommended:</b> Physical Chemistrr Thermodynamics	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem <b>3 Strom</b> <b>f-learning / E-learning compo</b> tube.com/watch?v=UVaHSegG om/bsc-1st-year-chemistry-no bookcentre.net/Chemistry/Phy ot3ath.com/uplode/book/boo ates.in/b-sc-books/ y, P.WE. Atkins, ELBS – J. Rajaram and J.C. Kuriacos	r; explo of Gib (comple nt sour are shi nistry a <b>ng cont</b> <b>nent</b> CPzE tes-pdf ysical-C k-6083	by the relation how entropy wo bas free energy and Helmholtz f etions" for irreversible chemical and knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p <b>ribution, 2 Average contribution</b> f/ Chemistry-Books.html 9.pdf	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
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CO2 r CO3 r CO4 r CO5 r CO5 r CO5 r CO5 r CO5 r CO5 r CO5 r CO5 r CO3 r	respect to P, T & V. Students would pe would decide the sy Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.youi https://www.freet https://www.freet https://www.mot https://examupda s recommended: Physical Chemistr Thermodynamics Chemical Thermo Principles of physi	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem <b>3 Strom</b> <b>f-learning / E-learning compo</b> tube.com/watch?v=UVaHSego om/bsc-1st-year-chemistry-no bookcentre.net/Chemistry/Phy bt3ath.com/uplode/book/boo ates.in/b-sc-books/ y, P.WE. Atkins, ELBS – J. Rajaram and J.C. Kuriacos dynamics by R.P.Rastogi et al ical chemistry by Puri Sharma	r; explo of Gik (comple nt sour are shi nistry a nistry a ng conte nent CPzE tes-pdf ysical-C k-6083 e – Edu and Pa	ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical and knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p <b>ribution, 2 Average contribution</b> f/ chemistry-Books.html 9.pdf	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 5 CO5 7 CO5 7 CO3 CO3 7 CO3 CO3 7 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3	respect to P, T & V. Students would pe would decide the sy Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.youi https://stuvera.cc http://www.freet https://www.mot https://examupda s recommended: Physical Chemistr Thermodynamics Chemical Thermo Principles of physi Essentials of Phys	velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem <b>3 Strom</b> <b>f-learning / E-learning compo</b> tube.com/watch?v=UVaHSeg om/bsc-1st-year-chemistry-no bookcentre.net/Chemistry/Phy bt3ath.com/uplode/book/boo ates.in/b-sc-books/ y, P.WE. Atkins, ELBS – J. Rajaram and J.C. Kuriacos dynamics by R.P.Rastogi et al ical chemistry, Bahl & Tuli, S.	r; explo of Gik (comple nt sour are shi nistry a nistry a	pre the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical and knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p <b>ribution, 2 Average contribution</b> <b>ribution, 2 Average contribution</b> <i>f/</i> Chemistry-Books.html 9.pdf ucational Publishers. than & Co. Ltd.	unctions; how reactions and Principle, how Equation. H, solubility ar	with 3 they 3 d for v the 3 nd its 3	1 1 1	2 2 1		2 2 3	1 1 2	
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1. Nam	e of the Departmen	nt: CHEMISTRY										
	se Name	INORGANIC CHEMISTRY – II				L		-	٢		Р	
	se Code	CH109				3					<u>г</u> 0	
	of Course (use tick					Core ( √ )		DE			FC (	)
	requisite (if any)	10+2 with Chemistry	6.	Frequency (use tick marks)	Even ( V )	Odd (	\ \	Either	<u> </u>	) F	very Sei	•
		es, Tutorials, Practicals	0.	frequency (use tick marks)	Even (V)	Ouu (	/	Littlei		/ -	very ser	
7110101		ures = 30		Tutorials = 10				Practic	al = Nil			
8 COUR		terest among students for gen	eral Ir		Icated and int	roduction of	neriodi			s of cla	ssificat	ion and
		ck elements will be made. Int										
	moieties will be do SE OUTCOMES (CO											
		,. completion, learners will develo	op foll	owina attributes:								
	SE OUTCOME (CO)		<u>, ,</u>	_	TRIBUTES							
	CO1	An understanding is developed	l for th			elements in per	iodic ta	ble.				
	CO2	Evaluation of anomalous behave	viour	of elements can be with proper	reasoning.							
	CO3	Introduction of coordination ch	nemis	try creates higher order thinkin	g ability to dea	I with comple	inorga	nic moie	eties.			
	CO4	How the stability of coordination	on cor	nplexes can be predicted throu	igh the applica	tion and reme	nbranc	e of sim	ple rule	s.		
	CO5	A keen interest is created in stu	udent	s to pursue inorganic chemistry	in higher class	ses						
10. Unit	t wise detailed cont	tent										
Unit-1		Number of lectures = 08	Titl	e of the unit: S – BLOCK ELEM	ENTS (GROUP -	- 1 AND 2 ELEN	IENTS)					
	,	onic configuration, Anomalous						ds in the	e variati	on of p	ropertie	es (such
	ion potential, atom	ic and ionic radii etc.)										
Unit-2		Number of lectures =08		of the unit: P – BLOCK ELEME								
		onic configuration, Variation of				s of first eleme	ents of e	each gro	oup. Stu	idy of s	ome im	portant
Unit-3		ydrides, fluorocarbons silicates Number of lectures = 08		of the unit: D – BLOCK ELEME								
	ristic properties of c	d-block elements. Properties of				ry compounds	such as	Carbid	as Ovid	os and	Sulphid	05
							Jucitus			cs ana .	Juipinu	
Unit-4	R chamical proporti	Number of lectures = 08		of the unit: CHEMISTRY OF N		Vo (Structuro	and hor	ading in	Vo com	nound	cuch a	
		ies noble gases, special propert d Clausius -Clapeyron equation			, chemistry of	xe (structure)		iung in	ve cou	ipound	s such a	is kerz,
Unit-5	Ner of equation an	Number of lectures = 08		of the unit: COORDINATION (	COMPOUNDS							
Double sa	alts. Werner's coord	lination theory, IUPAC nomencl				ner and outer o	orbital c	omplex	es.			
	0 mapping											
	U mapping			1				000	204	DOF	DOC	007
COs			\ttribu			PO1	PO2	PO3	PO4	PO5	PO6	PO7
		s developed for the significance			ents in periodic			1				2
CO2		nalous behaviour of elements ca				2						
CO3	moieties.	ordination chemistry creates hi	gner o	brder thinking ability to deal w	ith complex in	organic 3			1			
CO4	How the stability o simple rules.	f coordination complexes can l	be pre	dicted through the application	and remembr	ance of 3						
CO5	A keen interest is c	reated in students to pursue in	organi	c chemistry in higher classes		2		1			1	2
		3 Strong	; conti	ibution, 2 Average contribution	on , 1 Low cont	ribution						
12. Brie		f-learning / E-learning compon										
1.		ey.com/en-in/Basic+Inorganic+C			)5327							
2.		a.ac.jp/chem/iwanami/inorg/IN	_	01.PDF.								
3.	s recommended:	org/doi/pdf/10.1021/ed073pA1	L4.Z									
13. 800		nic Chemistry Vol-I & II, Satya Pi	rakach	GD Tuli SK Rasu RD Mad	an S Chand &	Colltd						
2.		ganic Chemistry, P.L. Soni, Sulta				CO. LIU.						
3.	-	in Inorganic Chemistry, Madan										
4.		Chemistry, J.D. Lee, Black Well		-								

1 Mare	o of the Department	+. CHEMISTRY	<u>SEMILOTEN II</u>							
-	e of the Departmen			•			T		-	
	se Name	ORGANIC CHEMISTRY – II		L			<u>г</u>	_	P	
	se Code	CH110		3			1	_	0	
	of Course (use tick	-		Core (√	)	DE	• •		FC (	
5. Pre-	requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ( √ )	Odd (	)	Either	Sem (	) E	very Sei	n()
7. Tota	Number of Lecture	s, Tutorials, Practicals								
	Lectu	ires = 30	Tutorials = 10			Practic	al = Nil			
8. COUR	SE OBJECTIVES: Stu	dents will be able to understa	nd the about arenes and Aromaticity, Huckel rule o	f aromaticity,	Aromat	ic electr	ophilic s	substitu	ution rea	actions
			stitution reaction of alkyl halides SN1 and SN2							
alcohols,	trihydric alcoholsald	ehydes and ketones, chemical	reactions of aldehydes and ketones.							
9. COUR	SE OUTCOMES (CO)	:								
After the	successful course co	ompletion, learners will develo	op following attributes:							
COUR	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Understanding of Kekule struc mechanism of Aromatic electr	ture, Stability and carbon-carbon bond lengths, re	sonance, Huc	kel rule	of arom	aticity,	chemic	al reacti	on and
			cation, methods of formation and chemical reaction	ns of alkyl ha	lides. M	echanis	m of nu	cleophi	lic subs	titutior
	CO2	•	nd SN2 reactions) with energy profile diagrams.		nacs, m	cenams		cicopin	110 5005	lication
			nomenclature, methods of formation, reduction of	aldehvdes, ke	etones.	carboxy	lic acids	and es	ters. Hv	droger
	(())	_	ons of alcohols, Dihydric alcohols, chemical reaction			-			-	-
			es Synthesis of aliphatic aldehydes and ketones, a	• /						
	(())		-koch reaction and aromatic ketones by Friedel craf		,					
			chanism of nucleophilic additions to carbonyl grou		l conde	nsation.	Cannizz	zaro rea	action. I	Baever
	0.05		ondorof Verlay reduction, Clemmensen reduction a	-					,	
10. Uni	t wise detailed cont	-								
Unit-1		Number of lectures = 08	Title of the unit: ARENES AND AROMATICS							
	ature of benzene de		enzene, Stability and carbon-carbon bond lengths of	of henzene re	sonance	Hucke	l rule of	aroma	ticity A	romati
			, Mechanism of nitration, halogenation. Sulphonati					aronna	ticity, A	Unatio
Unit-2	inc substitution gen	Number of lectures =08	Title of the unit: ALKYL AND ARYL HALIDES	on and thede	-crants	eaction	•			
	aturo classification		emical reactions of alkyl halides. Mechanims of nuc	loophilic subs	titution	roaction	ofalley	balido	c (SN1 o	nd SN
	) with energy profile		entical reactions of any handes. Mechanins of fuc	leopinite subs	itution	reaction		manue	5 (JIAT 9	
Unit-3	/ with energy prome	Number of lectures = 08	Title of the unit: ALCOHOLS							
	luie electrole un un un					. Is a sealing	a Asidi		Deed	
			n, reduction of aldehydes, ketones, carboxylic acids							
	-	prmation and chemical reaction	ormation, chemical reactions of vicinal glycols an		acolone	realiai	igemeni	L. THINY		JIIUIS -
Unit-4	ature, methous of to	Number of lectures = 08	Title of the unit: ALDEHYDES AND KETONES							
	of alighetic aldebuy			side Crienerd				2 4:44:	C:	
			r reference to acid chlorides, alcohols, carboxylic a						anes. Sy	ntnesi
	tic aldenydes by oxi	·	r-Tiemann reaction, gattermann-koch reaction and Title of the unit: CHEMICAL REACTION OF ALDEH			-neual c	rait acy	ation.		
Unit-5	6 1 1 11	Number of lectures = 08								
			ith particular reference: aldol condensation, Cann			in react	ion, Wit	tig rea	ction, N	lannic
		ation, Meerwine Pondorof Ver	lay reduction, Clemmensen reduction and Wolff-Kis	shner reductio	n.					
	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1			carbon-carbon bond lengths, resonance, Huckel	rule of 3	1	1		2		2
	11		Aromatic electrophilic substitution.		-	-		-		-
CO2	Mechanism of nucl	-	of formation and chemical reactions of alkyl of alkyl halides (SN1 and SN2 reactions) with energy	-	1	1		2		2
	diagrams. To create basic kr	nowledge of nomenclature r	nethods of formation, reduction of aldehydes, k	etones	+					
CO3			Acidic nature, Reactions of alcohols, Dihydric a	-	1	1		2		2
205	-	of vicinal glycols and pinacol-p	-	iconois, <b>3</b>	1	1		-		<u> </u>
ļ			nacolone rearrangement. natic aldehydes and ketones, alcohols, carboxylic ac	side and	+					
604								2		-
CO4		s Reimer-Hemann reaction, g	attermann-koch reaction and aromatic ketones by	Friedel 3	1	1		2		2
	craft acylation.	vo the mechanism of nuclear	nilic additions to carbonyl groups with aldol conder	acation						
605	, , ,		, , ,	·				2		-
CO5			erwine Pondorof Verlay reduction, Clemmensen re	duction 3	1	1		2		2
	and Wolff-Kishner r				1	1	1		1	<u> </u>
			contribution, 2 Average contribution , 1 Low cont	ribution						
12. Brie		-learning / E-learning compon								
1.			c_Chemistry/Map%3A_Organic_Chemistry_(Smith)	/Chapter_06%	3A_Un	derstand	ling_Org	ganic_R	eaction	5
2.	https://www.dum	mies.com/education/science/	biology/the-basics-of-organic-chemistry/							
3.	https://www.topp	or.com/guides/chemistry/orga	nic-chemistry/							
13. Bool	s recommended:									
1.		Chemistry, Bahl & Bahl, S. Cha	ind & Co. Ltd.							
2.	-	/ Vol.I & II, I.L. Finar								
3.		Organic Chemistry, Nafis Haide	r, S. Chand & Co. Ltd.							
4.			ngh, L.D.S. Yadav, Pragati Prakashan							
		, ,								

4	· · (ultire Delle								
	e of the Departmen			-	_	-			
-	se Name	INDUSTRIAL CHEMISTRY LAB – II	L		1			P	
	se Code of Course (use tick	CH111	0			)		8	<b>`</b>
	requisite (if any)	10+2 with Chemistry <b>6. Frequency (use tick marks)</b> Even ( v )	Core(√) Odd()		DE Either		) 5	FC ( very Ser	
		s, Tutorials, Practicals	Ouu ( )		LIUIEI	Seni (	) [	very Sei	II ( )
		res = 00 Tutorials = 00			Practic	al = 08			
8. COUF		Ident will be able to work effectively and safely in a laboratory environment, practic	al/technic	al/ con			ills, cor	ncepts t	o solve
-		problems, transferable skills like ability to work in teams as well as independently.							
	SE OUTCOMES (CO)								
-	SE OUTCOME (CO)	ompletion, learners will develop following attributes: ATTRIBUTES							
COOK	CO1	Remember to keep records of all performed experiments in themanner which is require	ed in labor	atory.					
	CO2	Able to Evaluate water quality parameters like chloride content and alkalinity.		,					
	CO3	Understand the basic titration methods and technical skills to work in the different field	s of chem	istry.					
	CO4	Know about the principles of qualitative and quantitative analysis of inorganic mixtures							
	CO5	Analyze the importance of personal safety and care of equipment's and chemicals.							
10. Syll	abus								
Exp – 0	1	To determine chloride content in the given water sample.							
Exp – 0	2	To determine the percentage of available chlorine in the given bleaching powder samp	le.						
Exp – 0	3	To determine Alkalinity in the given water sample.							
Exp – 0	4	Qualitative analysis of inorganic mixture Cations: NH4 <sup>+</sup> Pb <sup>2+</sup> , Ag+, Bi <sup>3+</sup> , Cu <sup>2+</sup> , Cd <sup>2+</sup> , Sn <sup>2+</sup> , Fe <sup>3+</sup> , Al <sup>3+</sup> , Co <sup>2+</sup> , Cr <sup>3+</sup> , Ni <sup>2+</sup> , Mn <sup>2+</sup> , Zn <sup>2+</sup> , Ba <sup>2+</sup> ,	Sr <sup>2+</sup> , Ca <sup>2+</sup> ,	K⁺					
Exp – 0		Qualitative analysis of inorganic mixture Anions: $CO^{32-}$ , $S^{2-}$ , $SO_3^{2-}$ , $SO_4^{2-}$ , $NO_3^{-}$ , $NO_2^{-}$ , $CH_3COO^-$ , $F^-$ , $CI^-$ , $Br^-$ , $I^-$ , $PO_4^{3-}$ , $BO_3^{3-}$ , $C_2O_4^{2-}$							
	O mapping								
COs		Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	Remember to keep	records of all performed experiments in themanner which is required in laboratory.	3	1	1		2	1	2
CO2	Able to Evaluate wa	ater quality parameters like chloride content and alkalinity.	3	1	1		1	2	2
CO3	Understand the bas	ic titration methods and technical skills to work in the different fields of chemistry.	3	1	1		1		2
CO4	Know about the pri	nciples of qualitative and quantitative analysis of inorganic mixtures.	3	1	1		1		2
CO5	Analyze the import	ance of personal safety and care of equipment's and chemicals.	3	1	1		1	2	2
		3 Strong contribution, 2 Average contribution, 1 Low contributi	on						
12. Brie		-learning / E-learning component							
1.		Im.edu/uploads/files/79645701812579729-genchem-reference-for-web.pdf							
2.		ahadhika.ac.id/E-BOOK/12-1213-akfarmahad-16-1-vogelqu-d.pdf au.edu.sa/filedownload/doc-6-pdf-f06110ef2e1e1ae119cbacf71dd17732-original.pdf							
3. 4.		n.org.uk/resources/collection/3959/practical-chemistry							
5.		tserv.chula.ac.th/~sanongn1/processing.pdf							
13. Bool	ks recommended:								
1.	Advanced Organic	: Chemistry, Bahl & Bahl, S. Chand & Co. Ltd.							
2.		/ Vol.I & II, I.L. Finar							
3.		Chemistry: B. Viswanathan and P.S.Raghavan.							
4.		ganic Chemistry – W.G.Palmer.							
5.	Organic Chemistry	ı Vol.I, II & III, Dr. Jagdamba Singh, L.D.S. Yadav, Pragati Prakashan.							

1. Name of the Departmen	nt: CHEMISTRY								
2. Course Name	INDUSTRIAL ASPECTS OF PH	YSICAL CHEMISTRY	L		1	Г		Р	
3. Course Code	CH201		3		1	L		0	
4. Type of Course (use tick	mark)		Core ( √ )		DE	()		FC (	)
5. Pre-requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ( )	Odd (√	)	Either	Sem (	) E'	very Sei	m ( )
7. Total Number of Lecture	es, Tutorials, Practicals								
Lectu	ures = 30	Tutorials = 10			Practic	al = Nil			
		study the use of simple models for predictive und							
-		s and to develop deep understanding of theory	-	ion an	d corro	sion of	mater	ials in	various
		for prevention of corrosion in different contexts wit	h kinetics.						
9. COURSE OUTCOMES (CO)	): completion, learners will develo	on following attributes:							
COURSE OUTCOME (CO)		ATTRIBUTES							
	Students will gain an understa	nding of the thermodynamic and kinetic forces invo	lved in chemic	al react	ions wh	ich dete	ermine	how mi	uch and
C01	how soon products are formed								
		ate the chemical kinetics, how reaction rates are m	neasured and r	eprese	nted in	rate law	s, and	applica	tions of
CO2	chemical kinetics in studying e								
CO3	Students will gain an understa	nding of methods for determining molecular mass b	ased upon coll	igative	propert	ies.			
	Students will create the own	understanding approaches to the finding of unknow	vn compositior	n of ana	lvte fro	m critic	al solut	e temp	erature
CO4	graph.								
CO5	Students will gain an understa	nding of approaches to the development of dry & w	et corrosion ar	nd its pr	eventio	n.			
10. Unit wise detailed cont		0 - FF / / / / / / / / / / / / / / / / /							
Unit-1	Number of lectures = 08	Title of the unit: ADSORPTION							
		ption, Adsorption of gases by solids, Freundlich ad	disorption isoth	erm l	angmui	r's theo	rv of a	dsornti	on BET
	ion, Determination of surface a			ierin, E	anginan	5 1100	iy or a	asorpen	, 521
Unit-2	Number of lectures =08	Title of the unit: CATALYSIS							
General characteristics of ca	talytic reactions Acid-base cat	alysis, Enzyme catalysis, Mechanism and kinetics o	f enzyme catal	yzed re	actions	Michae	elis-Me	nten ec	uation,
		catalysis, Surface reactions, Kinetics of surface react		-					
Unit-3	Number of lectures = 08	Title of the unit: COLLIGATIVE PROPERTIES							
		of molecular mass of solute from lowering of vap							
		e, Determination of molecular mass of solute fror							
Relation between depression and osmotic pressure, van't l		g of vapour pressure, Determination of molecular	mass of solute	from c	lepressi	on of fr	eezing	point, C	Jsmosis
Unit-4	Number of lectures = 08	Title of the unit: AZEOTROPIC MIXTURES							
		ble liquids, Phenol water system, CST and effect of in	mpurities on C	ST.					
Unit-5	Number of lectures = 08	Title of the unit: CORROSION AND ITS CONTROL		<u></u>		1.0			
corrosion.	ects of corrosion, Dry or Chem	ical Corrosion, Wet or electrochemical corrosion, I	viecnanism of	Electro	cnemica	a Corros	sion, Pr	reventio	n trom
11. CO-PO mapping									
COs		Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Students will gain a		odynamic and kinetic forces involved in chemical re	actions		105	104		100	107
	ow much and how soon produc		3	1	1		2	1	1
Students will be ab		etics, how reaction rates are measured and represe	ented in				-		
rate laws, and appl	ications of chemical kinetics in	studying enzyme mechanisms.	3	1	2		3	1	
CO3 Students will gain	an understanding of method	s for determining molecular mass based upon col	lligative 3	1	2		3	1	
properties.			_	-	-		,	-	<b> </b>
CO4	0 11	oaches to the finding of unknown composition of	analyte 3	1	1		2	1	1
from critical solute	temperature graph.								
cos prevention.	an understanding of approac	hes to the development of dry & wet corrosion	and its 3	1	1		2	1	1
prevention.	2 Strong	contribution, 2 Average contribution , 1 Low cont	ribution						l
12. Brief description of col	f-learning / E-learning compor								
-	r.res.in/jspui/handle/12345678								
• • •	org/doi/full/10.1021/ie50157a								
	csonline.org/industrial-chemis								
4. http://nsdl.niscair	r.res.in/jspui/handle/12345678	9/351?mode=full							
13. Books recommended:									
		th edition, Pubs: John Wiely & Sons, New York, 1982							
		s, Pubs: McGraw Hill Book Company, New York(198	,						
•		rial Chemistry, Pubs: Van Nostrand inhold Company							
-		Vol. I & II, Pubs: Vikas Publishing House, Pvt. Ltd., N Industrial Inorganic Chemistry, Pubs: V. Ch. Publish		-					
5. Buchner V., 30fille		muusunai morganic chemistry, Pubs. v. ch. Publish	CIS, NEW TULK	(1202).					

1. Name of the Depa	rtment: CHEMISTRY								
2. Course Name	INDUSTRIAL ASPECTS OF IN	ORGANIC CHEMISTRY	L			Г		Р	
3. Course Code	CH202		3		-	1		0	
4. Type of Course (us			Core ( √ )		DE	()		FC (	)
5. Pre-requisite (if a		6. Frequency (use tick marks) Even ()	Odd (V	)	Either	Sem (	) E	very Se	m()
7. Total Number of L	ectures, Tutorials, Practicals					1			
	Lectures = 30	Tutorials = 10           basic metallurgical processes and their application	anc in inductri	ios alor		al = Nil	niou	of allo	rc thoir
	ction of important metals from their				ig with				s, then
9. COURSE OUTCOME	-								
	ourse completion, learners will devel	•••••							
COURSE OUTCOME		ATTRIBUTES							
C01	Basic understanding of import	ant aspects of inorganic chemistry application such a	as metallurgica	l proce	sses is c	reated	among	studen	ts.
CO2	How inorganic materials are ir	nportant for industrial chemistry is evaluated throug	gh suitable exa	mples.					
CO3	Evaluation of Commercial prep	parations of alloys, their merits and demerits and ho	w they can be	applied	l in indu	strial ch	emistry	y is don	e.
CO4	Importance and application of	f metallurgical processes in industrial chemistry is lea	arnt.						
CO5	Important applications of inor	ganic materials like zeolites, alumina etc. are evaluat	ted by their rea	actions	and pro	perties.			
10. Unit wise detaile		<u> </u>	,						
Unit-1	Number of lectures = 08	Title of the unit: METALLURGY							
Basic metallurgical op	erations- crushing and pulverization,	concentration, calcinations, roasting, types of roasti	ng, reduction a	and refi	ning.				
Unit-2	Number of lectures =08	Title of the unit: PHYSICO CHEMICAL PRINCIPLES	OF EXTRACTIO	DN					
	and refining of Copper, lead, alumin								
Unit-3	Number of lectures = 08	Title of the unit: INORGANIC MATERIALS OF INDU	ISTRIAL IMPO	RTANCI	F				
	ucture and modification. Alumina, sili				6				
Unit-4	Number of lectures = 08	Title of the unit: METALS AND ALLOYS							
		, nickel, titanium and their alloys, mechanical and ch	emical propert	ies and	their a	onlicatio	ns		
-									
Unit-5	Number of lectures = 08	Title of the unit: ADHESIVE development of adhesive strength, chemical factors	influencing ad	nosivo a	oction f	rom cor	rosion		
		development of duriesive strength, enemical factors	innachenig au				1051011.		
11. CO-PO mapping			201	202	000	204	DOF	DOC	0.07
COs Basic underst		Attributes ganic chemistry application such as metallurgical pro	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	nong students.	ganic chemistry application such as metallurgical pro	2		1		1	1	2
CO2 How inorgan	ic materials are important for indust	rial chemistry is evaluated through suitable examples	s. <b>2</b>	1				1	2
03	f Commercial preparations of alloys, emistry is done.	their merits and demerits and how they can be app	plied in 1						1
	· ·	esses in industrial chemistry is learnt.	2	1	1		1	1	2
Important an		e zeolites, alumina etc. are evaluated by their reaction		-	-		-	-	
cos properties.			2					1	2
12 Brief description	of self-learning / E-learning compor	g contribution, 2 Average contribution , 1 Low contribution	Πουτιοη						
-	w.degruyter.com/view/title/304228								
		ial_inorganic_chemistry.html?id=y43xAAAAMAAJ							
		89/743/CHE%2012_EN%20Inorganic%20Chemistry.p	df?sequence=	1&isAllo	owed=y				
		s.org/events-list/industrial-inorganic-chemistry							
13. Books recommend 1. Austin H. T.		es, Pubs: McGraw Hill Book Company, New York (198	24)						
	-	trial Chemistry, Pubs: Van Nostrand Hold Company, L							
		, Vol. I & II Pubs: Vikas Publishing House, Pvt. Ltd., Ne	· · ·						
		, Industrial Inorganic Chemistry, Pubs: V. Ch. Publish	ers, New York	(1989).					
		ngineering, Pubs: Mir Publishers, Moscow (1961).							
	-	nemical Engineering, Pubs: McGraw-Hill Co., U.S.A, 1 Chemical Engineering, Pubs: McGraw-Hill Book Con		rk 100	100-	rn ( I LI	Cham:	cal En~	nooring
	Pubs: McGraw-Hill Book Company, N		npany, New Yo	ик, 198	н. о. ге	ııy J.⊓.,	Chemi	cai Erig	meening
		/							

1. Name of	f the Departmen	t: CHEMISTRY	<u>SEMESTER III</u>							
2. Course N	Name	INDUSTRIAL ASPECTS OF OF	IGANIC CHEMISTRY	L			Т		Р	
3. Course C	Code	CH203		3			1		0	
4. Type of	Course (use tick	mark)		Core ( √ )		DE	()		FC (	)
5. Pre-requ	uisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ()	Odd (√	)	Either	Sem (	) E	very Se	m()
7. Total Nu	umber of Lecture	s, Tutorials, Practicals	· · ·							
		ıres = 30	Tutorials = 10				al = Nil			
			nd role of organometallic reagents in the synthesis of							
			ium aluminum hydride, Sodium borohydride, Alkox			-		-		-
		ano-cuprates compounds. Al	so introduce the carbon nanotubes: synthesis, str	ucture, char	acteriza	ation, n	hechani	sm, mo	odificati	on and
applications.	OUTCOMES (CO)	•								
		,. ompletion, learners will devel	op following attributes:							
COURSE O	OUTCOME (CO)		ATTRIBUTES							
	CO1	The study of various technique enzyme-catalyzed and microw	ues used in the organic synthesis gives additional str rave-induced reactions.	rength and u	ndersta	nding r	egardin	g bio-tr	ansform	nations
	CO2		e synthesis and applications of different organomet	allic reagents	such a	s Grign	ard rea	gents, (	Drgano-	lithium
	02	Zinc, Copper, Palladium and N	ickel compounds along with homogeneous catalytic r	eactions, hyd	lrogena	tion and	l hydrof	ormyla	tion.	
	CO3	Students can analyze the synt	nesis and applications of organo-silicon, Organo-palla	dium and lith	ium org	gano-cu	prates o	ompou	nds.	
			rious chemical reactions: reduction with Lithium al ew dimension in the study. Dissolving metal reductio		-					-
	CO5		rization, mechanism, modification and applications c	arbon nanot	ubes giv	ve addit	ional su	upport 1	o the s	tudents
	ise detailed cont	to understand the carbon nan	otudes.							
Unit-1	ise detailed cont	Number of lectures = 08	Title of the unit: TECHNIQUES IN ORGANIC SYNTH	IFSIS						
	natons – Enzym		vave induced reactions-Principle, conditions, advant		onventi	onal he	ating n	nethod	- Annli	cations
sonication.					onventi		ating i	ictilou.	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	cations
Unit-2		Number of lectures =08	Title of the unit: ORGANOMETALLIC REAGENTS							
Synthesis a	nd applications	of Grignard reagents-orga	nolithium, Zinc, Copper, Palladium, Nickel comp	pounds in a	organic	synthe	sis- Ho	omoger	eous d	catalytic
reactionshyd	drogenation, hyd	roformylation.								
Unit-3		Number of lectures = 08	Title of the unit: METHODS IN ORGANIC SYNTHESI							
U U			n organic synthesis; Applications of Pd (0) and Pd (II)	) complexes i	n orgar	nic syntl	nesis- S	uzuki a	nd Sono	ogashira
Unit-4	eck reaction, Prep	paration and applications of lit Number of lectures = 08	Title of the unit: METHODS IN ORGANIC SYNTHESI	C _ II						
	vith lithium alun		nydride, alkoxides, bismethoxyethoxyaluminium hyd		alumini	um hvo	lride ar	d deriv	atives-r	ratalytic
			allic reducing agents including enzymatic and microbi	-			inde di		utives (	Latarytic
Unit-5	-	Number of lectures = 08	Title of the unit: CARBON NANOTUBES							
Synthesis, Si	ingle walled carl	oon nanotubes, Structure and	characterization, Mechanism of formation, chemic	ally modified	l carbo	n nanot	ubes, D	oping,	Functio	nalizing
		arbon nanotubes.								
11. CO-PO m	napping						1	r	r	1
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
			anic synthesis gives additional strength and understa	anding 1	1	1	1	-	1	3
			and microwave-induced reactions. applications of different organometallic reagents su	ich ac						
		, ,	Palladium and Nickel compounds along with homoge		1	2	1	-	1	2
	• • •	hydrogenation and hydroform			-	_	_		-	_
CO3 Stu		ze the synthesis and applicatio	ns of organo-silicon, Organo-palladium and lithium or	rgano- 2	1	2	1	-	1	1
	· ·		ctions: reduction with Lithium aluminum hydride, So	odium	1			l	l	
rec	ductions and non	-metallic reducing reactions a			1	2	1	-	1	2
005		e, characterization, mechanis to the students to understand	m, modification and applications carbon nanotube the carbon nanotubes.	s give 1	1	2	2	-	1	2
		3 Stron	g contribution, 2 Average contribution , 1 Low contri	bution						
-		-learning / E-learning compo								
		m.ubc.ca/chemistry-412-indus annica.com/technology/chemi	trial-organic-chemistry cal-industry/Organic-chemicals.							
	-	cat/guiesdocents/2019-20/g10	2495a2019-20iENG.pdf							
	ecommended:									
		· ·	Chemical Engineering, Pubs:McGraw-Hill Book Compa	any, New Yor	k,1984.					
		<b>o o</b> .	s: McGraw-Hill Book Company, NewYork, 1993.		Mairt	im				
			2004): The Chemistry of Nanomaterials, Vol.1, and 2, V n to Nanotechnology Wiley Interscience, New Jersey.		weinne	eim.				
			erials in Chemistry, WileyInterscience, New York.							
			, they have been a second of the second of t							
0. 0	ary, F. A and Sun		Organic Chemistry, Part A and B, 5th Edition, Springer.							
7. Si 8. Bi	mith,M. B. (2005 ansal R K(1999):	dberg,R. I. (2009) :Advanced C ): Organic Synthesis, 2nd Editi Heterocyclic Chemistry, New 7	on, McGraw-Hill: New York.							

#### **SEMESTER – III**

1. Nam	e of the Departmer	nt: CHEMISTRY											
	se Name	MATERIALS AND ENERGY B	ALANC	ČE			L		-	Г		Р	
	se Code	CH204		-			3			1		0	
4. Type	of Course (use tick	mark)				Cor	e(√)			()		FC (	)
	requisite (if any)	10+2 with Chemistry	6.	Frequency (use tick marks)	Even ( )		d (V)		Either	• •	) E	very Se	
7. Tota	Number of Lecture	es, Tutorials, Practicals		· · · · ·	. ,		. ,						
	Lect	ures = 30		Tutorials = 10					Practic	al = Nil			
8. COUR	SE OBJECTIVES: Th	e purpose of this course is to	study	the basic concepts of mole, sig	nificant figur	es, soluti	on che	mistry	and ur	nderstar	nding th	ne princ	iples o
		y, normality mole fraction co	ncept	etc. Thereafter apply the mater	ials balance &	& energy	balan	ce con	cept an	d its ca	lculatio	ns to c	nemica
	s unit operations.	<b>N</b>											
	SE OUTCOMES (CO	): completion, learners will devel	on fol	lowing attributes:									
-	SE OUTCOME (CO)	Inpletion, learners will dever	<u>op jon</u>	-	RIBUTES								
	. ,	Students will be able to anal	vze th	e mathematical interdisciplinary		problem a	and ch	emical	reactio	ons and	strates	gies to	oalance
	CO1	them.	,								51.4102	,	2010110
	CO2	Students will be able to evalua	ate the	e solution chemistry numerical fo	r titrimetric a	nalysis.							
				in the fundamentals and applica		-	m and	basis	of mole	cular pr	ocesses	s with c	nemica
	CO3	reactions.	aatioi							outur pr			
	CO4	Students will have a firm fou	ndatic	on in the fundamentals & applic	ations materi	ials and e	energy	balan	ce for t	he parti	cular r	eaction	and it
	04	scheme.											
	CO5			communicate the results of sci	entific work	in chem	ical e	nginee	ring op	erations	s such	as dist	illatior
40.11.1		evaporation, absorption and c	rystall	ization.									
Unit-1	t wise detailed con	Number of lectures = 08	Tial	e of the unit: UNITS AND DIMEN									
	tion Dimensions (		-										
Introduc	tion, Dimensions &	Systems of Units, Fundamenta	i quan	tities, Derived Quantities, Conve	rsions & Prob	nems.							
Unit-2		Number of lectures =08		e of the unit: BASIC CHEMICAL C									
			1ethoo	ds of expressing the composition	of mixtures	(mass pe	ercent,	volum	e perce	ent, mol	e perce	ent), equ	Jivalen
	ormality, molarity,	Mumber of lectures = 08	Tiel	e of the unit: MATERIAL BALANC	۲ <b>.</b>								
Unit-3	lassification Choic			processes with chemical reaction		halanca		tions	multinl		*****	Dogu	
bypass.		e of system and basis of more	culai	processes with themical reactio	ins, material	Dalatice	Laicula	tions,	munup	e unit p	locesse	es, necy	
Unit-4		Number of lectures = 08	Title	e of the unit: ENERGY BALANCE									
Energy ba	alance: Forms of en	ergy, Energy balance, Energy c	hange	s in physical processes, Energy ch	anges in read	ctions, En	ergy b	alance	Calcula	tions.			
Unit-5		Number of lectures = 08	Title	e of the unit: MATERIAL BALANC		CHEMICA	L REA	CTIONS	5				
Material	Balance without ch	emical reactions: Flow diagran	n for m	naterial balance, simple material	balance with	out recyc	les or	bypass	for che	emical e	nginee	ring ope	eration
such as d	istillation, evaporat	ion, absorption and crystallizat	tion.	-		-							
11. CO-P	O mapping												
COs			Attrib	utes			PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1			natical	interdisciplinary numerical pro	blem and cl	hemical	3	1	1		2	1	1
	reactions and strat	egies to balance them.					-		_				ļ
CO2	Students will be ab	le to evaluate the solution che	mistry	numerical for titrimetric analysis	5.		3	1	2		2	1	
CO3			ament	tals and application of Choice of	system and	basis of	3	1	2		2	1	
		es with chemical reactions.						-			-	-	<u> </u>
CO4			lamen	tals & applications materials and	d energy bala	ance for	3	1	1		3	2	1
		tion and its scheme.	tho	results of scientific work in cl	homical ongi	nooring							
CO5		distillation, evaporation, abso			lennear engi	neering	3	1	1		3	2	1
			•	ribution, 2 Average contribution	. 1 Low cont	ribution				1			
12. Brie	f description of sel	f-learning / E-learning compo	-	,	,								
1.		ary.wiley.com/doi/book/10.10		81118237786									
2.	https://beeindia.	gov.in/sites/default/files/1Ch4	.pdf										
3.				naterial-energy-balance-calculati	-								
4.		ogle.com/books/about/Handbo	ook_or	n_Material_and_Energy_Balance	.html?id=9l3o	o1K2B260	QC						
	s recommended:												
1.		-		ata McGraw-Hill Publishing Comp	-		984.						
2. 3.	-			al Engineering, Pubs: McGraw-Hil cal Engineering, Pubs: McGraw-H			N Vork	100/					
5. 4.		•		Graw-Hill Book Company, New Yo		parry, Nev	N TOTK	, 1504.					
5.	-			s of chemical Engineering, 6th ed		rentic Ha	II, 200	3.					
6				n I. P. Principles of unit operation					d Conc	1004			

- Forst A.S., Wenzel L.A., Clump C.W., Maus L., Andersen L.B., Principles of unit operations, 2nd edition, Pubs: John Wiley and Sons, 1994. Chattopadhay P., Unit Operations of Chemicals Engineering, Vol I, Pubs: Khanna Publishers, Delhi, 1996. 6.
- 7.

1 Name e	f the Departmen	+. CHEMISTRY	<u>JLIVILJILIX – III</u>							
2. Course l	of the Departmen	INDUSTRIAL ASPECTS OF MI	CROBIOLOGY	-		-	-	1		
			CROBIOLOGY	L			<u> </u>		P	
3. Course (		CH205		3			L		0	
	Course (use tick	-		Core ( )		DE			FC (	
•	quisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ( )	Odd (v	)	Either	Sem (	) E'	very Se	m ( )
7. Total Nu		s, Tutorials, Practicals								
		ires = 30	Tutorials = 10			Practic				
		-	e is to study the classification and nomenclature of		ms, cul	turing a	nd pres	servatio	n of m	icrobes
	•	•	blems and production mechanism of industrial met	abolites.						
	OUTCOMES (CO)	: ompletion, learners will develo	on following attributes:							
-	OUTCOME (CO)	simpletion, learners will devel	ATTRIBUTES							
0001132 (		Students will be able to unde	stand the concept of microorganism classification a	and nomencla	ture de	neral cl	haracte	ristics a	nd imn	ortance
			cetes, algae and fungi and their applications in ferme				laracter	istics a		ortanec
			p the concept Growth kinetics of microbes cultur			vation t	echniqu	ues as v	well as	factors
	(0)	affecting the growth	· ··· ································		p					
			fermentation: which includes general structure of a	fermenter ar	nd its ty	pes. Bui	ld the f	irm fou	ndation	of USF
	CO3	& DSP and its purification met	hods							
	CO4	Evaluate mechanisms and pro	cess for the industrial production of metabolites suc	ch as Antibiot	cs, Enzy	/mes, So	olvents,	Vitami	ns and	Organio
L	04	Acids.								
	005		f industrial contamination problems: microbiologica	al examination	n of cor	itamina	nts and	their c	ontrol 1	through
		sterilization techniques.								
	vise detailed cont									
Unit-1		Number of lectures = 08	Title of the unit: CLASSIFICATION AND NOMENCI				-			
-			tes, Introduction to Microbial Diversity: Genera	I characteris	tics and	d impo	rtance	of Viru	uses, B	acteria
	etes, algae and fur	ngi. Use of microorganisms in f			2050					
Unit-2		Number of lectures =08	Title of the unit: PURE CULTURE AND PRESERVAT						6	
	-		ch and continuous culture. Factors affecting growth y of growth supporting substances- Amino acids and		trition	& Ferme	entatior	n media	: Comp	onents
Unit-3	synthetic media.	Number of lectures = 08	Title of the unit: BASIC CONCEPTS OF FERMENTAT							
	rmontation Con		. Introduction to upstream and downstream proce		poratio	ac in D	ownetre	om pro	cossing	
		ation, Extraction, Concentratio		essing. Unit u	peratio		JWIISLIE	ani pro	JCESSIIIE	s (DSP)
Unit-4	on or cens, separa	Number of lectures = 08	Title of the unit: INDUSTRIAL PRODUCTION							
	of antibiotics- Pe		icillins. Production of enzymes-Amylase. Immobiliza	tion of enzym	es and a	applicat	ions of	immobi	ilized er	nzvmes
			nocobalamin. Production of Organic Acids- Acetic Ac							-,
Unit-5		Number of lectures = 08	Title of the unit: CONTAMINATION PROBLEM IN F	ERMENTATIO	N					
Microbiologi	gical examination	of water and common contar	ninant. Food poisoning. Control of microorganisms,	Sterilization,	inhibiti	ng subs	tances-	Antibio	tics, M	inimum
inhibitory co	oncentration.									
11. CO-PO m	mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
Stı	udents will be ab	le to understand the concept	of microorganism classification and nomenclature, g	general						
<b>CO1</b> cha	naracteristics and	importance of Viruses, Bacteri	a, Actinomycetes, algae and fungi and their applicat	ions in <b>3</b>	2	1		1		2
	rmentation indus									
LUZ			wth kinetics of microbes culturing and their preser	vation 3	2	1		1		1
tec		as factors affecting the growth						_		
			ch includes general structure of a fermenter and its	types. 3	3	1		1		2
		dation of USP & DSP and its pu								
UU4			ial production of metabolites such as Antibiotics, En	zymes, 3	2	1		1		1
		and Organic Acids.	ntamination problems: microbiological examinat	ion of						
1 105		heir control through sterilization		2	2	2		1		1
			contribution, 2 Average contribution , 1 Low contr	ibution			1	1		
12 Brief d	lescription of self	f-learning / E-learning compon		ibution .						
		tube.com/watch?v=V0BzQQCC								
		tube.com/watch?v=lm76h4h1f	5							
		-	logy/Book%3A_Microbiology_(Boundless)/17%3A_Ir	ndustrial Micr	obiolog	v				
		-	nicrobiology/chapter/industrial-microbiology/	-	0	,				
	recommended:	-								
1. N	Medical Microbio	logy, Vol. 1: Microbial Infectior	, Vol. 2 : Practical Medical Microbiology, Authors- M	ackie and Mc	Cartney					
		Infections, Author- Smith			,					
		mections, Author- Simur								
3. N		linical Practice, Author- D.C. Sh	anson.							
4. D	Microbiology in Cl Diagnostic Microb	inical Practice, Author- D.C. Sh iology, Authors- Baron, Peters	on and Finegold.							
4. D 5. T	Microbiology in Cl Diagnostic Microb Textbook of Indus	inical Practice, Author- D.C. Sh iiology, Authors- Baron, Peters trial Microbiology, Author- A. I	on and Finegold.							
4. D 5. T 6. Ir	Microbiology in Cl Diagnostic Microb Textbook of Indus Industrial Microbi	inical Practice, Author- D.C. Sh iology, Authors- Baron, Peters	on and Finegold.							

CO1       The students will able to explain about the chemical structures of carbohydrate, and their classification and z z 1 1 1 z 1 1 1 1 1 1 1 1 1 1 1 1 1	2. Course Na 3. Course Co 4. Type of Co 5. Pre-requi 7. Total Num 8. COURSE OI 9. COURSE OI 9. COURSE OI After the succ COURSE OI COURSE OI COURSE OI 0. COURSE OI 0. COURS	ame         BIOCHEMISTRY           ode         CH206           ourse (use tick mark)         10+2 with Chemistry           isite (if any)         10+2 with Chemistry           nber of Lectures, Tutorials, Practicals         Lectures = 30           BJECTIVES: Understand the concept of Bioc         UTCOMES (CO):           essful course completion, learners will dev         UTCOME (CO)           O1         The students will able to exp           O2         Student will able to know able           O3         The students will explain the           O5         The students will explain the           O5         The students will understand           e detailed content         Number of lectures = 08           And classification, monosaccharide (glucosed)         their uses. Polysaccharides (Starch and Ceell)           Number of lectures = 08         Classification, and Preparation of Amino Amidary, Tertiary and Quaternary Structure of           Number of lectures = 08         Mumber of lectures = 08           And Characteristic features of enzymes. Face         Structures of enzymes. Face	Tutorials = 10         hemistry regarding BiomoleculesCarbohydrates, protein         elop following attributes:         ATTRIBUTES         alain about the chemical structures of carbohydrate, an         out amino acids and primary, secondary, tertiary, quatries         w about enzymes and their characteristics. They also will         e structure and function of lipids, circulating lipids and in         d about the structure and function of nucleosides and n         Title of the unit: CARBOHYDRATES         e and fructose) physical and chemical properties and their use         Title of the unit: AMINO ACIDS, PPTIDES AND PRC         wcids: Strecker synthesis using Gabriel's phthalimide s         proteins.         Title of the unit: ENZYMES	3 Core ( ) Odd ( v s, lipids, Nuc s, lipids, Nuc l their classif rnary structu l be able to k flammatory ucleotides. flammatory i. PTIENS	ication ure of p now th lipid m	DE Either Practic ds, Enzy and use proteins he impor ediators	1 (√) Sem ( cal = Nil rmes. es. es.	f enzyn	0 FC ( very Se	m ( )	
	3. Course Co 4. Type of Co 5. Pre-requi 7. Total Num 8. COURSE OI 9. COURSE OI 9. COURSE OI After the succ COURSE OI CO CO CO CO 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	ode       CH206         ourse (use tick mark)       10+2 with Chemistry         isite (if any)       10+2 with Chemistry         nher of Lectures, Tutorials, Practicals       Lectures = 30         BJECTIVES: Understand the concept of Bioc       UTCOMES (CO):         essful course completion, learners will dev       UTCOME (CO)         01       The students will able to exp         02       Student will able to know able to know industries.         03       The students will explain the students will explain the students will explain the cost of the students of the stu	Tutorials = 10         hemistry regarding BiomoleculesCarbohydrates, protein         elop following attributes:         ATTRIBUTES         alain about the chemical structures of carbohydrate, an         out amino acids and primary, secondary, tertiary, quatries         w about enzymes and their characteristics. They also will         e structure and function of lipids, circulating lipids and in         d about the structure and function of nucleosides and n         Title of the unit: CARBOHYDRATES         e and fructose) physical and chemical properties and their use         Title of the unit: AMINO ACIDS, PPTIDES AND PRC         wcids: Strecker synthesis using Gabriel's phthalimide s         proteins.         Title of the unit: ENZYMES	3 Core ( ) Odd ( v s, lipids, Nuc s, lipids, Nuc l their classif rnary structu l be able to k flammatory ucleotides. flammatory i. PTIENS	ication ure of p now th lipid m	DE Either Practic ds, Enzy and use proteins he impor ediators	1 (√) Sem ( cal = Nil rmes. es. es.	f enzyn	0 FC ( very Se	m ( )	
4. Type of Course (yee tek marks)         Ever ()         EV (/)         FE (/)         EV (/)         EVer (/)	4. Type of Co 5. Pre-requi 7. Total Num 8. COURSE OI 9. COURSE OI After the succ COURSE OI COURSE OI CO CO CO CO CO 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	ourse (use tick mark)         isite (if any)       10+2 with Chemistry         nber of Lectures, Tutorials, Practicals         Lectures = 30         BJECTIVES: Understand the concept of Bioc         UTCOMES (CO):         essful course completion, learners will dev         UTCOME (CO)         01       The students will able to exp         02       Student will able to know ab         03       The students will explain the         04       The students will explain the         05       The students will understand         e detailed content       Number of lectures = 08         and classification, monosaccharide (glucose       their uses. Polysaccharides (Starch and Ce         Number of lectures = 08       Classification, and Preparation of Amino A         ndary, Tertiary and Quaternary Structure of       Number of lectures = 08         and Characteristic features of enzymes. Face       Student so fenzymes. Face	Tutorials = 10         hemistry regarding BiomoleculesCarbohydrates, protein         elop following attributes:         ATTRIBUTES         alain about the chemical structures of carbohydrate, an         out amino acids and primary, secondary, tertiary, quatries         w about enzymes and their characteristics. They also will         e structure and function of lipids, circulating lipids and in         d about the structure and function of nucleosides and n         Title of the unit: CARBOHYDRATES         e and fructose) physical and chemical properties and their use         Title of the unit: AMINO ACIDS, PPTIDES AND PRC         wcids: Strecker synthesis using Gabriel's phthalimide s         proteins.         Title of the unit: ENZYMES	Core ( ) Odd ( V s, lipids, Nuc l their classif rnary structu l be able to k flammatory ucleotides.	ication ure of p now th lipid m	DE Either Practic ds, Enzy and use proteins he impor ediators	(√) Sem ( cal = Nil mes. ss. ss. setc	f enzyn	FC ( very Se	m ( )	
Encrementation         Description         Description         Every Sem ( )         Dotd (v)         Ether Sem ( )         Every Sem ( )           2. Total Number of Iscures, 1303 (STURING), Practical = NU         3         COURSE OURCENTS (C):         Practical = NU         3           3. COURSE OURCENTS (CO):         Accord and the concept of Biochemistry regarding Biomicules/Carbohydrates, proteins, lipids, Nucleic adds, Enzymes.         3         COURSE OURCENTS (CO):           After the successful course completion, learners will develop following attributes:         COURSE OURCENTS (CO):         ATTRIBUTES           COURSE OURCENTS (CO):         After the successful course completion, learners will develop following attributes:         COURSE OURCENTS (CO):         ATTRIBUTES           COURSE OURCENTS (CO):         The students will abe to know about enzymes and their characteristics. They also will be able to know about enzymes and their characteristics. They also will be able to know the importance of enzymes in chemical moderna and counces of the students will explain the structure and function of nucleosides and nucleotides.         Unit will be able to know about enzymes and function of nucleosides and nucleotides.           10. Unit wide detailed content         Unit 2         Number of lectures = 08         The of the unit. CARBOHYDRATES           Introduction, Classification, and cassification, and Praparation of Amino Acids: Streeker synthesis using Gabrel's phthalimide synthesis. Structura for characteristic farmer and functoo physical and Chemical properties and theinr uses.         <	5. Pre-requi 7. Total Nun 8. COURSE OI 9. COURSE OI After the succ COURSE OI COURSE OI CO CO CO CO CO CO CO CO CO CO CO CO CO	site (if any)       10+2 with Chemistry         nber of Lectures, Tutorials, Practicals       Lectures = 30         BJECTIVES: Understand the concept of Bioc       UTCOMES (CO):         essful course completion, learners will dev       JTCOME (CO)         01       The students will able to exp         02       Student will able to know able to student will able to know industries.         04       The students will explain the cost of the students will understand the content         Number of lectures = 08       Number of lectures = 08         Classification, and Preparation of Amino Andary, Tertiary and Quaternary Structure of Number of lectures = 08         and Characteristic features of enzymes. Factorial	Tutorials = 10         hemistry regarding BiomoleculesCarbohydrates, protein         elop following attributes:         ATTRIBUTES         alain about the chemical structures of carbohydrate, an         out amino acids and primary, secondary, tertiary, quatries         w about enzymes and their characteristics. They also will         e structure and function of lipids, circulating lipids and in         d about the structure and function of nucleosides and n         Title of the unit: CARBOHYDRATES         e and fructose) physical and chemical properties and their use         Title of the unit: AMINO ACIDS, PPTIDES AND PRC         wcids: Strecker synthesis using Gabriel's phthalimide s         proteins.         Title of the unit: ENZYMES	Odd ( v s, lipids, Nuc l their classif rnary structu l be able to k flammatory ucleotides. heir uses. Dis i. <b>PTIENS</b>	ication ure of p now th lipid m	Either Practic ds, Enzy and use proteins he impor ediators	Sem ( cal = Nil mes. es. es. es.	f enzyn	very Se	m ( )	
	7. Total Nun 8. COURSE OI 9. COURSE OI After the succ COURSE OI COURSE OI CO CO CO CO CO CO CO CO CO CO CO CO CO	Indextures, Tutorials, Practicals         Lectures, Tutorials, Practicals         Lectures = 30         BJECTIVES: Understand the concept of Bioc         UTCOMES (CO):         essful course completion, learners will dev         JTCOME (CO)         O1         The students will able to exp         O2         Student will able to know ab         O3         The students will able to know ab         O4         The students will able to know ab         O5         The students will explain the         O5         The students will understand         e detailed content         Number of lectures = 08         Classification, monosaccharide (glucose         Aud classification, and Preparation of Amino A         Index of lectures = 08	Tutorials = 10         hemistry regarding BiomoleculesCarbohydrates, protein         elop following attributes:         ATTRIBUTES         alain about the chemical structures of carbohydrate, an         out amino acids and primary, secondary, tertiary, quatries         w about enzymes and their characteristics. They also will         e structure and function of lipids, circulating lipids and in         d about the structure and function of nucleosides and n         Title of the unit: CARBOHYDRATES         e and fructose) physical and chemical properties and their use         Title of the unit: AMINO ACIDS, PPTIDES AND PRC         wcids: Strecker synthesis using Gabriel's phthalimide s         proteins.         Title of the unit: ENZYMES	s, lipids, Nuc I their classif rnary structu I be able to k flammatory ucleotides. heir uses. Dis	ication ure of p now th lipid m	Practic ds, Enzy and use proteins he impor ediators	ral = Nil rmes. rs. rtance o s etc	f enzyn	nes in cl		
Interview = 30         Tutorials = 10         Practical = NII           8. COURSE ODECTIVES: Understand the concept of Biochemistry regarding Biomolecules/arbohydrates, proteins, lipids, Nucleic adds, Enzymes.         S. COURSE OUTCOMES (CO):           Apr: the successful course completion, learners will develop following attributes:         COURSE OUTCOMES (CO):         ATTRIBUTES           COURSE OUTCOMES (CO):         ATTRIBUTES         COURSE OUTCOMES (CO):         ATTRIBUTES           COURSE OUTCOMES (CO):         Attributes:         COURSE OUTCOMES (CO):         Attributes:           COURSE OUTCOMES (CO):         Attributes:         Attributes:         COURSE OUTCOMES (CO):         Attributes:           CO2         brute will able to know about enzymes and their characteristics: They also will be be know the importance of enzymes in chemic antipolity of and inflammatory lipid mediators etc.         CO3         The students will understand about the structure and function of nucleosides and nucleotides:         10. Unit wise detailed content         Title of the unit: CARBOHYDRATES           Introduction, Classification, and Dreparation of Annah Cale: Streeter structures and themical synthesis. Zwitter ion and isoleteric point: Overview of Primary, Secondary, Tertiary and Duaternary Structure of proteins:         Title of the unit: CARBOHYDRATES           Unit3         Number of lectures = 08         Title of the unit: CARBOHYDRATES         Title of the unit: CARBOHYDRATES           Unit4         Number of lectures = 00	8. COURSE OI 9. COURSE OI After the succ COURSE OU COURSE OU CO CO CO CO CO CO CO CO CO CO CO CO CO	Lectures = 30         BJECTIVES: Understand the concept of Bioc         UTCOMES (CO):         essful course completion, learners will dev         JTCOME (CO)         01       The students will able to exp         02       Student will able to know ab         03       The students will able to know industries.         04       The students will explain the         05       The students will understand         e detailed content       Number of lectures = 08         and classification, monosaccharide (glucose       their uses. Polysaccharides (Starch and Ce         Number of lectures =08       Classification, and Preparation of Amino /         ndary, Tertiary and Quaternary Structure of       Number of lectures = 08         and Characteristic features of enzymes. Face       Structures of enzymes. Face	In the structure and function of nucleosides and n     In the structure and function of nucleosides and n     Title of the unit: CARBOHYDRATES     and fructose) physical and chemical properties and the     Ilulose); Physical and Chemical Properties and their use     Title of the unit: CARBOHYDRATES     and fructose) physical and chemical properties and their use     Title of the unit: CARBOHYDRATES     and fructose) physical and chemical properties and their use     Title of the unit: CARBOHYDRATES     and fructose) physical and chemical properties and their use     Title of the unit: CARBOHYDRATES     and fructose) physical and chemical properties and their use     Title of the unit: AMINO ACIDS, PPTIDES AND PRC     ucids: Strecker synthesis using Gabriel's phthalimide s     proteins.     Title of the unit: ENZYMES	I their classifi rnary structu I be able to k flammatory ucleotides. neir uses. Dis	ication ure of p now th lipid m sacchar	ds, Enzy and use proteins ne impor ediators	rmes. rs. rtance o			hemical	
2 COURSE COBECTIVES: Understand the concept of Biochemistry regarding Biomolecules/Carbohydrates, probeins, lipids, Nucleic acids, Enzymes. 3. COURSE COUTCOMES (CO): After the successful course completion, learners will develop following attributes: COURSE COURCE (CO) COI The students will able to explain about the chemical structures of carbohydrate, and their classification and uses. CO2 Student will able to know about amino acids and primary, secondary, tertiary, quaternary structure of proteins. CO3 The students will able to know about enzymes and their characteristics. They also will be able to know about enzymes in chemic. CO4 The students will able to know about enzymes and function of lipids, circulating lipids and inflammatory lipid mediators etc. CO5 The students will able to know about enzymes and function of nucleosides and nucleotides. 10. Unit was detailed content CO4 The students will able to any about the structure and function of nucleosides and nucleotides. 10. Units as forestanding Start and Clauboxy (bryocal and chemical properties and their uses. Disaccharides (Start and Clauboxy), Bryocal and Chemical properties and their uses. Disaccharides (Start and Clauboxy), Bryocal and Chemical properties and their uses. Disaccharides (Start and Clauboxy), Bryocal and Chemical properties and their uses. Disaccharides (Start and Clauboxy), Bryocal and Chemical properties and their uses. Disaccharides (Start and Clauboxy), Bryocal and Chemical properties and their uses. Disaccharides (Start and Clauboxy), Bryocal and Chemical properties and their and transcence of proteins.  Introduction, Clauboxing and Practaria (Start and Clauboxy), Bryocal and Chemical properties and their uses. Disaccharides (Start and Clauboxy), Bryocal and Chemical properties and their and transcence of proteins.  Introduction, Clauboxing and Practaria (Start and Clauboxy), Bryocal and Chemical properties and their and transcence of proteins and Clauboxy.  Introduction, Clauboxing and Practary (Start and Claubox), Introduction,	9. COURSE OI After the succ COURSE OI COURSE OI CO CO CO CO 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	BJECTIVES: Understand the concept of Bioc UTCOMES (CO): essful course completion, learners will dev UTCOME (CO) O1 The students will able to exp O2 Student will able to know ab O3 The student will able to know ab O3 The student will able to know ab O4 The students will explain the O5 The students will explain the O5 The students will understand e detailed content Number of lectures = 08 and classification, monosaccharide (glucose d their uses. Polysaccharides (Starch and Ce Number of lectures = 08 Classification, and Preparation of Amino A ndary, Tertiary and Quaternary Structure of Number of lectures = 08 and Characteristic features of enzymes. Fac	In the structure and function of nucleosides and n     In the structure and function of nucleosides and n     Title of the unit: CARBOHYDRATES     and fructose) physical and chemical properties and the     Ilulose); Physical and Chemical Properties and their use     Title of the unit: CARBOHYDRATES     and fructose) physical and chemical properties and their use     Title of the unit: CARBOHYDRATES     and fructose) physical and chemical properties and their use     Title of the unit: CARBOHYDRATES     and fructose) physical and chemical properties and their use     Title of the unit: CARBOHYDRATES     and fructose) physical and chemical properties and their use     Title of the unit: AMINO ACIDS, PPTIDES AND PRC     ucids: Strecker synthesis using Gabriel's phthalimide s     proteins.     Title of the unit: ENZYMES	I their classifi rnary structu I be able to k flammatory ucleotides. neir uses. Dis	ication ure of p now th lipid m sacchar	ds, Enzy and use proteins ne impor ediators	rmes. rs. rtance o			hemical	
3. COURSE OUTCOMES (CO):       ATTIBUTES         Approximation of the successful course completion, learners will develop following attributes:       ATTIBUTES         COURSE OUTCOMES (CO)       ATTIBUTES         COURSE COURCE (CO)       The students will able to know about amine acids and primary, secondary, turtiary, quaterary structure of proteins         CO3       The students will able to know about amine acids and primary, secondary, turtiary, quaterary structure of proteins         CO4       The students will explain the structure and function of lipids, circulating lipids and inflammatory lipid mediators etc         CO5       The students will explain the structure and function of nucleosides and nucleotides.         10. Unit wise detailed content       Number of lectures = 08       Title of the unit: CARBONYDRATES         Unit-1       Number of lectures = 08       Title of the unit: CARBONYDRATES         Unit-2       Number of lectures = 08       Title of the unit: CARBONYDRATES         Unit-3       Number of lectures = 08       Title of the unit: CARBONYDRATES         Unit-3       Number of lectures = 08       Title of the unit: EN2YMES         Unit-3       Number of lectures = 08       Title of the unit: EN2YMES         Unit-3       Number of lectures = 08       Title of the unit: EN2YMES         Unit-3       Number of lectures = 08       Title of the unit: NUCECE ACID         Unit	9. COURSE OI After the succ COURSE OI COURSE OI CO CO CO CO 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	UTCOMES (CO): essful course completion, learners will dev UTCOME (CO) O1 The students will able to exp O2 Student will able to know able O3 The student will able to know able O3 The student will able to know able O4 The students will explain the O5 The students will explain the O5 The students will understand e detailed content Number of lectures = 08 and classification, monosaccharide (glucose a their uses. Polysaccharides (Starch and Ce Number of lectures = 08 Classification, and Preparation of Amino A ndary, Tertiary and Quaternary Structure of Number of lectures = 08 and Characteristic features of enzymes. Fac	ATTRIBUTES ATTRIBUTES Itain about the chemical structures of carbohydrate, an out amino acids and primary, secondary, tertiary, quat w about enzymes and their characteristics. They also wi e structure and function of lipids, circulating lipids and in d about the structure and function of nucleosides and n Title of the unit: CARBOHYDRATES and fructose) physical and chemical properties and their use Title of the unit: AMINO ACIDS, PPTIDES AND PRC scids: Strecker synthesis using Gabriel's phthalimide s proteins. Title of the unit: ENZYMES	I their classifi rnary structu I be able to k flammatory ucleotides. neir uses. Dis	ication ure of p now th lipid m sacchar	and use proteins ne impor ediators	rtance o			hemical	
After the successful course competition, learners will develop following attributes:         COURSE COURCE (COI         COI       The students will able to know about anymes and their characteristics. They also will be able to work the importance of enzymes in chemical industries.         COI       The students will explain the structure and function of lipids, circulating lipids and inflammatory lipid mediators etc         COI       The students will enderstand about the structure and function of nucleosides and nucleotides.         10. Units vise detailed content         Units 2       Number of lectures 30       The of the unit: CARBOHYDRATES         Introduction and Classification, monosaccharide [glosce and fructore] physical and chemical properties and their uses. Disaccharides [sucrose], Physical and chemical properties and their uses. Disaccharides [sucrose], Physical and chemical properties and their uses. Disaccharides [sucrose], Physical and Chemical Properties and their uses.         Units 2       Number of lectures 30       The of the unit: CARBOHYDRATES         Introduction, Classification, Traityperides, Status and Chemical Properties and their uses. Disaccharides [sucrose], Physical and chemical properis and their cla	After the succ COURSE OL COURSE OL CO CO CO CO 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	essful course completion, learners will dev JTCOME (CO) O1 The students will able to exp O2 Student will able to know ab O3 The student will able to know ab O3 The student will able to know industries. O4 The students will explain the O5 The students will understand e detailed content Number of lectures = 08 and classification, monosaccharide (glucose d their uses. Polysaccharides (Starch and Ce Number of lectures =08 Classification, and Preparation of Amino A ndary, Tertiary and Quaternary Structure of Number of lectures = 08 and Characteristic features of enzymes. Fac	ATTRIBUTES           Ilain about the chemical structures of carbohydrate, an           out amino acids and primary, secondary, tertiary, quat           w about enzymes and their characteristics. They also wi           estructure and function of lipids, circulating lipids and in           d about the structure and function of nucleosides and n           Title of the unit: CARBOHYDRATES           e and fructose) physical and chemical properties and their use           Title of the unit: AMINO ACIDS, PPTIDES AND PRO           wcids: Strecker synthesis using Gabriel's phthalimide s           proteins.           Title of the unit: ENZYMES	rnary structu l be able to k flammatory ucleotides. neir uses. Dis i. <b>PTIENS</b>	ure of p know th lipid ma sacchar	ediators	rtance o s etc			hemical	
COLINSE CUTCOME (CO)         ATTRIBUTES           CO1         The students will able to kexplain about the chemical structures of carbohydrate, and their classification and uses.           CO2         Student will able to know about amino acids and primary, secondary, tertiary, quaternary structure of proteins           CO3         The student will able to know about enzymes and their characteristics. They also will be able to know the importance of enzymes in chemic industries.           CO4         The students will explain the structure and function of lipids, circulating lipids and inflammatory lipid mediators etc.           CO5         The students will understand about the structure and function of nucleosides and nucleotides.           JO. Unit wide detailed content         The of the unit: CARBONYDRATES           Unit 2         Number of lectures = 08         Title of the unit: CARBONYDRATES           Introduction, classification, manoscharidre (glocene)         Title of the unit: CARBONYDRATES           Introduction, classification, and Preparation of Amino Acids. Streeker synthesis using Gabriel's phthalimide synthesis. Zwitter ion and loadetectric point. Overview of Primary, Secondary, Structures of proteins.           Unit 3         Number of lectures = 08         Title of the unit: ENTMONES           Introduction, classification, normore acid structures of entryme. Factors influencing engrets existing caston of they physical and chemic induction.           Unit 4         Number of lectures = 08         Title of the unit: ENTMONES	COURSE OU CC CC CC CC CC CC 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	JTCOME (CO)         O1       The students will able to exp         O2       Student will able to know ab         O3       The student will able to know industries.         O4       The students will explain the         O5       The students will understame         e detailed content       Number of lectures = 08         and classification, monosaccharide (glucosed their uses. Polysaccharides (Starch and Center Starch and Center Starch and Center Structure of Number of lectures = 08         Classification, and Preparation of Amino Andary, Tertiary and Quaternary Structure of Number of lectures = 08         and Characteristic features of enzymes. Face	ATTRIBUTES           Ilain about the chemical structures of carbohydrate, an           out amino acids and primary, secondary, tertiary, quat           w about enzymes and their characteristics. They also wi           estructure and function of lipids, circulating lipids and in           d about the structure and function of nucleosides and n           Title of the unit: CARBOHYDRATES           e and fructose) physical and chemical properties and their use           Title of the unit: AMINO ACIDS, PPTIDES AND PRO           wcids: Strecker synthesis using Gabriel's phthalimide s           proteins.           Title of the unit: ENZYMES	rnary structu l be able to k flammatory ucleotides. neir uses. Dis i. <b>PTIENS</b>	ure of p know th lipid ma sacchar	ediators	rtance o s etc			hemical	
C01       The students will able to explain about the chemical structures of carbohydrate, and their classification and uses.         C02       Student will able to know about annino acids and primary, secondary, tertiary, guaternary structure of proteins         C03       The students will able to know about enzymes and their characteristics. They also will be able to know the importance of enzymes in chemici industries.         C04       The students will able to know about enzymes and function of julds, circulating lipids and inflammatory lipid mediators etc         C05       The students will able to know about enzymes and their characteristics. They also will be able to know the importance of enzymes in chemici properties and their uses. Obseccharides (Sucrose), Physical and chemical properties and their uses. Disaccharides (Sucrose), Physical and chemical properties and their uses. Disaccharides (Sucrose), Physical and chemical properties and their uses. Disaccharides (Sucrose), Physical and chemical properties and their uses. Disaccharides (Sucrose), Physical and chemical properties and their uses. Disaccharides (Sucrose), Physical and chemical properties and their uses. Disaccharides (Sucrose), Physical and chemical properties and their uses.         Unite1       Number of lectures = 08       Title of the unit: ENZMMS         Unite2       Number of lectures = 08       Title of the unit: ENZMMS         Unite3       Number of lectures = 08       Title of the unit: ENZMMS         Unite4       Number of lectures = 08       Title of the unit: ENZMMS         Unite3       Number of lectures = 08       Title of the u	CC CC CC CC CC 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, P Primary, Secon Unit-3 Introduction a	01       The students will able to exp         02       Student will able to know ab         03       The student will able to know industries.         04       The students will explain the         05       The students will explain the         05       The students will understand         e detailed content       Number of lectures = 08         and classification, monosaccharide (glucosed)       Iteris (Starch and Celes)         Number of lectures = 08       Classification, and Preparation of Amino Andary, Tertiary and Quaternary Structure of         Number of lectures = 08       Number of lectures = 08         Andary, Tertiary and Quaternary Structure of       Number of lectures = 08         And Characteristic features of enzymes. Face       Number of lectures = 08	Iain about the chemical structures of carbohydrate, an out amino acids and primary, secondary, tertiary, quat w about enzymes and their characteristics. They also wi e structure and function of lipids, circulating lipids and in d about the structure and function of nucleosides and n <b>Title of the unit: CARBOHYDRATES</b> e and fructose) physical and chemical properties and their use <b>Title of the unit: AMINO ACIDS, PPTIDES AND PRC</b> scids: Strecker synthesis using Gabriel's phthalimide s proteins. <b>Title of the unit: ENZYMES</b>	rnary structu l be able to k flammatory ucleotides. neir uses. Dis i. <b>PTIENS</b>	ure of p know th lipid ma sacchar	ediators	rtance o s etc			hemical	
CO2       Student will able to know about anino acids and primary, secondary, tertiary, quaternary structure of proteins         CO3       The student will able to know about enzymes and their characteristics. They also will be able to know the importance of enzymes in chemic industries.         CO4       The students will explain the structure and function of nucleosides and nucleotides.         10. Unit vise detailed contern         Title of the unit: CARBOHYDRATES         Introduction and classification, monosaccharide (glucose and fructose) physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their classification, and Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Prop	Cd Cd Cd 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	O2       Student will able to know ab         O3       The student will able to know industries.         O4       The students will explain the         O5       The students will understand         e detailed content       Number of lectures = 08         and classification, monosaccharide (glucose)       their uses. Polysaccharides (Starch and Ce)         Classification, and Preparation of Amino A         ndary, Tertiary and Quaternary Structure of         Number of lectures = 08         and Characteristic features of enzymes. Fac	out amino acids and primary, secondary, tertiary, quatery         w about enzymes and their characteristics. They also with         e structure and function of lipids, circulating lipids and in         d about the structure and function of nucleosides and n         Title of the unit: CARBOHYDRATES         and fructose) physical and chemical properties and their use         Title of the unit: AMINO ACIDS, PPTIDES AND PRC         wcids: Strecker synthesis using Gabriel's phthalimide s         proteins.         Title of the unit: ENZYMES	rnary structu l be able to k flammatory ucleotides. neir uses. Dis i. <b>PTIENS</b>	ure of p know th lipid ma sacchar	ediators	rtance o s etc			hemical	
CO3         The student will able to know about enzymes and their characteristics. They also will be able to know the importance of enzymes in chemical industries.           CO4         The students will explain the structure and function of lipids, circulating lipids and inflammatory lipid mediators etc           CO5         The students will understand about the structure and function of nucleosides and nucleotides.           10. Units wise detailed content           Units 1         Number of lectures = 08         Title of the unit: CARBOHYDRATES           Introduction, Classification, monosaccharides (glucose and fructose) physical and chemical properties and their uses. Disaccharides (Sarcharol Cellulose): Physical and Chemical Properties and their uses.         Units 2         Number of lectures -08         Title of the unit: ENZYMES           Units 2         Number of lectures -08         Title of the unit: ENZYMES           Units 3         Number of lectures -08         Title of the unit: ENZYMES           Units 4         Number of lectures -08         Title of the unit: ENZYMES           Units 4         Number of lectures -08         Title of the unit: ENZYMES           Number of lectures -08         Title of the unit: ENZYMES	Co Co Co Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	O3       The student will able to know industries.         O4       The students will explain the students will explain the students will understand the students of the students of the students of the students will understand the students of t	w about enzymes and their characteristics. They also with estructure and function of lipids, circulating lipids and in a about the structure and function of nucleosides and normality of the unit: CARBOHYDRATES and fructose) physical and chemical properties and their use Title of the unit: AMINO ACIDS, PPTIDES AND PRO Acids: Strecker synthesis using Gabriel's phthalimide structures. Title of the unit: ENZYMES	l be able to k flammatory ucleotides. neir uses. Dis <b>PTIENS</b>	know th lipid mo	ediators	s etc			hemical	
CO3         Industries.           CO4         The students will explain the structure and function of lipids, circulating lipids and inflammatory lipid mediators etc           CO5         The students will understand about the structure and function of nucleosides and nucleotides.           10. Unit wise detailed content         Number of lectures = 08         Title of the unit: CARBOHYDRATES           Info2         Number of lectures = 08         Title of the unit: CARBOHYDRATES           Info2         Number of lectures = 08         Title of the unit: ANRA OCIS, PFIDES AND PROPTIENS           Infra2         Number of lectures = 08         Title of the unit: ENTANDE NOTENS           Unit 2         Number of lectures = 08         Title of the unit: ENTANDE           Unit 3         Number of lectures = 08         Title of the unit: ENTANDE           Unit 3         Number of lectures = 08         Title of the unit: ENTANDE           Unit 4         Number of lectures = 08         Title of the unit: ENTANDE           Introduction activation fragmentale industry.         Unit 4         Number of lectures = 08         Title of the unit: UNICEI CACID           Introduction, Ruclessides and nucleotides, Hydrogenatic anine bases, monosaccharides (D-ribose or 2-deoxy-D-ribose) and phosphate ions, Structure of prima a secondary (double heim kine dalous)         Structure of prima a secondary (double heim kine dalous)           CO5         The students wi	Co 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	D3     industries.       O4     The students will explain the       O5     The students will understand       e detailed content     Number of lectures = 08       and classification, monosaccharide (glucose     their uses. Polysaccharides (Starch and Ce       Number of lectures = 08     Number of lectures = 08       Classification, and Preparation of Amino Andry, Tertiary and Quaternary Structure of     Number of lectures = 08       Number of lectures = 08     Number of lectures = 08	e structure and function of lipids, circulating lipids and in         d about the structure and function of nucleosides and n         Title of the unit: CARBOHYDRATES         e and fructose) physical and chemical properties and their use         Title of the unit: AMINO ACIDS, PPTIDES AND PRC         xcids: Strecker synthesis using Gabriel's phthalimide s         proteins.         Title of the unit: ENZYMES	flammatory ucleotides. neir uses. Dis s. <b>PTIENS</b>	lipid mo	ediators	s etc			hemica	
CO3         Industries.           CO4         The students will explain the structure and function of lipids, circulating lipids and inflammatory lipid mediators etc           CO5         The students will understand about the structure and function of nucleosides and nucleotides.           10. Unit wise detailed content         Number of lectures = 08         Title of the unit: CARBOHYDRATES           Info2         Number of lectures = 08         Title of the unit: CARBOHYDRATES           Info2         Number of lectures = 08         Title of the unit: ANRA OCIS, PFIDES AND PROPTIENS           Infra2         Number of lectures = 08         Title of the unit: ENTANDE NOTENS           Unit 2         Number of lectures = 08         Title of the unit: ENTANDE           Unit 3         Number of lectures = 08         Title of the unit: ENTANDE           Unit 3         Number of lectures = 08         Title of the unit: ENTANDE           Unit 4         Number of lectures = 08         Title of the unit: ENTANDE           Introduction activation fragmentale industry.         Unit 4         Number of lectures = 08         Title of the unit: UNICEI CACID           Introduction, Ruclessides and nucleotides, Hydrogenatic anine bases, monosaccharides (D-ribose or 2-deoxy-D-ribose) and phosphate ions, Structure of prima a secondary (double heim kine dalous)         Structure of prima a secondary (double heim kine dalous)           CO5         The students wi	Co 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	D3     industries.       O4     The students will explain the       O5     The students will understand       e detailed content     Number of lectures = 08       and classification, monosaccharide (glucose     their uses. Polysaccharides (Starch and Ce       Number of lectures = 08     Number of lectures = 08       Classification, and Preparation of Amino Andry, Tertiary and Quaternary Structure of     Number of lectures = 08       Number of lectures = 08     Number of lectures = 08	e structure and function of lipids, circulating lipids and in         d about the structure and function of nucleosides and n         Title of the unit: CARBOHYDRATES         e and fructose) physical and chemical properties and their use         Title of the unit: AMINO ACIDS, PPTIDES AND PRC         xcids: Strecker synthesis using Gabriel's phthalimide s         proteins.         Title of the unit: ENZYMES	flammatory ucleotides. neir uses. Dis s. <b>PTIENS</b>	lipid mo	ediators	s etc				
COS       The students will understand about the structure and function of nucleosides and nucleotides.         10. Unit vise detailed content         Unit-1       Number of lectures = 08       Title of the unit: CARBOHYDRATES         Introduction and classification, monosaccharide (glucose and fructose) physical and chemical properties and their uses. Disaccharides (Sucrose), Physical and chemical properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses.         Optimize Status and Celluose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses.         Optimize Sucrossite Castro Status and Celluose), Physical and Chemical Properties and their uses.         Disaccharide Status and Celluose), Physical and Chemical Properties and their uses.         Number of lectures = 08         Title of the unit: EN2YMES         Introduction and Characteristic features = 08       Title of the unit: LIPIDS         Introduction, Classification, Triglycerides, statu acids, Structure of proteins, structure of Prostaglandins.         Unit-3       Number of lectures = 08       Title of the unit: NUCLEIC ACID         Introduction, Nucleosides and nucleotides, Heterocyclic aromatic amine bases, monosaccharides (D-ribose or 2-deoxy-D-ribose) and phosphate lons, Structure of proteins aro	Co 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	O5 The students will understand e detailed content Number of lectures = 08 and classification, monosaccharide (glucose d their uses. Polysaccharides (Starch and Ce Number of lectures =08 Classification, and Preparation of Amino A indary, Tertiary and Quaternary Structure of Number of lectures = 08 and Characteristic features of enzymes. Fac	about the structure and function of nucleosides and n         Title of the unit: CARBOHYDRATES         and fructose) physical and chemical properties and their use         Title of the unit: AMINO ACIDS, PPTIDES AND PRO         acids: Strecker synthesis using Gabriel's phthalimide s         proteins.         Title of the unit: ENZYMES	ucleotides. neir uses. Dis  <b>PTIENS</b>	sacchar						
COS       The students will understand about the structure and function of nucleosides and nucleotides.         10. Unit vise detailed content         Unit-1       Number of lectures = 08       Title of the unit: CARBOHYDRATES         Introduction and classification, monosaccharide (glucose and fructose) physical and chemical properties and their uses. Disaccharides (Sucrose), Physical and chemical properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses.         Optimize Status and Celluose), Physical and Chemical Properties and their uses. Disaccharides (Sucrose), Physical and Chemical Properties and their uses.         Optimize Sucrossite Castro Status and Celluose), Physical and Chemical Properties and their uses.         Disaccharide Status and Celluose), Physical and Chemical Properties and their uses.         Number of lectures = 08         Title of the unit: EN2YMES         Introduction and Characteristic features = 08       Title of the unit: LIPIDS         Introduction, Classification, Triglycerides, statu acids, Structure of proteins, structure of Prostaglandins.         Unit-3       Number of lectures = 08       Title of the unit: NUCLEIC ACID         Introduction, Nucleosides and nucleotides, Heterocyclic aromatic amine bases, monosaccharides (D-ribose or 2-deoxy-D-ribose) and phosphate lons, Structure of proteins aro	10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	O5 The students will understand e detailed content Number of lectures = 08 and classification, monosaccharide (glucose d their uses. Polysaccharides (Starch and Ce Number of lectures =08 Classification, and Preparation of Amino A indary, Tertiary and Quaternary Structure of Number of lectures = 08 and Characteristic features of enzymes. Fac	about the structure and function of nucleosides and n         Title of the unit: CARBOHYDRATES         and fructose) physical and chemical properties and their use         Title of the unit: AMINO ACIDS, PPTIDES AND PRO         acids: Strecker synthesis using Gabriel's phthalimide s         proteins.         Title of the unit: ENZYMES	ucleotides. neir uses. Dis  <b>PTIENS</b>	sacchar						
10. Unit wise detailed context         Unit-3       Number of lectures = 08       Title of the unit: CARBOHYDRATES         Inroduction and classification, monosaccharide (glucose and fuctose) physical and chemical properties and their uses.       Disaccharides (Surcose), Physical and chemical Properties and their uses.         Unit-2       Number of lectures = 08       Title of the unit: ANINO ACIDS, PPTIDES AND PROPETIES         Inroduction, and Preparation of Amino Acids: Strecker synthesis using Gabriel's phthalimide synthesis. Zwitter ion and Isoelectric point. Overview of primary, Secondary, Tertiary and Quaternary Structures of proteins.         Unit-3       Number of lectures = 08       Title of the unit: ENZYMES         ntroduction and Characteristic features of enzymes. Factors influencing enzyme activity, Coenzymes, prosthetic group, Lock and key hypothesis, induced fit hypothesis induced fit hypothesis (biological importance in "Chemical Industry.         Unit-3       Number of lectures = 08       Title of the unit: UPIDS         Introduction, Classification, Trighyerides, Faty acids, Hydrogenation of Trighycerides, Saponification of Trighycerides, Reaction of carboxyl groups of fatty acids, Structure of printariand secondary. (Sougher dels): of DNA.         11. Co-PO mapping       Number of lectures = 08       Title of the unit: NUCLEIC ACID         Introduction, Nucleosides and nucleotides, Heterocyclic aromatic armine bases, monosaccharides (D-ribose or 2-deoxy-D-ribose) and phosphate ions, Structure of printaria structures of carbohydrate, and their classification and 2       2       1	10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	e detailed content           Number of lectures = 08           and classification, monosaccharide (glucose           d their uses. Polysaccharides (Starch and Ce           Number of lectures = 08           Classification, and Preparation of Amino A           ndary, Tertiary and Quaternary Structure of           Number of lectures = 08           Output           Number of lectures = 08           Number of lectures = 08           And Characteristic features of enzymes. Factorial contents of the structure of the	Title of the unit: CARBOHYDRATES         and fructose) physical and chemical properties and their use         Ilulose); Physical and Chemical Properties and their use         Title of the unit: AMINO ACIDS, PPTIDES AND PRO         Acids: Strecker synthesis using Gabriel's phthalimide sproteins.         Title of the unit: ENZYMES	neir uses. Dis <b>PTIENS</b>		ides (Su	icrose),				
Unit-1         Number of lectures = 08         Title of the unit: CARBOHYDRATES           ntroduction and classification, monosaccharide (glucose and fructose) physical and chemical properties and their uses. Disaccharides (Sucrose), Physical and chemical properties and their uses.           Unit-2         Number of lectures = 08         Title of the unit: AMINO ACIDS, PPTIDES AND PROPENDS           Unit-3         Number of lectures = 08         Title of the unit: AMINO ACIDS, PPTIDES AND PROPENDS           Unit-3         Number of lectures = 08         Title of the unit: ENZYMES           Introduction, Classification, and Proparation of Animo Acids: Strecker synthesis using Gabriel's phthalimide synthesis. Zwitter ion and Isoelectric point. Overview of proteins.           Unit-3         Number of lectures = 08         Title of the unit: ENZYMES           Introduction, Classification, Trejlycerides, Fatty acids, Hydrogenation of Triglycerides, Reaction of carboxyl groups of fatty acids, Structure and Biological inoportance of Prostaglandins.           Unit-5         Number of lectures = 08         Title of the unit: NUCLEIC ACID           Introduction, Nucleosides and nucleotides, Heterocycilic aromatic amine bases, monosaccharides (D-ribose or 2-deoxy-D-ribose) and phosphate ions, Structure of primaria descendary (double heix model) of DNA.           CO1         The students will able to know about enzymes and their characteristics. They also will be able to know the         2         1         1         1         1         1         1         1 </td <td>Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a</td> <td>Number of lectures = 08           and classification, monosaccharide (glucose           d their uses. Polysaccharides (Starch and Ce           Number of lectures =08           Classification, and Preparation of Amino A           ndary, Tertiary and Quaternary Structure of           Number of lectures = 08           ndary, Tertiary and Quaternary Structure of           Number of lectures = 08           and Characteristic features of enzymes. Fac</td> <td>and fructose) physical and chemical properties and t llulose); Physical and Chemical Properties and their use Title of the unit: AMINO ACIDS, PPTIDES AND PRC Acids: Strecker synthesis using Gabriel's phthalimide s proteins. Title of the unit: ENZYMES</td> <td>PTIENS</td> <td></td> <td>ides (Su</td> <td>icrose),</td> <td></td> <td>ا م م ما م</td> <td></td>	Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a	Number of lectures = 08           and classification, monosaccharide (glucose           d their uses. Polysaccharides (Starch and Ce           Number of lectures =08           Classification, and Preparation of Amino A           ndary, Tertiary and Quaternary Structure of           Number of lectures = 08           ndary, Tertiary and Quaternary Structure of           Number of lectures = 08           and Characteristic features of enzymes. Fac	and fructose) physical and chemical properties and t llulose); Physical and Chemical Properties and their use Title of the unit: AMINO ACIDS, PPTIDES AND PRC Acids: Strecker synthesis using Gabriel's phthalimide s proteins. Title of the unit: ENZYMES	PTIENS		ides (Su	icrose),		ا م م ما م		
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Introduction, Classification, and Preparation of Amino Acids: Strecker synthesis using Gabriel's phthalimide synthesis. Zwitter ion and Isoelectric point. Overview of Primary, Secondary, Tertiary and Quatemary Structure of proteins.         Unit:3       Number of lectures = 08       Title of the unit: ENZVMES         Introduction on Characteristic features of enzymes. Factors influencing enzyme activity, Coenzymes, prosthetic group, Lock and key hypothesis, induced fit hypothesis       Induced fit hypothesis         Introduction, Classification, Triglycerides, Fatty acids, Hydrogenation of Triglycerides, Saponification of Triglycerides, Reaction of carboxyl groups of fatty acids, Structure and Biological importance of Prostaglandins.       Unit:4       Number of lectures = 08       Title of the unit: UPLOE         Unit-5       Number of lectures = 08       Title of the unit: NUCLEIC ACID       Introduction, Nucleosides and nucleotides, Heterocyclic aromatic amine bases, monosaccharides (D-ribose or 2-deoxy-D-ribose) and phosphate ions, Structure of primaria descondary (Idouble helix model) of DNA.         11. CO-PO mapping       COS       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO1       The students will able to know about annino acids and primary, secondary, tertiary, quaternary structure of z       2       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1	Introduction, Primary, Secor Unit-3 Introduction a	Classification, and Preparation of Amino A ndary, Tertiary and Quaternary Structure of Number of lectures = 08 and Characteristic features of enzymes. Fac	cids: Strecker synthesis using Gabriel's phthalimide s proteins. Title of the unit: ENZYMES		itter io						
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Immediators etc       Immediators etc         COS       The students will understand about the structure and function of nucleosides and nucleotides.       2       2       1	004	-	tion of lipids, circulating lipids and inflammatory lipid	2	2	1	1	1	1	1	
3 Strong contribution, 2 Average contribution , 1 Low contribution         12. Brief description of self-learning / E-learning component         1.       https://www.youtube.com/watch?v=uM1t0mWXU30         2.       https://www.youtube.com/watch?v=uM1t0mWXU30         3.       https://www.youtube.com/watch?v=Q6R4o-oECxs         4.       https://www.youtube.com/watch?v=FoswKE7tUH8         13. Books recommended:         1.       Organic Chemistry by Robert Thornton Morrison, Robert Neilson Boyd, and Saibal Kanti Bhattacharjee, Seventh edition, Pearson publication.         2.       Organic Chemistry by Ionathan Clayden, Nick Greeves, and Stuart Warren, Second edition, Oxford Publication.         3.       Organic Chemistry by T.W.Graham Solomons, and Craig B. Fryhle, Ninth edition, Wiley Publication.         4.       Organic Chemistry by IL Finar, Volume 1 & 2, Sixth edition, Pearson Publication.         5.       J.M. Berg, J.L. Tymoczko and L. Stryer, Biochemistry, 6th Edn. W.H. Freeman and Co. (2006).	med									<u> </u>	
12. Brief description of self-learning / E-learning component         1. https://www.youtube.com/watch?v=uM1t0mWXU30         2. https://www.youtube.com/watch?v=dKT_9AjO9BE         3. https://www.youtube.com/watch?v=Q6R4o-oECxs         4. https://www.youtube.com/watch?v=Yge.klKR8         5. https://www.youtube.com/watch?v=FoswKE7tUH8         13. Books recommended:         1. Organic Chemistry by Robert Thornton Morrison, Robert Neilson Boyd, and Saibal Kanti Bhattacharjee, Seventh edition, Pearson publication.         2. Organic Chemistry by Jonathan Clayden, Nick Greeves, and Stuart Warren, Second edition, Oxford Publication.         3. Organic Chemistry by J. U. Graham Solomons, and Craig B. Fryhle, Ninth edition, Wiley Publication.         4. Organic Chemistry by IL Finar, Volume 1 & 2, Sixth edition, Pearson Publication.         5. J.M. Berg, J.L. Tymoczko and L. Stryer, Biochemistry, 6th Edn. W.H. Freeman and Co. (2006).	CO5 The	students will understand about the structur	e and function of nucleosides and nucleotides.	2	2	1	1	1	1	1	
12. Brief description of self-learning / E-learning component         1. https://www.youtube.com/watch?v=uM1t0mWXU30         2. https://www.youtube.com/watch?v=dKT_9AjO9BE         3. https://www.youtube.com/watch?v=Q6R4o-oECxs         4. https://www.youtube.com/watch?v=Yge.klKR8         5. https://www.youtube.com/watch?v=FoswKE7tUH8         13. Books recommended:         1. Organic Chemistry by Robert Thornton Morrison, Robert Neilson Boyd, and Saibal Kanti Bhattacharjee, Seventh edition, Pearson publication.         2. Organic Chemistry by Jonathan Clayden, Nick Greeves, and Stuart Warren, Second edition, Oxford Publication.         3. Organic Chemistry by J. U. Graham Solomons, and Craig B. Fryhle, Ninth edition, Wiley Publication.         4. Organic Chemistry by IL Finar, Volume 1 & 2, Sixth edition, Pearson Publication.         5. J.M. Berg, J.L. Tymoczko and L. Stryer, Biochemistry, 6th Edn. W.H. Freeman and Co. (2006).	i	3 Stro	ng contribution, 2 Average contribution, 1 Low contri	oution	•					·	
<ol> <li>https://www.youtube.com/watch?v=uM1t0mWXU30</li> <li>https://www.youtube.com/watch?v=dKT_9AjO9BE</li> <li>https://www.youtube.com/watch?v=Q6R4o-oECxs</li> <li>https://www.youtube.com/watch?v=ymYZg-klKR8</li> <li>https://www.youtube.com/watch?v=FoswKE7tUH8</li> </ol> <b>13. Books recommended:</b> <ol> <li>Organic Chemistry by Robert Thornton Morrison, Robert Neilson Boyd, and Saibal Kanti Bhattacharjee, Seventh edition, Pearson publication.</li> <li>Organic Chemistry by Jonathan Clayden, Nick Greeves, and Stuart Warren, Second edition, Oxford Publication.</li> <li>Organic Chemistry by T.W.Graham Solomons, and Craig B. Fryhle, Ninth edition, Wiley Publication. <ol> <li>Organic Chemistry by IL Finar, Volume 1 &amp; 2, Sixth edition, Pearson Publication.</li> <li>J.M. Berg, J.L. Tymoczko and L. Stryer, Biochemistry, 6th Edn. W.H. Freeman and Co. (2006).</li> </ol></li></ol>	12. Brief des										
<ol> <li>https://www.youtube.com/watch?v=dKT_9AjO9BE</li> <li>https://www.youtube.com/watch?v=Q6R4o-oECxs</li> <li>https://www.youtube.com/watch?v=ymYZg-klKR8</li> <li>https://www.youtube.com/watch?v=FoswKE7tUH8</li> </ol> <b>13. Books recommended:</b> <ol> <li>Organic Chemistry by Robert Thornton Morrison, Robert Neilson Boyd, and Saibal Kanti Bhattacharjee, Seventh edition, Pearson publication.</li> <li>Organic Chemistry by Jonathan Clayden, Nick Greeves, and Stuart Warren, Second edition, Oxford Publication.</li> <li>Organic Chemistry by T.W.Graham Solomons, and Craig B. Fryhle, Ninth edition, Wiley Publication.</li> <li>Organic Chemistry by IL Finar, Volume 1 &amp; 2, Sixth edition, Pearson Publication.</li> <li>J.M. Berg, J.L. Tymoczko and L. Stryer, Biochemistry, 6th Edn. W.H. Freeman and Co. (2006).</li> </ol>											
<ol> <li>https://www.youtube.com/watch?v=Q6R4o-oECxs</li> <li>https://www.youtube.com/watch?v=ymYZg-klKR8</li> <li>https://www.youtube.com/watch?v=FoswKE7tUH8</li> <li>Books recommended:         <ol> <li>Organic Chemistry by Robert Thornton Morrison, Robert Neilson Boyd, and Saibal Kanti Bhattacharjee, Seventh edition, Pearson publication.</li> <li>Organic Chemistry by Jonathan Clayden, Nick Greeves, and Stuart Warren, Second edition, Oxford Publication.</li> <li>Organic Chemistry by T.W.Graham Solomons, and Craig B. Fryhle, Ninth edition, Wiley Publication.</li> <li>Organic Chemistry by IL Finar, Volume 1 &amp; 2, Sixth edition, Pearson Publication.</li> <li>J.M. Berg, J.L. Tymoczko and L. Stryer, Biochemistry, 6th Edn. W.H. Freeman and Co. (2006).</li> </ol> </li> </ol>											
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<ol> <li>Organic Chemistry by IL Finar, Volume 1 &amp; 2, Sixth edition, Pearson Publication.</li> <li>J.M. Berg, J.L. Tymoczko and L. Stryer, Biochemistry, 6th Edn. W.H. Freeman and Co. (2006).</li> </ol>	•			cation.							
5. J.M. Berg, J.L. Tymoczko and L. Stryer, Biochemistry, 6th Edn. W.H. Freeman and Co. (2006).	•										
				a (2000)							
		-		0. (2009).							
<ol> <li>R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Harper's</li> <li>Illustrated Biochemistry. XXVIII edition. Lange medical Books/ McGraw-Hill (2009).</li> </ol>											
	<u> </u>	ettatea biochemistry. Avvin euron. Lange									

1. Nam	e of the Departmer	nt: CHEMISTRY								
	se Name	INDUSTRIAL CHEMISTRY LA	3 – III	L		Т	r		Р	
3. Cour	se Code	CH207		0		C	)		8	
4. Type	of Course (use tick	mark)		Core ( √ )		DE	( )		FC (	)
5. Pre-	requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ()	Odd (v)		Either S	Sem (	) E'	very Ser	m ( )
7. Tota	Number of Lecture	es, Tutorials, Practicals								
	Lectu	ures = 00	Tutorials = 00			Practic	al = 08			
			ectively and safely in a laboratory environment, p	practical/technic	al/ com	nmunica	ation sk	ills, cor	icepts t	o solve:
			e ability to work in teams as well as independently.							
	SE OUTCOMES (CO	; completion, learners will develo	on following attributes:							
-	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Remember to keep records of	all performed experiments in themanner which is r	equired in labor	atory.					
	CO2	Able to Evaluate water quality	parameters like chloride content and alkalinity.		•					
	CO3	. ,	methods and technical skills to work in the differer	nt fields of chem	istry					
	CO4		qualitative and quantitative analysis of inorganic mi		iisti y.					
10 Sull	CO5	Analyze the importance of per	sonal safety and care of equipment's and chemical	5.						
10. Syll		Dotorming the dozetile are	cific gravity of an unknown liquid							
Exp - 0			cific gravity of an unknown liquid.							
Exp – 0		To determine the water equiv	alent of calorimeter.							
Exp – 0	3	Conductometric titration.								
Exp – 0	4	Preparation of chrome alum.								
Exp – 0	5	Preparation of borax/ boric a	cid.							
Exp – 0	6	Estimatio n of Calcium in Cha	k by permagnatometry.							
Exp – 0	7	To study the absorption of ac	id an activated charcoal.							
Exp – 0	8	To determine the pH of given	HCl solution by using pH meter.							
Exp – 0	9	Microbiology and Biochemist	ry:							
Exp – 1	0	test). Qualitative test of carbohydr iodine test, Seliwanoff's test, Methods of sterilisation and p Identification of isolated bact Find out the isoelectric point Protein separation by polyacr Enumeration of microorganis	•	est, Benedict's			•			
11. CO-P	O mapping	Furnication techniques serial	dilution, pour plate and streak plate method							
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Remember to keep	records of all performed expe	riments in themanner which is required in laborato	ry. <b>3</b>	1	1		2	1	2
CO2	Able to Evaluate wa	ater quality parameters like ch	oride content and alkalinity.	3	1	1		1	2	2
CO3	Understand the ba	sic titration methods and techr	nical skills to work in the different fields of chemistr	v. 3	1	1		1		2
CO4	Know about the pr	inciples of qualitative and quar	ititative analysis of inorganic mixtures.	3	1	1		1		2
CO5	Analyze the import	ance of personal safety and ca	re of equipment's and chemicals.	3	1	1		1	2	2
			contribution, 2 Average contribution , 1 Low cont	-	_	_			_	
12. Brie	of description of sel	f-learning / E-learning compor								
1. 2. 3. 4. 5.	http://file.akfarm https://faculty.ps https://www.ster http://pioneer.ne	ahadhika.ac.id/E-BOOK/12-12		pdf						
	s recommended:	Chemistry: Jagdamba Singh L	D.S. Vaday, Java Singh, J.D. Siddigui, DragatiEdition							
1. 2. 3.	Practical Organic Practical Physical	Chemistry, A.I.Vogel. Chemistry: B. Viswanathan and								
4.	Experimental inol	rganic Chemistry –W.G.Palmer								

I Almon of the Department: CHANGITY         Course Name         POIVMRESCENCE         L         T         P           3. Course Code         POI208         Gard (1)         0 </th <th>1 Nam</th> <th>e of the Denartmen</th> <th>t: CHEMISTRY</th> <th><u>SEMESTER IV</u></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	1 Nam	e of the Denartmen	t: CHEMISTRY	<u>SEMESTER IV</u>							
3. Course Code         0.1008         0           4. Type of Course Quick List Kin with         0.1007         Feregousite (If any)         1.10.2 with Course Quick List Kin with Course Quick List Analy         Even (V)         0.016 ()         Ether Stern ()         Even y Sem ()           5. Proceroguike (If any)         1.10.2 with Course Quick List Analy         Even (V)         0.016 ()         Ether Stern ()         Even y Sem ()           7. Total Number of Lectures. Variables and applications of polymers, polymer tracessing courses, secondamine of polymer, polymer and the history of macromolecular science, polymer, hypes and physical state of polymer, polymer processing consess mechanism of polymers, polymer processing courses, including, polymers, courses, polymer processing techniques as moulding, polymer, course, polymers, courses, polymers, polymeras, course, polymers, polymers, polymera, polymers, cours							•	г		D	
4. Type of Course (use tick mark)         Core {(V)         DE(1)         E(1)         E(1) <td></td>											
S. Pre-requisite (if any)         10-2 with Chemistry         6. Frequency (use tick narrol)         Odd ( )         Enher Sem ( )         Every Sem ( )           Total Number of Lectures, Tutorials Particlais         Tutorials = 10         Pre-tickal = Nill         Every Sem ( )         Every Sem ( ) </td <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>1</td>						1					1
Total Number of Lectures 7:0         Practical = Nil           Colspan="2">Practical = Nil           Colspan="2">Source Completion, kenners will develop following attributes:           Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"           Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"           Colspan="2">Colspan="2"           Colspan="2"				<b>6 Eroguongy (uso tick marks)</b> Evon $(y')$	•	,		• •	) 6		
Lectures 30         Tutorials 30         Practical NII           6c/0486 048CHVES Students will able to understand the history of macromolecular science, polymer, types and physical state of polymers, polymer processing complexes, mechanism of nodymeris, and applications of polymers.         Social Science 300           0.00486 048CHVES (Students will average and applications of polymers, coss-linked copolymers, polymerization and functionality.         To know the Classification of polymers, cross-linked copolymers, physical state of polymer; crystallinity, Glass Transition Temperature.           C01         Remember the history of macromolecular science and basic definition of polymer, polymerization, initiators, linhibitors and lwing polymers.           C03         To create basic Knowledge of the mechanism of addition, condensation, copolymers, addition polymers, copolymers, copolymers, copolymers, copolymers, copolymers, addition polymers, copolymers, copolymers, copolymers, copolymers, addition polymers, copolymers, process, the compact science, science, science, addition polymers, copolymers, copo			1		Ouu (	)	Littlei	Jeni	) -	very Je	
6. COUSE OBJECTVES: Students will able to understand the history of macromolecular science, polymer, types and physical state of polymer, polymer processing echniques, mechanism of polymeritanics, synthesis and applications of polymers.         9. COUSE SOUTCONES (CO)         Fifter the successing function, kenners will develop following attributes:         COUSE SOUTCONES (CO)         If the the successing function, kenners will develop following attributes:         COUSE SOUTCONE (CO)         If the the successing function, kenners will develop following attributes:         COO3       To insue the history of macromolecular science and basic definition of polymer, polymerization, initiators, inhibitors and living polymers.         CO3       To insue thesk Knowledge of the mechanism of addition, condensation, copelymerization, initiators, inhibitors and living polymers.         CO4       Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting.         CO5       knalye the importance of synthesis and applicators of corso linked copolymers, suddition polymers, condensation. How and hetero chain olymers, coopsinger.         Unit 2       Number of fectures 08       Title of the unit: CLASPIRCATION OF POLYMERS.         Unit 2       Number of fectures 08       Title of the unit: CLASPIRCATION OF POLYMERS.         Unit 3       Number of fectures 08       Title of the unit: CLASPIRCATION OF POLYMERS.         Unit 4       Number of fectures 08       Title of the unit: CLASP	7. 10(a)		· ·	Tutorials - 10			Practic	al – Nil			
echniques mechanism of polymerization, synthesis and applications of polymers. SOURSE OUTCOME (CO) SOURSE OUTCOME (CO) SOURCE (CO) SOURC	8 COUR				types and n	nysical s			rs nolvi	ner nro	ressing
9. COURSE COURCINES (CO):  1. COURSE COO: 1. COP Constraining, met zpinning. 2. COURSE COO: 2. COO: 2. COP Constraining, met zpinning. 2. COO: 3. COP Constraining, met zpinning. 3. COP Constraining, met zpinning, developed metazing, definition of polymer, polymerization, copolymerization, copolymeriza					types and p	lysical s		Jorymer	5, pory	ner pre	,eessing
OURSE OUTCOME (CO)         ATTRIBUTES           CO1         Remember the history of macromolecular science and basic definition of polymer, paylymerization and functionality.           CO2         To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; crystallinity, Glass Transitor           CO3         To create basic Know/tedge of the mechanism of addition, condensation, copolymerrization, initiators, inhibitors and living polymers.           CO4         Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting.           CO5         Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, coopolymers.           Unit vise defaulted content         Visite of the unit: INTRODUCTION           Unit vise default contents.         Title of the unit: INTRODUCTION           Unit vise default, integrand, organic, thermoplastics, thermosets, elastemers, fibres, speciality, linear, branched, cross linked copolymers (random, alternative, block and raft), tacticity (notacite, and atactic polymers).         Title of the unit: CLASSIFICATION OF POLYMERS           Unit vis         Number of lectures - 08         Title of the unit: INTROD POLYMERS           Unit vis         Number of lectures - 08         Title of the unit: POLYMERIZATION           Unit vis         Number of lectures - 08         Title of the unit: POLYMERIZATION           Unit vis         Number of lectures - 08         Title of the unit:											
C01         Remember the history of macromolecular science and basic definition of polymer; polymerization and functionality.           C02         To know the Classification of polymers; cross-linked copolymers, facticity, Physical state of polymer; crystallinity, Glass Transitor Temperature.           C03         To create basic Knowledge of the mechanism of addition; condensation; copolymerization, initiators, inhibitors and living polymers.           C04         Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting.           C05         Analyze the importance of synthesis and applications of cross-linked copolymers; addition polymers, coopolymers.           10. Unit wise detailed ontent         Unit-1         Number of lectures = 08         Title of the unit: CLASSIPLATION OF POLYMERS           Unit-1         Number of lectures = 08         Title of the unit: CLASSIPLATION OF POLYMERS           Unit-2         Number of lectures = 08         Title of the unit: CLASSIPLATION OF POLYMERS           Unit-3         Number of lectures = 08         Title of the unit: CLASSIPLATION OF POLYMERS           Unit-4         Number of lectures = 08         Title of the unit: CLASSIPLATION OF POLYMERS           Unit-4         Number of lectures = 08         Title of the unit: CLASSIPLATION OF POLYMERS           Unit-4         Number of lectures = 08         Title of the unit: CLASSIPLATION OF POLYMERS           Unit-4         Number of lectures = 08	After the	successful course c	ompletion, learners will devel	op following attributes:							
CO2         To know the classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; crystallinity, Giass Transition           CO3         To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers.           CO4         Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting.           CO5         Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, copolymers.           Unit via detailed content         Number of lectures 08         Title of the unit: INTRODUCTION           Unit2         Number of lectures 08         Title of the unit: CLASSIFICATION OF POLYMERS           Jatural, synthetic, iongranic, organic, thermopastic, thermosets, elastomers, these, speciality, linear, branched, cross-linked copolymers, condensation polymerization (linechanism of free-radical, anionic, and catolic polymer: proballinity, Gias Transition Temperature           Unit3         Number of lectures 08         Title of the unit: CLASSIFICATION OF POLYMERS           Unit3         Number of lectures 08         Title of the unit: CLASSIFICATION OF POLYMERS           Unit3         Number of lectures 08         Title of the unit: CVIVIER PROCESING           Unit3         Number of lectures 08         Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS           Unit4         Number of lectures 08         Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS	COURS	SE OUTCOME (CO)		ATTRIBUTES							
C02       Temperature.       Temperature         C03       To create basic knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers.         C04       Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting.         C05       knalyze the importance of synthesis and applications of cross-linked copolymers, copolymers, copolymers.         10. Unit Wise detailed content       Unit-1       Number of lectures - 08       Title of the unit: INTRODUCTION         Unit-1       Number of lectures - 08       Title of the unit: INTRODUCTION       Hermospin (Joss)         Unit-2       Number of lectures - 08       Title of the unit: CINSSHICATION OF POLYMERS         Jaturdi Synthetic, inorganic, themoplastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers (random, alternative, block and ratic, loorganic, themoplastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers, condensation polymerization, coordination polymerization, could using polymerization, initiators, inhibitors, inhibitors, living polymers, condensation polymerization (mechanism of free-radia, anionic and calonic polymerization), initiators, inhibitors, inviting polymers, condensation polymerization polymerization femoforming, fourthesis, properties and applications of polytelene, polyterrafurcetryleter, polying/ challes,		CO1	Remember the history of mac	romolecular science and basic definition of polymer,	polymerizat	ion and i	function	ality.			
CO3       to create basic Knowledge of the mechanism of addition, condemsation, copolymerization, initiators, initiators, initiators, and living polymers.         CO4       Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting.         CO5       Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, copolymers.       How and the polymers of the other content of accounce, general characteristics of polymers, some basic definitions (functionality, polymer, polymerization, Homo and hetero chair objmers, copolymer).         Unit 2       Number of lectures 08       Title of the unit: INTRODUCTION         Unit 2       Number of lectures 08       Title of the unit: CLASSIFICATION OF POLYMERS         Jatural, synthetic, inorganic, organic, thermopastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers, condensation polymerization opolymerization (mechanism of free-ardiac), anotic and calonic polymerization, initiators, initiators, initiators, initiators, universe, condensation polymerization opolymerization polymerization epolymerization, endication, endication, endication, elastomeret contraction, endication, elastomeret, calender polymerization, polymerization endications of polythelene, polyteropylene, polyteration moulding, injection moulding, injection moulding, elastom endicate, endication, endicate, polytomerization, endicate, polytomerization, endicate, polytomerization, endicate, en		CO2		of polymers, cross-linked copolymers, tacticity, I	Physical stat	e of po	olymer;	crystalli	nity, G	lass Tr	ansitior
OF the importance of synthesis and applications of cross-linked copplymers, addition polymers. Copplymers.         10. Unit wise detailed content         Unit:1       Number of lectures = 08       THe of the unit: INTRODUCTION         Inter of lectures = 08       THe of the unit: INTRODUCTION         Inter of lectures = 08       THe of the unit: INTRODUCTION         Unit:2       Number of lectures = 08       THe of the unit: INTRODUCTION OF POLYMERS         Jatural synthetic, inorganic, organic, thermopatsics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers, condensation polymerization polymerization (bulk, suspension, emulsion, solution).       Unit:3       Number of lectures = 08       THe of the unit: INPES OF POLYMERIZATION         Unit:3       Number of lectures = 08       THe of the unit: SYNTHESS, POPCHERS AND APPLICATIONS         Unit:3       Number of lectures = 08       THe of the unit: SYNTHESS, PROPERTIES AND APPLICATIONS         Unit:3       Number of lectures = 08       THe of the unit: SYNTHESS, PROPERTIES AND APPLICATIONS         Unit:5       Number of lectures = 08       THe of the unit: SYNTHESS, PROPERTIES AND APPLICATIONS         Unit:5       Number of lectures = 08       THe of the unit: SYNTHESS, PROPERTIES AND APPLICATIONS <td></td> <td>CO3</td> <td></td> <td>the mechanism of addition, condensation, copolyme</td> <td>erization, init</td> <td>ators, in</td> <td>hibitors</td> <td>and livi</td> <td>ng poly</td> <td>mers.</td> <td></td>		CO3		the mechanism of addition, condensation, copolyme	erization, init	ators, in	hibitors	and livi	ng poly	mers.	
10. Unit wise detailed content       Intervent of fectures = 08       Title of the unit: INTRODUCTION         Unit 1       Number of lectures = 08       Title of the unit: INTRODUCTION         Unit 2       Number of lectures = 08       Title of the unit: INTRODUCTION         Unit 2       Number of lectures = 08       Title of the unit: INTRODUCTION         Unit 2       Number of lectures = 08       Title of the unit: INTRODUCTION         Unit 2       Number of lectures = 08       Title of the unit: SUSSIFICATION OF POLYMERS         Unit 3       Number of lectures = 08       Title of the unit: TYPES OF POLYMERIZATION         Unit 4       Number of lectures = 08       Title of the unit: TYPES OF POLYMERIZATION         Unit 3       Number of lectures = 08       Title of the unit: TYPES OF POLYMERIZATION         Unit 4       Number of lectures = 08       Title of the unit: POLYMERIZATION         Unit 5       Number of lectures = 08       Title of the unit: POLYMERIZATION         Unit 5       Number of lectures = 08       Title of the unit: POLYMERIZATION         Unit 4       Number of lectures = 08       Title of the unit: POLYMERIZATION         Unit 5       Number of lectures = 08       Title of the unit: POLYMERIZATION         Unit 5       Number of lectures = 08       Title of the unit: POLYMERIS AND APPLICATIONS         virtua 4, bua		CO4	Able to evaluate different type	es of polymer processing techniques as moulding, sp	inning, calen	daring, d	casting.				
Unit         Number of lectures = 08         Title of the unit: INTRODUCTION           Unit of macromice/ular science, general characteristics of polymers, some basic definitions (functionality, polymer, polymer/zation, Homo and hetero chair objemes, coppolymer).           Unit 2         Number of lectures = 08         Title of the unit: CLASSIFICATION OF POLYMERS           Matural, synthetic, inorganic, capacity, thermoster, leadstomers, fibres, speciality, lines, branched, cross-linked copolymers (random, alternative, block and raft), isolatic, polymerization (mechanism of fice-radical, anionic and cationic polymerization, linitators, inhibitors, living polymers, condensation polymerization (polymerization (condination polymerization (bulk, suspension, emulsion, solution).           Unit 4         Number of lectures = 08         Title of the unit: EVMENE POCESSING           Compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding, braining, ext spinning.           Unit 5         Number of lectures = 08         Title of the unit: EVMENE POCESSING           Compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding, blow moulding, extrusion moulding, injection moulding, biolognere, polybutaleine, neoprene una N, buna s, phenoformal dehyde ureaformaldehyde, polyurethanes.           1. COP Omapping         Cost Autributes         P01         P02         P03         P04         P05         P05         P07           CO1		CO5	Analyze the importance of syr	thesis and applications of cross-linked copolymers, a	addition poly	mers, co	polyme	ſS.			
rife history of macromlecular science, general characteristics of polymers, some basic definitions (functionality, polymer, polymerization, Homo and hetero chair colymers, copplymer). Unit 2 Number of lectures =08 Title of the unit: CLASSIFICATION OF POLYMERS datural, synthetic, inorganic, organic, thermoplastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers (random, alternative, block and raft), tacticity (lostacite, and atacite polymers). Physical state of polymer; rystBiniton Temperature Unit 3 Number of lectures = 08 Title of the unit: TYES OF POLYMERIZATION Unit 4 Number of lectures = 08 Title of the unit: POLYMER PACCESSING Compounding, vulcanization reinforcement, clandering, dire-asting, filmcasting, compression moulding, injection moulding, extrusion moulding, vulcanization inforcement, clandering, dire-asting, filmcasting, compression moulding, injection moulding, extrusion moulding, tompounding, vulcanization reinforcement, clandering, dire-asting, filmcasting, compression moulding, injection moulding, extrusion moulding, hermoforming, foaming, melt spinning. Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of polymer, polymerization and 3 1 1 1 2 1 2 To know the Classification of polymers, cross-linked cooplymers, tacticity, Physical state of polymer for create basic Knowledge of the mechanism of addition, condensation, cooplymerization, initiators, 3 1 1 1 2 2 1 2 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, 3 1 1 1 2 2 1 2 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, 3 1 1 1 2 2 1 2 Able to evaluate different types of polymers/polymer-spolymer-spinners/lease science- and-hibitors com/spice/polymers/ Able to evaluate different types of polymers/polymer-spinners/le	10. Unit	t wise detailed cont	tent								
Oplymery, Oplymery, Oplymery, Physical state of polymer, crystallinity, Glass Transition Temperature       Unit 2       Number of lectures =08       Title of the unit: CLASSIFICATION OF POLYMERS         iatural, synthetic, inorganic, organic, thermoplastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers (random, alternative, block and raft), tacticity (isotacit, and atactic polymers), Physical state of polymer; crystallinity, Glass Transition Temperature       Unit 3       Number of lectures =08       Title of the unit: TPOS OF POLYMERXZITON         Vinita       Number of lectures =08       Title of the unit: POLYMER POCCESSING       Number of lectures =08       Title of the unit: POLYMER PROCESSING         Compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding, longering, met spinning.       Number of lectures = 08       Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS         Unit 5       Number of lectures = 08       Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS       Number of lectures = 08       Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS         Unit 5       Number of lectures = 08       Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS       Number of lectures = 08       PO6       PO7         CO2       Remember the history of macromolecular science and basic definition of polymer, polymerization and living polymers, cross-linked copolymers, catclicity, Physical state of polymer andition spolymer anditing, Gaaring, Gaaniag, Cassing, Cassing, Cass	Unit-1		Number of lectures = 08	Title of the unit: INTRODUCTION							
Unit 2         Number of lectures = 08         Title of the unit: CLASSFICATION OF POLYMERS           Jatural, synthetic, iorganic, organic, thermoplastics, thermosets, elastomesr, fibres, speciality, linear, branched, cross-linked copolymers (random, alternative, block and raft), tacticity (stotactic, and tactic polymers, 0)         Title of the unit: TYPES OF POLYMERIZATION           Unit 3         Number of lectures = 08         Title of the unit: TYPES OF POLYMERIZATION           Unit 4         Number of lectures = 08         Title of the unit: POLYMERIZATION           Unit 4         Number of lectures = 08         Title of the unit: POLYMERIZATION           Unit 5         Number of lectures = 08         Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS           Unit 5         Number of lectures = 08         Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS           vinte-5         Number of lectures = 08         Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS           vinte-5         Number of lectures = 08         Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS           vinte-5         Number of lectures = 08         Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS           vinte-5         Number of lectures = 08         Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS           vinte-5         Number of lectures = 08         Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS           vinte-5 <t< td=""><td></td><td></td><td>llar science, general characte</td><td>ristics of polymers, some basic definitions (function</td><td>onality, polyr</td><td>ner, pol</td><td>ymerizat</td><td>ion, Ho</td><td>omo an</td><td>d heter</td><td>o chain</td></t<>			llar science, general characte	ristics of polymers, some basic definitions (function	onality, polyr	ner, pol	ymerizat	ion, Ho	omo an	d heter	o chain
Jatural, synthetic, inorganic, organic, thermoplastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers (random, alternative, block and raft), tacticity (isotacic, and atactic polymers). Physical state of polymer: crystallinity, Glass Transition Temperature:         Unit 3       Number of lectures = 08       Title of the unit: TVPS DF POLYMERIZATION         Uddition polymerization (mechanism of free-radical, anionic and cationic polymerization), initiators, inhibitors, living polymers, condensation polymerization polymerization (mechanism of free-radical, anionic and cationic polymerization, initiators, inhibitors, living polymers, condensation polymerization polymerization (mechanism of free-radical, anionic and cationic polymerization, initiators, inhibitors, living polymers, condensation polymerization polymerization, adming mets spinning.         Unit 4       Number of lectures = 08       Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS         Unit 5       Number of lectures = 08       Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS         Unit 5       Number of lectures = 08       Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS         Unit 5       Number of networks, cross-linked copolymerk, polyterpropertene, polybityrene, polybityrene, polybityrene, polybitadiene, polybutadiene, neoprene una-N, buna-s, phenolformal dehyde ureaformaldehyde, polyurethanes.       1       1       1       2       1       2         CO3       Remember the history of macromolecular science and basic definition of polymer, polymerization, initiators, a       1       1       1		, copolymer).									
<pre>irafly, tacticity (isotactic, and atactic polymers). Physical state of polymer; crystallinity, Glass Transition Temperature Unit-3 Unit-4 Number of lectures = 08 Title of the unit: TYPES OF POLYMERIZATION Unit-4 Number of lectures = 08 Title of the unit: CPUS OF POLYMERIZATION Unit-4 Number of lectures = 08 Title of the unit: CPUS OF POLYMERIZATION Unit-4 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-4 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of polythelene, polytopylene, polytetrafluroethylene pyolystyrene, polytoutaliene, neoprene una-N, buans, phenolformal dehyde ureaformaldehyde, polyurerthanes. T.CO-PO mapping CO Remember the history of macromolecular science and basic definition of polymer, polymerization and 3 1 1 1 2 1 2 1 CO Remember the history of macromolecular science and basic definition, initiators, 3 1 1 1 2 1 2 1 2 CO Analyze the importance of synthesis and applications of ross-linked copolymerization, initiators, 3 1 1 1 2 2 2 2 CO Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, 3 1 1 1 2 2 2 2 2 CO Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, 3 2 2 CO Analyze the importance of synthesis and applications of cross-linked copolymers, 3 1 1 1 2 2 2 2 2 2 CO Analyze the importance of synthesis and applications of cross-linked copolymers, 3 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2</pre>					d and the				- 11		
Unit3         Number of lectures = 08         Title of the unit: TYPES OF POLYMERIZATION           Uddition polymerization (mechanism of free-radical, anionic and cationic polymerization), initiators, inibibitors, living polymers, condensation polymerization opolymerization, coordination polymerization opolymerization, emulsion, solution).           Unit4         Number of lectures = 08         Title of the unit: POLYMER PROCESSING           Compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding hermoforming, foraming, melt spinning.         Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS           Unit-5         Number of lectures = 08         Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS           Unit-5         Number of lectures = 04         Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS           Unit-5         Number of lectures = 04         Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS           Unit-5         Number of macromolecular science and basic definition of polymer, polymerization and functionand functi						ed copol	ymers (r	andom,	, alterna	ative, bi	оск апо
ddition polymerization (mechanism of free-radical, anionic and cationic polymerization), initiators, inhibitors, living polymers, condensation polymerization opolymerization (bulk, suspension, emulsion, solution). Unit 4 Inumber of lectures = 08 Title of the unit: POLYMER PROCESSING compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding, hermoforning, foaming, melt spinning. Unit 5 Inumber of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS vnthesis, properties and applications of polythelene, polytorpylene, polytetrafluroethylene pyolystyrene, polyvinyl chloride, polysioprene, polybutadiene, neoprene una-N, buna-s, phenolformal dehyde ureaformaldehyde, polyurethanes. 1. CO-PO mapping COS Attributes POI PO2 PO3 PO4 PO5 PO6 PO7 functionality. COS Internation for polymers, cross-linked copolymers, tacticity, Physical state of polymer anihibitors and living polymers. CO3 Inhibitors and living polymers. CO3 Inhibitors and living polymers. CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting. CO5 Contexte basic. Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers. CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting. CO5 Anaryte the importance of synthesis and applications of cross-linked copolymers, addition polymers, a 1 1 1 2 1 2 CO5 Anaryte the importance of synthesis and applications of cross-linked copolymers, addition polymers, a 1 1 1 2 1 2 CO5 Anaryte the importance of synthesis and applications of cross-linked copolymers, addition polymers, casting. CO6 Anaryte the importance of synthesis and applications of cross-linked copolymers, thtps://bemed.chem.putdue.du/genchem/topicreview/bp/1polymer/types.html 4. https://bemed.chem.putdue.du/genchem/topicreview/bp/1polymers/sillatio					ature						
opolymerization, coordination polymerization (bulk, suspension, emulsion, solution).         Unit-4       Number of lectures = 08       Title of the unit: POLYMER PROCESSING         Compounding, vulcanization reinforcement, calendering, dire-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding, texturiation moulding, formation moulding, polymeration, compounding, formation, moulding, polymeration, polyters, polyters, properties and applications of polythelene, polyteropylene, polytetrafluroethylene pyolystyrene, polytinyl chloride, polytisoprene, polybutadiene, neoprene unan-N, buna-s, phenofformal dehyde ureaformaldehyde, polyurethanes.         1. CO-PO mapping       COS       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO1       Remember the history of macromolecular science and basic definition of polymer, polymerization and functionally.       3       1       1       1       2       1       2         CO2       To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; as a 1       1       1       2       1       2         CO3       Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, as 1       1       1       2       1       2         CO4       Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, as 1       1       1       2       1       2 </td <td></td> <td>polymerization (m</td> <td></td> <td></td> <td>hibitors, liv</td> <td>ing poly</td> <td>/mers, d</td> <td>condens</td> <td>ation p</td> <td>oolyme</td> <td>rization,</td>		polymerization (m			hibitors, liv	ing poly	/mers, d	condens	ation p	oolyme	rization,
compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding         hermoforming, feaming, melt spinning.         Unit-5       Number of lectures = 08       Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS         ynthesis, properties and applications of polythelene, polypropylene, polytetrafluroethylene pyolystyrene, polyvinyl chloride, polyisoprene, polybutadiene, neoprene         Unit-5       Number of lectures = 08       Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS         Vint-5       Number of lectures = 08       Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS         Unit-5       Number of lectures = 08       Tote of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS         Vint-5       Number of lectures = 08       Tote of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS         Vint-6       Attributes       PO1       PO2       PO4       PO5       PO6       PO7         CO1       Remember the history of macromolecular science and basic definition of polymer, polymerization and an incidentiation, incidentiation, class Transition Temperature.       3       1       1       1       2       1       2         CO2       To know the Classification of polymers, cross-linked copolymers, callendaring, and inhibitors and living polymers.       3       1       1       1       2       1       2 <t< td=""><td></td><td></td><td></td><td></td><td>,</td><td>017</td><td></td><td></td><td></td><td>,</td><td>,</td></t<>					,	017				,	,
Number of lectres = 08       Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS         Unit-5       Number of lectres = 08       Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS         Unit-5       Number of lectres = 08       Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS         Vintersion of polythelene, polyboropylene, polytetrafluroethylene pyolystyrene, polytingl chloride, polybiosprene, polybutadiene, neoprene una-N, buna-s, phenolformal dehyde ureaformaldehyde, polyurethanes.       PO1       PO2       PO3       PO4       PO5       PO6       PO7         COP mapping       PO1       PO2       PO3       PO4       PO5       PO6       PO7         COP mapping       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO2       Remember the history of macromolecular science and basic definition of polymer, polymerization and 3       1       1       1       1       2       1       2       1       2       1       2 <td>Unit-4</td> <td></td> <td>Number of lectures = 08</td> <td>Title of the unit: POLYMER PROCESSING</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Unit-4		Number of lectures = 08	Title of the unit: POLYMER PROCESSING							
Unit:5         Number of lectures = 08         Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS           ynthesis, properties and applications of polythelene, polytoropylene, polytetrafluroethylene pyolystyrene, polyvinyl chloride, polytosprene, polybutadiene, neoprene una-N, buna-S, phenolformal dehyde ureaformaldehyde, polyurethanes.           CO-PO mapping         PO1         PO2         PO3         PO4         PO5         PO6         PO7           CO1         Remember the history of macromolecular science and basic definition of polymer, polymerization and functionality.         3         1         1         1         2         1         2           CO2         To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; crystallinity, Glass Transition Temperature.         3         1         1         1         2         1         2           CO3         To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers.         3         1         1         1         2         1         2           CO4         Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting.         3         1         1         1         2         1         2           CO4         Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, capolymers	Compour	nding, vulcanization	reinforcement, calendering,	die-casting, filmcasting, compression moulding,	injection mo	ulding,	blow m	oulding	, extru	sion m	oulding,
ynthesis, properties and applications of polythelene, polypropylene, polytetrafluroethylene pyolystyrene, polyvinyl chloride, polyiosprene, polybutadiene, neoprene juna-N, buna-s, phenofformal dehyde ureaformal dehyde, polyurethanes. 1. CO-PO mapping CO2 CO3 Remember the history of macromolecular science and basic definition of polymer, polymerization and functionality. CO2 To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer: a 1 1 1 2 1 2 CO3 To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer: a 1 1 1 2 1 2 To know the Classification of polymers polymers, cross-linked copolymers, tacticity, Physical state of polymer: a 1 1 1 2 1 2 To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, a 1 1 1 2 1 2 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, a 1 1 1 2 1 2 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, a 1 1 1 2 1 2 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, a 1 1 1 2 1 2 Analyze the importance of synthesis and applications of cross-linked copolymers, a http://chemistry-chemistry/Polymers/ http://bus.com/jee/polymers/ http://bus.com/jee/polymers/ http://bus.com/jee/polymers/ https://www.toppr.com/guides/chem.typolymers/classification-of-polymers/ 1. Chemical Thermodynamics by R.P.Rastogi et al Principles of Physical Chemistry, Burli Sharma and Pathan 3. Essentials of Physical Chemistry, Barna & Pathania, Vishal Publishing Co. 5. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd.		orming, foaming, me									
Numa-N, buna-s, phenolformal dehyde ureaformaldehyde, polyurethanes.         I. CO-P mapping         CO3       PO4       PO5       PO6       PO7         CO1       Remember the history of macromolecular science and basic definition of polymer, polymerization and an interval interva		properties and ar					hicopro	no noli	(hutodi)		
1. CO-PO mapping       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7         C01       Remember the history of macromolecular science and basic definition of polymer, polymerization and unctionality.       3       1       1       1       2       1       2         C02       To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; 3       1       1       1       2       1       2         C03       To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; 3       1       1       1       2       1       2         C03       To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, as in initiators, and living polymers.       3       1       1       1       2       1       2         C04       Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, as in a 1       1       1       2       1       2         C04       Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, as in a 1       1       1       2       1       2         C05       Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, addition polymers, addition polymers, as in in in in z	-				olyvinyi chio	nue, po	nyisoprei	ne, poly	pulaul	ene, ne	oprene,
COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7         C01       Remember the history of macromolecular science and basic definition of polymer, polymerization and unctionality.       3       1       1       1       2       1       2         C02       To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer;       3       1       1       1       2       1       2         C03       To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers.       3       1       1       1       2       1       2         C04       Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, asing.       3       1       1       1       2       1       2         C04       Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, asing.       1       1       1       2       1       2         C05       Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, asing.       3       1       1       1       2       1       2         C05       Analyze the importance of synthesis com/chemister/Polimers/polymerscicnec-and-technology.pdf       1 </td <td></td>											
CO1       Remember the history of macromolecular science and basic definition of polymer, polymerization and functionality.       3       1       1       1       2       1       2         CO2       To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; as 1       1       1       1       2       1       2         CO3       To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers.       3       1       1       1       2       1       2         CO3       To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers.       3       1       1       1       2       1       2         CO4       Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, as 1       1       1       1       2       1       2         CO4       Aalyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, copolymers.       3       1       1       1       2       1       2         CO5       Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, as 1       1       1       1       2       1       2         CO5       Analyze the importance of synthesi				Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
tunctionality.III<	601	Remember the his			on and						
CO2crystallinity, Glass Transition Temperature.3111212CO3To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers.31111212CO4Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting.31111212CO5Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, copolymers.31111212Betraning / E-learning Cemponent12. Brief description of self-learning / E-learning component1.https://chemistry-chemists.com/chemister/Polimers/polymer-science-and-technology.pdf2.https://chemistry-chemists.com/chemister/Polimers/polymer-science-and-technology.pdf1.https://chemed.chem.purdue.edu/genchem/topicreview/bp/1polymer/types.html4.https://chemid.chem.purdue.edu/genchem/topicreview/bp/1polymers/13. Books recommended:1.Chemical Thermodynamics by R.P.Rastogi et alPrinciples of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.Principles of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.Principles of Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd.	01	,	sification of notimors cross	linked conclumers testisity. Divised state of p	-	1	1	1	2	1	2
CO3       inhibitors and living polymers.       3       1 <th1< th=""> <th1< th="">       1</th1<></th1<>	CO2	crystallinity, Glass 1	Fransition Temperature.		5	1	1	1	2	1	2
CO4       casting.       3       1       1       1       2       1       2         CO5       Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, opolymers.       3       1       1       1       2       1       2         Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, additin polymer, additin polymer, addition polymers, addition polymer,	CO3		-	of addition, condensation, copolymerization, ini	tiators, 3	1	1	1	2	1	2
COS       Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, opplymers, addition polymers, additis, additis, addition polymers, addition polymers, addit	CO4		different types of polymer p	rocessing techniques as moulding, spinning, calen	idaring, 3	1	1	1	2	1	2
3 Strong contribution, 2 Average contribution , 1 Low contribution         12. Brief description of self-learning / E-learning component         1.       http://chemistry-chemists.com/chemister/Polimers/polymer-science-and-technology.pdf         2.       https://byjus.com/jee/polymers/         3.       http://chemed.chem.purdue.edu/genchem/topicreview/bp/1polymer/types.html         4.       https://www.britannica.com/science/polymer         5.       https://www.toppr.com/guides/chemistry/polymers/classification-of-polymers/         13. Books recommended:       1.         1.       Chemical Thermodynamics by R.P.Rastogi et al         2.       Principles of physical chemistry by Puri Sharma and Pathan         3.       Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.         4.       Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co.         5.       Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd.	CO5	Analyze the impo	rtance of synthesis and app	lications of cross-linked copolymers, addition po	lymers, 3	1	1	1	2	1	2
12. Brief description of self-learning / E-learning component         1. http://chemistry-chemists.com/chemister/Polimers/polymer-science-and-technology.pdf         2. https://byjus.com/jee/polymers/         3. http://chemed.chem.purdue.edu/genchem/topicreview/bp/1polymer/types.html         4. https://www.britannica.com/science/polymer         5. https://www.toppr.com/guides/chemistry/polymers/classification-of-polymers/         13. Books recommended:         1. Chemical Thermodynamics by R.P.Rastogi et al         2. Principles of physical chemistry by Puri Sharma and Pathan         3. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.         4. Principles of Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd.		copolymers.	2 Stron	contribution 2 Average contribution 1 Low cont	ribution						
<ol> <li>http://chemistry-chemists.com/chemister/Polimers/polymer-science-and-technology.pdf</li> <li>https://byjus.com/jee/polymers/</li> <li>http://chemed.chem.purdue.edu/genchem/topicreview/bp/1polymer/types.html</li> <li>https://www.britannica.com/science/polymer</li> <li>https://www.toppr.com/guides/chemistry/polymers/classification-of-polymers/</li> <li>Books recommended:         <ul> <li>Chemical Thermodynamics by R.P.Rastogi et al</li> <li>Principles of physical chemistry by Puri Sharma and Pathan</li> <li>Essentials of Physical Chemistry, Bahl &amp; Tuli, S. Chand &amp; Co. Ltd.</li> <li>Principles of Physical Chemistry, Madan &amp; Tuli, S. Chand &amp; Co. Ltd.</li> </ul> </li> </ol>	12 Brie	f description of self									
<ol> <li>https://byjus.com/jee/polymers/</li> <li>http://chemed.chem.purdue.edu/genchem/topicreview/bp/1polymer/types.html</li> <li>https://www.britannica.com/science/polymer</li> <li>https://www.toppr.com/guides/chemistry/polymers/classification-of-polymers/</li> </ol> 13. Books recommended: <ol> <li>Chemical Thermodynamics by R.P.Rastogi et al</li> <li>Principles of physical chemistry by Puri Sharma and Pathan</li> <li>Essentials of Physical Chemistry, Bahl &amp; Tuli, S. Chand &amp; Co. Ltd.</li> <li>Principles of Physical Chemistry, Puri, Sharma &amp; Pathania, Vishal Publishing Co.</li> <li>Simplified course in Physical Chemistry, Madan &amp; Tuli, S. Chand &amp; Co. Ltd.</li> </ol>											
<ul> <li>4. https://www.britannica.com/science/polymer</li> <li>5. https://www.toppr.com/guides/chemistry/polymers/classification-of-polymers/</li> <li>13. Books recommended: <ol> <li>Chemical Thermodynamics by R.P.Rastogi et al</li> <li>Principles of physical chemistry by Puri Sharma and Pathan</li> <li>Essentials of Physical Chemistry, Bahl &amp; Tuli, S. Chand &amp; Co. Ltd.</li> <li>Principles of Physical Chemistry, Puri, Sharma &amp; Pathania, Vishal Publishing Co.</li> <li>Simplified course in Physical Chemistry, Madan &amp; Tuli, S. Chand &amp; Co. Ltd.</li> </ol> </li> </ul>											
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<ol> <li>Books recommended:         <ol> <li>Chemical Thermodynamics by R.P.Rastogi et al</li> <li>Principles of physical chemistry by Puri Sharma and Pathan</li> <li>Essentials of Physical Chemistry, Bahl &amp; Tuli, S. Chand &amp; Co. Ltd.</li> <li>Principles of Physical Chemistry, Puri, Sharma &amp; Pathania, Vishal Publishing Co.</li> <li>Simplified course in Physical Chemistry, Madan &amp; Tuli, S. Chand &amp; Co. Ltd.</li> </ol> </li> </ol>											
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5. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd.			-								
6. Atkin's Physical Chemistry, Atkin, Oxford Press.		Simplified course	in Physical Chemistry, Madan	-							
	6.	Atkin's Physical Cl	nemistry, Atkin, Oxford Press.								

1. Name of the Departme								
2. Course Name		PV.			-			
	MEDICINAL DRUGS CHEMIST	RY	L		<u>T</u>		Р	
3. Course Code	CH209		3		1		0	-
4. Type of Course (use tio	-		Core ( √ )		DE()		FC (	
5. Pre-requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ( √ )	Odd (	) E	Either Sem (	) E	ivery Se	m()
7. Total Number of Lectu	res, Tutorials, Practicals							
Leo	tures = 30	Tutorials = 10		P	Practical = N	il		
8. COURSE OBJECTIVES: T	o study the basic fundamentals o	of available drugs in various fields such as antibiotic	cs, antipyretics	, analges	ics, antimal	arial, car	diovascı	ular and
newer drugs for the newer								
9. COURSE OUTCOMES (C								
	completion, learners will develo	p following attributes:						
COURSE OUTCOME (CO		ATTRIBUTES						
CO1	Evaluation and study of introc provided a better understandir	duction, examples and uses of various antibiotics of the antibiotics.	such as β-Lac	tam, Am	inoglycoside	es and C	hloramp	henico
CO2		ation, synthesis and uses of antipyretics and analge ine create more knowledge about their chemistry.	sics like Parac	etamol, A	Aspirin, Phei	nazone, F	henylb	utazone
		of antimalarial drugs like Chloroquine phosphat	e. Primaguine	phosph	ate. Isopen	taguine.	Progua	nil HCl
CO3		new antimalarial drugs like Artemisinin and Mefl						
CO4	Introduction, classification, str	ucture and uses of cardiovascular drugs such as arrhythmic Agents: Lorcainide HCl and Verapamil H			-			-
CO5	Knowledge regarding newer	available drugs such as Misoprostol, probucol,	Tamoxifen Cit	rate, Flu	tamide, Me	ethimazo	le, Etha	mbuto
	· ·	picin and Linezolid for the newer disease create mo	ore understand	ling and b	become esse	entials of	moderr	i life.
10. Unit wise detailed co				_				
Unit-1	Number of lectures = 08	Title of the unit: ANTIBIOTICS						
Introduction, examples and and Chloramphenicol.	l uses of β-Lactam Antibiotics; Ir	troduction, examples and uses of first, second, thin	rd and fourth	generatic	on Cephalos	porins, A	minogly	cosides/
Unit-2	Number of lectures =08	Title of the unit: ANTIPYRETICS AND ANALGESICS	;					
Introduction, examples and	uses of B-Lactam Antibiotics: Ir	troduction, examples and uses of first, second, thin	rd and fourth	generatio	on Cephalos	porins. A	minogly	/cosides
and Chloramphenicol.	,	······································		5				
Unit-3	Number of lectures = 08	Title of the unit: ANTIMALERIALS						
		loroquine phosphate, Primaquine phosphate, Isor	pentaguine. P	roguanil	Hydrochlori	de. Trim	ethopri	m. New
	inin and mefloquine Hydrochlori		pentaquine) i	0844111		,	ethopin	
Unit-4	Number of lectures = 08	Title of the unit: CARDIOVASCULAR DRUGS						
Introduction and Classific	tion of Cardiovascular Drugs		nd digitoxin /	Antihyner	tensive dru	igs: Losa	rtan C	lonidine
		tructure and uses: Cardiac glycosides; digoxin ar				•	rtan, C	lonidine
Hydrochloride, Methyldopa	. Antiarrhythmic Agents; Lorcain	tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety				•	rtan, C	lonidine
Hydrochloride, Methyldopa Unit-5	. Antiarrhythmic Agents; Lorcain Number of lectures = 08	tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS	ylium tosylate,	Verapan	nil Hydrochl	oride.	-	
Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride,	. Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety	tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS /lium tosylate, Verapamil Hydrochloride. Newer Dr	ylium tosylate,	Verapan	nil Hydrochl	oride.	-	
Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan	. Antiarrhythmic Agents; Lorcain Number of lectures = 08	tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS /lium tosylate, Verapamil Hydrochloride. Newer Dr	ylium tosylate,	Verapan	nil Hydrochl	oride.	-	
Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping	Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro	itructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS /lium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid,	ylium tosylate, rugs for Newe	Verapan r Disease	nil Hydrochl e: Introduct	ion, Stru	cture ar	nd uses
Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs	Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro A	itructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS vlium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid,	ylium tosylate, rugs for Newe PO1	Verapan	nil Hydrochl	ion, Stru	-	
Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs Evaluation and	Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro A study of introduction, example	itructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS lium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid, .ttributes es and uses of various antibiotics such as β-L	ylium tosylate, rugs for Newe PO1	Verapan r Disease	nil Hydrochl e: Introduct	ion, Stru	cture ar	nd uses
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Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs CO1 Evaluation and Aminoglycosides Study of introdu Aspirin, Phenazor chemistry. Overview, struct CO3 Isopentaquine, P Mefloquine HCl h Introduction, cla Digitoxin; Antihy Verapamil HCl giv Knowledge regar CO5 Methimazole, Eth more understand 1. https://www.ys 2. https://www.to 13. Books recommended: 1. Chemical Therm 2. Principles of phy 3. Essentials of Physical Cos Content of the second CO3 CO3 CO3 CO4 CO4 CO4 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5	Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro Aution, Citrate, Ethambutol Hydro and Chloramphenicol provided a tion, classification, synthesis a ite, Phenylbutazone along with M are and uses of antimalarial dr roguanil HCl, Trimethoprim as v elpful to understand about the cl isification, structure and uses bertensive drugs: Losartan and es a better understanding and ar ding newer available drugs such ambutol Hydrochloride, Isoniazi ing and become essentials of mo <b>3 Strong</b> elf-learning / E-learning compon mubooks.am/uploads/Ph_Ch_te armacologicalsciences.us/medici opr.com/guides/chemistry/chem	tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS /lium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid, 	ylium tosylate, rugs for Newe PO1 Lactam, 2 etamol, ut their 2 sphate, hin and 2 es and ICI and 2 tamide, create 2 ribution	r Disease PO2 1 1 1 1	PO3 PO4 2 2 1 2 1 2 1 2 1 2	ion, Stru	PO6 2 2 2 2 2 2	PO7 3 3 3 3 3 3
Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs CO1 Evaluation and Aminoglycosides Study of introdu Aspirin, Phenazor chemistry. Overview, struct CO3 Isopentaquine, P Mefloquine HCl h Introduction, cla CO4 Digitoxin; Antihy Verapamil HCl giv Verapamil HCl giv Knowledge regar CO5 Methimazole, Eth more understand 12. Brief description of so 1. https://www.ys 2. https://www.to 13. Books recommended: 1. Chemical Therm 2. Principles of Phy 3. Essentials of Phy	Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro Aution, Citrate, Ethambutol Hydro and Chloramphenicol provided a tion, classification, synthesis a ite, Phenylbutazone along with M are and uses of antimalarial dr roguanil HCl, Trimethoprim as v elpful to understand about the cl isification, structure and uses bertensive drugs: Losartan and es a better understanding and ar ding newer available drugs such ambutol Hydrochloride, Isoniazi ing and become essentials of mo <b>3 Strong</b> elf-learning / E-learning compon mubooks.am/uploads/Ph_Ch_tta armacologicalsciences.us/medici opr.com/guides/chemistry/chem odynamics by R.P.Rastogi et al sical chemistry, Bahl & Tuli, S. Cl	tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS vilum tosylate, Verapamil Hydrochloride. Newer Drochloride, Isoniazid, tributes es and uses of various antibiotics such as β-L better understanding of the antibiotics. and uses of antipyretics and analgesics like Parace lorphine and Codeine create more knowledge abou- ugs like Chloroquine phosphate, Primaquine phos- rell as some new antimalarial drugs like Artemisine memistry of these drugs. of cardiovascular drugs such as Cardiac glycosid Methyldopa; Antiarrhythmic Agents: Lorcainide H halyzing ability. as Misoprostol, probucol, Tamoxifen Citrate, Flut d, Rifampicin and Linezolid for the newer disease dern life. contribution, 2 Average contribution , 1 Low contre extbook.pdf nal-chemistry/classification-of-drugs.html istry-in-everyday-life/drugs-and-their-classification/ md Pathan hand & Co. Ltd. Pathania, Vishal Publishing Co.	ylium tosylate, rugs for Newe PO1 Lactam, 2 etamol, ut their 2 sphate, hin and 2 es and ICI and 2 tamide, create 2 ribution	r Disease PO2 1 1 1 1	PO3 PO4 2 2 1 2 1 2 1 2 1 2	ion, Stru	PO6 2 2 2 2 2 2	PO7 3 3 3 3 3 3

1. Nam	e of the Departmen	t: CHEMISTRY											
	se Name	PETRO – CHEMICALS				L			1	Γ		Р	
3. Cour	se Code	CH210				3			1			0	
	of Course (use tick					Core			DE			FC (	)
	requisite (if any)	10+2 with Chemistry	6.	Frequency (use tick marks)	Even ( V )	Odd			Either		) E	very Se	
		es, Tutorials, Practicals					( )				, –		
		ires = 30		Tutorials = 10					Practic	al = Nil			
8. COUR			wledge	of origin, composition, exploration	on and desa	alting of cr	ude oil				essenti	als, pro	file and
				esses of petroleum. Similarly, stud									
	SE OUTCOMES (CO)	-	01		, , ,								
After the	successful course c	ompletion, learners will devel	op folle	owing attributes:									
COUR	SE OUTCOME (CO)			ATTRI	BUTES								
		Introduction of crude oil, expl and enhance the understandir		y methods, oil reservoirs, transpor ne petrochemicals.	rtation of cr	ude oil, th	e consti	tutio	n of cr	ude oil	and nat	ural ga:	s create
				il, separation of natural gas alor int, octane number improve the e							oint dep	oressan	ts, drag
	<b>CO3</b>	Discussion of the different o	peratic	ons such as catalytic cracking, hy d and their applications helpful to	/drocracking	g, isomeriz	ation, r	efor			lation of	concern	ing the
				els and their characteristics concer					vlene	acetyle	ne and	nronvle	ne with
				provide new dimensions to the a		anaractarii	ig of the		yiene,	accepter	ine und	propyre	
	CO5		anol, a	cetaldehyde, acetic acid, vinyl ac		inolamines	, and v	inyl (	chlorid	e enhai	nce the	knowl	edge to
10. Uni	t wise detailed cont	· ·	icinisti										
Unit-1		Number of lectures = 08	Title	e of the unit:									
-	ion to crude oil evo			sportation of crude oil, Constitution	on of crude	oil and Na	tural ga	c					
millouuci	tion to crude on, exp	-	1	-			turai ga	3.					
Unit-2		Number of lectures =08		of the unit:									
		-		ctions based on relative volatilitie	es, Composi	tions of dif	ferent o	listill	ates. N	leaning	of term	ns such	as-Pou
	pressants, drag redu	cers, viscocity reducers, flash p											
Unit-3		Number of lectures = 08		of the unit:									
			spect t	o process, mechanism, catalysts	used and	applicatio	ns, Crao	cking	: Catal	ytic cra	acking,	Hydroc	racking,
	ation, Reforming, All	, ,											
Unit-4		Number of lectures = 08		of the unit:	1 .			•••					
Types of	hydrocarbon fuels a	nd their characteristics. Manuf	facture	of the following compounds: eth	ylene, acety	lene, Prop	ylene w	ith re	eaction	s and p	rocess	diagram	
Unit-5		Number of lectures = 08	Title	of the unit:									
Preparati	ion of the following	compounds from ethylene: eth	hanol, a	acetaldehyde, acetic acid, vinyl ace	etate, ethan	olamines,	and vin	yl ch	loride.				
11. CO-P	O mapping												
COs			Attribu	ites		P	01 P	02	PO3	PO4	PO5	PO6	P07
	Introduction of crue			voirs, transportation of crude oil,	the constitu	ution of	-		100		100		
CO1				tanding of the petrochemicals.	the constitu		2	1	2	1	-	2	3
CO2	Study of the distilla	tion of crude oil, separation of	f natur	al gas along with the meaning of the second se			2	1	1	1	_	2	3
	applications of petr	ochemicals.											
CO3		-	-	c cracking, hydrocracking, isome nd catalyst used and their appli		-	2	1	2	1	-	2	3
	evaluate the quality												
CO4	ethylene, acetylene			aracteristics concerning the mains and process diagrams provide r			2	1	1	1	-	2	3
CO5				acid, vinyl acetate, ethanolamines	, and vinyl c	chloride	2	1	2	1	-	2	3
		edge to analyze these chemica		ibution, 2 Average contribution ,	1 1 000 0000	ribution				I			I
12 Brid	f description of cold	s strong f-learning / E-learning compor	-	Sation, 2 Average contribution ,	I LOW CON	insution		_					_
		annica.com/science/petrochen											
1. 2.		annica.com/science/petrochen ucation.ca/encyclopedia/Petro		al									
3.		tube.com/watch?v=NJbNg3Glk											
4.				y-chemical-economics-handbook	.html								
	s recommended:												
1.		dynamics by R.P.Rastogi et al											
2.		ical chemistry by Puri Sharma a	and Pat	than									
3.		ical Chemistry, Bahl & Tuli, S. C											
4.		ical Chemistry, Puri, Sharma &		_									
5.		in Physical Chemistry, Madan 8	& Tuli,	S. Chand & Co. Ltd.									
6.	Atkin's Physical Ch	nemistry, Atkin, Oxford Press.											

1. Name of the Departme	nt: CHEMISTRY								
2. Course Name	AGRO – CHEMICALS		L			т		Р	
3. Course Code	CH211		3		:	1		0	
4. Type of Course (use tick	( mark)		Core (√	)	DE	()		FC (	)
5. Pre-requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ( √ )	Odd (	)	Either	Sem (	) E	very Sei	m ( )
7. Total Number of Lectur	es, Tutorials, Practicals								
Lect	ures = 30	Tutorials = 10			Practic	al = Nil			
8. COURSE OBJECTIVES: T	o understand about Organochl	orines, organophosphate and carbamates Insectic	ides natural o	organic i	nsectici	desand	their m	node of	action,
		of action and their applications f aromatic acid de	rivatives like	2,4-D &	2,4,5-T,	concept	ts of for	mulatio	ons (dry
and wet)in pesticide and gro	<u> </u>								
9. COURSE OUTCOMES (CO		<i></i>							
	completion, learners will develo								
COURSE OUTCOME (CO)		ATTRIBUTES							
C01	Remembergeneral introductio	n, chemical classification of Insecticides and natural	l organic inseq	ticides l	ike pyre	throids	and pyr	ethrins.	
CO2	Comprehension of concepts or	f formulations (dry and wet)in pesticide and synthes	sis, application	ns of rod	enticide	s			
CO3		fungicides and different classes of fungicides and d							
03						-			
CO4		s of commercial synthetic methodologies of 2,4-D	& 2,4,5-T an	d roden	ticides I	ikeZinc	phosph	ides, W	artarin,
	sodium monofluoroacetate.	nhosnhata insoctisidas over Organachlarinas lasad	ticidos Sunth	ncic ma	do of ar	tion	00 204	formul	ation of
CO5		phosphate insecticides over Organochlorines Insect phates and carbamates insecticides.	ncines, synth	zsis, 1110	ue or ac	LIUN, US	es and	iormula	
10. Unit wise detailed con									
Unit-1	Number of lectures = 08	Title of the unit:							
		s, contact poisons, systemic poisons, fumigants. Ch	nemical classi	ication	of nesti	cidos: In	sorticia	los fun	aicidas
		des. Natural organic insecticidcs: pyrethroids and py		ication	or pesti	ciues. In	isection	ies, iun	giciues
Unit-2	Number of lectures =08	Title of the unit:							
	esis, mode of action and app	lications: (a) Organochlorine Insecticides: DDT, BH	IC. aldrin. en	losulfon	. (b) Or	ganoph	osphori	us insec	ticides
		c) Carbamate insecticides: Carbaryl, Carbofuran.	-,,		(-)	8			
Unit-3	Number of lectures = 08	Title of the unit:							
General introduction, synthe	esis, mode of action and application	tions: (a) Inorganic fungicides: Sulphur, Lime sulph	ur, copper sul	phate, B	urgundy	y mixtur	e, copp	er oxyc	hloride,
Dithiocarbamates: Ziram, th									-
Unit-4	Number of lectures = 08	Title of the unit:							
		Herbicides: 2, 4, dichloro phenoxy acetic acid (2, 4-	-D), alachlor, s	ulphony	l urea c	ompour	nds. Roo	denticid	es- Zinc
phosphides, Warfarin, sodiu									
Unit-5	Number of lectures = 08	Title of the unit:							
		cytokinins. Formulation of pesticides: Dry formula	tion: Dusts, g	anules,	wettabl	e powd	ers, see	d disinf	ectants
liquid formulation: Emulsion	is and suspensions.								
11. CO-PO mapping									
COs		Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
(O) ~		cation of Insecticides and natural organic insecticit	des like 3	1	1		2	2	2
pyrethroids and py		dry and wet)in pesticide and synthesis, applicat	ions of	_					
	i concepts of formulations (	ary and weijin pesticide and synthesis, applicat	<b>3</b>	1	1		2	2	2
rodenticides	chemistry of fungicides and diff	erent classes of fungicides and dithiocarbamates as	notent						
CO3 fungicides.	una di su	erent classes of rangiciaes and ditillocarballates as	<b>3</b>	1	1		2	2	2
Able toevaluatedit	ferent types of commercial svi	nthetic methodologies of 2,4-D & 2,4,5-T and rode	nticides _				-	_	-
604	s, Warfarin, sodium monofluor	<b>e</b>	3	1	1		2	2	2
CO5 Analyze and comp	are Organophosphate insectici	des over Organochlorines Insecticides, Synthesis, n	node of 3	1	1		2	2	2
action, uses and fo	ormulation of Organochlorines,	Organophosphates and carbamates insecticides.	3	L			2	2	2
	3 Strong	g contribution, 2 Average contribution , 1 Low cont	ribution						
12. Brief description of se	lf-learning / E-learning compor	lent							
		stry-articles/agrochemicals-types-and-their-effects.							
		pedias-almanacs-transcripts-and-maps/agrochemic	cals						
• • •	annica.com/technology/agroch								
1 1/	n/biology/effects-of-agrochemi	Cals/							
13. Books recommended:	1 1 1 2 2 2 1 1								
	odynamics by R.P.Rastogi et al	a Dathara							
	sical chemistry by Puri Sharma a								
	sical Chemistry, Bahl & Tuli, S. C								
	sical Chemistry, Puri, Sharma &	-							
	in Physical Chemistry, Madan 8 Chemistry, Atkin, Oxford Press.								
U. AUNITS FILYSICAL	ARTING Y, ARTIN, OXIOI U FIESS.								

1. Nam	e of the Departmen	t: CHEMISTRY								
2. Cour	se Name	INDUSTRIAL WASTE TREATM	IENT	L			т		Р	
3. Cour	se Code	CH212		3			1		0	
4. Type	of Course (use tick	mark)		Core (	)	DE	(√)		FC (	)
5. Pre-	requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ( √ )	Odd (	)	Either	Sem (	) E	very Se	m()
7. Total	Number of Lecture	s, Tutorials, Practicals								
	Lectu	ıres = 30	Tutorials = 10			Practic	al = Nil			
			aste management technologies, acquaintance wit	h basic wast	e treatr	nent tec	hnologi	es and	enviror	nmental
		s wastes will be taught to stud	ents.							
	SE OUTCOMES (CO)									
-	-	ompletion, learners will devel								
COOK	SE OUTCOME (CO)	Analysis working mothodologi	ATTRIBUTES es of treatment technologies to tackle waste from h	ourschold and	linducti	rios is do	<b>n</b> 0			
		, , ,	č							
			pacts of wastes on climate and human health creat							
			al measures to check waste volume and strength de	-					measu	res.
	CO4	Awareness about waste gener	ation, its impact and mitigation strategies would be	created to re	move h	azardous	s wastes	5.		
	CO5	Remembrance of important as	pects of environmental audits would lead to its app	lication in ind	lustries.					
	t wise detailed cont									
Unit-1		Number of lectures = 08	Title of the unit: INTRODUCTION							
			of industrial wastes; Population equivalent; Bioassa							, sewer,
	age treatment plan		nental legislations related to prevention and control	of industrial	effluent	ts and ha	zardous	s wastes	5.	
Unit-2		Number of lectures =08	Title of the unit: CLEANER PRODUCTION							
Waste m	anagement Approac	ch; Waste Audit; Volume and s	rength reduction; Material and process modificatio	ns Recycle, re	euse and	d byprod	uct reco	overy; A	pplicati	ons.
Unit-3		Number of lectures = 08	Title of the unit: POLLUTION FROM MAJOR INDU							
			selected industries such as Textiles, Tanneries, Pha	armaceuticals	, Dairy,	Sugar, P	aper, d	istillerie	s, Steel	plants,
	oower plants; Waste	water reclamation concepts.	Title of the unit. TREATMENT TECHNOLOGIES							
Unit-4	ion: Noutralization:	Number of lectures = 08	Title of the unit: TREATMENT TECHNOLOGIES solved organic solids; Chemical oxidation, Adsorptic	n Domovol o	fdiccolu	ad in ara	onios. C	ombing	d traat	mont of
		tes; Residue management; Dev				eu morg	anics, c	ombine	u treat	ment of
Unit-5		Number of lectures = 08	Title of the unit: HAZARDOUS WASTE MANAGEN	IENT						
Hazardou	is wastes - Physico c	hemical treatment, solidificati	on, incineration, Secure land fills.							
11 CO-P	O mapping									
COs			Attributes	PO	PO2	PO3	PO4	PO5	PO6	PO7
cos	Analysis working m		hnologies to tackle waste from household and indu	-	. PU2	P03	P04	PU5	PU6	P07
CO1	done			2		2	2	2	3	1
CO2	An evaluation of h students.	nazardous impacts of wastes	on climate and human health create awareness	among 2		2			3	2
		erent remedial measures to	check waste volume and strength develops a so	ense of		-				
CO3	sustainable environ	mental measures.		3	1	2	2	2	3	1
CO4	Awareness about hazardous wastes.	waste generation, its impact	and mitigation strategies would be created to	remove 2		1	2		3	2
CO5	Remembrance of in	nportant aspects of environme	ntal audits would lead to its application in industrie	s.	3	2				3
		· · · · · · · · · · · · · · · · · · ·	contribution, 2 Average contribution , 1 Low cont	ribution						
		f-learning / E-learning compor								
1.		em.com/en/industrial-wastewa								
2. 3.			018/understand-industrial-wastewater-treatment/ ncyclopedias-almanacs-transcripts-and-maps/indus							
3. 4.	1 11 1	er.wa.gov.au/ data/assets/po	<i>,</i> , , , , , , , , , , , , , , , , , ,	וומו־שמגנכ-נו	catificiti	L				
	s recommended:									
1.		dynamics by R.P.Rastogi et al								
2.		ical chemistry by Puri Sharma a	ind Pathan							
3.	• • •	ical Chemistry, Bahl & Tuli, S. C								
4.			Pathania, Vishal Publishing Co.							
5.	•	in Physical Chemistry, Madan	& Tuli, S. Chand & Co. Ltd.							
6.	Atkin's Physical Ch	nemistry, Atkin, Oxford Press.								

	ent: CHEMISTRY								
2. Course Name	WATER TREATMENT AND AN	IALYSIS	L		1	Г		Р	
3. Course Code	CH213		3		1	1		0	
4. Type of Course (use ti	k mark)		Core ( )		DE	(√)		FC (	)
5. Pre-requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ( √ )	Odd ( )		Either	Sem (	) E	very Sei	m ( )
7. Total Number of Lectu	res, Tutorials, Practicals								
Le	tures = 30	Tutorials = 10			Practic	al = Nil			
8. COURSE OBJECTIVES: Th	e aim of this course is to introduc	ce the students to the area of water and wastewater tre	atment. Th	e cour	se will c	over wa	ater che	emistry;	
characteristics of water &	vastewater; primary, secondary 8	& tertiary treatment processes; sludge disposal; and desi	ign of wate	r and v	vastewa	ater trea	atment	plants.	
9. COURSE OUTCOMES (C	D):								
After the successful course	completion, learners will develo	p following attributes:							
COURSE OUTCOME (CO		ATTRIBUTES							
CO1	Ability to describe the purpo Coagulation, precipitation, chlo	ose and operational steps of key water treatment porination etc.	processes u	used t	o impr	ove wa	ter qu	ality ind	cluding
CO2	Identify the parameters that ch	naracterize the constituents found in potable water and	wastewate	r;					
CO3	Illustrate the fundamentals of v	water and wastewater treatment							
CO4	Recognise the common physica	al, chemical and biological unit operations encountered	in treatmer	nt proc	esses				
CO5	Examine biological parameters	of water.							
10. Unit wise detailed co	ntent								
Unit-1	Number of lectures = 08	Title of the unit: PURIFICATION OF WATER FOR DRIN	KING PUR	POSE					
Clarification, coagulation, (	ontact & electro chemical coagul	ation, sterilization & disinfections of water, precipitation	n, aeration,	ozonis	ation a	nd Chlo	rinatior	า.	
Unit-2	Number of lectures =08	Title of the unit: DETERMINATION OF HARDNESS AN			THODS	FOR W	ΔTFR		
		mplexometric method using EDTA.	0.001.1211		mobo				
		zeolite process, Ion exchange process or demineralizati	on of wate	r, Desa	alinatio	n of wa	ter: ele	ecrodiay	sis and
Unit-3	Number of lectures = 08	Title of the unit: WATER ANALYSIS							
Water analysis: sampling	f water for analysis - chemical su	bstances affecting potability - colour, turbidity odour, ta	iste, tempe	rature	, pH and	d electri	cal con	ductivit	y.
		ved solids, total acidity, alkalinity, free CO2, and free chl			•				•
Unit-4	Number of lectures = 08	Title of the unit: ANALYSIS OF CHEMICAL SUBTANCES	S AFFECTIN	G HEA	LTH				
Analysis of chamical cubet	Number of lectures – 08		-						
Analysis of chemical substa		Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu							
Analysis of chemical substa	nces affecting health: Ammonia, nces indicative of pollution: Disso	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Cher	uoride. nical oxygei	n dem		)D).			
Analysis of chemical substa Unit-5	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chen Title of the unit: BACTERIOLOGICAL EXAMINATION C	uoride. nical oxygei <b>DF WATER</b>		and (CO	,			
Analysis of chemical substa Unit-5	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Cher	uoride. nical oxygei <b>DF WATER</b>		and (CO	,			
Analysis of chemical substa Unit-5	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chen Title of the unit: BACTERIOLOGICAL EXAMINATION C	uoride. nical oxygei <b>DF WATER</b>		and (CO	,			
Analysis of chemical substa Unit-5 Bacteriological examinatio	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chen Title of the unit: BACTERIOLOGICAL EXAMINATION C	uoride. nical oxygei <b>DF WATER</b>		and (CO	,	P05	P06	P07
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli 6 6 7 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Chen <b>Title of the unit: BACTERIOLOGICAL EXAMINATION C</b> test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro-	uoride. nical oxyger <b>PF WATER</b> gical exami <b>PO1</b>	ination	and (CC	er.	PO5	PO6 2	P07 3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational suding: Coagulation, precipitation,	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chem <b>Title of the unit: BACTERIOLOGICAL EXAMINATION C</b> test, E.coli index, most probable number method, Biolo <b>Attributes</b> steps of key water treatment processes used to impro- , chlorination etc.	uoride. nical oxyger <b>F WATER</b> gical exami <b>PO1</b> vve <b>3</b>	ination PO2 3	of wate	er. PO4 1	1	2	3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs CO1 Ability to descrit water quality inc CO2 Identify the para	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chem <b>Title of the unit: BACTERIOLOGICAL EXAMINATION C</b> test, E.coli index, most probable number method, Biolo <b>Attributes</b> steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater;	uoride. nical oxyger F WATER gical exami PO1 vve 3 3	PO2 3 3	of wate	er. <b>PO4</b> 1 1	1	2 2	3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun Becognise the co	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewa	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chem <b>Title of the unit: BACTERIOLOGICAL EXAMINATION C</b> test, E.coli index, most probable number method, Biolo <b>Attributes</b> steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater;	uoride. nical oxygeu <b>FF WATER</b> gical exami <b>PO1</b> ove <b>3</b> <b>3</b> <b>3</b>	PO2 3 3 3	of wate	PO4 1 1 2	1 1 1	2 2 2	3 3 3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Chen <b>Title of the unit: BACTERIOLOGICAL EXAMINATION C</b> test, E.coli index, most probable number method, Biolo <b>Attributes</b> steps of key water treatment processes used to improc , chlorination etc. tituents found in potable water and wastewater; ter treatment	voride. mical oxyger F WATER gical exami PPO1 vve 3 3 3 3 3 3	PO2 3 3 3 3 3	of wate <b>PO3</b> 3 3 3 3 3	PO4 1 1 2 2	1 1 1 1	2 2 2 2	3 3 3 3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chem <b>Title of the unit: BACTERIOLOGICAL EXAMINATION C</b> test, E.coli index, most probable number method, Biolo <b>Attributes</b> steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment	Joride. nical oxyger FWATER gical exami ve 3 3 3 3 3 3 3 3 3	PO2 3 3 3	of wate	PO4 1 1 2	1 1 1	2 2 2	3 3 3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio al parameters of water. 3 Strong	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Chen <b>Title of the unit: BACTERIOLOGICAL EXAMINATION C</b> test, E.coli index, most probable number method, Biolo <b>Attributes</b> steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment <b>contribution, 2 Average contribution , 1 Low contribute</b>	Joride. nical oxyger FWATER gical exami ve 3 3 3 3 3 3 3 3 3	PO2 3 3 3 3 3	of wate <b>PO3</b> 3 3 3 3 3	PO4 1 1 2 2	1 1 1 1	2 2 2 2	3 3 3 3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to descrit water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s	An of water: total count test; E.coli An of water and w	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chem <b>Title of the unit: BACTERIOLOGICAL EXAMINATION C</b> test, E.coli index, most probable number method, Biolo <b>Attributes</b> steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment <b>contribution, 2 Average contribution , 1 Low contribute</b> ent	Joride. nical oxyger <b>F WATER</b> gical exami <b>PO1</b> ve 3 3 3 3 3 3 3 ion	PO2 3 3 3 3 3 3 3 3	and (CC) of wate 903 3 3 3 3 3 3 3	PO4 1 1 2 2 2 2	1 1 1 1	2 2 2 2	3 3 3 3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to descrit water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s 1. https://sswm.ir	An of water: total count test; E.coli Number of lectures = 08 An of water: total count test; E.coli An of water: test; E.coli An	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Chem <b>Title of the unit: BACTERIOLOGICAL EXAMINATION C</b> test, E.coli index, most probable number method, Biolo <b>Attributes</b> steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment <b>contribution, 2 Average contribution , 1 Low contribute</b> ent attachments/MCCAFFREY%20ny%20Water%20Quality%	Joride. nical oxyger F WATER gical exami PO1 ve 3 3 3 3 3 3 ion 20Paramet	PO2 3 3 3 3 3 3 3 cers%20	and (CC) of wate 903 3 3 3 3 3 3 3 3 0&%201	PO4 1 1 2 2 2 ndicato	1 1 1 1	2 2 2 2	3 3 3 3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s 1. https://sswm.ir 2. https://www.yo	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio al parameters of water. 3 Strong elf-learning / E-learning compone fo/sites/default/files/reference_ utube.com/watch?v=60t2t9YyzK	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Cher Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment contribution, 2 Average contribution , 1 Low contribute ent attachments/MCCAFFREY%20ny%20Water%20Quality% (U&list=RDCMUCYa1Wtl-vb_bx-anHdmpNfA&start_radiu	Joride. nical oxyger F WATER gical exami PO1 ve 3 3 3 3 3 3 ion 20Paramet	PO2 3 3 3 3 3 3 3 cers%20	and (CC) of wate 903 3 3 3 3 3 3 3 3 0&%201	PO4 1 1 2 2 2 ndicato	1 1 1 1	2 2 2 2	3 3 3 3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s 1. https://sswm.ir 2. https://www.yo 3. https://wedc.ku	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio al parameters of water. 3 Strong elf-learning / E-learning compone fo/sites/default/files/reference_ utube.com/watch?v=60t2t9YyzK owledge.lboro.ac.uk/resources/e	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Chem <b>Title of the unit: BACTERIOLOGICAL EXAMINATION C</b> test, E.coli index, most probable number method, Biolo <b>Attributes</b> steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment <b>contribution, 2 Average contribution , 1 Low contribute</b> ent attachments/MCCAFFREY%20ny%20Water%20Quality%	Joride. nical oxyger F WATER gical exami PO1 ve 3 3 3 3 3 ion 20Paramet	PO2 3 3 3 3 3 3 3 cers%20	and (CC) of wate 903 3 3 3 3 3 3 3 3 0&%201	PO4 1 1 2 2 2 ndicato	1 1 1 1	2 2 2 2	3 3 3 3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s 1. https://sswm.ir 2. https://www.yo 3. https://wedc.ku	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewai mmon physical, chemical and bio al parameters of water. 3 Strong elf-learning / E-learning compone fo/sites/default/files/reference_a utube.com/watch?v=6Ot2t9YyzK owledge.lboro.ac.uk/resources/e deshare.net/doctortvrao/bacterio	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Cher Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment contribution, 2 Average contribution , 1 Low contribute ent attachments/MCCAFFREY%20ny%20Water%20Quality% (U&list=RDCMUCYa1Wtl-vb_bx-anHdmpNfA&start_radie e/mn/006-Bacteriological-testing-of-water.pdf	Joride. nical oxyger F WATER gical exami PO1 ve 3 3 3 3 3 ion 20Paramet	PO2 3 3 3 3 3 3 3 cers%20	and (CC) of wate <b>PO3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b></b>	PO4 1 1 2 2 2 ndicato	1 1 1 1	2 2 2 2	3 3 3 3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s 1. https://sswm.ir 2. https://www.yo 3. https://www.sl 13. Books recommended:	nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio al parameters of water. 3 Strong elf-learning / E-learning compone fo/sites/default/files/reference_ utube.com/watch?v=60t2t9YyzK owledge.lboro.ac.uk/resources/e deshare.net/doctortvrao/bacterio	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Cher Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment contribution, 2 Average contribution , 1 Low contribute ent attachments/MCCAFFREY%20ny%20Water%20Quality% (U&list=RDCMUCYa1Wtl-vb_bx-anHdmpNfA&start_radie e/mn/006-Bacteriological-testing-of-water.pdf	Joride. nical oxyger F WATER gical exami PO1 ve 3 3 3 3 3 ion 20Paramet	PO2 3 3 3 3 3 3 3 cers%20	and (CC) of wate <b>PO3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b></b>	PO4 1 1 2 2 2 ndicato	1 1 1 1	2 2 2 2	3 3 3 3
Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s 1. https://sswm.ir 2. https://www.yo 3. https://www.sl 13. Books recommended: 1. Industrial chem	Ances affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli and of water: total count test; E.coli and the purpose and operational suding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio al parameters of water. 3 Strong elf-learning / E-learning compone fo/sites/default/files/reference_ utube.com/watch?v=60t2t9YyzK owledge.lboro.ac.uk/resources/e deshare.net/doctortvrao/bacterio stry (including chemical - engined	Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Cher <b>Title of the unit: BACTERIOLOGICAL EXAMINATION C</b> test, E.coli index, most probable number method, Biolo <b>Attributes</b> steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment <b>contribution, 2 Average contribution , 1 Low contribute</b> attachments/MCCAFFREY%20ny%20Water%20Quality% (U&list=RDCMUCYa1Wtl-vb_bx-anHdmpNfA&start_radie e/mn/006-Bacteriological-testing-of-water.pdf ology-of-water-and-analysis-basics	Joride. mical oxyger FWATER gical exami yve 3 3 3 3 3 3 3 3 0 20Paramet 0=1&rv=60	PO2 3 3 3 3 3 3 3 cers%20	and (CC) of wate <b>PO3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b></b>	PO4 1 1 2 2 2 ndicato	1 1 1 1	2 2 2 2	3 3 3 3

1. Name of the De	epartment	: CHEMISTRY									
2. Course Name		INDUSTRIAL CHEMISTRY LAB	3 – IV		L		1	Г		Р	
3. Course Code		CH214			0		(	)		8	
4. Type of Course	-				ore (		DE	<u> </u>		FC (	)
5. Pre-requisite (i		10+2 with Chemistry	6. Frequency (use tick marks) Even (V	) C	0dd ( )		Either	Sem (	) E'	very Sei	m ( )
7. Total Number o		, Tutorials, Practicals res = 00	Tutorials = 00				Practic	al = 09			
8. COURSE OBJECT			ectively and safely in a laboratory environment	, practical	/technica	l/ con			ills. cor	ncepts t	o solve
			e ability to work in teams as well as independent	-		•				•	
9. COURSE OUTCO			<i></i>								
After the successful COURSE OUTCO		mpletion, learners will develo	op following attributes: ATTRIBUTES								
CO1		Remember to keep records of	all performed experiments in themanner which	is required	in labora	tory.					
CO2		·	parameters like DO,BOD,COD,TDS and alkalinity	•							
CO3			methods and technical skills to work in the diffe		of chemi	strv.					
CO4		now the preparation of resing									
CO5			sonal safety and care of equipment's and chemi	cals.							
10. Syllabus		,	,								
Exp - 01		Preparation of urea formaldel	hyde resin.								
Exp - 02		Preparation of Phenol formal	dehyde (Bakelite) resin.								
Exp - 03		Preparation of Nylon 6, 6.									
Exp - 04	1	Preparation of Acetyl Salicylic	acid (Aspirin).								
Exp – 05	1	Preparation of acetanilide.									
Exp – 06	1	Preparation of Methyl salicyla	te (oil of winter).								
Exp — 07		Determination of total hardne	ess in the given water sample.								
Exp - 08	1	Determination of Dissolved ov	xygen (DO) in the given water sample.								
Ехр — 09	1	Determination of Biological or	xygen demand (BOD) in the given water sample.								
Exp — 10		Determination of Chemical ox	tygen demand (COD) in the given water sample.								
Exp — 11		Determination of Total dissolv	ved solid (TDS) in the given water sample.								
Exp – 12		Determination of alkali conter	nt in antacid tablet using HCl.								
11. CO-PO mapping	8				1 · [						
COs			Attributes			PO2	PO3	PO4	PO5	PO6	PO7
CO1 Remembe	er to keep r	ecords of all performed expension	riments in themanner which is required in labora	itory.	3	1	1		2	1	2
			),BOD,COD,TDS and alkalinity.		3	1	1		1	2	2
			nical skills to work in the different fields of chemi	stry.	3	1	1		1		2
		on of resins and acetanilide.			3	1	1		1		2
CO5 Analyze th	ne importa		re of equipment's and chemicals.		3	1	1		1	2	2
12 Drief descripti	on of colf			ontribution	า						
			13-akfarmahad-16-1-vogelqu-d.pdf								
			pdf-f06110ef2e1e1ae119cbacf71dd17732-origir	nal.pdf							
13. Books recomm											
		Chemistry, Bahl & Bahl, S. Cha	and & Co. Ltd.								
2. Advance	Practical C	Chemistry: Jagdamba Singh, L.	.D.S Yadav, Jaya Singh, I.R. Siddiqui, Pragati Editio	on.							
		hemistry A.I. Vogel. hemistry: B. Viswanathan anc									
H. FIALILA	i i i ysicai C	anic Chemistry –W.G.Palmer.	5								
CO5 Analyze th 12. Brief descripti 1. https://vi 2. http://fil 3. https://fi 4. https://vi 5. http://pi 13. Books recomm 1. Advance 2. Advance 3. Practical	ne importa ion of self- www.fandr le.akfarmal aculty.psat www.stem. ioneer.nets ended: d Organic ( Practical C Organic Cl	nce of personal safety and car <b>3 Strong</b> <b>learning / E-learning compon</b> n.edu/uploads/files/7964570 hadhika.ac.id/E-BOOK/12-121 u.edu.sa/filedownload/doc-6- .org.uk/resources/collection/3 serv.chula.ac.th/~sanongn1/p Chemistry, Bahl & Bahl, S. Cha Chemistry: Jagdamba Singh, L. hemistry A.I. Vogel.	g contribution, 2 Average contribution , 1 Low content and the second s	nal.pdf	3					2	

	e of the Departmen	it: CHEMISTRY								
2. Cours	se Name	CHROMATOGRAPHY TECHN	IQUES	L			Г		Р	
3. Cours	se Code	СН301		3			1		0	
4. Type	of Course (use tick	mark)		Core ( √ )		DE	()		FC (	)
5. Pre-r	requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ()	Odd (V	)	Either	Sem (	) E	very Se	m ( )
		es, Tutorials, Practicals			, .			,	,	. ,
		ures = 30	Tutorials = 10			Practic	al = Nil			
8. COUR			paration techniques such as Thin layer chromatogra	aphy. Paper o	hroma			chroma	tograph	nv. Higi
		tography and Ion exchange chro		, , , , , , , , , , , , , , , , , , ,			,,			,, 0
9. COUR	SE OUTCOMES (CO)	):								
After the	successful course c	ompletion, learners will develo	op following attributes:							
COURS	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Understand the chromatograp	hic techniques and its classification.							
	CO2	Evaluate Thin layer chromato mixture.	graphy; principle and its applications. Paper chroma	atography and	d its ap	plicatio	ns. Sep	aration	of ami	no acio
	CO3		f gas-liquid chromatography, Instrumentation and its	Industrial ap	plicatio	ns.				
	CO4	Able to discuss Normal and detector and Industrial applica	reverse phase HPLC, Isocratic and gradient elutior tions of HPLC.	, Instrument	ation; r	nobile	phase i	reservoi	ir, colui	nn and
	CO5		experimental techniques, applications, separation	of metal ions	, separ	ation of	f chlorid	de and	Bromid	e ions
10. Unit	t wise detailed cont									
Unit-1		Number of lectures = 08	Title of the unit: SEPARATION TECHNIQUES							
	ography. Classificat		ods, Elution in column chromatography, chromato	grams, distri	bution	constar	nt. rete	ntion ti	me. sta	tionar
phase, m			n chromatography, column chromatography; princip							
elution. Unit-2		Number of lectures =08	Title of the unit: THIN LAYER CHROMATOGRAPHY							
principle,	, choice of adsorbe	nt and solvent, Rf value, appli	cations. Paper chromatography; solvents used, prin	ciple, Rf valu	e, facto	ors influ	encing	Rf valu	e, appli	cations
Separatio	on of amino acid mix	dure.								
Unit-3		Number of lectures = 08	Title of the unit: GAS CHROMATOGRAPHY							
Introduct	tion, Principles of g	as-liquid chromatography, Inst	trumentation; Carrier gas system, Sample injection,	Columns, Sta	ationary	phase,	Detect	ors (Fla	me lor	ization
	capture and Therma	al conductivity) and Industrial a								
Unit-4	-	Number of lectures = 08	Title of the unit: HIGH PERFORMANCE LIQUID CHF							
	-		Isocratic and gradient elution, Instrumentation; m	obile phase	reservo	oir, colu	imn an	d detec	tor (U\	/-visible
Unit-5	on, Electrochemical)	and Industrial applications of H Number of lectures = 08	Title of the unit: ION EXCHANGE CHROMATOGRA	עונ						
	, resins, action of r		is, applications, separation of metal ions, separatio		and B	romide	ions -	remova	l of int	erferin
radicals.	,,									
11. CO-P(	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	Understand the ch	romatographic techniques and	its classification	3	1	1	2	2	1	2
			e and its applications. Paper chromatography a	-	-	-	-	-	-	
(0)		ation of amino acid mixture.	e and its applications. Paper chromatography a	3	1	1	2	2	1	2
										2
CO3	Comprehension of	Principles of gas-liquid chroma	tography, Instrumentation and its Industrial applicati	ons. 3	1	1	2	2	1	
CO4	Able to discuss No	ormal and reverse phase HPLC	tography, Instrumentation and its Industrial applicati C, Isocratic and gradient elution, Instrumentation; r		1	1	2 2	2 2	1	2
CO4	Able to discuss No phase reservoir, co Analyze the action	ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat	nobile 3						
CO4	Able to discuss No phase reservoir, co Analyze the action	ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn de ions - removal of interfering	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals.	nobile 3 ion of 3	1	1	2	2	1	2
CO4 CO5	Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi	ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering <b>3 Strong</b>	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. g contribution, 2 Average contribution, 1 Low contri	nobile 3 ion of 3	1	1	2	2	1	2
CO4 CO5 12. Brie	Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi	ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering <b>3 Strong</b> <b>f-learning / E-learning compon</b>	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. g contribution, 2 Average contribution, 1 Low contri- tent	nobile 3 ion of 3	1	1	2	2	1	2
CO4 CO5	Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khai	ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering <b>3 Strong</b> <b>f-learning / E-learning compon</b> otes.com/chromatography-prir nacademy.org/science/class-11	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. grontribution, 2 Average contribution, 1 Low contri- tent hciple-types-and-applications/ L-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-cl	nobile 3 ion of 3 bution	1 1 e-basic	1	2 2	2 2	1	2
CO4 CO5 12. Brie 1. 2.	Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khau techniques/xfbb6	normal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering <b>3 Strong</b> <b>f-learning / E-learning compon</b> otes.com/chromatography-prir nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradicals. grontribution, 2 Average contribution, 1 Low contri- tent heciple-types-and-applications/ L-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-co f-purification-of-organic-compounds/v/basics-of-chro	nobile 3 ion of 3 bution	1 1 e-basic	1	2 2	2 2	1	2
CO4 CO5 12. Brie 1. 2. 3.	Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khan techniques/xfbb6 https://www.slide	normal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering <b>3 Strong</b> <b>f-learning / E-learning compon</b> otes.com/chromatography-prir nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradicals. grontribution, 2 Average contribution, 1 Low contri- tent heciple-types-and-applications/ L-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-cl f-purification-of-organic-compounds/v/basics-of-chr /chromatography-34247423	nobile 3 ion of 3 bution nemistry-som omatography	1 1 e-basic	1 1 -princip	2 2 les-and	2	1	2
CO4 CO5 12. Brie 1. 2. 3. 4.	Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khan techniques/xfbb6 https://www.slide http://www.biolo	normal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering <b>3 Strong</b> <b>f-learning / E-learning compon</b> otes.com/chromatography-prir nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradicals. grontribution, 2 Average contribution, 1 Low contri- tent heciple-types-and-applications/ L-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-co f-purification-of-organic-compounds/v/basics-of-chro	nobile 3 ion of 3 bution nemistry-som omatography	1 1 e-basic	1 1 -princip	2 2 les-and	2	1	2
CO4 CO5 1. 2. 3. 4. 13. Book	Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khan techniques/xfbb6 https://www.biolo ktp://www.biolo ks recommended:	na detector and Industr lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering <b>3 Strong</b> <b>f-learning / E-learning compon</b> otes.com/chromatography-prin nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 gydiscussion.com/biochemistro	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradicals. grontribution, 2 Average contribution, 1 Low contri- tent heciple-types-and-applications/ L-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-cl f-purification-of-organic-compounds/v/basics-of-chr /chromatography-34247423	nobile 3 ion of 3 bution nemistry-som omatography	1 1 e-basic	1 1 -princip	2 2 les-and	2	1	2
CO4 CO5 12. Brie 1. 2. 3. 4. 13. Book 1.	Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khai techniques/xfbb6 https://www.slide http://www.biolo ks recommended: Chemical Thermo	ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering <b>3 Strong</b> <b>f-learning / E-learning compon</b> otes.com/chromatography-prir nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 gydiscussion.com/biochemistro dynamics by R.P.Rastogi et al	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradical	nobile 3 ion of 3 bution nemistry-som omatography	1 1 e-basic	1 1 -princip	2 2 les-and	2	1	2
CO4 CO5 12. Brie 1. 2. 3. 4. 13. Book 1. 2.	Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khan techniques/xfbb6 https://www.biolo ktp://www.biolo ks recommended: Chemical Thermo Principles of phys	ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering <b>3 Strong</b> <b>f-learning / E-learning compon</b> otes.com/chromatography-prin nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 gydiscussion.com/biochemistru dynamics by R.P.Rastogi et al ical chemistry by Puri Sharma a	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradical	nobile 3 ion of 3 bution nemistry-som omatography	1 1 e-basic	1 1 -princip	2 2 les-and	2	1	2
CO4 CO5 12. Brie 1. 2. 3. 4. 13. Book 1.	Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khan techniques/xfbb6 https://www.biolo ktp://www.biolo ks recommended: Chemical Thermo Principles of phys Essentials of Phys	ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering <b>3 Strong</b> <b>f-learning / E-learning compon</b> otes.com/chromatography-prir nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 gydiscussion.com/biochemistro dynamics by R.P.Rastogi et al	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradical	nobile 3 ion of 3 bution nemistry-som omatography	1 1 e-basic	1 1 -princip	2 2 les-and	2	1	2
CO4 CO5 12. Brie 1. 2. 3. 4. 13. Book 1. 2. 3. 3.	Able to discuss No phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khai techniques/xfbb6 https://www.slide http://www.biolo srecommended: Chemical Thermo Principles of phys Essentials of Phys	A strong f-learning / E-learning compon otes.com/chromatography-prin nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 gydiscussion.com/biochemistry dynamics by R.P.Rastogi et al ical chemistry by Puri Sharma a ical Chemistry, Bahl & Tuli, S. C	C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. g contribution, 2 Average contribution, 1 Low contri- lent nciple-types-and-applications/ I-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-cd f-purification-of-organic-compounds/v/basics-of-chr /chromatography-34247423 y/chromatography-techniques/top-12-types-of-chron und Pathan hand & Co. Ltd. Pathania, Vishal Publishing Co.	nobile 3 ion of 3 bution nemistry-som omatography	1 1 e-basic	1 1 -princip	2 2 les-and	2	1	2

1 Nam	e of the Departme	nt: CHEMISTRY			_								
	e of the Departments se Name	PROCESS IN ORGANIC CHEN					L			T		Р	
	se Code	CH302	IICALS	SWANDFACTORING		+	3					<u>Р</u> 0	
	of Course (use tick						5 ore (√)		DE	$\frac{1}{\sqrt{2}}$		FC (	· · ·
	requisite (if any)	10+2 with Chemistry	6.	Fraguancy (usa tick marks)	Even ( )		)dd (√	\	Either	<u> </u>	) [	very Se	
		es, Tutorials, Practicals	0.	Frequency (use tick marks)	Even()		uu (v	)	EILIIEI	Seni (	) [	very se	III ( )
7. 101a		ures = 30		Tutorials = 10					Dractic	al = Nil			
		terest will be developed amo	ng stu		chomistry ar	d introd	uction (	of bas			micals'	manuf	acturin
		mechanisms and their applica				u muou		Ji Das	ic orga		inicals	manure	acturin
-	SE OUTCOMES (CO												
	•	completion, learners will devel	op foll	lowing attributes:									
COUR	SE OUTCOME (CO)			A	TTRIBUTES								
	CO1	An understanding of the haza	dous d	outcomes of certain commerce	ial procedures	is and th	e altern	atives	are sugg	gested.			
	<u> </u>	Commercial preparations of ir			•					·			
	CO2												
	CO3	Merits and demerits of variou manufacture.	is orga	anic procedures like batch an	d continuous	oreparati	ons are	analyse	ed in co	ontext w	ith org	anic ch	emicals
	CO4	How common organic reaction	ns are	applied in commercial chemic	als' manufact	ure is don	e along	with th	neir meo	chanisti	c action	•	
	CO5	Interest for organic synthesis i	n cont	text with industrial chemistry	s created amo	ong stude	nts.						
10. Uni	t wise detailed con	tent											
Unit-1		Number of lectures = 08	Titl	le of the unit: NITRATION									
Introduct	ion - Nitrating age	ents and mechanism of nitration	on pro	ocess such as nitration: i) Be	zene to nitro	benzene	and m-	dinitrol	benzene	e ii) Chl	oroben	zene to	o- an
•	orobenzenes iii) To	luene. Continuous vs batch nitr	1										
Unit-2		Number of lectures =08		e of the unit: SULPHONATION									
		agents, Chemical and physica	l facto	ors affect sulphonation, mec	nanism of sul	phonatio	n reacti	ons, Co	ommero	cial sulp	honatio	on of b	enzene
· ·	ene, Toluene, batch	n vs continuous sulphonation.		6.1 I									
Unit-3		Number of lectures = 08		e of the unit: ALKYLATION		1		1					
Introduct	tion, Types of alkyla	tion, Alkylating agents, mechar	nism o	of alkylation reactions, manufa	cture of alcoh	ol, N-alky	laniline	s (mon	o dimet	hyl and	ethyl a	nilines.)	).
Unit-4		Number of lectures = 08	Title	e of the unit: ESTERIFICATION									
Introduct	ion, Esterfication b	y organic acids, by addition of	unsatı	urated compounds, esterifica	ion of carbox	/l acid de	rivative	s, comr	mercial	manufa	cture o	f ethyl a	acetate
,	tate, cellulose aceta												
Unit-5		Number of lectures = 08		e of the unit: HALOGENATIO		_			-				
		or halogenations, mechanism		halogenation, , halogenatio	n of aromati	cs. Com	mercial	manu	factures	s - chl	oroben	zenes,	chlora
		methanes, dichlorofluorometh	ane.										
COs	O mapping		A				201	202	000	004	0.05	DOC	007
COS	A second s		Attrib		and the others		PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	suggested.	of the hazardous outcomes of					2	1	1	1	2	3	2
CO2	feasibility.	rations of important organic su					1				1	2	1
CO3		its of various organic procedur nic chemicals' manufacture.	es like	e batch and continuous prepa	rations are ar	alysed in	2	1			2	2	1
CO4		anic reactions are applied in co	ommer	rcial chemicals' manufacture	s done along	with their	2						1
CO5		c synthesis in context with indu	strial o	chemistry is created among si	udents.		2	1	1		1	2	2
				ribution, 2 Average contribut		ntributio			1	1	1	1	1
12, Brie	of description of sel	If-learning / E-learning compor	-	Average contribut			•						
1.		annica.com/technology/chemi		dustry/Organic-chemicals									
2.		s.org/documents/chpt77e.htm		and if or Barrie circuitens									
3.		essengineeringlibrary.com/bro		andbook-of-industrial-chemis	try-organic-ch	emicals/c	978007	141037	/3ch01				
4.		mistryexplained.com/Hy-Kr/Ind			-								
13. Bool	ks recommended:												
1.		odynamics by R.P.Rastogi et al											
2.		sical chemistry by Puri Sharma											
3.		sical Chemistry, Bahl & Tuli, S. C											
4.		sical Chemistry, Puri, Sharma &											
5.		in Physical Chemistry, Madan	α iuli,	, S. Chand & CO. Ltd.									

6. Atkin's Physical Chemistry, Atkin, Oxford Press.

CO1       Isolation and separation procedures are understood to separate individual components in natural products 2       2       2       2         CO2       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.       2       2       1         CO3       Classification and structure of vitamins is understood and utility of vitamins is applied in biological 2       2       1	1. Name o	of the Departmen	t: CHEMISTRY										
4. Type of Course (use tick mark)       Core (V)       DE ( )       FC ( )         5. Pre-requisite (if any)       10+2 with Chemistry       6. Frequency (use tick marks)       Even ( )       Odd (V)       Either Sem ( )       Every Sem (         7. Total Number of Lectures; Tutorials, Practicals       Tutorials = 10       Practical = Nil       E.         8. COURSE OUECOMES: Students will be capanited with important terpenoids, alkaloids and hormones their synthesis and structure elucidation is done in context: rudustrial chemistry. A special emphasis will be laid on plant based phytochemicals and their medicinal utility.       9. COURSE OUTCOME (CO)       Practical = Nil         6. COURSE OUTCOME (CO)       ATTRIBUTES       COURSE OUTCOME (CO)       COURSE OUTCOME (CO)         COURSE OUTCOME (CO)       ATTRIBUTES       COURSE OUTCOME (CO)       COURSE OUTCOME (CO)         CO1       solation and separation procedures are understood to separate individual components in natural products chemistry.       CO3       Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.       CO4       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry       CO4       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry       CO4       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry       CO4       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry       CO4 <td>2. Course</td> <td>Name</td> <td>PHYTOCHEMISTRY</td> <td></td> <td></td> <td></td> <td>L</td> <td></td> <td></td> <td>г</td> <td></td> <td>Р</td> <td></td>	2. Course	Name	PHYTOCHEMISTRY				L			г		Р	
S. Pre-requisite (if any)       10-2 with Chemistry       6.       Frequency (use tick marks)       Even ( )       Odd ( V)       Either Sem ( )       Eveny Sem ( )         7. Total Number of Lectures, Tutorials Practicals       Tutorials = 10       Practical = Nil       Eveny Sem ( )       Eve	3. Course	Code	СН303				3			1		0	
7. Total Number of Lectures - 30       Tutorials = 10       Practical = Nil         COURSE OBJECTIVES: Students will be capainted with important terpenoids, alkaloids and hormones their synthesis and structure elucidation is done in context industrial chemistry. A special emphasis will be laid on plant based phytochemicals and their medicinal utility.       9. COURSE OUTCOMES (CO)         After the successful course completion, learners will develop following attributes:       COURSE OUTCOMES (CO)         COURSE OUTCOME (CO)       ATTRIBUTES         COURSE OUTCOME (CO)       ATTRIBUTES         COURSE OUTCOME (CO)       COURSE OUTCOME (CO)         COURSE OUTCOME (CO)       ATTRIBUTES         CO1       solation and separation procedures are understood to separate individual components in natural products chemistry.         CO2       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytopharmaceuticals and their utility is analysed in context with industrial chemistry         CO3       Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.         CO4       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry         Unit-1       Number of lectures = 08       Title of the unit: TERPENOIDS         Introduction, nomenchature, chemical classifi	4. Type of	Course (use tick	mark)				Core ( √ )		DE	()		FC (	)
Lectures = 30         Tutorials = 10         Practical = Nil           8. COURSE OBJECTIVES: Students will be laid on plant based phytochemicals and their medicinal utility.         Account of the acquainted with important terpenoids, aikaloids and hormones their synthesis and structure elucidation is done in context industrial chemistry. A special emphasis will be laid on plant based phytochemicals and their medicinal utility.           9. COURSE OUTCOMES (CO):         ATTRIBUTES           CO1         solation and separation procedures are understood to separate individual components in natural products chemistry.           CO2         Structure elucidation of various aikaloids, terpenoids is done to better understand the fundamentals of phytochemistry.           CO3         Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.           CO4         Phytopharmaceuticals and their utility is analysed in context with industrial chemistry           CO5         Physiological action of important steroids and hormones is evaluated.           10. Unit vise detailed content         Unit-1           Unit-2         Number of lectures = 08           Title of the unit: TERPENDIDS           Introduction, nomenclature, courrence, general properties, classification, sloation of terpenoids, isoprene rule; synthesis of Citral and Menthol. Carotence introduction, classification, and isolation, isolation, and general properties of aikaloid. Introduction and physiological action; Epidet the unit: STENDIDS AND HORMONES           Introduction, C	5. Pre-req	uisite (if any)	10+2 with Chemistry	6.	Frequency (use tick marks)	Even ( )	Odd (V	)	Either	Sem (	) E <sup>.</sup>	very Ser	m ( )
B. COURSE OBJECTIVES: Students will be acquainted with important terpenoids, alkaloids and heir medicinal utility.         9. COURSE OUTCOMES (CO):         After the successful course completion, learners will develop following attributes:         COURSE OUTCOMES (CO):         After the successful course completion, learners will develop following attributes:         COURSE OUTCOMES (CO):         After the successful course completion, learners will develop following attributes:         COURSE OUTCOME (CO)         CO1       solation and separation procedures are understood to separate individual components in natural products chemistry.         CO3       Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.         CO4       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry.         CO5       Physiological action of important steroids and hormones is evaluated.         10. Unit wise detailed content       Unit-1         Unit-2       Number of lectures = 08       Title of the unit: TERPENOIDS         Introduction, cocurrence, functions, nome	7. Total Nu	umber of Lecture	s, Tutorials, Practicals										
Industrial chemistry. A special emphasis will be laid on plant based phytochemicals and their medicinal utility. 9. COURSE OUTCOMES (CO) ATTRIBUTES CO1 solation and separation procedures are understood to separate individual components in natural products chemistry. CO2 Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry. CO3 Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures. CO4 Phytopharmaceuticals and their utility is analysed in context with industrial chemistry CO5 Physiological action of important steroids and hormones is evaluated. 10. Unit wise detailed content Unit-1 Number of lectures = 08 Title of the unit: TERPENOIDS Introduction, nomenclature, occurrence, functions, nomenclature, chemical classification, isolation, isolation of targenoids, isoprene rule; synthesis of Citral and Menthol. Caroteno Introduction, cassification, nor directures = 08 Title of the unit: TERPENOIDS Introduction, occurrence, functions, nomenclature, chemical classification, isolation, adgeneral properties of alkaloid. Introduction and physiological action; phedi Adreneline or Epinephrine, Nor adreneline or Nor epinephrine, Nicotine, atropine. Unit-3 Number of lectures = 08 Title of the unit: VITAMINS Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. 28.65, and Vit. C. Unit-5 Number of lectures = 08 Title of the unit: PHYTOPHARMACEUTICALS Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine. 11. CO-PO mapping CO1 solation and separation procedures are understood to separate individual components in natural products 2 2 2 2 2 2 1 CO2 2 CO2 Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of 2 2 2 2 1 2 2 2 1 2 2 2 1 2 2 2 1 2 2 2 1 2													
9. COURSE OUTCOMES (CO):         After the successful course completion, learners will develop following attributes:         COURSE OUTCOME (CO)         COI       solation and separation procedures are understood to separate individual components in natural products chemistry.         CO2       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.         CO3       Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.         CO4       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry         CO5       Physiological action of important steroids and hormones is evaluated.         10. Unit wise detailed content       Unit-1         Number of lectures = 08       Title of the unit: TERPENOIDS         Introduction, nomenclature, occurrence, general properties, classification, and general properties of alkaloid. Introduction and physiological action; beneficial classification, and general properties of alkaloid. Introduction and physiological action; beleteres = 08         Unit 2       Number of lectures = 08       Title of the unit: STRODIS AND HORMONES         Introduction, occurrence, structure and physiological action; belesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.         Unit 3       Number of lectures = 08       Title of the unit: STRDDIS AND HORMONES         Introduction, classification, and physiological action; be			-		-		r synthesis and	structu	ire eluci	dation i	s done	in conte	ext with
After the successful course completion, learners will develop following attributes:       ATTRIBUTES         CO1       solation and separation procedures are understood to separate individual components in natural products chemistry.         CO2       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.         CO3       Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.         CO4       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry         CO5       Physiological action of important steroids and hormones is evaluated.         10. Unit wise detailed content       Intel of the unit: TERPENOIDS         Introduction, nomenclature, corurrence, general properties, classification, and isolation of terptonoids, isoprene rule; synthesis of Citral and Menthol. Carotenent         Introduction occurrence, functions, nomenclature, chemical classification, isolation, and general properties of alkaloid. Introduction and physiological action; Ephedi         Adreneline or Epinephrine, Nor adreneline or Nor epinephrine, Nicotine, atropine.         Unit-3       Number of lectures = 08       Title of the unit: STEROIDS AND HORMONES         Introduction, classification, sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit 28 E6, and Vit. C.         Unit-5       Number of lectures = 08       Title of the unit: STEROIDS AND HORMONES				t base	d phytochemicals and their me	dicinal utility.							
COURSE OUTCOME (CO)         ATTRIBUTES           CO1         solation and separation procedures are understood to separate individual components in natural products chemistry.           CO2         Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.           CO3         Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.           CO4         Phytopharmaceuticals and their utility is analysed in context with industrial chemistry           CO5         Physiological action of important steroids and hormones is evaluated.           10. Unit wise detailed content         Unit-1           Number of lectures = 08         Title of the unit: TERPENDIDS           Introduction, nadisolation of caratenoids.         Unit-2           Number of lectures = 08         Title of the unit: ALKALOIDS           Introduction, cassification, and isolation of a cardenoids.         Introduction and physiological action; solation, isolation, and caratenoids.           Unit-2         Number of lectures = 08         Title of the unit: STEROIDS AND HORMONES           Introduction, cassification, Sources of vitamins and their deficiency diseases. Physiological function of waters. Progesterone, Testosterone, Androgen, Oestrogens.           Unit-3         Number of lectures = 08         Title of the unit: STEROIDS AND HORMONES           Introduction, Cassification, Sources of vitamins and their defic				an fall	louing attributos.								
C01       solation and separation procedures are understood to separate individual components in natural products chemistry.         C02       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.         C03       Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.         C04       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry         C05       Physiological action of important steroids and hormones is evaluated.         10. Unit wise detailed content       Unit-1         Number of lectures = 08       Title of the unit: TERPENDIDS         introduction, nomenclature, occurrence, general properties, classification, and isolation of terpenoids, isoprene rule; synthesis of Citral and Menthol. Carotene Introduction, and isolation of carotenoids.         Unit 2       Number of lectures = 08       Title of the unit: ALKALODS         Introduction, occurrence, functions, nomenclature, chemical classification, isolation, and general properties of alkaloid. Introduction and physiological action; Explore.         Unit 3       Number of lectures = 08       Title of the unit: STEROIDS AND HORMONES         Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. 82 B6, and Vit. C.         Unit 5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS <t< td=""><td></td><td></td><td>Simpletion, learners will develo</td><td>эр јон</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>			Simpletion, learners will develo	эр јон									
CO2       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.         CO3       Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.         CO4       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry         CO5       Physiological action of important steroids and hormones is evaluated.         10. Unit wise detailed content       Unit-1         Unit-1       Number of lectures = 08       Title of the unit: TERPENOIDS         Introduction, classification, and isolation of carotenoids.       Unit-2       Number of lectures = 08         Unit-2       Number of lectures = 08       Title of the unit: ALKALOIDS         Introduction occurrence, functions, nomenclature, chemical classification, isolation, and general properties of alkaloid. Introduction and physiological action; Ephedring.         Vinit-3       Number of lectures = 08       Title of the unit: STEROIDS AND HORMONES         Introduction, cocurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.         Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Introduction, Courrence, structure and physiological action; cholesterol, Ergosterol. Structure and fat soluble vitamins. Structure and uses; Vit. A, Vit         B2 B6, and Vit. C.       Unit-5       Number of lecture													
CO3       Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.         CO4       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry         CO5       Physiological action of important steroids and hormones is evaluated.         10. Unit wise detailed content       Vitia         Unit-1       Number of lectures = 08       Title of the unit: TERPENOIDS         Introduction, classification, and isolation of carotenoids.       Vitia         Unit-2       Number of lectures = 08       Title of the unit: ALKALOIDS         Introduction occurrence, general properties, classification, and isolation of alkaloid. Introduction and physiological action; Ephedhrine, Nor adreneline or Nor epinephrine, Nicotine, atropine.       Vitia         Unit-3       Number of lectures = 08       Title of the unit: STEROIDS AND HORMONES         Introduction, cocurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.         Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and use; Vit. A, Vit. 82 86, and Vit. C.         Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products			isolation and separation proce	aures	are understood to separate inc	lividual compo	onents in natura	al prodi	ucts cne	mistry.			
CO4       Phytopharmaceuticals and their utility is analysed in context with industrial chemistry         CO5       Physiological action of important steroids and hormones is evaluated.         10. Unit wise detailed content       Itile of the unit: TERPENOIDS         Introduction, nomenclature, occurrence, general properties, classification, and isolation of terpenoids, isoprene rule; synthesis of Citral and Menthol. Carotene introduction, classification, and isolation of carotenoids.         Unit-1       Number of lectures = 08       Title of the unit: ALKALOIDS         Introduction occurrence, functions, nomenclature, chemical classification, isolation, and general properties of alkaloid. Introduction and physiological action; Ehedid Adreneline or Epinephrine, Nor adreneline or Nor epinephrine, Nicotine, atropine.       Unit:-3       Number of lectures = 08       Title of the unit: STERDIDS AND HORMONES         Introduction, classification, Sources of vitamins and their deficiency diseases. Physiological hormones; Progesterone, Testosterone, Androgen, Oestrogens.       Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit B2 B6, and Vit. C.       Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.       11.CO-PO mapping         CO3		CO2	Structure elucidation of variou	s alka	loids, terpenoids is done to bet	er understand	the fundamen	itals of	phytoch	emistry			
CO5         Physiological action of important steroids and hormones is evaluated.           10. Unit wise detailed content         Unit-1         Number of lectures = 08         Title of the unit: TERPENOIDS           Introduction, nomenclature, occurrence, general properties, classification, and isolation of terpenoids, isoprene rule; synthesis of Citral and Menthol. Carotene introduction occurrence, functions, nomenclature, chemical classification, isolation, and general properties of alkaloid. Introduction and physiological action; Ephedi Adreneline or Epinephrine, Nor adreneline or Nor epinephrine, Nicotine, atropine.         Unit-2         Number of lectures = 08         Title of the unit: STEROIDS AND HORMONES           Introduction, occurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.         Unit-4         Number of lectures = 08         Title of the unit: VITAMINS           Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. B2 B6, and Vit. C.         Unit-5         Number of lectures = 08         Title of the unit: PHYTOPHARMACEUTICALS           It. CO-PO mapping         CO5         Attributes         PO1         PO2         PO3         PO4         PO5         PO6         P           CO1         Isolation and separation procedures are understood to separate individual components in natural products         2         2         2         2         2 </td <td></td> <td>CO3</td> <td>Classification and structure of</td> <td>vitam</td> <td>ins is understood and utility of v</td> <td>vitamins is app</td> <td>lied in biologica</td> <td>al struc</td> <td>tures.</td> <td></td> <td></td> <td></td> <td></td>		CO3	Classification and structure of	vitam	ins is understood and utility of v	vitamins is app	lied in biologica	al struc	tures.				
10. Unit wise detailed content         Unit-1       Number of lectures = 08       Title of the unit: TERPENOIDS         Introduction, nomenclature, occurrence, general properties, classification, and isolation of terpenoids, isoprene rule; synthesis of Citral and Menthol. Carotence introduction, classification, and isolation of carotenoids.         Unit-2       Number of lectures = 08       Title of the unit: ALKALOIDS         Introduction occurrence, functions, nomenclature, chemical classification, isolation, and general properties of alkaloid. Introduction and physiological action; Ephedi         Adreneline or Epinephrine, Nor adreneline or Nor epinephrine, Nicotine, atropine.       Unit-3         Unit-3       Number of lectures = 08       Title of the unit: STEROIDS AND HORMONES         Introduction, occurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.         Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit B2 B6, and Vit. C.         Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.         11. CO-PO mapping       2       2       2       2		CO4	Phytopharmaceuticals and the	ir utili	ity is analysed in context with in	dustrial chemi	istry						
Unit-1         Number of lectures = 08         Title of the unit: TERPENOIDS           Introduction, nomenclature, occurrence, general properties, classification, and isolation of terpenoids, isoprene rule; synthesis of Citral and Menthol. Carotenoids.           Unit-2         Number of lectures = 08         Title of the unit: ALKALOIDS           Introduction, classification, and isolation of carotenoids.         Title of the unit: ALKALOIDS           Introduction occurrence, functions, nomenclature, chemical classification, isolation, and general properties of alkaloid. Introduction and physiological action; Ephedia Adreneline or Epinephrine, Nor adreneline or Nor epinephrine, Nicotine, atropine.           Unit-3         Number of lectures = 08         Title of the unit: STEROIDS AND HORMONES           Introduction, occurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.           Unit-4         Number of lectures = 08         Title of the unit: VITAMINS           Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. B2 B6, and Vit. C.           Unit-5         Number of lectures = 08         Title of the unit: PHYTOPHARMACEUTICALS           Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.           11. CO-PO mapping         Cos         Attributes         PO1         PO2		CO5	Physiological action of importa	ant ste	eroids and hormones is evaluate	d.							
Introduction, nomenclature, occurrence, general properties, classification, and isolation of terpenoids, isoprene rule; synthesis of Citral and Menthol. Carotene Introduction, classification, and isolation of carotenoids.         Unit-2       Number of lectures =08       Title of the unit: ALKALOIDS         Introduction, classification, and general properties of alkaloid. Introduction and physiological action; Ephedia Adreneline or Epinephrine, Nor adreneline or Nor epinephrine, Nicotine, atropine.         Unit-3       Number of lectures = 08       Title of the unit: STEROIDS AND HORMONES         Introduction, cccurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.         Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit B2 B6, and Vit. C.         Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.         11. CO-PO mapping       Co1       Isolation and separation procedures are understood to separate individual components in natural products       2       2       2       2       2       2       2       2       2       2       2       <	10. Unit w	vise detailed cont	ent										
Introduction, classification, and isolation of carotenoids.          Unit-2       Number of lectures =08       Title of the unit: ALKALOIDS         Introduction occurrence, functions, nomenclature, chemical classification, isolation, and general properties of alkaloid. Introduction and physiological action; Ephedia         Adreneline or Epinephrine, Nor adreneline or Nor epinephrine, Nicotine, atropine.       Unit-3         Unit-3       Number of lectures = 08       Title of the unit: STROIDS AND HORMONES         Introduction, occurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.         Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit B2 B6, and Vit. C.         Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.         11. CO-PO mapping       Cos       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       P         Co1       Isolation and separation procedures are understood to separate individual components in natural products       2       2       2       2       2       2       2       2 <t< td=""><td>Unit-1</td><td></td><td>Number of lectures = 08</td><td>Titl</td><td>le of the unit: TERPENOIDS</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Unit-1		Number of lectures = 08	Titl	le of the unit: TERPENOIDS								
Unit-2         Number of lectures =08         Title of the unit: ALKALOIDS           Introduction occurrence, functions, nomenclature, chemical classification, isolation, and general properties of alkaloid. Introduction and physiological action; Ephedia           Adreneline or Epinephrine, Nor adreneline or Nor epinephrine, Nicotine, atropine.           Unit-3         Number of lectures = 08         Title of the unit: STEROIDS AND HORMONES           Introduction, occurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.           Unit-4         Number of lectures = 08         Title of the unit: VITAMINS           Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit B2 B6, and Vit. C.           Unit-5         Number of lectures = 08         Title of the unit: PHYTOPHARMACEUTICALS           Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.           11. CO-PO mapping         CO1         Isolation and separation procedures are understood to separate individual components in natural products         2 <t< td=""><td>Introduction</td><td>n, nomenclature,</td><td>occurrence, general properti</td><td>es, cla</td><td>assification, and isolation of te</td><td>erpenoids, isor</td><td>prene rule; syr</td><td>nthesis</td><td>of Citra</td><td>al and M</td><td>/lentho</td><td>l. Carot</td><td>cenoids</td></t<>	Introduction	n, nomenclature,	occurrence, general properti	es, cla	assification, and isolation of te	erpenoids, isor	prene rule; syr	nthesis	of Citra	al and M	/lentho	l. Carot	cenoids
Introduction occurrence, functions, nomenclature, chemical classification, isolation, and general properties of alkaloid. Introduction and physiological action; Ephedi         Mumber of lectures = 08       Title of the unit: STEROIDS AND HORMONES         Unit-3       Number of lectures = 08       Title of the unit: STEROIDS AND HORMONES         Unit-4       Number of lectures = 08       Title of the unit: STEROIDS AND HORMONES         Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Dispan="2">Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Cos       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       P         Cos       Attributes       PO1       PO2       PO3       PO4		n, classification, a											
Adreneline or Epinephrine, Nor adreneline or Nor epinephrine, Nicotine, atropine.       Intervalue         Unit-3       Number of lectures = 08       Title of the unit: STEROIDS AND HORMONES         Introduction, occurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.         Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. B2 BG, and Vit. C.         Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       P         co1       Isolation and separation procedures are understood to separate individual components in natural products 2       2       2       2       2       2       2       2       1         co2       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.       2       2       1       1         co3       Classification and structure of vitamins is understood and utility of vitamins													
Unit-3       Number of lectures = 08       Title of the unit: STEROIDS AND HORMONES         Introduction, occurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.         Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. B2 B6, and Vit. C.         Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.         11. CO-PO mapping         CO1       Isolation and separation procedures are understood to separate individual components in natural products       2       2       2         CO2       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.       2       2       1         CO3       Classification and structure of vitamins is understood and utility of vitamins is applied in biological 2       2       1						l properties of	alkaloid. Intro	ductio	n and pł	nysiolog	cal acti	on; Eph	nedrine
Introduction, occurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens.         Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. B2 B6, and Vit. C.         Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.       Introduction and separation procedures are understood to separate individual components in natural products       2 <th2< th="">       2       2</th2<>		or Epinephrine, N			· ·								
Unit-4       Number of lectures = 08       Title of the unit: VITAMINS         Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. B2 B6, and Vit. C.         Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       Pr         CO1       Isolation and separation procedures are understood to separate individual components in natural products chemistry.       2       2       2       2       1         CO2       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.       2       2       1       2       1         CO3       Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.       2       1       1													
Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. B2 B6, and Vit. C.          Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.         11. CO-PO mapping       PO1       PO2       PO3       PO4       PO5       PO6       Pri         C01       Isolation and separation procedures are understood to separate individual components in natural products in natural products.       2       2       2       2       2       2       2       1         C02       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.       2       2       1 </td <td>Introduction</td> <td>n, occurrence, stru</td> <td>ucture and physiological action</td> <td>i; chol</td> <td>lesterol, Ergosterol. Steroidal ho</td> <td>rmones; Proge</td> <td>esterone, Testo</td> <td>steron</td> <td>e, Andro</td> <td>ogen, Oe</td> <td>estrogei</td> <td>ns.</td> <td></td>	Introduction	n, occurrence, stru	ucture and physiological action	i; chol	lesterol, Ergosterol. Steroidal ho	rmones; Proge	esterone, Testo	steron	e, Andro	ogen, Oe	estrogei	ns.	
B2 B6, and Vit. C.         Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.         11. CO-PO mapping         COs       PO1       PO2       PO3       PO4       PO5       PO6       P         COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       P         COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       P         CO1       Isolation and separation procedures are understood to separate individual components in natural products       2       2       2       2       2       2       2       2       2       2       2       2       1       CO2       Structure elucidation of various alkaloids, terpenoids is done to b													
Unit-5       Number of lectures = 08       Title of the unit: PHYTOPHARMACEUTICALS         Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       Pri         CO1       Isolation and separation procedures are understood to separate individual components in natural products chemistry.       2       2       2       2       2       2       2       2       1         CO2       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.       2       2       2       1 <td></td> <td></td> <td>ources of vitamins and their d</td> <td>leficie</td> <td>ncy diseases. Physiological func</td> <td>tion of water</td> <td>and fat soluble</td> <td>vitami</td> <td>ins. Stru</td> <td>cture ar</td> <td>d uses;</td> <td>Vit. A,</td> <td>Vit. B1</td>			ources of vitamins and their d	leficie	ncy diseases. Physiological func	tion of water	and fat soluble	vitami	ins. Stru	cture ar	d uses;	Vit. A,	Vit. B1
Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine.         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       Pr         C01       Isolation and separation procedures are understood to separate individual components in natural products chemistry.       2       2       2       2       2       2       2       2       2       1       2		vit. C.	Number of lectures - 08	Title									
11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       Pi         C01       Isolation and separation procedures are understood to separate individual components in natural products chemistry.       2       2       2       2       2       2       1         C02       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.       2       2       1       2       2       1       2       2 <td></td> <td>alonment and con</td> <td></td> <td></td> <td></td> <td></td> <td>caffeine theor</td> <td>hylling</td> <td>and the</td> <td>ohromi</td> <td>no</td> <td></td> <td></td>		alonment and con					caffeine theor	hylling	and the	ohromi	no		
COsAttributesPO1PO2PO3PO4PO5PO6PCO1Isolation and separation procedures are understood to separate individual components in natural products chemistry.2222CO2Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.2221CO3Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.221		•		anatt	and products. Structure and me		currence, theory	, in y in it c		20010111	iic.		
CO1Isolation and separation procedures are understood to separate individual components in natural products chemistry.2222CO2Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.221CO3Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.21		napping											
CO1       chemistry.       2       2       2       2         CO2       Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.       2       2       1         CO3       Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.       2       1       1							-	PO2	PO3	PO4	PO5	PO6	P07
CO2     phytochemistry.     2     1       CO3     Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.     2     1	CO1		ation procedures are understo	od to	separate individual componen	ts in natural p	roducts 2				2	2	2
CO3 Classification and structure of vitamins is understood and utility of vitamins is applied in biological 2	CO2		on of various alkaloids, terpe	noids	is done to better understand	the fundame	ntals of 2				2	1	1
	CO3	assification and	structure of vitamins is und	lersto	od and utility of vitamins is	applied in bi	ological 2						2
CO4Phytopharmaceuticals and their utility is analysed in context with industrial chemistry21121			als and their utility is analysed	in cor	ntext with industrial chemistry		2	1	1		2	1	2
									1				1
3 Strong contribution, 2 Average contribution , 1 Low contribution	I		3 Strong	cont	ribution, 2 Average contributio	n , 1 Low cont	ribution	1	1	L			1
12. Brief description of self-learning / E-learning component	12. Brief d	lescription of self		·									
1. https://medlineplus.gov/vitamins.html		-											
2. https://www.health.harvard.edu/staying-healthy/listing_of_vitamins				y/listir	ng_of_vitamins								
3. https://medlineplus.gov/steroids.html													
<ol> <li>4. https://www.versusarthritis.org/about-arthritis/treatments/drugs/steroids/</li> <li>13. Books recommended:</li> </ol>			usarthritis.org/about-arthritis/	treatr	ments/drugs/steroids/								
13. Books recommended:         1. Chemical Thermodynamics by R.P.Rastogi et al			dynamics by R.P. Pastori et al										
				and Pa	athan								
			-										
3. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.			-		-								
3. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.	5. S	Simplified course	in Physical Chemistry, Madan a	ዿ Tuli,	, S. Chand & Co. Ltd.								

1. Name	e of the Departmer	nt: CHEMISTRY								
2. Cours	se Name	UNIT OPERATION IN CHEMI	CAL INDUSTRY	L		•	Г		Р	
3. Cours	se Code	CH304		3			1		0	
4. Type	of Course (use tick	mark)		Core ( √ )		DE	()		FC (	)
5. Pre-ı	requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ()	Odd (√	)	Either	Sem (	) E <sup>.</sup>	very Sei	m()
7. Total	Number of Lecture	es, Tutorials, Practicals								
		ures = 30	Tutorials = 10				al = Nil			
			o develop the deep understanding of theory distill							
-			nt in a binary/ ternary component with the contex	t of industrial	separa	tion teo	chniques	s incluc	ling soli	d state
	SE OUTCOMES (CO		anism of solid crystal for industrial perspective.							
	•	ompletion, learners will devel	op following attributes:							
	SE OUTCOME (CO)		ATTRIBUTES							
		Students will create an under	standing of the design and application of an analysi	is related to a	questi	on of re	levance	based	on exp	erience
	CO1	in separations techniques.								
	CO2		rstanding of the connection between common ap	proximation	methoo	ls and s	standard	d chem	ical ads	orptior
		absorption.								
	CO3		stand about the ingredients of filtering and drying of		•	ucts.				
	CO4	Students will have a firm foun	dation in the fundamentals and applications of crysta	allization proce	ess.					
	CO5	Students will gain an understa	nding of extraction of the compounds in mixtures.							
10. Uni	t wise detailed con	tent								
Unit-1		Number of lectures = 08	Title of the unit: DISTILLATION							
			of azeotropes, Plates columns and packed column	s Absorption:	Introd	uction:	Equipme	ents- p	acked c	olumn
	umns, bubble colun		nechanically agitated contractors.							
Unit-2	·	Number of lectures =08	Title of the unit: EVAPORATION		·	. /		<u> </u>		· · ·
		short tube (standard) Evapora	tor forced circulation evaporators, falling film evap	orators, climb	oing filr	n (upw	ard flow	) evap	orators,	, wiped
Unit-3	) film evaporator.	Number of lectures = 08	Title of the unit: FILTRATION							
	: Introduction, filte		ments- plate and frame filter press, nutch filter, r	otarv drum fi	lter, sr	arkler f	ilter. ca	ndle fi	ter, ba	g filter
			ture drying curve; equipments- tray dryer, rotary dry							
Unit-4		Number of lectures = 08	Title of the unit: CRYSTALLIZATION							
Introduct	ion: solubility, supe	r-saturation nucleation, crysta	growth; Equipment- tank crystallizer, agitated crysta	allizer, evapor	ator, cr	ystallize	r, draft i	tube cr	ystallize	r.
Unit-5		Number of lectures = 08	Title of the unit: EXTRACTION							
Introduct	ion: selection of sol	lvent; Equipments- Spray colur	nn, packed column rotating disc column, mixer-settle	er. Mixing- Int	roducti	on; mixi	ng of lic	uid-liq	uid solic	l- Solid
liquid-sol	id systems		-							
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1			ign and application of an analysis related to a ques	tion of 3	1	1		1	3	
		n experience in separations tec	•							
CO2		te an understanding of the co adsorption /absorption.	nnection between common approximation metho	ds and 3	1	1		1	3	
CO3			redients of filtering and drying of the commercial pro	oducts. 3	1	3		2	1	
CO4	Students will have	a firm foundation in the funda	nentals and applications of crystallization process.	3	1	3		2	1	
CO5	Students will gain a	an understanding of extraction	of the compounds in mixtures.	3	1	1		2	1	
		3 Strong	contribution, 2 Average contribution , 1 Low contr	ibution						
12. Brie		f-learning / E-learning compor								
1.			ical-technology/chemical-processing-unit-operation							
2.	1 11 0	du.iq/ched/images/lectures/ch								
3. 4.		oo.it/en/teaching/course-unit- tube.com/watch?v=H_Nc7SJw	catalogue/course-unit/2016/367440							
	s recommended:									
13. 000		dynamics by R.P.Rastogi et al								
2.		ical chemistry by Puri Sharma a	and Pathan							
3.		ical Chemistry, Bahl & Tuli, S. C								
4.		ical Chemistry, Puri, Sharma &	-							
5.		in Physical Chemistry, Madan	& Tuli, S. Chand & Co. Ltd.							
6.	Atkin's Physical C	hemistry, Atkin, Oxford Press.								

#### SEMESTER – V

1 Name	e of the Departmen	+- CHEMISTRY									
	se Name	PULP, PAPER, LEATHER AND	TEXTI		L		1	-	1	Р	
3. Cours		CH305			3					р 0	
	of Course (use tick				Core ()		DE			FC (	· · · ·
	equisite (if any)	10+2 with Chemistry	6.	Frequency (use tick marks) Even ( )	Odd (V)	)	Either		) F	very Sei	
	• • •	es, Tutorials, Practicals	0.		ouu (v	/	Little		/ -	very ser	
		ires = 30		Tutorials = 10			Practic	al = Nil			
8. COURS			of the	nature of chemical materials and the emerging t	rend. In ac	dition.			ress the	e massiv	/e drive
				ler to meet material requirements		,					
	SE OUTCOMES (CO)										
		ompletion, learners will develo	op foll	-							
COURS	SE OUTCOME (CO)			ATTRIBUTES							
	CO1	Student will be able to apply the	ne kno	wledge to produce various types of pulp and pape	ers.						
	CO2	Student will be able know the	proces	sing techniques to produce special types of paper	s.						
	CO3	Student will be able to demon	strate	the basic mechanism and processes involved in le	ather indu	stry.					
	CO4	Student will be able to know a	bout a	challenge which arises from leather industries an	d their har	ndling.					
	CO5	Student will able to know abou	ut India	an industries and products.							
10. Unit	wise detailed cont	tent									
Unit-1		Number of lectures = 08	Title	e of the unit: PULP AND PAPER							
		of pulp, Sulphate or Kraft pulp essing aids, functional additive		a pulp, Sulphite pulp Rag pulp, Beating, refining, nethodatives and binders.	filling, sizi	ng and	colorin	g, man	ufactur	e of pap	per and
Unit-2		Number of lectures =08	<u> </u>	of the unit: SPECIAL TYPES OF PAPERS AND THE	IR MANUF	ACTUR	ING PR	DCESS			
Ammonia	paper, Art paper, E	Bituminized water proof paper,	Emery	/ Paper, Toilet paper, Wall paper , Wax coated pap	per and po	lymeric	modifie	d pape	rs.		
Unit-3		Number of lectures = 08	Title	of the unit: LEATHER INDUSTRY-I							
Introducti	ion - Constituents o	f Animal Skin - Preparing skins	and hi	des - Cleaning and soaking - Liming and degreasin	g.						
Unit-4		Number of lectures = 08	Title	of the unit: LEATHER INDUSTRY-II							
Introducti	ion, Manufacture of	f leather, Preparation of hides	for tan	ning, Vegetable, chrome and oil tanning - Byprod	uct.						
Unit-5		Number of lectures = 08		of the unit: TEXTILES CHEMISTRY							
	-		bres:	cotton, wool, silk, and rayon fibres; General con	siderations	s of syn	thetic f	ibres; lı	ndetific	ation of	textile
-	ater soluble resins, a <b>D mapping</b>	and epoxy resins.									
COs			Attribu	***	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	o							-			_
CO1	Student will be able	e to apply the knowledge to pro	oduce	various types of pulp and papers.	1	1	1	2	3	3	1
				produce special types of papers.	1	1	1	2	3	3	1
CO3	Student will be able	e to demonstrate the basic med	chanisi	m and processes involved in leather industry.	1	1	1	2	3	3	1
CO4	Student will be able	e to know about a challenge wł	nich ar	ises from leather industries and their handling.	1	1	1	3	3	3	1
CO5	Student will able to	know about Indian industries	and pr	oducts.	1	1	2	3	3	3	1
		3 Strong	; contr	ibution, 2 Average contribution , 1 Low contribu	tion						
12. Brie		f-learning / E-learning compon									
1.	1 ,	tube.com/watch?v=4pWBknxL									
2. 3.		tube.com/watch?v=z6QnUCc72 tube.com/watch?v=5Lusmpg 1	•								
3. 4.	1 ,	tube.com/watch?v=5Lusmpg_1 tube.com/watch?v=Lu31Zt8f3x									
	s recommended:										
1.		industries N.R Nerris shreve									
2.	Chemical process	principales: part 1 & II – O.A /	Houge	n, K.M Watson RA Ragatz (CBS)							
3.	-		-	ge T. Austin, Mc Graw Hill Book Co.							
4.	Handbook of indu	strial chemistry: Volume I & II ,	KH Da	avis , FS Berner, CBS Publication.							
5.	Plastic Additives T	echnology Hand Book: Himadr	i Pand	a, Engineers India Research Institute.							
6	Industrial Chamist	try B K Sharma, goel nublishing	house								

6. Industrial Chemistry B.K.Sharma, goel publishing house

I manie of the Departin	ent: CHEMISTRY								
2. Course Name	DYES		L		٦	1		Р	
3. Course Code	СН306		3		1			0	
4. Type of Course (use ti	ck mark)		Core ( )		DE	(√)		FC (	)
5. Pre-requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ( )	Odd (V	)	Either	Sem (	) E <sup>.</sup>	very Sei	m ( )
7. Total Number of Lect	ures, Tutorials, Practicals								
	ctures = 30	Tutorials = 10			Practic	-			
		and era and history, color and chemical constitution	Develop basic	chemi	cal reac	tion and	d synth	esis of a	azodyes
and applications of some t 9. COURSE OUTCOMES (C									
	.0): e completion, learners will devel	on following attributes:							
COURSE OUTCOME (CC		ATTRIBUTES							
C01		d synthesis of benzene intermediates.							
		the dyes with respect to general structural features	mode of ann	lication	to fibo	r color	chados	classif	fication
CO2	mode of application, Color and		s, mode of app	lication	to fibe	1, COIOI	shaues	, Classii	ication,
		pes of Anthraguinone Dyes like Anthraguinone mo	ordant dyes, A	nthragu	inone v	at dyes	, Anthi	raguino	ne acid
CO3	dyes, Anthraquinone Disperse		, <i>, ,</i>			,			
CO4	Able to create basic Knowled	ge of azodyes, Diazotization, Diazo Coupling, Acidi	c azo dyes, Ba	sic azo	dyes, D	irect or	substa	intive a	zodyes,
	Mordant azodyes								
CO5		ations of Phenolphthalein, fluorescein, Eosin, Mal	achite green, l	Methyle	ene blue	e, Indig	o. Napl	hthol ye	ellow-S,
10. Unit wise detailed co	Crystal violet.								
Unit-1	Number of lectures = 08	Title of the unit: CHEMISTRY OF INTERMEDIATES	s						
		prical development from Natural to synthetic dyes.	-	nediate	s-Chloro	onitrobe	nzenes	. Nitroa	nilines
Bromonitroanilines, Nitroa				.culuic				,,	
Unit-2	Number of lectures =08	Title of the unit: CLASSIFICATION							
		ture and the mode of application to the fibre. Colou		l consti	tution c	of dyes;	Chemis	stry of t	he dyes
		ation to fibre, colour shades, synthesis of typical 4-5	dyes., uses.						
Unit-3	Number of lectures = 08	Title of the unit: ANTHRAQUINONE DYES			<u> </u>				
Anthraquinone mordant d Disperse dye.	yes; Alizarin, Alizarin Orange, Ali	zarin Red S. Anthraquinone vat dyes; Indanthrone b	lue, Pyranthror	ne. Anti	nraquin	one acio	d dyes, i	Anthrac	quinone
Unit-4									
onic 4	Number of lectures = 08	Title of the unit: AZO DYES							
Diazotization, Diazo Coup	Number of lectures = 08	Title of the unit: AZO DYES azo dyes (Methyl Orange, Tartrazine), Basic azo dy	ves: aniline, bu	utter ve	llow. D	irect or	substa	ntive a	zodves:
	ling, Types of Azo dyes; Acidic	Title of the unit: AZO DYES azo dyes (Methyl Orange, Tartrazine). Basic azo dy ochrome Black-T. synthetic fibre dyes; red disperse d		itter ye	llow. D	irect or	substa	intive a	zodyes;
	ling, Types of Azo dyes; Acidic	azo dyes (Methyl Orange, Tartrazine). Basic azo dy		itter ye	llow. D	irect or	substa	intive a	zodyes;
Congored. Ingrain azodyes Unit-5	ling, Types of Azo dyes; Acidic ; ; para red.Mordant azodyes; Eric Number of lectures = 08	azo dyes (Methyl Orange, Tartrazine). Basic azo dy pchrome Black-T. synthetic fibre dyes; red disperse d	ye.		llow. D	irect or	substa	intive a	zodyes;
Congored. Ingrain azodyes Unit-5 Structure and uses; Pheno	ling, Types of Azo dyes; Acidic ; ; para red.Mordant azodyes; Eric Number of lectures = 08	azo dyes (Methyl Orange, Tartrazine). Basic azo dy ochrome Black-T. synthetic fibre dyes; red disperse d Title of the unit: MISCELLANEOUS DYES	ye.		llow. D	irect or	substa	intive a	zodyes;
Congored. Ingrain azodyes Unit-5 Structure and uses; Pheno 11. CO-PO mapping	ling, Types of Azo dyes; Acidic : ; para red.Mordant azodyes; Eric Number of lectures = 08 Iphthalein, fluorescein, Eosin, Ma	azo dyes (Methyl Orange, Tartrazine). Basic azo dy ochrome Black-T. synthetic fibre dyes; red disperse d Title of the unit: MISCELLANEOUS DYES alachite green, Methylene blue, Indigo. Naphthol yel	ye. low-S, Crystal v	violet.					
Congored. Ingrain azodyes Unit-5 Structure and uses; Pheno 11. CO-PO mapping COs	ling, Types of Azo dyes; Acidic ;; para red.Mordant azodyes; Eric Number of lectures = 08 lphthalein, fluorescein, Eosin, Ma	Azo dyes (Methyl Orange, Tartrazine). Basic azo dy bochrome Black-T. synthetic fibre dyes; red disperse d Title of the unit: MISCELLANEOUS DYES alachite green, Methylene blue, Indigo. Naphthol yel Attributes	ye. low-S, Crystal v PO1	violet.	PO3	PO4	PO5	PO6	P07
Congored. Ingrain azodyes Unit-5 Structure and uses; Pheno 11. CO-PO mapping COs CO1 Remember the e	ling, Types of Azo dyes; Acidic : ; para red.Mordant azodyes; Eric Number of lectures = 08 Iphthalein, fluorescein, Eosin, Ma ra of dyes and synthesis of benze	Alazo dyes (Methyl Orange, Tartrazine). Basic azo dy bochrome Black-T. synthetic fibre dyes; red disperse d Title of the unit: MISCELLANEOUS DYES alachite green, Methylene blue, Indigo. Naphthol yel Attributes ene intermediates.	ye. low-S, Crystal v PO1 3	violet.					
Congored. Ingrain azodyes Unit-5 Structure and uses; Pheno 11. CO-PO mapping COs CO1 Remember the e CO2 Understand the	ling, Types of Azo dyes; Acidic : ; para red.Mordant azodyes; Eric Number of lectures = 08 Iphthalein, fluorescein, Eosin, Ma ra of dyes and synthesis of benze chemistry of the dyes with resp	Azo dyes (Methyl Orange, Tartrazine). Basic azo dy bochrome Black-T. synthetic fibre dyes; red disperse d Title of the unit: MISCELLANEOUS DYES alachite green, Methylene blue, Indigo. Naphthol yel Attributes ene intermediates. Dect to general structural features, mode of applica	ye. low-S, Crystal v PO1 3	violet.	PO3	PO4	PO5	PO6	P07
Congored. Ingrain azodyes Unit-5 Structure and uses; Pheno 11. CO-PO mapping COs CO1 Remember the e CO2 Understand the fiber, color shade Able to evaluate	Ing, Types of Azo dyes; Acidic : ; para red.Mordant azodyes; Eric Number of lectures = 08 Iphthalein, fluorescein, Eosin, Ma ra of dyes and synthesis of benze chemistry of the dyes with resp es, classification, mode of applica	Azo dyes (Methyl Orange, Tartrazine). Basic azo dy bochrome Black-T. synthetic fibre dyes; red disperse d Title of the unit: MISCELLANEOUS DYES alachite green, Methylene blue, Indigo. Naphthol yel Attributes ene intermediates. Dect to general structural features, mode of applica ation, Color and chemical constitution	ye. low-S, Crystal v PO1 3 ition to 3	riolet. PO2 1 1	PO3 1 1	PO4 2 2	PO5 2 2	PO6 1 1	P07 2 2
Congored. Ingrain azodyes Unit-5 Structure and uses; Pheno 11. CO-PO mapping COs CO1 Remember the e CO2 Understand the fiber, color shade CO3 Able to evaluate	Ing, Types of Azo dyes; Acidic : ; para red.Mordant azodyes; Eric Number of lectures = 08 Iphthalein, fluorescein, Eosin, Ma ra of dyes and synthesis of benze chemistry of the dyes with resp es, classification, mode of applica	Alazo dyes (Methyl Orange, Tartrazine). Basic azo dy bochrome Black-T. synthetic fibre dyes; red disperse d Title of the unit: MISCELLANEOUS DYES alachite green, Methylene blue, Indigo. Naphthol yel Attributes ene intermediates. Dect to general structural features, mode of applica attion, Color and chemical constitution ne Dyes like Anthraquinone mordant dyes, Anthrac	ye. low-S, Crystal v PO1 3 ition to 3	violet. PO2 1	PO3 1	PO4 2	P05 2	PO6 1	PO7 2
Congored. Ingrain azodyes Unit-5 Structure and uses; Pheno 11. CO-PO mapping COs CO1 Remember the e CO2 Understand the fiber, color shade CO3 Able to evaluate vat dyes, Anthrac	Ing, Types of Azo dyes; Acidic : ; para red.Mordant azodyes; Eric Number of lectures = 08 Iphthalein, fluorescein, Eosin, Ma ra of dyes and synthesis of benze chemistry of the dyes with resp es, classification, mode of applica e different types of Anthraquinon quinone acid dyes, Anthraquinon asic Knowledge of azodyes, Diaz	Alazo dyes (Methyl Orange, Tartrazine). Basic azo dy bochrome Black-T. synthetic fibre dyes; red disperse d Title of the unit: MISCELLANEOUS DYES alachite green, Methylene blue, Indigo. Naphthol yel Attributes ene intermediates. Dect to general structural features, mode of applica attion, Color and chemical constitution ne Dyes like Anthraquinone mordant dyes, Anthrac	ye. low-S, Crystal v PO1 3 ition to 3 juinone 3 0 dives	violet. PO2 1 1 1	PO3 1 1 1	PO4 2 2 2	PO5 2 2 2	PO6 1 1	PO7 2 2 2
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2. Course Name 3. Course Code	INDUSTRIAL CHEMISTRY LAB – V CH307	L 0			)		<u>Р</u> 8	
4. Type of Course (		 Core ( √ )		DE			FC (	
5. Pre-requisite (if		Odd (V)		Either		) Ev	very Ser	
7. Total Number of	ectures, Tutorials, Practicals							
	Lectures = 00 Tutorials = 00			Practic				
	<b>FES:</b> Student will be able to work effectively and safely in a laboratory environment, putative problems, transferable skills like ability to work in teams as well as independently.	ractical/technic	al/ con	nmunica	ation sk	ills, cor	icepts t	o solve
9. COURSE OUTCON								
	burse completion, learners will develop following attributes:							
COURSE OUTCOM								
C01	Remember to keep records of all performed experiments in themanner which is re	equired in labor	atory.					
CO2	Able to detect adulterants in the given food sample.							
CO3	Understand the basic titration methods and technical skills to work in the different	t fields of chem	istry.					
CO4	Explain the principles of chromatographic techniques.							
CO5	Analyze the importance of personal safety and care of equipment's and chemicals							
10. Syllabus								
Exp – 01	Separation of amino acid by Thin layer chromatography.							
Exp – 02	Separation of amino acid by paper chromatography.							
Exp – 03	Separation of sugar by Thin layer chromatography.							
Ехр — 04	Isolation of lactose & casein.							
Ехр — 05	Isolation of lycopene from tomato.							
Ехр — 06	Isolation of caffeine from tea.							
Ехр — 07	Isolation of piperine from black pepper.							
Ехр — 08	Isolation of eugenol from cloves.							
Ехр — 09	Isolation of nicotine from tobacco.							
Exp — 10	Determination of protein content of food.							
Exp — 11	Determination of fat content of food.							
Exp – 12	Determination of acetic acid content of vinegar.							
Exp – 13	Determination of acid value of oil.							
Exp – 14	Preparation of methyl orange.							
11. CO-PO mapping								
COs	Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1 Remember	o keep records of all performed experiments in themanner which is required in laborator	y. <b>3</b>	1	1		2	1	2
CO2 Able to det	ct adulterants in the given food sample.	3	1	1		1	2	2
CO3 Understand	the basic titration methods and technical skills to work in the different fields of chemistry	. <b>3</b>	1	1		1		2
CO4 Explain the	rrinciples of chromatographic techniques.	3	1	1		1		2
CO5 Analyze the	importance of personal safety and care of equipment's and chemicals.	3	1	1		1	2	2
12 Drief description	3 Strong contribution, 2 Average contribution, 1 Low contribution of colf learning / E learning component	ribution						
	of self-learning / E-learning component w.youtube.com/watch?v=MTsn1-ToKqQ 2.							
2. http://ww	v.bellevuecollege.edu/wp-content/uploads/sites/140/2014/06/aspirin_tablets_titration.p	odf						
	w.frontiersin.org/articles/10.3389/fonc.2015.00196/full w.youtube.com/watch?v=1tmqUVSVPo4							
	w.youtube.com/watch?v=ttmq0v5vPo4 w.youtube.com/watch?v=KZ35K05SA7g							
13. Books recomme	ded:							
	actical Chemistry: Jagdamba Singh, L.D.S Yadav, Jaya Singh, I.R. Siddiqui, PragatiEdition. rganic Chemistry A.I.Vogel.							
	ysical Chemistry : B. Viswanathan and P.S.Raghavan.							
4. Experimer	tal Inorganic Chemistry –W.G.Palmer.							

1. Name	e of the Departmen	t: CHEMISTRY	<u>SEMESTER VI</u>							
	se Name	SPECTROSCOPIC TECHNIQUE	S	L		1	•		Р	
3. Cours		CH308		3		1			<u>Р</u> 0	
	of Course (use tick			Core (√)		DE			FC (	<u>۱</u>
	requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ( V )	Odd ()		Either	· ·	) Ev	very Ser	
		s, Tutorials, Practicals		000 ( )		LILITET		/	very ser	
7110101		res = 30	Tutorials = 10			Practic	al – Nil			
8. COUR			interaction of electromagnetic radiation with the mate	rials, spec	trosco			like Ult	raviolet	ET-IR
		spectroscopy and mass spectr	5	indis, spec			inques		raviolet	., i i iii
	SE OUTCOMES (CO)		,							
After the	successful course co	ompletion, learners will develo	p following attributes:							
COURS	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Woodward – Fieser rules for ca				-				_
		vibrational frequencies, charac	in the infrared region, theory of infrared spectroscopy, in teristic absorptions in common classes of compounds.							
	CO3	To create basics of NMR spect coupling.	roscopy, instrumentation, chemical shift, equivalent and	nonequiv	alent p	rotons,	spin-sp	in splitt	ing and	l vicina
	0.04	Able to evaluate the NMR spe of NMR spectroscopy.	ctra of some representative compounds: Hydrocarbons,	Aldehyde	s, Keto	nes, Aci	ds and	Alcohol	s, Appli	cations
	CO5	• •	ntation, important useful terms in mass spectrometry; groups (alkanes, alkenes, alkynes, alcohols, ketones, alde		•			•	fragme	ntatior
10. Unit	t wise detailed cont	ent								
Unit-1		Number of lectures = 08	Title of the unit: UV SPECTROSCOPY							
Wave-like	e propagation of ligh	it, absorption of electromagne	tic radiation by organic molecules allowed and forbidder	transitior	ns, instr	umenta	tion, co	njugate	ed syste	ms and
	n energies, Woodwa		arbonyl compounds, conjugated dienes and polyenes.							
Unit-2		Number of lectures =08	Title of the unit: IR SPECTROSCOPY							
			of infrared spectroscopy, instrumentation, molecular			rs affec	ting vi	orationa	al frequ	iencies
	ristic absorptions in		, characteristic vibrational frequencies of some organic of	ompound	S.					
Unit-3	in the second ALAD	Number of lectures = 08	Title of the unit: NMR SPECTROSCOPY							
		spectroscopy, instrumentation entative compounds.	n, chemical shift, equivalent and nonequivalent protons	spin-spin	splittir	ig, vicin	al coup	ing,, In	terpreta	ation of
Unit-4	ctra or some represe	Number of lectures = 08	Title of the unit: MASS SPECTROSCOPY							
	ion basic theory in		ul terms in mass spectrometry, fragmentation patterns of	fvarious	functio	nal grou	ins (alka	anes all	enes a	lkvnes
	-	-	ters, acids, anhydrides), molecular ion peak, metastable			-				
Unit-5	•	Number of lectures = 08	Title of the unit: ATOMIC ABSORPTION SPECTROPHO	•	<u> </u>		<u> </u>	·	<u> </u>	
Introducti	ion, Principle, Instru	mentation, Sample preparatio	n, Internal standard and standard addition, calibration a	nd applica	tions of	AAS.				
11 CO-PC	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Understanding Way		ectronic transitions, instrumentation, conjugated system	nc	PUZ	PU3	PU4	PUS	PUO	P07
.01	and transition energe	gies, Woodward – Fieser rules	for calculation of wave length.	3	1	2		1		2
CO2		•	egion, theory of infrared spectroscopy, instrumentatic frequencies, characteristic absorptions in common class		1	2		1		2
603	To create basics o	f NMR spectroscopy, instrum plitting and vicinal coupling.	nentation, chemical shift, equivalent and nonequivale	nt 3	1	2		1		2
CO4	Able to evaluate th		sentative compounds: Hydrocarbons, Aldehydes, Keton	es, 3	1	1		1		2
			useful terms in mass spectrometry; molecular ion per	ık.						
			ous functional groups (alkanes, alkenes, alkynes, alcoho		1	1		1		2
	ketones, aldehydes	), Mclafferty rearrangements.								
		3 Strong	contribution, 2 Average contribution , 1 Low contribut	on						
12. Brie		-learning / E-learning compon								
1.	https://www.yout	ube.com/watch?v=2Y8pSoS0d	lg							
1. 2.	https://www.yout http://www.infoc	ube.com/watch?v=2Y8pSoS0d bbuild.com/education/audio-v	1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet	nods-IIT-N	1adras/	lecture-	25.htm	1		
1. 2. 3.	https://www.yout http://www.infoc https://scrippslabs	ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco	1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/	nods-IIT-N	1adras/	lecture-	25.htm	1		
1. 2. 3. 4.	https://www.yout http://www.infoce https://scrippslab https://nptel.ac.in	ube.com/watch?v=2Y8pSoS0d bbuild.com/education/audio-v	1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/	nods-IIT-N	1adras/	lecture-	25.htm			
1. 2. 3. 4. <b>13. Book</b>	https://www.yout http://www.infocd https://scrippslab: https://nptel.ac.in <b>ss recommended:</b>	ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10	1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf	nods-IIT-N	1adras/	lecture-	25.htm	1		
1. 2. 3. 4. <b>13. Book</b>	https://www.yout http://www.infoc https://scrippslab https://nptel.ac.in screcommended: Introduction to sp	ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman 8	1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole.	nods-IIT-N	1adras/	lecture-	25.htm	1		
1. 2. 3. 4. <b>13. Book</b>	https://www.yout http://www.infoc https://scrippslab https://nptel.ac.in <b>s recommended:</b> Introduction to sp Spectroscopic met	ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman 8 chods in organic chemistry: H. <sup>1</sup>	1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole. Williams and Ian fleminig, V Edition Tata Mc Grawhills	nods-IIT-N	1adras/	lecture-	25.htm	I		
1. 2. 3. 4. <b>13. Book</b> 1. 2.	https://www.yout http://www.infoc https://scrippslab https://nptel.ac.in serecommended: Introduction to sp Spectroscopic met Organic spectrosco	ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman 8 chods in organic chemistry: H. 1 opy: William Kemp, 3rd Editior	1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole. Williams and Ian fleminig, V Edition Tata Mc Grawhills					I		
1. 2. 3. 4. <b>13. Book</b> 1. 2. 3.	https://www.yout http://www.infoc https://scrippslab https://nptel.ac.in <b>s recommended:</b> Introduction to sp Spectroscopic mel Organic spectrosc Fundamentals of <i>i</i>	ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman 8 chods in organic chemistry: H. 1 opy: William Kemp, 3rd Editior Analytical chemistry, Douglas A	1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole. Williams and Ian fleminig, V Edition Tata Mc Grawhills , Palgrave publications.					1		
1. 2. 3. 4. <b>13. Book</b> 1. 2. 3. 4. 5. 6.	https://www.yout http://www.infoc https://scrippslab https://nptel.ac.in ss recommended: Introduction to sp Spectroscopic mel Organic spectrosc Fundamentals of A Principles and pra Analytical chemist	ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman & chods in organic chemistry: H. Y opy: William Kemp, 3rd Editior Analytical chemistry, Douglas A ctice of analytical chemistry, F. ry, Gary D. Christian, 6th editic	1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole. Williams and Ian fleminig, V Edition Tata Mc Grawhills , Palgrave publications. . Skoog, Donald M. West, F. James Holler, 7th edition, Ha W. Fifield, D. Kealey, 5th edition, Blackwell publication. m, Wiley and sons publication.					1		
1. 2. 3. 4. <b>13. Book</b> 1. 2. 3. 4. 5.	https://www.yout http://www.infoc https://scrippslab: https://nptel.ac.in ss recommended: Introduction to sp Spectroscopic met Organic spectrosc Fundamentals of A Principles and pra Analytical chemist Spectrometric ide	ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman & chods in organic chemistry: H. Y opy: William Kemp, 3rd Edition Analytical chemistry, Douglas A ctice of analytical chemistry, F. ry, Gary D. Christian, 6th edition ntification of organic compoun	1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole. Williams and Ian fleminig, V Edition Tata Mc Grawhills , Palgrave publications. . Skoog, Donald M. West, F. James Holler, 7th edition, Ha W. Fifield, D. Kealey, 5th edition, Blackwell publication.					I		

1. Name of the Department	nt: CHEMISTRY									
2. Course Name	CHEMICAL PROCESS INDUST	TRY		L		•	г		Р	
3. Course Code	СН309			3			L		0	
4. Type of Course (use tick	mark)		(	Core ( √ )		DE	()		FC (	)
5. Pre-requisite (if any)	10+2 with Chemistry	6.	Frequency (use tick marks) Even ( V )	Odd (	)	Either	Sem (	) E	very Sei	n()
7. Total Number of Lecture	es, Tutorials, Practicals									
Lect	ures = 30		Tutorials = 10			Practic	al = Nil			
			study the composition, preparation, properties and	d uses of	ammo	nia, nitr	ic acid,	phosph	iorus ch	emical
		oxic ha	zards on the health of consumer.							
9. COURSE OUTCOMES (CO										
COURSE OUTCOME (CO)	completion, learners will develo	op foll								
	Evaluate different preparation		sses for the manufacture of ammonia, nitric acid, a	mmoniu	m nitra	to and a	mmon	ium culi	hate a	nd thai
CO1	related quality control, hazard			innioniu	mmua			uni sui	Jiate a	iu thei
CO2			thods of caustic soda and phosphorus chemicals an	d their n	ronerti	es and i				
		-			operti		505.			
CO3	Understand the composition of	of glass	and their types, properties and uses.							
CO4	Analyze the composition, type	es, prop	perties and preparation of cement and its setting tin	ne.						
CO5	Understand the classification,	prope	ties and uses of ceramics and refractories and thei	r respect	ive cha	racteris	tics.			
10. Unit wise detailed con	tent									
Unit-1	Number of lectures = 08	Titl	e of the unit: SYNTHETIC NITROGEN PRODUCTS							
		ulphat	e their manufacture with reference to; consumption	n Pattern	, Raw r	naterial	s, Produ	uction p	rocess,	Quality
control, Hazards and safety a		<b></b>								
Unit-2	Number of lectures =08		of the unit: CHLOR – ALKALI INDUSTRIAL PRODUC							<u>C'l'</u>
Caustic soda Chlorine. Pho: calcium carbide.	sphorus chemicals; Phosphoru	is, pho	sphoric acid, ammonium phosphate, superphosp	hate, tri	ole sup	erphosp	bhate. I	.ime, g	psum,	Silicon
Unit-3	Number of lectures = 08	Title	of the unit: GLASS							
			acteristics, raw Materials, Chemical Reactions, Meth	nods of M	lanufad	ture an	d Uses			
			· · · ·				u 0303.			
Unit-4	Number of lectures = 08		of the unit: CEMENT						· ·	
Testing & Uses of cement.	Types of cement, Portland cer	ment; i	raw Materials, manufacture of Cement by wet & I	Dry proce	ess, Rea	action II	n the K	in, sett	ing of c	ement
Unit-5	Number of lectures = 08	Title	of the unit: CERAMICS AND REFRACTORIES							
Introduction, Types of cerar	nics materials, properties and	applic	ations. Refractories, classification of refractories, c	haracter	istics of	refract	ories m	aterials	, prope	rties o
refractories. Neutral refracto	ories; Silicon carbide. Acid refra	octories	; High Alumina refractories.							
11. CO-PO mapping										
COs										
		Attribu	ites	PO1	PO2	PO3	PO4	PO5	PO6	P07
(0)	preparation processes for the	manu	facture of ammonia, nitric acid, ammonium nitrat	<u>م</u>	-					-
and ammonium su	preparation processes for the lphate and their related quality	manu y contr	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management.	<sup>.e</sup> 3	PO2 2	PO3 3	PO4 3	PO5 2	PO6 3	PO7 2
and ammonium su Evaluate different	preparation processes for the lphate and their related quality	manu y contr	facture of ammonia, nitric acid, ammonium nitrat	<sup>.e</sup> 3	-					-
CO1 and ammonium su CO2 Evaluate different and uses.	preparation processes for the lphate and their related quality manufacturing methods of ca	manu y contro ustic s	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie	<sup>28</sup> 3	2	3	3	2	3	2
col     and ammonium su       col     Evaluate different and uses.       col     Understand the col	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ	manu y contro ustic s pes, pro	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses.	<sup>e</sup> 3 <sup>25</sup> 3 3	2 2 2 2	3 3 3	3 3 3	2 1 1	3 3 3	2 2 2
col     and ammonium su       col     Evaluate different and uses.       col     Understand the col	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ	manu y contro ustic s pes, pro	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie	<sup>28</sup> 3	2	3	3	2	3	2
CO1     and ammonium su       CO2     Evaluate different and uses.       CO3     Understand the co       CO4     Analyze the compo       CO5     Understand the co	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ ssition, types, properties and p	manu y contri ustic s pes, pro	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses.	<sup>25</sup> 3 3 3 3	2 2 2 2 2	3 3 3 3	3 3 3 3	2 1 1 1	3 3 3 3	2 2 2 2 2
col     and ammonium su       col     Evaluate different and uses.       col     Understand the col       col     Analyze the compo	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ position, types, properties and pro- classification, properties and pro-	reparat	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv	e 3 25 3 3 3 re 3	2 2 2 2	3 3 3	3 3 3	2 1 1	3 3 3	2 2 2
col       and ammonium su         co2       Evaluate different and uses.         co3       Understand the co         co4       Analyze the comport characteristics.	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ position, types, properties and pro- classification, properties and pro- <b>3 Strong</b>	y contra ustic s pes, pro repara uses o g contr	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time.	e 3 25 3 3 3 re 3	2 2 2 2 2	3 3 3 3	3 3 3 3	2 1 1 1	3 3 3 3	2 2 2 2 2
CO1       and ammonium su         CO2       Evaluate different and uses.         CO3       Understand the co         CO4       Analyze the compo         CO5       Understand the co characteristics.         12. Brief description of set	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ position, types, properties and pr classification, properties and pr <b>3 Strong</b> <b>f-learning / E-learning compore</b>	manu y contri ustic s pes, pro reparat uses o g contri nent	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv <b>ibution, 2 Average contribution , 1 Low contributio</b>	e 3 25 3 3 3 re 3	2 2 2 2 2	3 3 3 3	3 3 3 3	2 1 1 1	3 3 3 3	2 2 2 2 2
CO1       and ammonium su         CO2       Evaluate different and uses.         CO3       Understand the co         CO4       Analyze the comport Understand the co characteristics.         12. Brief description of set 1.       https://encycloped	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ position, types, properties and pr lassification, properties and pr <b>3 Strong</b> <b>f-learning / E-learning compor</b> edia2.thefreedictionary.com/ch	manu y contri ustic s pes, pro reparat uses o g contri nent nemica	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv <b>ibution, 2 Average contribution , 1 Low contributio</b>	e 3 25 3 3 3 re 3	2 2 2 2 2	3 3 3 3	3 3 3 3	2 1 1 1	3 3 3 3	2 2 2 2 2
CO1       and ammonium su         CO2       Evaluate different and uses.         CO3       Understand the co         CO4       Analyze the compo         CO5       Understand the co characteristics.         12. Brief description of sel 1. https://encyclope 2. https://www.you	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ position, types, properties and pr classification, properties and pr <b>3 Strong</b> <b>f-learning / E-learning compore</b>	manu y contri ustic s pes, pro reparat uses o g contri nent nemica	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv <b>ibution, 2 Average contribution , 1 Low contributio</b>	e 3 25 3 3 3 re 3	2 2 2 2 2	3 3 3 3	3 3 3 3	2 1 1 1	3 3 3 3	2 2 2 2 2
col       and ammonium su         co2       Evaluate different and uses.         co3       Understand the co         co4       Analyze the compo         co5       Understand the co characteristics.         12. Brief description of sel         1.       https://encyclope         2.       https://www.you         3.       https://www.che	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ sition, types, properties and p lassification, properties and p <b>3 Strong</b> <b>f-learning / E-learning compor</b> edia2.thefreedictionary.com/ch tube.com/watch?v=RjZJjneJ5fk	manu y contru ustic s pes, pro repara uses o g contru nent nemica	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv <b>ibution, 2 Average contribution , 1 Low contributio</b> I+process+industry	e 3 25 3 3 3 re 3	2 2 2 2 2	3 3 3 3	3 3 3 3	2 1 1 1	3 3 3 3	2 2 2 2 2
col       and ammonium su         co2       Evaluate different and uses.         co3       Understand the co         co4       Analyze the compo         co5       Understand the co characteristics.         12. Brief description of sel         1.       https://encyclope         2.       https://www.you         3.       https://www.che	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ sition, types, properties and pr lassification, properties and pr <b>3 Strong</b> <b>f-learning / E-learning compor</b> edia2.thefreedictionary.com/ch tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/	manu y contru ustic s pes, pro repara uses o g contru nent nemica	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv <b>ibution, 2 Average contribution , 1 Low contributio</b> I+process+industry	e 3 25 3 3 3 re 3	2 2 2 2 2	3 3 3 3	3 3 3 3	2 1 1 1	3 3 3 3	2 2 2 2 2
col       and ammonium su         co2       Evaluate different and uses.         co3       Understand the co         co4       Analyze the compo         co5       Understand the co         characteristics.       Understand the co         co5       Understand the co         characteristics.       Understand the co         characteristics.       Understand the co         1.       https://encyclope         2.       https://www.you         3.       https://www.che         4.       https://www.britt         13. Books recommended:       1.         Shreve R.N. Brink       Shreve R.N. Brink	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ sition, types, properties and pr lassification, properties and pr discription of glass and their typ sition, types, properties and pr lassification, properties and pr lassification, properties and pr lassification, properties and pr discription of glass and their typ sition, types, properties and pr discription of glass and their typ station, types, properties and pr discription of glass and their typ station, types, properties and pr discription of glass and their typ station, types, properties and pr discription of glass and their typ discription of	manu y contri ustic s pes, pro reparat uses o g contri nent nemica c us-cher	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv <b>ibution, 2 Average contribution , 1 Low contributio</b> I+process+industry mical-element ernational student edition, Pubs: McGraw Hill Book	e 3 3 3 3 3 3 3 3 5 0 7 6 3 0 7 8 6 0 7 8 7 8 9 8 9 8 9 8 9 8 9 8 9 8 9 8 9 8	2 2 2 2 2	3 3 3 3 3	3 3 3 3 3	2 1 1 1 1 1	3 3 3 3	2 2 2 2 2
col       and ammonium su         co2       Evaluate different and uses.         co3       Understand the co         co4       Analyze the compo         co5       Understand the co         characteristics.       Understand the co         co5       Understand the co         characteristics.       Understand the co         co4       Analyze the compo         1.       https://encyclope         2.       https://www.you         3.       https://www.obrit         13. Books recommended:       1.         Shreve R.N. Brink       2.         Groggins P.M., Unit       1.	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ osition, types, properties and pr lassification, properties and pr distribution of glass and their typ sition, types, properties and pr lassification, properties and pr distribution of glass and their typ sition, types, properties and pr distribution of glass and their typ sition, types, properties and pr distribution of glass and their typ sition, types, properties and pr distribution of glass and their typ distribution of glass and their ty	manu y contri ustic s pes, pro repara uses o g contri nemica c us-cher ries, Int	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv <b>ibution, 2 Average contribution , 1 Low contributio</b> I+process+industry mical-element ernational student edition, Pubs: McGraw Hill Book dition, International student edition, Pubs: McGraw	e 3 3 3 3 3 9 3 0 0 7 6 3 0 0 7 7 8 7 8 3 7 8 3 7 8 3 7 8 9 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	2 2 2 2 2 2	3 3 3 3 3 3	3 3 3 3 3	2 1 1 1 1 1	3 3 3 3	2 2 2 2 2
CO1       and ammonium su         and ammonium su       Evaluate different and uses.         CO3       Understand the co         CO4       Analyze the compo         CO5       Understand the co         CO5       Understand the co         CO5       Understand the co         CO5       Understand the co         CO4       Analyze the compo         1.       https://encyclope         2.       https://www.you         3.       https://www.obrit         13. Books recommended:       1.         Shreve R.N. Brink       2.         Groggins P.M., Un       3.         Dryden's outlines	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ osition, types, properties and pri- classification, properties and pri- pri- price and properties and pro- price and prope	manu y contri ustic s pes, pro reparat uses o g contri nent nemica c us-cher ries, Int s, 5th e ed and	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv <b>ibution, 2 Average contribution , 1 Low contributio</b> I+process+industry mical-element ernational student edition, Pubs: McGraw Hill Book dition, International student edition, Pubs: McGraw revised by Gopala Rao M. and Marshall S, Pubs: Eas	e 3 3 3 3 3 9 3 0 0 7 6 3 0 0 7 7 8 7 8 3 7 8 3 7 8 3 7 8 9 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	2 2 2 2 2 2	3 3 3 3 3 3	3 3 3 3 3	2 1 1 1 1 1	3 3 3 3	2 2 2 2 2
col       and ammonium su         co2       Evaluate different and uses.         co3       Understand the co         co4       Analyze the compo         co5       Understand the co         characteristics.       Understand the co         co5       Understand the co         characteristics.       Understand the co         co4       Analyze the compo         1.       https://encyclope         2.       https://www.you         3.       https://www.obrit         13. Books recommended:       1.         Shreve R.N. Brink       Cirogigins P.M., Ui         3.       Dryden's outlines         4.       Industrial Chemis	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ osition, types, properties and pri- classification, properties and pro- classification, pro- pro- classification, pro- pro- classif	manu y contri ustic s pes, pro reparat uses o g contri nent nemica c us-cher ries, Int s, 5th e ed and	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv <b>ibution, 2 Average contribution , 1 Low contributio</b> I+process+industry mical-element ernational student edition, Pubs: McGraw Hill Book dition, International student edition, Pubs: McGraw revised by Gopala Rao M. and Marshall S, Pubs: Eas	e 3 3 3 3 3 9 3 3 0 7 6 3 0 7 7 8 6 0 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	2 2 2 2 2 2	3 3 3 3 3 3	3 3 3 3 3	2 1 1 1 1 1	3 3 3 3	2 2 2 2 2
c01       and ammonium su         c02       Evaluate different and uses.         c03       Understand the co         c04       Analyze the comport understand the co characteristics.         c05       Understand the co characteristics.         12. Brief description of sel 1. https://encyclope 2. https://www.you 3. https://www.che 4. https://www.brit         13. Books recommended:         1. Shreve R.N. Brink 2. Groggins P.M., Ut 3. Dryden's outlines 4. Industrial Chemis 5. Chemical process	preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ osition, types, properties and pre- classification, properties and pre- pre- classification, properties and pre- pre- classification, properties and pre- pre- classification, properties and pre- pre- pre- pre- pre- pre- pre- pre-	manu y contri ustic s pes, pro reparat uses o g contri nemica c us-cher ries, Int s, 5th e ed and g house	facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv <b>ibution, 2 Average contribution , 1 Low contributio</b> I+process+industry mical-element ernational student edition, Pubs: McGraw Hill Book dition, International student edition, Pubs: McGraw revised by Gopala Rao M. and Marshall S, Pubs: Eas	e 3 3 3 3 3 9 3 3 0 7 6 3 0 7 7 8 6 0 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	2 2 2 2 2 2	3 3 3 3 3 3	3 3 3 3 3	2 1 1 1 1 1	3 3 3 3	2 2 2 2 2

Chemical process principales: part 1 & II – O.A / Hougen, K.M Watson RA Ragatz (CBS)
 Shrev's Chemical process Industries: 5th edition – George T. Austin, Mc Graw Hill.

Course Name         FUNDAMENTAL OF FOOD CHEMISTRY         L         T         P           6. Course Course (use take wark)         Course Course (use take wark)         Course Course (use take wark)         FC ()         FC	1. Name of the Departmen	t: CHEMISTRY								
1. Type of Course (use tick murk)         Core (_1)         DE(Y)         FC (_1)           2. For exequisitie (fany)         1D-2 with Chemistry (6. Frequency (use tick marks)         twen (Y)         Odd (_)         Either Sem (_1)         Every Sem (_1)           3. For exequisitie (fany)         1D-2 with Chemistry, Pacturals         Pactural = Nil         Pactural = Nil           4. Ecourse = 30         Totorials = 10         Pactural = Nil         Pactural = Nil           4. Representation (use)         For early (use)         For early (use)         For early (use)         For early (use)           5. COURSE OUTCOMES (OC)         After the successful curvas completion, learners will develop following attributes:         ATTRIBUTES           COURSE OUTCOME (OC)         Understanding of Indian food law and food standards, value of quality saurance and safety assurance         CO2         Comprehension of chemical structure, progenites and argue importance of food components, including carbohydrates, protein, lipid           CO2         Comprehension of clearcial structure, and carbohydrates, and completion, learner and cod	2. Course Name	FUNDAMENTAL OF FOOD C	HEMISTRY	L			Г		Р	
Ferenguistic (if any)         10-2 with Chemistry         6. Frequency (use tick marks)         two (v)         Odd ()         Ether Sen ()         Every Sen ()         Fordial Senter of Lactures, 10-0000         Fordial Senters         Local Senter         Local Senters	3. Course Code	CH310		3			1		0	
Total Number of Lectures, Tutorials, Practicals         Tutorials = 10         Practical = Nil           1:         COURSE ODECTURES: The course focuse on providing knowledge of food constituents, food additives and food processing techniques. The study of food laws and standards paped students about quality and safety assurance and food related hazads.           3:         COURSE OUTCOMES (CO)         Artification         Artification           4:         COURSE OUTCOMES (CO)         Understanding of Indian food law and food related hazads.           5:         COURSE OUTCOME (CO)         Understanding of Indian food law and food stadurds, value of quality assurance           CO2         Comprehension of chemical structure, properties and argue importance of food components, including carbohydrates, protein, lipid           CO3         Describe the principiles in food processing techniques and differentiate food preservation methods like heat preservation and compreservation, food packaging           CO4         Able to explain different types of food additives with examples and judge its value in real life.           CO5         Analyze the importance of food safety and food related physical, chemical and biological hazards.           10. Unit vise detailed content         Unit-1         Number of lectures = 08         Title of the unit: GOVERNMENTAL REGULATIONS           Unit-2         Number of lectures = 08         Title of the unit: GOVERNMENTAL REGULATIONS         Intervise           Unit-3         Number of lecture	4. Type of Course (use tick	mark)		Core ( )		DE	(√)		FC (	)
Interview         Totals = 10         Practical = NII           COURS 0012FURS: The course for proving howeldge of food constituents, food additives and food processing techniques. The study of food laws and standards.         Scourse 001700015 (CO)           COURS 001700015 (CO)         COURS 001700015 (CO)         ATTRIBUTES           COURS 001700016 (CO)         Concentration of chemical structure, properties and argue importance of food components, including carbohydrates, protein. Jupid variants and minerals.         COO           COO         Describe the principles in food processing techniques: and differentiate food preservation methods like heat preservation and co preservation, nod packaging         COO           COO         Analyze the importance of food additives with examples and judge its value in real life.         Analyze the importance of food additives with examples and judge its value in real life.           Unit.3         Number of lectures 08         Title of the unit: GOVERNMENTAL REGULATIONS           Introduction, food laws and standards: Indian food safety and sadety assurance in food industry. Bit Laboratory Services and Certification 18/s.           Unit.3         Number of lectures 08         Title of the unit: FOOD PROCESSING TECHNIQUES           Carbohydrates, Proteins, Fast and oils, Vitaming and Minerals.         Title of the unit: FOOD ADDITIVES           Unit.3         Number of lectures 08         Title of the unit: FOOD SAFETY, RISK SAND HAZABOS           Cororechydrates, Proteins, Fasts and oils, Vitaming and Min			6. Frequency (use tick marks) Even ( √ )	Odd (	)	Either	Sem (	) E	very Se	.m ( )
S. COURSE ORIECTIVES: The course focuses on providing knowledge of food constituents, food additives and food processing techniques. The study of food laws at standards appraise students about quality and safety assurance and food related hazards. After the successful course completion, learners will develop following attributes: COURSE OUTCOME (CO) After the successful course completion, learners will develop following attributes: COURSE OUTCOME (CO) COURSE OUTCOME (CO) COURSE OUTCOME (CO) Diderstanding of Indian food law and food standards, value of quality assurance and safety assurance CO1 Understanding of Indian food law and food standards, value of quality assurance food components, including carbohydrates, protein, lipid CO2 Comprehension of chemical structure, properties and argue importance of food components, including carbohydrates, protein, lipid CO3 Pascribe the principles in food processing techniques and judge its value in real life. CO5 A Pale to explain different types of food additives with examples and judge its value in real life. CO5 Analyze the Importance of food safety and Isod related physical, chemical and biological hazards. 30. Unit wise detailed content Unit 1 Number of lactures = 08 Title of the unit: GOVERNMENTAL REGULATIONS Unit 2 Number of lactures = 08 Title of the unit: FOOD PROCESSING TECHNIQUES Common unit operations, Food detorioation and there. Cotochydrates, Proteins, Fats and oil, Vitamins and Minerals. Unit 3 Number of lactures = 08 Title of the unit: FOOD PROCESSING TECHNIQUES Common unit operations, Food detorioation and there is. CO6 Analyze the Importance of food safety, Effects of processing and storage on microbial safety. Chemical hazards associated with food revention, food baw and food storadards, value of quality assurance and storage on microbial safety. Chemical hazards associated with food revention methods from food bar educations in food safety. Effects of processing and storage contribution gates, Sevetening agents & Hazards ascolad Albe tor explain diff	7. Total Number of Lecture	s, Tutorials, Practicals								
Standards appraise students about quality and safety assurance and food related hazards.  After the successful course completion, knownes will develop following attributes:  COURSE OUTCOMES (CO)  After the successful course completion, knownes will develop following attributes:  COURSE OUTCOME (CO)  CO  After the successful course completion, knownes will develop following attributes:  COURSE OUTCOME (CO)  CO  CO  CO  CO  CO  CO  CO  Describe  CO  Able to explain florent types of food additives with examples and judge its value in real life.  CO  Analyze the importance of food additives with examples and judge its value in real life.  CO  Analyze the importance of food additives with examples and judge its value in real life.  CO  Analyze the importance of food additives with examples and judge its value in real life.  CO  Analyze the importance of food additives with examples and judge its value in real life.  CO  Analyze the importance of food additives with examples and judge its value in real life.  CO  Analyze the importance of food additives with examples and judge its value in real life.  CO  Analyze the importance of food additives with examples and judge its value in real life.  CO  Analyze the importance of food additives with examples and judge its value in real life.  Co  Analyze the importance of food additives with examples and judge its value in real life.  Co  Analyze the importance of food additives with examples and judge its value in real life.  Co  Analyze the importance of food additives with examples and judge its value in real life.  Co  Analyze the importance of food additives with examples and judge its value in real life.  Co  Analyze the importance of food additives with examples and judge its value in real life.  Co  Another of lectures = 08  Title of the unit: FOOD ADD THEIR NUTRITIVE ASPECTS  Controlwydrates, Proteins, Fats and oils, Vitamins and Minerals.  Unit-3  Number of lectures = 08  Title of the unit: FOOD ADDTIVES  Co  Common unit operations, Food deteriforion and their co										
9. COURSE OUTCOMES [CO]: After the successful course completion, learners will develop following attributes: COURSE OUTCOME [CO] COURSE OUTCOME [			5	d food proces	sing teo	chnique	s. The s	tudy of	food la	aws and
After the successful course completion, learners will develop following attributes:       ATTRIBUTES         COURSE OUTCOME [CO]       ATTRIBUTES         CO2       Comprehension of chemical structure, properties and argue importance of food components, including carbohydrates, protein, lipid         CO3       Describe the principles in food processing techniques and differentiate food preservation methods like heat preservation and co preservation, food packaging.         CO4       Able to explain different types of food additives with examples and judge its value in real life.         L0. Unit wise detailed content       Title of the unit: COVERNMENTAL REGULATIONS         Introduction, food laws and standards. Indian food safety laws and standards, Quality and safety assurance in food industry; BIS Laboratory Services and Certification In BS.         Unit.2       Number of lectures = 08       Title of the unit: COVERNMENTAL REGULATIONS         Introduction, food laws and standards. Indian food safety laws and standards, Quality and safety assurance in food industry; BIS Laboratory Services and Certification In BS.         Unit.3       Number of lectures = 08       Title of the unit: FOOD PROCESSING TECHNIQUES         Contentiation & food packaging, Provide deterioration and their control; Heat preservation and processing. Cold preservation and processing Food dehydration, Foo concentration & food packaging, Preservation, and packaging and Thickening agents, Surface active agents, Stabilizing and Thickening agents, Surface active agents, Stabilizing and Thickening agents, Surface active agents, Stabilizing and Thickening agents, Colo			ance and food related hazards.							
COURSE OUTCOME (CO)         ATTRBUTES           CO1         Understanding of indian food law and food standards, value of quality assurance and safety assurance           CO2         Comprehension of chemical structure, properties and argue importance of food components, including carbohydrates, protein, lipid           CO3         Describe the principles in food processing techniques and differentiate food preservation methods like heat preservation and co preservation, food packaging           CO4         Able to explain different types of food additives with examples and judge its value in real life.           CO5         Analyze the importance of food safety and food related physical, chemical and biological hazards.           10. Unit vise detailed content         Units.1         Number of lectures = 08         Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS           Carbohydrates, Proteins, Fats and oils, Vitamins and Minerals.         Units.3         Number of lectures = 08         Title of the unit: FOOD OPROCESSING TECHNQUES           Concentration & Kod packaging.         Units.4         Number of lectures = 08         Title of the unit: FOOD ADDITIVES           Preservative, Alcod packaging.         Units Obd packaging.         Units Obd packaging.           Units.4         Number of lectures = 08         Title of the unit: FOOD ADDITIVES           Preservative, Alcod packaging.         Units food packaging.         Units Obd packaging.           Units			op following attributes:							
Concernetworks of chemical structure, properties and argue importance of food components, including carbohydrates, protein, lipid training and minerals.           CO3         Describe the principles in food processing techniques         and differentiate food preservation methods like heat preservation and correservation, food packaging           CO4         Able to explain different types of food additives with examples and judge its value in real life.           CO5         Analyze the importance of food additives with examples and judge its value in real life.           CO4         Able to explain different types of food additives with examples and judge its value in real life.           CO5         Analyze the importance of food safety and food related physical, chemical and biological hazards.           10Init 3         Number of lectures = 08         Title of the unit: GOVERNMENTAL REGULATIONS           Introduction, Food deterioration and thier control; Heat preservation and processing. Cold preservation and processing Food dehydration, Foo Concentration & food packaging.           Unit-3         Number of lectures = 08         Title of the unit: FOOD DADDITVES           Concentration & food packaging.           Unit-3         Number of lectures = 08         Title of the unit: FOOD ADDITIVES           Concontrati		,								
C02       witamins and minerals.         C03       Describe the principles in food processing techniques and differentiate food preservation methods like heat preservation and co preservation, food packaging.         C04       Able to explain different types of food additives with examples and judge its value in real life.         C05       Analyze the importance of food safety and food related physical, chemical and biological hazards.         10. Unit wise detailed content       Unit-1       Number of lectures = 08       Title of the unit: GOVENNMENTAL REGULATIONS         Introduction, Food laws and standards: Indian food safety aws and standards. Quality and safety assurance in food industry: BIS Laboratory Services and Certification I         BIS.       Number of lectures = 08       Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS         Carbohydrates, Proteins, Fats and olis, Vitamins and Minerals.       Inite of the unit: FOOD PROCESSING TECHNIQUES         Common unit operations, Food deterioration and their control; Heat preservation and processing. Colouring agents, Sweetening agents & Flavori agents.         Unit-5       Number of lectures = 08       Title of the unit: FOOD ADDTIVES         Vonted       Number of lectures = 08       Title of the unit: FOOD SAFETY, RISK AND HAZARDS         Food related Hazards, Microbiological Considerations in food safety. Effects of processing and storage on microbial safety. Chemical hazards associated with food yevention methods from food bar dus and food standards, value of quality assurance and safety assuranc	C01	Understanding of Indian food	law and food standards, value of quality assurance a	and safety assu	rance					
CO3         Describe         the principles in food processing techniques         and differentitie food preservation methods like heat preservation and co preservation, food packaging           CO4         Able to explain different types of food additives with examples and judge its value in real life.         Image: CO5         Analyze the importance of food safety and food related physical, chemical and biological hazards.           10. Unit wise detailed content         Unit:1         Number of lectures = 08         Title of the unit: GOVERNMENTAL REGULATIONS           Unit:2         Number of lectures = 08         Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS           Carbohydrates, Proteins, Food deterioration and their control; Heat preservation and processing. Cold preservation and processing. Food dehydration, Foo concentrations, Food deterioration and their control; Heat preservation and processing. Cold preservation and processing. Food dehydration, Foo concentrations, Cold deterioration and their control; Heat preservation and processing. Colouring agents, Sweetening agents & Flavorin agents.           Unit:4         Number of lectures = 08         Title of the unit: FOOD ADDITIVES           Preservatives, Antioxidants, Chelating agents, Stabiling and Thickening agents, Surface active agents, Stabiling and Thickening agents, Surface active agents, Stabiling and Thickening agents, Buffering agents, Colouring agents, Sweetening agents applied           CO5         Number of lectures = 08         Title of the unit: FOOD AADTHEIR NUTRITIVE ASPECTS           Unit:5         Number of lectures = 08	CO2	•	structure, properties and argue importance of fo	od componen	ts, incl	uding c	arbohyo	drates,	protein	ı, lipids,
CO4         Abie to explain different types of food additives with examples and judge its value in real life.           CO5         Analyze the importance of food safety and food related physical, chemical and biological hazards.           10. Unit wise detailed content         Number of lectures = 08         Title of the unit: GOVERNMENTAL REGULATIONS           Unit-1         Number of lectures = 08         Title of the unit: GOVERNMENTAL REGULATIONS           Unit-2         Number of lectures = 08         Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS           Carbohydrates, Proteins, Fats and oils, Vitamins and Minerals.         Init-3         Number of lectures = 08           Unit-3         Number of lectures = 08         Title of the unit: FOOD PROCESSING TECHNIQUES           Common unit operations, Food deterioration and their control; Heat preservation and processing. Cold preservation and processing Food dehydration, Foc concentration & food packaging.           Unit-4         Number of lectures = 08         Title of the unit: FOOD ADDITIVES           Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorin agents.           Unit-5         Number of lectures = 08         Title of the unit: FOOD SAFETY, RISKS AND HAZARDS           Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety. Chemical hazards asociated with food Prevention methods from food born disea	CO3	Describe the principles in f	ood processing techniques and differentiate foo	d preservatior	n meth	ods like	heat I	oreserv	ation a	nd cold
10. Unit wise detailed content       Number of lectures = 08       Title of the unit: GOVERNMENTAL REGULATIONS         Introduction, Food laws and standards: Indian food safety laws and standards; Quality and safety assurance in food industry; BIS Laboratory Services and Certification I BIS.         Unit-2       Number of lectures = 08       Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS         Carbohydrates, Proteins, Fast and oils, Vitamins and Minerals.       Inte of the unit: FOOD PROCESSING TECHNIQUES         Common unit operations, Food deterioration and their control; Heat preservation and processing, Cold preservation and processing Food dehydration, Foo concentration & Food paterioration and their control; Heat preservation and processing. Cold preservation agents, Sweetening agents & Flavorin agents.         Unit-3       Number of lectures = 08       Title of the unit: FOOD DADTIVES         Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorin agents.         Unit-5       Number of lectures = 08       Title of the unit: FOOD SAFETY, RISKS AND HAZARDS         Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety. Chemical hazards associated with food revention methods from food born disease.         11. CO-PO mapping       Cos       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7       CO1       Understanding of Indian food law an			of food additives with examples and judge its value	in real life.						
Unit-1         Number of lectures = 08         Title of the unit: GOVERNMENTAL REGULATIONS           Introduction, Food laws and standards: Indian food safety laws and standards; Quality and safety assurance in food industry: BIS Laboratory Services and Certification I BIS.           Unit-2         Number of lectures = 08         Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS           Carbohydrates, Proteins, Fats and oils, Vitamins and Minerals.         Unit-3         Number of lectures = 08         Title of the unit: FOOD PROCESSING TECHNIQUES           Common unit operations, Food deterioration and their control: Heat preservation and processing. Cold preservation and processing Food dehydration, Foot concentration & food packaging.         Unit-4         Number of lectures = 08         Title of the unit: FOOD ADDITIVES           Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents agents.         Unit-5         Number of lectures = 08         Title of the unit: FOOD SAFETY, RISKS AND HAZARDS           Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food prevention methods from food born disease.         11.0 -PO mapping         2         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3 </td <td>CO5</td> <td>Analyze the importance of foc</td> <td>d safety and food related physical, chemical and bio</td> <td>ological hazards</td> <td><b>.</b></td> <td></td> <td></td> <td></td> <td></td> <td></td>	CO5	Analyze the importance of foc	d safety and food related physical, chemical and bio	ological hazards	<b>.</b>					
Introduction, Food laws and standards: Indian food safety laws and standards; Quality and safety assurance in food industry; BIS Laboratory Services and Certification I         BIS.       Unit-2       Number of lectures =08       Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS         Carbohydrates, Proteins, Fats and oils, Vitamins and Minerals.       Number of lectures =08       Title of the unit: FOOD PROCESSING TECHNIQUES         Common unit operations, Food deterioration and their control; Heat preservation and processing, Cold preservation and processing. Food dehydration, Foc concentration & food packaging.       Number of lectures = 08       Title of the unit: FOOD ADDITIVES         Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorin agents.       Number of lectures = 08       Title of the unit: FOOD SAFETY, RISKS AND HAZARDS         Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease.       11. CO-PO mapping       P01       P02       P03       P04       P05       P06       P07         CO1       Understanding of Indian food sandards, value of quality assurance and safety assurance       3       2       2       3       3       3       3         CO2       Contenticles in food processing techniques and ijudge its value in real life.       3       2       2<	10. Unit wise detailed cont	ent								
bis. Unit-2 Number of lectures =08 Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS Carbohydrates, Proteins, Fats and olis, Vitamins and Minerals. Unit-3 Number of lectures = 08 Title of the unit: FOOD PROCESSING TECHNIQUES Common unit operations, Food deterioration and their control; Heat preservation and processing, Cold preservation and processing Food dehydration, Food concentration & food packaging. Unit-4 Number of lectures = 08 Title of the unit: FOOD ADDITIVES Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorir agents. Unit-5 Number of lectures = 08 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease. 11. CO-PO mapping COS Mathematical Structure, properties and argue importance of food components, including 3 2 3 3 2 3 3 3 3 CO2 Comprehension of chemical structure, properties and argue importance of food components, including 3 2 2 2 3 3 3 3 3 CO3 heat preservation and cold preservation, food packaging CO4 blue to explain different types of food additives with examples and judge its value in real life. 3 2 2 2 3 3 3 3 3 CO4 Able to explain different types of food additives with examples and judge its value in real life. 3 Leff description of self-learning <i>Chemistry</i> . Average contribution, 1 Low contribution 12. Brief description of self-learning <i>Chemistry</i> . 13. http://www.basicknowledge101.com/pdf/Food%20chemistry.basics/ 3 https://www.cabdirect.org/cabdirect/abstract/19710406009 4. https://www.cabdirect.org/cabdirect/abstract/19710406009 4. https://www.cabdirect.org/cabdirect/abstract/19710406009 4. https://www.cabdirect.org/cabdirect/abstract/19710406009 4. https://www.cabdirect.org/cabdirect/abstract/19710406009 4. https://wwww.cabdirect.o	Unit-1	Number of lectures = 08	Title of the unit: GOVERNMENTAL REGULATION	S						
Unit-2       Number of lectures =08       Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS         Carbohydrates, Proteins, Fats and oils, Vitamins and Minerals.       Number of lectures = 08       Title of the unit: FOOD PROCESSING TECHNIQUES         Common unit operations, Food deterioration and their control; Heat preservation and processing. Cold preservation and processing Food dehydration, Foo concentration & food packaging.       Number of lectures = 08       Title of the unit: FOOD ADDITIVES         Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorir agents.       Number of lectures = 08       Title of the unit: FOOD SAFETY, RISKS AND HAZARDS         Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Provemption methods from food barn disease.       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO1       Understanding of Indian food law and food standards, value of quality assurance and safety assurance       3       2       3       3       3       3         CO2       Coarprehension of chemical structure, properties and argue importance of food components, including all preservation and coid preservation, food packaging       3       2       2       3       3       3         CO2       Coarprehension of chemical structure, properties and argue importance of food		standards: Indian food safety	laws and standards; Quality and safety assurance in	food industry;	BIS La	borator	y Servic	es and	Certifica	ation by
Carbohydrates, Proteins, Fats and oils, Vitamins and Minerals.         Unit-3       Number of lectures = 08       Title of the unit: FOOD PROCESSING TECHNIQUES         Common unit operations, Food deterioration and their control; Heat preservation and processing, Cold preservation and processing Food dehydration, Foo concentration & food packaging.         Unit-4       Number of lectures = 08       Title of the unit: FOOD ADDITIVES         Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorin agents.         Unit-5       Number of lectures = 08       Title of the unit: FOOD SAFETY, RISKS AND HAZARDS         Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease.         11. CO-PO mapping         CO1       Understanding of Indian food law and food standards, value of quality assurance and safety assurance       3       2       3       3       3         CO2       Comprehension of chemical structure, properties and argue importance of food components, including a z       2       3       3       3       3       3       3       3       3       3       3       2       2										
Unit:3       Number of lectures = 08       Title of the unit: FOOD PROCESSING TECHNIQUES         Common unit operations, Food deterioration and their control; Heat preservation and processing, Cold preservation and processing Food dehydration, Food concentration & food packaging.         Unit:4       Number of lectures = 08       Title of the unit: FOOD ADDITIVES         Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorin agents.         Unit:5       Number of lectures = 08       Title of the unit: FOOD SAFETY, RISKS AND HAZARDS         Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food prevention methods from food born disease.       11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO1       Understanding of Indian food law and food standards, value of quality assurance and safety assurance       3       2       3       3       3         CO3       Comprehension of chemical structure, properties and argue importance of food components, including a 2       2       3       3       3         CO3       Describe the principles in food processing techniques and judge its value in real life.       3       2       2       3       3       3       3 <td></td> <td></td> <td></td> <td>HEIR NUTRITI</td> <td>/e aspe</td> <td></td> <td></td> <td></td> <td></td> <td></td>				HEIR NUTRITI	/e aspe					
Common unit operations, Food deterioration and their control; Heat preservation and processing, Cold preservation and processing Food dehydration, Foc         Unit-4       Number of lectures = 08       Title of the unit: FOOD ADDITIVES         Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorir agents.         Unit-5       Number of lectures = 08       Title of the unit: FOOD SAFETY, RISKS AND HAZARDS         Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease.         11. CO-PO mapping       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO1       Understanding of Indian food law and food standards, value of quality assurance and safety assurance       3       2       3       3       3         CO2       Comprehension of chemical structure, properties and argue importance of food components, including a 2       2       3       3       3         CO3       Describe the principles in food processing techniques and differentiate food preservation methods like a 2       2       2       3       3       3         CO4       Able to explain different types of food additives with examples and judge its value in real life.       3       2       2       2       3	,									
Concentration & food packaging.       Number of lectures = 08       Title of the unit: FOOD ADDITIVES         Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavoring agents.         Unit 5       Number of lectures = 08       Title of the unit: FOOD SAFETY, RISKS AND HAZARDS         Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food prevention methods from food born disease.         11. CO-PO mapping       COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO1       Understanding of Indian food law and food standards, value of quality assurance and safety assurance       3       2       3       2       3       3       3         CO2       Comprehension of chemical structure, properties and argue importance of food components, including as the preservation and cold preservation, food packaging       3       2       2       2       3       3       3         CO3       heat preservation and cold preservation, food packaging       3       2       2       2       3       3       3         CO4       Able to explain different types of food additives with examples and judge its value in real life.       3       2       2       3       3 <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>				-						
Unit-4       Number of lectures = 08       Title of the unit: FOOD ADDITIVES         Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorin agents.         Unit-5       Number of lectures = 08       Title of the unit: FOOD SAFETY, RISKS AND HAZARDS         Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease.         11. CO-PO mapping       COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO1       Understanding of Indian food law and food standards, value of quality assurance and safety assurance       3       2       3       3       3         CO2       Comprehension of chemical structure, properties and argue importance of food components, including acribohydrates, protein, lipids, vitamins and minerals.       3       2       2       3       3       3         CO3       Describe the principles in food processing techniques and judge its value in real life.       3       2       2       2       3       3       3         CO4       Able to explain different types of food additives with examples and judge its value in real life.       3       2       2       2       3       3       3			control; Heat preservation and processing, Col	d preservation	n and	process	ing Foo	od deh	ydratior	n, Food
Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorir agents. Unit-5 Unit-5 Unit-5 Unit-5 Unit-5 Unit-5 Unit-5 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease. 11. CO-PO mapping CO1 Understanding of Indian food law and food standards, value of quality assurance and safety assurance CO1 Understanding of Indian food law and food standards, value of quality assurance and safety assurance CO2 Comprehension of chemical structure, properties and argue importance of food components, including CO2 Comprehension of chemical structure, properties and argue importance of food components, including CO3 Co2 Comprehension of chemical structure, properties and argue importance of food components, including CO3 Co3 Describe the principles in food processing techniques and differentiate food preservation methods like heat preservation and cold preservation, food packaging CO4 Able to explain different types of food additives with examples and judge its value in real life. CO5 Analyze the importance of food safety and food related physical, chemical and biological hazards. CO3 Co5 Analyze the importance of food safety and food related physical, chemical and biological hazards. CO5 Analyze the importance of sold startar() PO0/PO0/PO0/PO0/PO0/PO0/PO0/PO0/PO0/PO0/			Title of the unit: FOOD ADDITIVES							
Agents.       Number of lectures = 08       Title of the unit: FOOD SAFETY, RISKS AND HAZARDS         Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease.         11. CO-PO mapping       COS       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO1       Understanding of Indian food law and food standards, value of quality assurance of food components, including a       2       3       2       3				ng agents, Colo	uring a	gents, S	weeten	ing age	nts & Fl	lavoring
Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food         Prevention methods from food born disease.         11. CO-PO mapping         CO1       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO1       Understanding of Indian food law and food standards, value of quality assurance and safety assurance       3       2       3       2       3       2       3       2       2       3       2       2       3       2       2       3       3       2       2       3       3       2       2       3       3       2       2       3       3       2       2       3       3       2       2       3       3       2       2       2       3       3										

1. Name of the Department	nt: CHEMISTRY									
2. Course Name	DAIRY CHEMISTRY			L		1	г		Р	
3. Course Code	CH311			3			1		0	
4. Type of Course (use tick	( mark)			Core ( )		DE	(√)		FC (	)
5. Pre-requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks)	Even ( V )	Odd (		Either		) E	very Se	-
7. Total Number of Lectur	es, Tutorials, Practicals		i							
Lect	ures = 30	Tutorials = 10				Practic	al = Nil			
8. COURSE OBJECTIVES: TO	o introduce students to an un	derstanding of the chemistry of milk	constituents	. Milk and var	ous da	airy prod	ducts a	re discu	issed fr	om the
perspective of the chemical,	physical and biological change	s that occur during processing.								
9. COURSE OUTCOMES (CO	<u> </u>									
After the successful course of	completion, learners will devel	op following attributes:								
COURSE OUTCOME (CO)		ATT	RIBUTES							
C01	Students will be able to descri	be the composition of milk, identify the	e approximat	e content of ind	lividua	l types p	resent			
CO2	Students will integrate their k	nowledge of food chemistry and descri	be physicoch	emical characte	ristics	of the m	nain cor	nponen	ts.	
СОЗ	Student will be able to explain processing steps involved.	how dairy products (such as fluid milk	, yogurt, butt	er, powder, che	eese) a	re made	and th	e key fu	inctions	of the
CO4	Student will be able explain ar the adulteration.	nd apply the processing techniques to p	produce milk	products such a	s butte	er, crear	n, ghee	etc. an	d also d	etect
CO5	Students will integrate their ki	nowledge of food chemistry to produce	e fermented r	nilk products su	ıch as i	ice-crea	ns milk	powde	r etc.	
10. Unit wise detailed con	tent									
Unit-1	Number of lectures = 08	Title of the unit: INTRODUCTION								
Definition, Composition, Mil	k lipids, Milk proteins, vitamins	and minerals. Factors affecting the co	mposition of	milk, adulteran	ts, pres	servative	es.			
Unit-2	Number of lectures =08	Title of the unit: PROPERTIES OF MI	LK							
Flavour and aroma, acidity, s	specific gravity, viscosity and co	nductivity. Estimation of fat, acidity an	nd total solids	in milk.						
Unit-3	Number of lectures = 08	Title of the unit: PROCESSING OF N	1ILK							
Effect of heat on milk, chen	nical changes taking place in m	ilk due to processing, sterilization, ho	mogenizatior	n and pasteuriz	ation, v	vacuum	pasteu	rization	and Ul	tra high
temperature pasteurization.										
Unit-4	Number of lectures = 08	Title of the unit: MILK PRODUCTS								
		definition, composition, theory of cl	nurning, desi-	-butter, salted	butter	. Ghee;	major (	constitu	ients, c	ommon
adulterants and their detect Unit-5	Number of lectures = 08	Title of the unit: FERMENTAED MIL								
		5. Composition, types, manufactures of		stabilizers, emi	lsifiers	and th	eir role.	Milk p	owder.	process
of making milk powder.			··· · · ,			,		r	,	
11. CO-PO mapping										
COs		Attributes		PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1 Students will be a types present	ble to describe the composition	on of milk, identify the approximate of	content of in	dividual 1	1	1	1	2	3	3
CO2		nemistry and describe physicochemical	characteristi	cs of 2	1	1	1	3	2	3
the main compone										
made and the key	functions of the processing ste			3	1	1	1	2	3	3
cream, ghee etc. a	nd also detect the adulteration			1	1	1	1	2	2	2
CO5 Creams milk powd	_	nemistry to produce fermented milk pr	oducts such a	as ice-	1	1	1	2	2	2
	3 Strong	g contribution, 2 Average contribution	, 1 Low cont	ribution						
	If-learning / E-learning compor									
	itube.com/watch?v=S4brYhScY									
		es_of_milk_dairy_and_food_engineerir	ng.pdf							
	itube.com/watch?v=iAaRs4vM8 itube.com/watch?v=QvSw68wJ									
13. Books recommended:		μųν								
	ry-K.Bagavathi Sundari MJP Pub	lishers Chennai, 2006.								
	y technology - Robert Jenness									
-	lucts - Rangappa and Acharya, I									
	Dairy chemistry - Wond. F.P. S	0								
	Technology - Sukumar De. – Ox									
<ol><li>Applied chemistr</li></ol>	y for home science & allied scie	nce - 1.Jacob, Micmillan.								

1. Name of the	Departmen	t: CHEMISTRY										
2. Course Name	e	PROJECT TRAINING (3 MON	THS)			L		1	Г		Р	
3. Course Code		CH312				0		(	)		0	
4. Type of Cour	rse (use tick	mark)				Core ( √ )		DE	()		FC (	)
5. Pre-requisite	e (if any)	10+2 with Chemistry	6.	Frequency (use tick marks)	Even (√)	Odd ( )	)	Either	Sem (	) E	very Sei	m()
7. Total Numbe	er of Lecture	es, Tutorials, Practicals										
	Lectu	ires = 30		Tutorials = 10				Practic	al = Nil			
8. COURSE OBJE	B. COURSE OBJECTIVES: The main objective is to enhance the technical skills and to provide students industrial exposure.											
9. COURSE OUTCOMES (CO):												
After the success	ful course c	ompletion, learners will devel	op foll	owing attributes:								
COURSE OUTO	COME (CO)			AT	TRIBUTES							
CO1		Hands on training										
CO2		Integrate classroom theory wi	th labo	pratory scale practice.								
CO3		Understanding professional et	hics of	f industry and code of conduct.								
10. CO-PO mapp	ing											
COs			Attribu	utes		PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1 Hands of	on training					3	2	3	2	3	3	3
CO2 Integra	O2 Integrate classroom theory with laboratory scale practice.							2	3	3	3	3
CO3 Unders	tanding pro	fessional ethics of industry and	code	of conduct.		3	2	2	2	3	3	3
		3 Strong	g contr	ribution, 2 Average contributio	on , 1 Low cont	tribution						

1. Name of the Departmen	1. Name of the Department: CHEMISTRY											
2. Course Name	ORAL PRESENTATION	L	т	Р								
3. Course Code	CH313	0	0	8								