

#### Integral University, Lucknow Department of Chemistry

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

#### Program: B.Sc. (Physics, Chemistry & Mathematics)

			Turne of	Per h	Period hr/week	/sem		Eval	uation So	heme	Sub						Attri	butes		
S. No.	Course	Course Title	Paper				(	CA				Cradit	Total	Employ	Entropro	Skill	Gondor	Environment	Human	Professional
	code		rapei	L	т	Р	UE	ТА	Total	ESE	Tot.	Credit	Credits	bility	neurship	Develop ment	Equality	& Sustainability	Value	Ethics
THEO	RIES																			
1.	LN104	Essential Professional Communication	Foundation	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~			~	~
2.	PY106	Mechanics and Wave Motion	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
3.	CH117	General Chemistry-I	Core	2	1	0	40	20	60	40	100	2:1:0	3	~		~				
4.	MT121	Algebra and Trigonometry	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
5.	MT122	Calculus	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
PRAC	TICALS																			
6.	PY107	Mechanics Lab	Core	0	0	6	40	20	60	40	100	0:0:3	3			$\checkmark$				
7.	CH118	Chemistry Practical-I	Core	0	0	4	40	20	60	40	100	0:0:2	2	$\checkmark$	✓	$\checkmark$				
			Total	14	5	10	280	140	420	280	700	14:5:5	24							

#### Program: B.Sc. (Physics, Chemistry & Mathematics)

Period Attributes **Evaluation Scheme** Per hr/week/sem Sub Type of Total Course S. No. **Course Title** CA Skill Environment Gender Human Professional Paper . Credit Employa Entrepre Credits code L Т Ρ Total ESE Develop ጲ Tot. UE ΤА bility neurship Ethics Equality Value Sustainability ment THEORIES Fundamentals of Environmental 1. ES115 ✓ ✓ ✓ Foundation 3 1 0 40 20 60 40 100 3:1:0 4 Science 2. 3 1 0 40 20 40 100 4 ✓ ✓ PY108 Physical Optics and Lasers 60 3:1:0 Core ✓ ✓ 3. CH119 General Chemistry-II 3 1 0 40 20 40 100 4 Core 60 3:1:0 ✓ ✓ 4. MT123 Vector Analysis and Geometry 3 0 40 20 60 40 100 3:1:0 4 Core 1 ✓ ✓ 5. MT124 3 1 0 40 20 60 40 100 4 Differential Equations Core 3:1:0 PRACTICALS 6. PY109 Optics Lab Core 0 0 40 20 60 40 100 0:0:2 2 ✓ 4 7. CH120 Chemistry Practical-II Core 0 0 4 40 20 60 40 100 0:0:2 2  $\checkmark$ √ ✓ 15 8 280 140 420 420 700 15:5:4 24 Total 5

Semester: Second

#### Semester: First



Integral University, Lucknow Department of Chemistry

#### Study and Evaluation Scheme

# Program: B.Sc. (Physics, Chemistry & Mathematics)

			Turne	Perk	Period nr/week	/sem		Eval	uation So	heme	Sub									
S. No.	Course	Course Title	Paper				C	CA				Credit	Total Crodite	Emplova	Entrepre	Skill	Gender	Environment	Human	Professional
	coue			L	т	Р	UE	TA	Total	ESE	Tot.		creats	bility	neurship	Develop ment	Equality	& Sustainability	Value	Ethics
THEO	RIES	•																		
1.	PY201	Circuit Fundamentals & Basic Electronics	Core	3	1	0	40	20	60	40	100	3:1:0	4			$\checkmark$				
2.	PY202	Kinetic Theory & Thermodynamics	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		$\checkmark$				
3.	CH221	Inorganic and Physical Chemistry-I	Core	2	1	0	40	20	60	40	100	2:1:0	3	~						
4.	CH222	Organic and Physical Chemistry-I	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		$\checkmark$				
5.	MT211	Numerical Computing	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		✓				
PRAC	TICALS																			
6.	PY203	Electronics and Thermal Physics Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2			$\checkmark$				
7.	CH223	Chemistry Practical-III	Core	0	0	4	40	20	60	40	100	0:0:2	2	✓		$\checkmark$				
8.	MT212	Numerical Computing Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2	✓		✓				
			Total	14	5	12	320	160	480	320	800	14:5:6	25							

#### **Program: B.Sc. (Physics, Chemistry & Mathematics)**

Semester: Fourth

			Turns of	Per l	Period nr/week	/sem		Eval	uation So	heme	Sub						Attri	butes		
S. No.	Course	Course Title	Paper				C	CA				Credit	Total	Employa	Entrenre	Skill	Gender	Environment	Human	Professional
	code		Tuper	L	т	Р	UE	ТА	Total	ESE	Tot.	create	Credits	bility	neurship	Develop ment	Equality	& Sustainability	Value	Ethics
THEO	RIES																			
1.	PY204	Electricity & Magnetism	Core	3	1	0	40	20	60	40	100	3:1:0	4			~				
2.	CH224	Inorganic and Physical Chemistry-II	Core	3	1	0	40	20	60	40	100	3:1:0	4			~				
3.	CH225	Organic and Physical Chemistry-II	Core	3	1	0	40	20	60	40	100	3:1:0	4	✓		~				
4.	MT213	Tensor Analysis	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
5.	MT214	Abstract Algebra	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
PRAC	TICALS																			
6.	PY205	Electricity & Magnetism Lab	Core	0	0	6	40	20	60	40	100	0:0:3	3	~		~				
7.	CH226	Chemistry Practical-IV	Core	0	0	4	40	20	60	40	100	0:0:2	2	✓	$\checkmark$	~				
			Total	15	5	10	280	140	420	280	700	15:5:5	25							

Semester: Third



Integral University, Lucknow Department of Chemistry

#### Study and Evaluation Scheme

#### Program: B.Sc. (PCM), Group (Physics & Mathematics)

			Turne of	Per h	Period nr/week/	/sem		Eval	uation So	heme	Sub			Skill				butes		
S. No.	Course code	Course Title	Paper	L	т	Ρ	UE	CA TA	Total	ESE	Tot.	Credit	Total Credits	Employa bility	Entrepre neurship	Skill Develop ment	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
THEO	RIES																			
1.	PY301	Elements of Quantum Mechanics, Atomic & Molecular Spectra	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
2.	PY302	Classical Mechanics, Relativity & Statistical Physics	Core	2	1	0	40	20	60	40	100	2:1:0	3			~				
3.	PY303	Solid State, Nuclear & Particle Physics	Core	2	1	0	40	20	60	40	100	2:1:0	3	~		~				
4.	MT301	Advanced Calculus	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
5.	MT302	Mathematical Statistics	Core	2	1	0	40	20	60	40	100	2:1:0	3	~		~				
6.	MT303	Number Theory	Core	2	1	0	40	20	60	40	100	2:1:0	3	~		~				
PRAC	TICALS																			
7.	PY304	Advance Electricity & Magnetism Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2			✓				
8.	VT304	Statistical Techniques Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2	$\checkmark$		$\checkmark$				
			Tota	14	6	8	320	160	480	320	800	14:6:4	24							
Due	D.	So (DCM) Crown (Dhasi	~ <u>0</u> M	41														6		tom Cirth

#### Program: B.Sc. (PCM), Group (Physics & Mathematics)

Semester: Sixth

			Turns of	Per	Period hr/week	/sem		Eva	uation So	heme	Sub						Attri	butes		
S. No.	Course	Course Title	Type of Paper				0	CA				Cradit	Total	Employa	Entropro	Skill	Gender	Environment	Human	Professional
	code		raper	L	т	Р	UE	ТА	Total	ESE	Tot.	credit	Credits	bility	neurship	Develop ment	Equality	& Sustainability	Value	Ethics
THEC	RIES					_		-	_	-			-			-			-	
1.	PY305	Applied Electronics	Core	3	1	0	40	20	60	40	100	3:1:0	4			$\checkmark$				
2	PY307	Mathematical Methods in Physics	Elective	3	1	0	40	20	60	40	100	2.1.0	4	~		~				
Ζ.	PY308	Advanced Solid-State Physics	Elective	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
2	MT307	Basic Mathematical Modeling	Elective	3	1	0	40	20	60	40	100	2.1.0	4	~		~				
3.	MT308	Linear Programming	Elective	3	1	0	40	20	60	40	100	3:1:0	4	✓		~				
4.	MT305	Statics & Dynamics	Core	3	1	0	40	20	60	40	100	3:1:0	4	✓		~				
5.	MT306	Analysis	Core	3	1	0	40	20	60	40	100	3:1:0	4	✓		~				
PRO	ECT																			
6.	PY309	UG Physics Project	Core	0	0	8	00	00	00	200	200	0:0:4	4	$\checkmark$		$\checkmark$				
			Total	15	5	8	200	100	300	400	700	15:5:4	24							

Semester: Fifth



Integral University, Lucknow Department of Chemistry

#### Study and Evaluation Scheme

# Program: B.Sc. (PCM), Group (Chemistry & Mathematics)

			Turns of	Perl	Period nr/week	/sem		Eval	uation So	heme	Sub						Attri	butes		
S. No.	Course code	Course Title	Paper	L	т	Ρ	UE	TA	Total	ESE	Tot.	Credit	Total Credits	Employa bility	Entrepre neurship	Skill Develop ment	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
THEO	RIES																			•
1.	CH314	Advance Inorganic Chemistry	Core	3	1	0	40	20	60	40	100	3:1:0	4	~						
2.	CH315	Advance Organic Chemistry	Core	2	1	0	40	20	60	40	100	2:1:0	3	~	~					
3.	CH319	Basics of Chromatographic Techniques	Core	2	1	0	40	20	60	40	100	2:1:0	3	~	~	~		~		
4.	MT301	Advanced Calculus	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
5.	MT302	Mathematical Statistics	Core	2	1	0	40	20	60	40	100	2:1:0	3	~		~				
6.	MT303	Number Theory	Core	2	1	0	40	20	60	40	100	2:1:0	3	~		~				
PRAC	TICALS																			
7.	CH316	Chemistry Practical-V	Core	0	0	4	40	20	60	40	100	0:0:2	2	$\checkmark$	✓	~			$\checkmark$	~
8.	MT304	Statistical Techniques Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2	$\checkmark$		~				
			Total	14	6	8	320	160	480	320	800	14:6:4	24							

#### Program: B.Sc. (PCM), Group (Chemistry & Mathematics)

Semester: Sixth

	S. No. Course Course Title		Turno of	Per l	Period hr/week	/sem		Eval	uation So	heme	Sub						Attri	butes		
S. No.	Course code	Course Title	Paper	L	т	Ρ	UE	TA	Total	ESE	Tot.	Credit	Total Credits	Employa bility	Entrepre neurship	Skill Develop ment	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
THEO	RIES												•							
1.	CH308	Spectroscopic Techniques	Core	3	1	0	40	20	60	40	100	3:1:0	4	✓	~	$\checkmark$				
2	CH309	Chemical Process Industry	Elective	3	1	0	40	20	60	40	100	3.1.0	Д	✓	✓	✓				✓
2.	CH317	Chemistry of Polymers	Elective	3	1	0	40	20	60	40	100	5.1.0	Ţ.	$\checkmark$	✓	$\checkmark$				√
2	MT307	Basic Mathematical Modeling	Elective	3	1	0	40	20	60	40	100	2.1.0	4	~		✓				
з.	MT308	Linear Programming	Elective	3	1	0	40	20	60	40	100	3.1.0	4	~		✓				
4.	MT305	Statics & Dynamics	Core	3	1	0	40	20	60	40	100	3:1:0	4	✓		✓				
5.	MT306	Analysis	Core	3	1	0	40	20	60	40	100	3:1:0	4	✓		✓				
PROJ	ЕСТ												•							
6.	CH318	UG Chemistry Project	Core	0	0	8	00	00	00	200	200	0:0:4	4	$\checkmark$	✓	$\checkmark$				
			Total	15	5	8	200	100	300	400	700	15:5:4	24							

Semester: Fifth



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

#### Program: B.Sc. (PCM), Group (Physics & Chemistry)

S. No. Cour			Turns of	Perl	Period hr/week	/sem		Eval	uation So	heme	Sub						Attri	butes		
S. No.	Course code	Course Title	Paper	L	т	Ρ	UE	A TA	Total	ESE	Tot.	Credit	Total Credits	Employa bility	Entrepre neurship	Skill Develop ment	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
THEO	RIES																			
1.	PY301	Elements of Quantum Mechanics, Atomic & Molecular Spectra	Core	3	1	0	40	20	60	40	100	3:1:0	4	~		~				
2.	PY302	Classical Mechanics, Relativity & Statistical Physics	Core	2	1	0	40	20	60	40	100	2:1:0	3			~				
3.	PY303	Solid State, Nuclear & Particle Physics	Core	2	1	0	40	20	60	40	100	2:1:0	3			~				
4.	CH314	Advance Inorganic Chemistry	Core	3	1	0	40	20	60	40	100	3:1:0	4	✓						
5.	CH315	Advance Organic Chemistry	Core	2	1	0	40	20	60	40	100	2:1:0	3	✓	~					
6.	CH319	Basics of Chromatographic Techniques	Core	2	1	0	40	20	60	40	100	2:1:0	3	~	~	~		~		
PRAC	TICALS																			
7.	PY304	Advance Electricity & Magnetism Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2			✓				
8.	CH316	Chemistry Practical-V	Core	0	0	4	40	20	60	40	100	0:0:2	2	✓	$\checkmark$	✓			~	~
			Tota	14	6	8	320	160	480	320	800	14:6:4	24							

#### Program: B.Sc. (PCM), Group (Physics & Chemistry)

Semester: Sixth

			Turne of	Perl	Period nr/week	/sem		Eval	uation So	heme	Sub						Attri	butes		
S. No.	Course	Course Title	Paper		_	,	0	CA .				Credit	Total Credits	Employa	Entrepre	Skill	Gender	Environment	Human	Professional
	couc			L	I	Р	UE	ТА	Iotal	ESE	Tot.		cicuits	bility	neurship	Develop ment	Equality	& Sustainability	Value	Ethics
THEC	RIES																			
1.	PY305	Applied Electronics	Core	3	1	0	40	20	60	40	100	3:1:0	4			~				
2.	PY307	Mathematical Methods in Physics	Elective	3	1	0	40	20	60	40	100	3:1:0	4	~		$\checkmark$				
	PY308	Advanced Solid-State Physics	Elective	3	1	0	40	20	60	40	100			~		~				
2	CH309	Chemical Process Industry	Elective	3	1	0	40	20	60	40	100	2.1.0	1	✓	✓	~				
5.	CH317	Chemistry of Polymers	Elective	3	1	0	40	20	60	40	100	5.1.0	4	$\checkmark$	✓	~				
4.	CH310/PY306	Fundamentals of Food Chemistry /Physics of Materials	Core	3	1	0	40	20	60	40	100	3:1:0	4	~	~	~			~	
PROJ	ECT																			
5.	PY 309/CH318	UG Physics Project/UG Chemistry Project	Core	0	0	8	00	00	00	200	200	0:0:4	4	~	~	$\checkmark$				
			Total	15	5	8	200	100	300	400	700	15:5:4	24							

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

1. Nam	ne of the Departmer	It: LANGUAGES				Γ						
2. Cour	rse Name	ESSENTIAL PROFESSIONAL C	сомм	IUNICATION		L		<u> </u>	<u>í                                    </u>		Р	
3. Cour	rse Code	LN104				3		1	L .		0	
4. Type	e of Course (use tick	mark)		- /	<b>5</b> ( )	Core ()		DE			FC ( √	)
5. Pre-	requisite (if any)	10+2 with Chemistry	6.	Frequency (use tick marks)	Even ( )	Odd (v)		Eithers	sem ( )	) E'	very Sei	m()
7. 101a	I Number of Lecture	ures - 30		Tutorials – 10				Practic	al – Nil			
8. COUF	RSE OBJECTIVES:	1163 - 50		101011013 - 10				riactica	ai — Ivii			
•	Developing the ar	t of communication and learni	ing lan	guage though literature								
•	Knowledge of Pro	fessional, cultural and cross-cu	ultural	communication								
•	Basic concept of s	structural and functional grammer	mar; m	reaning and process of commun	nication, verba	and nonverbal	comm	unicatio	n			
•	Knowledge of rea	ding and comprehension of ge	neral a	and technical articles, precise w	vriting, summa	rizing, abstracti	ng					
•	Basic concepts of	group discussion, organizing se	eminai	rs and conferences								
9. COUF	RSF OUTCOMES (CO											
After the	e successful course c	ompletion, learners will devel	op foll	lowing attributes:								
COUR	SE OUTCOME (CO)			AT	TRIBUTES							
	CO1	Basic Understanding of Comm	nunicat	tion and Professional Communi	ication							
	CO2	Basic knowledge of structural	and fu	Inctional grammar. Learning La	nguage throug	h literature						
	CO3	Basic tools of communication	and in	nprovement in communicative	competence							
	CO4	Understanding the basic gram	imar a	nd basic structure of language								
	CO5	Enhancement of writing skills	in Eng	lish i.e. writing application, rep	ort and various							
10. Uni	it wise detailed con	tent										
Unit-1		Number of lectures = 08	Titl	e of the unit:								
Professio	onal Communication	: Its Meaning and Importance,	, Essen	itials of Effective Communication	on, Barriers to	Effective Comm	nunicati	on. The	Cross C	ultural	Dimen	sions of
linit 2		Number of lectures -08	Title	o of the unit:								
Interner	sonal Communicatio	n: Culture- Definition and Type	es Cor	munication and Culture inclur	ling Cross Cultu	Iral Communica	ation					
Unit-3		Number of lectures = 08	Title	e of the unit:								
Written	Communication: Let	ter Writing- Informal and Forr.	mal - L	etters of Enquiry, Letters of co	omplaint, Resp	onse to compla	ints an	d enqui	ries, Sel	f Explo	ration t	through
descripti	on	Number of lestures - 09	Tiel	e ef the unit.								
Gramma	r through Workshe	ets: Situational activities and	modul	s of the unit:	vrticles Modals	Active and P	accivo	Subject	Vorb A	groom	ant Dir	ect and
Indirect S	Speech, Degrees of a	comparison.	mouur	contracto of opeccel, relises, P			ussive,	Jubjeet		Breening	.int, Dir	
Unit-5		Number of lectures = 08	Title	e of the unit:								
Gramma	r through Workshee	ts Continued: Sentences: Simp	ole, Co	mpound, Complex, Declarative	, Assertive, Neg	gative, Interroga	ative, Ex	clamat	ory, Imp	erative		
11. CO-P	O mapping											
COs			Attrib	utes		PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Basic Understandir	ng of Communication and Profe	essiona	al Communication		3	1	1		2	1	1
CO2	Basic knowledge of	f structural and functional gran	nmar.	Learning Language through lite	erature	3	1	1		2	1	1
СОЗ	Basic tools of comr	nunication and improvement in	n com	municative competence		3	1	2		2	1	1
CO4	Understanding the	basic grammar and basic struc	ture o	of language		3	1	2		2	1	1
CO5	Enhancement of w	riting skills in English i.e. writin	ıg appl	ication, report and various		2	1	2		2	1	1
	3 S	trong contribution, 2 Average	contri	bution , 1 Low contribution								
12. Brie	ef description of sel	f-learning / E-learning compor	nent									
13. Boo	ks recommended:											
1.	Wren PC and Mar	tin H, "High School Grammar a	and Co	mposition", S. Chand and Co.								
2.	K. Floyd , "Interpe	ersonal Communication: The W	/hole S	story" (2009), McGraw Hill,								
3.	Greenbaum Sidne	y and Nelson Gerald, "An Intro	oductio	on To English Grammar", Pears	on Swan							
4. ⊑	Raymond Murph	ai English Usage" OUP, 2005	mar"	(2007) Cambridge University P	.000							
э.	naymonu iviu phy	, interneulate Linglish Graffil	indi , I	(2007) cambridge University Pr	C33							

1. Name of the Departme	nt: PHYSICS						-		
2. Course Name	MECHANICS AND WAVE MC	DTION	L		1	-		Р	
3. Course Code	PY106		3		1	L		0	
4. Type of Course (use ticl	k mark)		Core (√	)	DE	()		FC (	)
5. Pre-requisite (if any)	10+2 with Physics	6. Frequency (use tick marks) Even ()	Odd (v	)	Either	Sem ( )	E٧	very Sei	m()
7. Total Number of Lectur	res, Tutorials, Practicals								
Lect	tures = 30	Tutorials = 10			Practic	al = Nil			
8. COURSE OBJECTIVES: T	he purpose of this undergradu	ate course is to impart basic and key knowledge o	f physical che	mistry.	By using	g the prin	cipal o	of phys	sics and
mathematics to obtain qua	ntitative relations which are ve	ry important for higher studies. After successfully c	completion of	course,	the stu	dent will	able e	xplore	subject
into their respective dimens	sions.								
9. COURSE OUTCOMES (CC	):								
After the successful course	completion, learners will devel	op following attributes:							
COURSE OUTCOME (CO)		ATTRIBUTES				· .			
CO1	Grasped the fundamentals o	f different types of frames of references and tra	nsformation I	aws Bot	th Galile	an and L	orent	z and	learned
	conservation laws of energy a	nd linear and angular momentum and apply them to	solve problei	ns.					
CO2	Students will gain an understa	nding of rotation motion and get the knowledge abo	out forces help	o the stu	idents in	their dai	ly life.		
603	Students will gain an understa	nding of gravitational forces and learn the basics of	potentials and	l fields,	central f	orces, an	d Kepl	er's lav	vs
CO4	Students will understand the p	physical characteristics of SHM and obtaining solutio	n of the oscill	ator usir	ng differ	ential equ	ation	s.	
CO5	Students will gain basic knowl	edge of wave motion and ability to outline the physi	cal properties	of wave	e motion	ı <b>.</b>			
10. Unit wise detailed cor									
Unit-1	Number of lectures = 08	Title of the unit: CONSERVATION LAWS							
Inertial reference frame. N	ewton's laws of motion dynar	nics of particle in rectilinear and circular motion c	onservative a	nd non	-conserv	vative for		onserva	ation of
energy, liner momentum an	id angular momentum, collision	in one and two dimensions, cross section.			conserv			511501 00	
Linit-2	Number of lectures =08								
Rotational energy and rotat	tional inertia for simple bodies	the combined translation and rotational and motic	n of a rigid b	ody on l	horizont	al and inc	lined	nlanos	simple
treatment of the motions of	f a top. Relations between elast	ic constants, bending of beams and torsion of cylind	er.	Suy on i	101120110		anneu	plunes,	Simple
Unit-3	Number of lectures = 08	Title of the unit: GRAVITATION							
law of gravitation gravitation	onal field and potential gravita	tional potential energy gravitational field intensity	central forces	two na	article ce	entral for	e nro	hlem r	educed
mass, relative and centre of	mass motion. law of gravitation	n. Kepler's laws, motions of planets and satellites, ge	eo-stationary	atellites	5.			oreni, i	cuuccu
Unit-4	Number of lectures = 08	Title of the unit: OSCILLATIONS							
Simple harmonic motion di	ifferential equation of S H M a	and its solution some examples (mass- spring simple	e nendulum a	nd com	nound n	endulum	h dam	ned os	cillator
Equation of motion and its	solution forced oscillations an	d resonance: solution of differential equation of a f	orced oscillat	or and y	variation	of ampli	tude v	vith fre	allency
and damping.			orecu oscinut		anation	or ampir		vien ne	queries
Unit-5	Number of lectures = 08	Title of the unit: WAVE MOTION							
Classification of waves, exp	pression for a plane progressiv	e and transverse harmonic wave, particle velocity	and acceleration	ation, p	ath diffe	erence an	d pha	ise diff	erence
velocity of transverse wave	in a string, differential equat	ion of wave motion, plane progressive waves in flu	id media. refl	ection o	of waves	. phase c	hange	on ref	lection
superposition, stationary wa	aves, pressure and energy distri	bution, phase and group velocity.	,,			,			
11. CO-PO mapping									
COs		Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Grasped the funda	amentals of different types of f	rames of references and transformation laws Both (	Galilean						
co1 and Lorentz and le	earned conservation laws of en	ergy and linear and angular momentum and apply t	them to 3	1	1		2	1	1
solve problems.		- 0, · · · · · · · · · · · · · · · · · ·							
Students will gair	an understanding of rotatio	n motion and get the knowledge about forces h	elp the				-		
students in their d	laily life.		. 3	1	2		3	1	1
Students will gain	1 an understanding of gravitat	ional forces and learn the basics of potentials and	fields,	4	2		2	4	4
central forces, and	d Kepler's laws		3	1	2		3	1	1
Students will und	erstand the physical characteri	stics of SHM and obtaining solution of the oscillate	or using	1			2	1	
differential equati	ons.		3	1			2	1	
Students will gain	basic knowledge of wave mot	tion and ability to outline the physical properties of	of wave	1			2	1	
motion.			2	1			2	Ŧ	
3 :	Strong contribution, 2 Average	contribution , 1 Low contribution							
12. Brief description of se	If-learning / E-learning compor	nent							
13. Books recommended:									
1. E. M. Purcell, Ed:	"Berkeley Physics Course, Vol.	1, Mechanics" (McGraw- Hill).							
2. R. P. Feymman, F	R. B. Lighton and M Sands; The I	Feymman Lectures in Physics, Vol. 1 (BI Publications,	Bombay, Dell	ni, Calcu	tta, Mac	dras).			
3. J. C. Upadhyay: '	Mechanics (Himalaya Publishing	g House)							
4. D.S. Mathur "Me	chanics" (S. Chand).								

5. P. K. Srivastava: "Mechanics" (New Age International).

1. Nam	e of the Departmer	nt: CHEMISTRY								
2. Cour	rse Name	GENERAL CHEMISTRY - I		L		Т			Р	
3. Cour	rse Code	CH117		2		1			0	
4. Type	e of Course (use tick	mark)		Core ( √ )		DE (	)		FC (	)
5. Pre-	requisite (if any)	10+2	6. Frequency (use tick marks) Even ( )	Odd (√	)	Either S	Sem ( )	E	very Se	m()
7. Tota	I Number of Lecture	es, Tutorials, Practicals								
	Lectu	ures = 30	Tutorials = 10			Practica	al = Nil			
8. COUF	RSE OBJECTIVES: To	learn about simple quantum	mechanical treatments of atoms and molecules, a	tomic structur	es, peri	odic pro	operties	of ele	ments,	various
electroni	c displacement effe	cts in organic compounds, mec	hanisms of organic reactions. States of matters with	i an emphasis c	on the g	aseous	state.			
9. COUR	RSE OUTCOMES (CO	): completion, learners will develo	on following attributor							
	SE OUTCOME (CO)	ompletion, learners will develo								
COOK										
		Explain the atomic structures of	based on quantum mechanics. Can write the electro		on of el	ements.				
	CO2	Evaluate the state of hybridiza	tion geometry of atoms nucleonhiles electronhiles	s and various e	lectron	displace	mont of	fforts		
	<u> </u>	Investigate the mechanisms of	organic reactions, design syntheses of organic mole	ecules.	lection	uispiace	inentei	ilects		
	<u> </u>	Explain various 'gas laws' gove	rning the physical/chemical behaviour of gases.							
10 Uni	it wise detailed con	tent	0 F / /							
Unit-1	it wise detailed con	Number of lectures = 08	Title of the unit: ATOMIC STRUCTURE							
Idea of d	le Broglie matter wa	aves Heisenberg uncertainty n	rinciple atomic orbitals. Schrodinger wave equation	n significance	of W ar	nd W2 r	mantum	numh	ers rad	dial and
angular	wave functions and	d probability distribution curv	res, shapes of s, p, d orbitals. Aufbau and Pauli	exclusion pri	nciples,	Hund's	multip	licity r	ule. Ele	ectronic
configura	ations of the elemen	its.		•						
Unit-2		Number of lectures =08	Title of the unit: PERIODIC PROPERTIES							
Atomic a	ind ionic radii, ioniz	ation energy, electron affinity	and electronegativity definition, effective nuclear of	charge, metho	ds of de	etermina	ation or	evalua	ation, tr	ends ir
periodic	table and applicatio	ns in predicting and explaining	the chemical behavior.							
Unit-3		Number of lectures = 08	Title of the unit: BASIC CONCEPT OF CHEMICAL B		RGANIC	CHEMIS	STRY			
Hybridisa offocts in	ation, tetravalency o	ric reconance hyperconjugatic	es; methane, ethane, ethylene, acetylene and benze	ene, Factors aff	ecting o	covalent	bond; E	lectro	n displa	cement
enects, in	inductive, electronie	Number of lectures = 00		TIONS						
Unit-4	ic and hotorolytic h	and brocking. Typos of roogon	Title of the unit: MECHANISM OF ORGANIC REAC	TIONS		acidorati	ions Bo	activo	intorm	odiator
carbocat	ions carbanions fre	e radicals carbenes arvnes an	d nitrenes (with examples) Assigning formal charge	s in intermedia	ates and	l other i	onic	active	merme	sulates-
Unit-5		Number of lectures = 08	Title of the unit: GASEOUS STATE			. other is				
Postulate	es of kinetic theory of	of gases, deviation from ideal b	ehavior, van der Waals equation of state. Critical Pl	nenomena: PV	isother	ms of re	al gases	, conti	nuity of	f states,
the isoth	erms of van der W	aals equation, relationship bet	ween critical constants and van der Waals consta	nts, the law of	<sup>f</sup> corres	ponding	states,	reduc	ed equa	ation of
state. Pro	oblems Molecular ve	elocities: Root mean square, av	erage and most probable velocities.							
11. CO-P	O mapping									-
COs		/	Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Explain the atomic elements.	structures based on quantum r	nechanics. Can write the electronic configuration of	3	1	1		2	1	1
CO2	Justify the causes c	of periodicity and periodic prop	erties of the different groups of elements.	3	1	1		2	1	1
CO3	Evaluate the state	of hybridization, geometry of a	toms, nucleophiles, electrophiles and various electro	on 3	1	2		2	1	1
CO4	Investigate the me	chanisms of organic reactions.	design syntheses of organic molecules.	3	1	2		2	1	1
005	Evolain various (ga	c lawe' governing the physical/e	themical helpsuider of gasos	2	1	-		-	1	-
		trong contribution 2 Average	nemical behavior of gases.	2	1	2		2	1	1
12 Brid	of description of sel	f-learning / F-learning compon	ent							
1	https://nptel.ac.ir	/content/storage2/nntel_data	3/html/mhrd/ict/text/104101090/lec1.ndf							
2.	https://nptel.ac.ir	n/content/storage2/nptel_data	3/html/mhrd/ict/text/104106096/lec9.pdf							
3.	https://ocw.mit.e	du/high-school/chemistry/exa	m-prep/structure-of-matter/chemical-bonding/							
4.	https://www.you	tube.com/watch?v=ZNo6gfCAg	WE							
5.	https://nptel.ac.ir	n/content/syllabus_pdf/104105	5033.pdf							
13. Bool	ks recommended:									
1.	New Concise Inor	ganic Chemistry by J.D. Lee Edit	tion III Compton Printing Ltd London.							
2.	Principles of Inorg	ganic Chemistry by HR Puri, R. S	harma & S.P. Jauhar, Vishal Publications Jalandhar.							
3.	Organic Chemistr	y, S.M. Mukherji, S.P. Singh and	R.P. Kapoor, Wiley Eastern Ltd. (New Age Internati	onal).						
4.	Modern Organic (	Chemistry, M. K. Jain and S.C. Sl	harma, Vishal Publications Jalandhar.							
5.	Physical Chemistr	y, P.W. Atkins, Oxford Universit	ty Press.							
6.	Principles of Phys	icai Chemistry, B.R. Puri& L.R. S	narma, Shoban Lai Nagin Chand & Cô.							

2. Course Name ACE BOAR NOT TISEONOMETRY  4. T  7  7  7  7  7  7  7  7  7  7  7  7  7	2. Course	of the Departmen											
3. Course Code:  4. Type of Course (in MT224  5. Pre-equality (if any) 5. Pre-equality (if any		e Name	ALGEBRA AND TRIGONOME	TRY	L		-	<u>г – – – – – – – – – – – – – – – – – – –</u>		Р			
4. Type of Course (see tick mark)         EC ( 1)         PE ( 1)         <	3. Course	e Code	MT121		3		-	L		0			
S.P. erequisite (fram)         10-2         6. Frequency (ase tick marks)         Even ( )         Practice	4. Type of	of Course (use tick	mark)		Core ( √ )		DE	()		FC (	)		
1. Total Number of Lectures 1:0         Function         Practical = Nil           a. COURSE OBJECTIVES: The purpose of this undergraduate course is to impart basic and key knowledge of Algebra and Tregometry. By using the principal of applied mathematics to obtain quantitative relations which are very important for higher studies. After successfully completion of course, the student will alse explore subject that their inspectos dimensions.           Part the accessful events counsettion, kenners will develop following attributes:         Executive and interpret Symmetric, Serverspmetric, Ser	5. Pre-rec	quisite (if any)	10+2	6. Frequency (use tick marks) Even ( )	Odd (√	)	Either	Sem ( )	E١	very Se	m ( )		
Lectures - 30         Tutorials - 10         Participation           COUNSE OBJECTIVES: The purpose of this undergraduate course is to impart takes and key involvedge of Algebra and Trigonometry. By using the principal of applications while their respective dimensions.         So CONSE OBJECTIVES: The purpose of this undergraduate course is to impart takes and key involved of algebra and Trigonometry. By using the principal of applications and the principation of course, the student will able explore subject in the principation of the student will able explore subject in the principation of the student will be explore subject in the principation of the student take applications.           COUNSE OUTCOME (CO)         Excluse and interpret Symmetric, Sinew-symmetric, Hermitian and Seev-Hermitian matrices, Elementry operations, Renk of Marits, Linear independence of row and colutions matrices, consistency and inconsistency of inser equations, eigen values and eigen vectors, Cayler takes and the interpret Symmetric, Sinew-symmetric, Intervert Singer operations, Bytechnic Structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           CO3         Explain and interpret Rampe functions and separation into real and imagenary parts, Exponential, direct and inverse trigonometric and consistency of interver Singer approach (cardon Method), biguadratic equations, Bytechnic equations, Bytechnice equations, Bytechnic equations, Bytechnic equations, B	7. Total N	Number of Lecture	es, Tutorials, Practicals										
8. COURSE OBJECTIVES: The purpose of this undergraduate course is in inpurt bask and key knowledge of Algebra and Tregometry. We using the principal of applied matcher respective dimensions.  A prior the accessful course completion of course, the student will able explore subject that their successful is completion of course, the student will able explore subject that their successful is completion of course, the student will able explore subject that their successful is completion of course, the student will able explore subject that their successful is completion of course, the student will able explore subject that the student of the student studes. After successful is completion of course, the student will able explore subject that the student of the student studes.  CO1 Independence of row and columns matrices, consistency and inconsistency of intere equations, eigen values and eigen vectors, Cayley thamitton the dign, solution of calcification of the students, biguaratic equations, and therpret Explores that collectarian of the students.  CO2 Evaluate and interpret Eigen properties, subgroups, cyclic properties, subgroups, cyclic costs and collectarian of the student students.  CO3 Indicate therefore, Complex functions, and separation into real and inagenary parts, taponential, direct and inverse tregometric and properties interpret Complex functions, adjepration into real and inagenary parts, taponential, direct and inverse tregometric and properties interpret Complex functions, adjeprating makes and signe values and eigen vectors, Cayley Hamilton theorem and applications.  Unit 2 Number of factures = 08 Title of the unit: MATRIX  Number of lectures = 08 Title of the unit: BIAARY OPEANTINE  Consistency and inconsistency of linear equations, characterialic equations, client values and single properties, subgroups, cyclic groups, Permutation groups  Unit 2 Number of lectures = 08 Title of the unit: BIAARY OPEANTINE  Consistency and interpret Symmetric, Severemetria, interest Eigenometric, and single prope		Lectu	ıres = 30	Tutorials = 10			Practic	al = Nil					
Number of lectures 30         Title of the unit: Status ALTER Successfully completion of course, the student will able explore subject materials. The successful courses, one student will able explore subject materials. The successful courses, one student will able explore subject materials. The successful courses completion, learners will develop following attributes:           COURSE OUTCOME (COURSE COURSE)         Explain and Integret Sammetric, Stew symmetric, Hermitian and skew Hermitian matrices. Elementary appreciators, and explain status, Course out and explore subject materials and stempt and subject materials. The subject materials and stempt and the subject of the subject materials and stempt and the subject of the subject materials. The subject materials and subject materials and subject materials. The subject materials and subject materials and subject materials. The subject mate	8. COURSE	E OBJECTIVES: The	e purpose of this undergradua	te course is to impart basic and key knowledge of Al	lgebra and Tri	gonom	etry. By	using the	e princ	ipal of	applied		
	mathematic	ics to obtain quan	titative relations which are ve	ry important for higher studies. After successfully co	ompletion of a	course,	the stu	dent will	able e	explore	subject		
Part of accessful course (completion, learners will develop following attributes:  COURSE OUTCOME (CO)  ATTRIBUTES  COURSE OUTCOME (CO)  ATTRIBUTES  COI  Bescribe and integret Symmetric, Sew-symmetric, Hermitian and Sew-Hermitian matrices, Elementary operations, Bank of Matrix, Linear  Adaption of course (Core of the add courses)  CO2  Boarder and Integret Engineering operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic  CO3  Boarder and integret Engineering operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic  CO3  Boarder and integret Engineering (Core of the unit: MATRIX  CO4  Explain and integret Engineering (Core of the unit: MATRIX  CO5  Indi add integret Engineering (Core of the unit: MATRIX  CO5  Indi add integret Engineering (Core of the unit: MATRIX  Indi: Symmetric, Seev-symmetric, Indiano, Characteristic equations, Bank of Matrix, Linear independence of row and columns matrices, Engineering and simple properties, subgroups, cyclic  CO5  Indi add integret Engineering (Core of the unit: MATRIX  Indi: Symmetric, Seev-symmetric, Indiano, Characteristic equations, Bank of Matrix, Linear independence of row and columns matrices, Engineering and Engineering (Core of the unit: MATRIX  Indi: Symmetric, Seev-symmetric, Indiano, characteristic equations, and eight vectors, Cayley Hamilton theorem and applications.  Unit 2  Number of lectures - 08  Title of the unit: BINARY OPERATIONS  Link: Symmetric, Sterver Symmetric, Sterver symmetric, Sterver Symmetric, Sterver Symmetric, Sterver Symmetric, Sterver Symmetric, Cayley Hamilton theorem and applications.  Unit-1  Number of lectures - 08  Title of the unit: BINARY OPERATIONS - 2  Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups  Unit-4  Number of lectures - 08  Title of the unit: BINARY OPERATIONS - 2  Binary operations, algebraic structures, Definitio			uns. I.										
COURSE CUTCOME (CO)         ATTRBUTES           COL         Describe and interpret Symmetric, Skew symmetric, Hermitian and skew Hermitian matrices. Elementary operations, Bank of Matrix, Linear Andependence of row and columns matrices, consistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications           CO2         Evaluate and Interpret Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, Excrete relation is display to represent the samples and simple properties, subgroups, cyclic groups, Permutation groups           CO3         Explain and interpret Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, forgent subgroups, cyclic groups, Permutation groups           CO4         Explain and interpret Generation functions (segary's seles; Summation of series)           CO5         Initian and interpret Generation (function, forgent/seles)           CO6         Interpret Generation (function, forgent/seles)           CO7         Initian and interpret Generation (function, forgent/seles)           CO8         Initian and interpret Generation (function, forgent/seles)           CO8         Initian and interpret Generation (function, forgent/seles)           CO8         Initian and seles/feeling (forgent/seles)           CO8         Initian and seles/feeling (forgent/seles)           CO8         Initian and seles/feeling (forgeneling)           Initian an	After the su	uccessful course c	,. ompletion, learners will devel	op following attributes:									
Describe and interpret Symmetric, Nervormiteric, Hermitian natices, Elementary operations, Rank of Matrix, Linear Independence of row and columns matrices, consistency and linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications           CO2         Evaluate and Interpret Edaptications         Evaluate and Interpret Edaptications           CO3         Evaluate and Interpret Edaptication Structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           CO4         Esplain and Interpret Edaptication, Interpret Candidation, Gregory's terres, Summation of arise           CO5         Find and Interpret Edaptication, Interpret Candidation, Gregory's terres, Summation of arise           CO6         Market Edaptication, Cargory's terres, Summation of arise           10. Unit wise detailed content         Number of lectures = 00         Title of the unit MATRIX           Vint 2         Number of lectures = 00         Title of the unit MATRIX           Vint 2         Number of lectures = 00         Title of the unit MATRIX           Vint 2         Number of lectures = 00         Title of the unit MATRIX           Vint 2         Number of lectures = 00         Title of the unit MATRIX           Vint 2         Number of lectures = 00         Title of the unit MARY OPERATIONS – 2           Biary operations, algebria: structures, Definition of a group with examples and simple properties.subgroups, cyclic groups, Permutation groups	COURSE	OUTCOME (CO)		ATTRIBUTES									
CO1         Independence of row and columns matrices, consistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications.           CO2         Evaluate and Interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Fernutation groups           CO3         Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Fernutation groups           CO4         Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Fernutation groups           CO5         Find and interpret Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, legent settis, Summatrice, Summatrice, Seew-symmetric, Hermitian and Skew-Hermitian, Elementary operations, Rank of Matrix, Unear independence of row and columns matrices, consistency of Innear equations, Anarce settistic equations, incertains equations, Anarce settistic equations, and sequence settistic equations.           Unit-1         Number of lectures = 08         Tite of the unit: BIARY OPERATIONS           Unit-3         Number of lectures = 08         Tite of the unit: BIARY OPERATIONS           Unit-3         Number of lectures = 08         Tite of the unit: BIARY OPERATIONS - Compose, cyclic groups, Permutation groups           Unit-3         Number of lectures = 08         Tite of the unit: BIARY OPERATIONS - Comporegroups, separation into real and imaginary parts			Describe and interpret Symm	etric, Skew-symmetric, Hermitian and skew-Hermitia	n matrices, El	ementa	ary oper	ations, R	ank of	Matrix	, Linear		
Hamition theorem and its applications           Evaluate and interpret Elinary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Colspan="2">Spring and interpret Engage operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Colspan="2">Spring and interpret Engage operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Colspan="2">Number of fectures = 08         Tite of the unit: MATRIX           Muncher of Entures = 08         Tite of the unit: MATRIX           Muncher of lectures = 08         Tite of the unit: MATRIX           Muncher of lectures = 08         Tite of the unit: MATRIX           Muncher of lectures = 08         Tite of the unit: BINARY OPERATIONS           Unit 2         Number of lectures = 08         Tite of the unit: BINARY OPERATIONS           Unit 4         Number of lectures = 08         Tite of the unit: BINARY OPERATIONS           Unit 4         Number of lectures = 08         Tite of the unit: BINARY OPERATIONS           Unit 4          Tite of the unit:		CO1	independence of row and co	olumns matrices, consistency and inconsistency of	linear equatio	ns, eig	en valu	es and e	eigen v	ectors,	Cayley		
CO2         Evaluate and Interpret Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           CO3         Explain and Interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           CO4         Explain and Interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           CO5         Find and Interpret Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Groups's series, Summation of series.           Unit-1         Number of lectures = 08         Title of the unit: MATKIX           Watris:         Symmetric, Skew-symmetric, Hermitian and Skew-Hermitian, Elementary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency of Inserve equations, Anicardetristic equations, and series tructures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Unit-3         Number of lectures = 08         Title of the unit: BINARY OPERATIONS           Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Unit-5         Number of lectures = 08         Title of the unit: BINARY OPERATIONS - 2			Hamilton theorem and its app	lications									
Discrete rule of sign, solution of cuncil, Cardon Mechoo), biguadraic equations.           CO3         Explain and interpret Explains and interpret Complex functions, adgebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups. Permutation groups           CO4         Explain and interpret Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, circegory's series, Summation of series           10. Unit Wate detailed content         Number of lectures = 08         Title of the unit: MATNIX           Matrix: Symmetric, Skew-symmetric, Hermitian and skew-Hermitian, Belematary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency and inconsistency of linear equations, characteristic equations, eigen values and eigen vectors, Cayley Hamilton theorem and applications.           Unit 2         Number of lectures = 08         Title of the unit: BINARY OPERATIONS           Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, logarithmic function, Grogory's service, Subgroups, cyclic groups, Permutation groups           Unit 3         Number of lectures = 08         Title of the unit: BINARY OPERATIONS =           Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Unit 4         Number of lectures = 08         Title of the unit: BINARY OPERATIONS =           Binary operations, algebraic structures, Definition of		CO2	Evaluate and Interpret Relation	on between roots and coefficient of general polynom	nial equation i	n one v	ariable,	transfor	matior	n of equ	uations,		
CO3       Explain and integret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         CO4       Explain and integret Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions. generations, generations groups with examples and simple properties, subgroups, cyclic groups, Permutation groups         CO5       Find and integret Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions. generatives and eigen vectors, Cayley Hamilton theorem and applications.         Unit-1       Number of lectures - 08       Title of the unit: MATRIX         Number of lectures - 08       Title of the unit: BINARY OPERATIONS         Unit-1       Number of lectures - 08       Title of the unit: BINARY OPERATIONS - 2         Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       Unit-1         Number of lectures = 08       Title of the unit: BINARY OPERATIONS - 2       End of the unit: COMPLEX FUNCTIONS         Dint-1       Number of lectures = 08       Title of the unit: COMPLEX FUNCTIONS - 2       End of the unit: COMPLEX FUNCTIONS - 2         Dint-5       Number of lectures = 08       Titl			Discrete rule of sign, solution	of cubic(Cardon Method), biquadratic equations.	n with over	lacana	امتصمام	nronorti			e avalia		
Description         Description           CO4         Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           CO5         Find and interpret Complex functions, logarithmic function, Gregory's series, Summation of Series           10. Unit wise detailed content         Number of lectures = 08         Title of the unit: MATRIX           Matrix: Symmetric, Keer-Symmetric, Hermitian and Skew-Hermitian, Blementary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency and inconsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and applications.           Unit 2         Number of lectures = 08         Title of the unit: BINARY OPERATIONS           Vinit-3         Number of lectures = 08         Title of the unit: BINARY OPERATIONS           Unit-4         Number of lectures = 08         Title of the unit: BINARY OPERATIONS           Unit-5         Number of lectures = 08         Title of the unit: BINARY OPERATIONS – 2           Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Unit-5         Number of lectures = 08         Title of the unit: COMPLEX FUNCTIONS           Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's serics, Summation of series.         1		CO3	arouns Permutation groups	operations, algebraic structures, Demittion of a grou	ip with examp	nes and	i simple	properti	ies, su	ogroup	s, cyclic		
CO4         groups, Permutation groups         First and interpret Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series           10. Unit wise detailed content         Title of the unit: MATRIX           Matrix: Symmetric, Skew-symmetric, Hermitian and skew-Hermitian, Elementary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency and inconsistency of intere equations, characteristic equation in one variable, transformation of equations, Descarte rule of sign, solution of cubic (Cardon Method), biquadrate equations.           Unit 2         Number of lectures = 08         Title of the unit: BINARY OPERATIONS           Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Unit 3         Number of lectures = 08         Title of the unit: BINARY OPERATIONS – 2           Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Unit 5         Number of lectures = 08         Title of the unit: BINARY OPERATIONS – 2           Cos bescribe and interpret Symmetric, Skew-symmetric, Hermitian and skew-Hermitian matrices, Elementary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Cos bescribe and interpret Symmetric, Skew-symmetric, Hermitian and skew-Hermitian matrices, Consistency and any operations, Rank of Matrix, Lin			Explain and interpret Binary of	operations, algebraic structures. Definition of a grou	in with exam	les and	l simple	propert	ies, su	bgroup	s. cvclic		
Cos       Find and interpret Complex functions, logarithmic function, Gregory's series, Summation of series         10. Unit vise detailed content         Number of lectures = 08       Title of the unit: BINARY OPERATIONS - 2         Binary operations, algebraic structures, Definition of a group with examples and simple properties.subgroups, cyclic groups, Permutation groups <t< td=""><td></td><td>CO4</td><td>groups, Permutation groups</td><td></td><td>ip men exemp</td><td></td><td></td><td>propert</td><td></td><td></td><td>., .,</td></t<>		CO4	groups, Permutation groups		ip men exemp			propert			., .,		
OCS         hyperbolic functions, logarithmic function, Gregory's series, Summation of series           10. Unit vise detailed content           Unit.1         Number of lectures = 08         Title of the unit: MATRIX           Matrix: Symmetric, Skew-symmetric, Hermitian, and skew-Hermitian, generalizators, Cayley Hamilton theorem and applications.         Unit vise detailed content           Unit.2         Number of lectures = 08         Title of the unit: POLYNOMIAL EQUATION           Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, Descarter rule of sign, solution of cubic (Cardon Method), biquadrate equations.         Unit 2           Unit.3         Number of lectures = 08         Title of the unit: BINARY OPERATIONS           Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Unit.4         Number of lectures = 08         Title of the unit: DINARY OPERATIONS – 2           Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Unit.4         Number of lectures = 08         Title of the unit: DINARY OPERATIONS – 2           Binary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency and neorements, eigen values and eigen vectors, Cayley Hamilton theorem and tiz         3         1         1         2         1         1			Find and interpret Complex	functions and separation into real and imaginary	parts, Expone	ntial, d	irect ar	nd invers	e trigo	onomet	ric and		
10. Unit vise detailed content         Unit:1       Number of lectures = 08       Title of the unit: MATRIX         Matrix: Symmetric, Stew-symmetric, Hermitian, and skew-Hermitian, Elementary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency of linear equations, characteristic equations, eigen values and eigen vertors, Cayley Hamilton theorem and applications.         Unit-2       Number of lectures = 08       Title of the unit: POLYNOMIAL EQUATION         Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, Descarte rule of sign, solution of cubic (Cardon Method), Biquardia equations.         Unit-3       Number of lectures = 08       Title of the unit: BINARY OPERATIONS         Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         Unit-5       Number of lectures = 08       Title of the unit: COMPLEX FUNCTIONS         Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series. Summation of series.       PO1       PO2       PO3       PO4       PO5       PO6       PO7         Cos       Describe and interpret Symmetric, Stew-symmetric, Hermitian and skew-Hermitian matrices, Elementary and ruo matrices, Consistency and rucons, Rank of Matrix, Linear independence of row and columns matrices, consistency and rucons, Rank of Matrix, Linear independence of row and columns matrices, consistency and ruconsi		CO5	hyperbolic functions, logarith	mic function, Gregory's series, Summation of series									
Unit.3         Number of lectures = 08         Title of the unit: MATRIX           Matric: Symmetric, Stew-symmetric, Hermitian and skew-Hermitian, Elementary operations, Rank of Matrix, Linear Independence of row and columns matrices, consistency of linear equations, characteristic equations, eigen values and eigen vectors, Cayley Hamilton theorem and applications.           Unit-2         Number of lectures = 08         Title of the unit: POLYNOMIALE EQUATION           Method), higuadratic equations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups           Unit-3         Number of lectures = 08         Title of the unit: BINARY OPERATIONS           Unit-4         Number of lectures = 08         Title of the unit: BINARY OPERATIONS           Unit-5         Number of lectures = 08         Title of the unit: COMPERATIONS = 2           Unit-4         Number of lectures = 08         Title of the unit: COMPERATIONS           Unit-5         Number of lectures = 08         Title of the unit: COMPERATIONS           Complex functions and separation into real and Imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, summation of series.           11: CO-OP mapping         Cos         Poi	10. Unit w	wise detailed cont	ent										
Matrix: Symmetric, Stew-symmetric, Hermitian and skew-Hermitian, Elementary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency and inconsistency of land inconsi	Unit-1		Number of lectures = 08	Title of the unit: MATRIX									
Consistency of linear equations, characteristic equations, eigen values and eigen vectors, Cayley Hamilton theorem and applications.         Unit-2       Number of lectures = 08       Title of the unit: 201X0001         Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, Descarte rule of sign, solution of cubic (Cardon Method), biquadratic equations.       Number of lectures = 08       Title of the unit: BINARY OPERATIONS         Unit-3       Number of lectures = 08       Title of the unit: BINARY OPERATIONS – 2         Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         Unit-5       Number of lectures = 08       Title of the unit: COMPLEX FUNCTIONS         Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series.         11: CO-P Omapping       Cos       bescribe and interpret Symmetric, Sew-symmetric, Hermitian and skew-Hermitian matrices, Consistency and periadom, series, equations, series, and eigen values and eigen vectors, Cayley Hamilton in one variable, transformation of equations, Discrete rule of sign, solution of cubic(Cardon Method), biquadratit and interpret Binary operations, algebraic structures, Definition of a group with examples and simple and simple and simple and simple and interpret Binary operation, selegoria, solution of cubic(Cardon Method), biquadratit and interpret Binary operation, selegora structures, Definition of a group with examples and	Matrix: Syn	mmetric, Skew-sy	mmetric, Hermitian and skew	w-Hermitian, Elementary operations, Rank of Mati	rix, Linear inc	lepend	ence of	row an	d colu	mns m	atrices,		
Unit-2         Number of lectures -08         Title of the unit: POLYNOMIAL EQUATION           Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, Descarte rule of sign, solution of cubic (Cardon Method), biquadratic equations.         Number of lectures - 08         Title of the unit: EINARY OPERATIONS           Unit-3         Number of lectures - 08         Title of the unit: EINARY OPERATIONS - 2         Unit-4           Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         Unit-4         Number of lectures - 08         Title of the unit: EINARY OPERATIONS - 2           Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         Unit-5         Number of lectures - 08         Title of the unit: COMPLEX FUNCTIONS           Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series.         PO1         PO2         PO3         PO4         PO5         PO6         PO7           Co1         Describe and Interpret Symmetric, Stew-symmetric, Hermitian and skew-Hermitian matrices, Elementary operations, Rank of Matrix, Linear independence of row and courns matrices, consistency and an inconsistency of linear equations, objecrete rule of sign, solution of cubic(Cardon Method), biquadratit and interpret subgroups, cyclicic groups, Permutation groups         3	consistency	y and inconsistenc	y of linear equations, characte	ristic equations, eigen values and eigen vectors, Cayl	ey Hamilton ti	neorem	and ap	plication	s.				
Relation between roots and coefficient of general porynomial equation in one Vanable, transformation of equations, Descarte rule of sign, solution of cubic (Lardon Method), biquardatic equations. Unit-3  Number of lectures = 08  Title of the unit: BINARY OPERATIONS  Unit-4  Number of lectures = 08  Title of the unit: BINARY OPERATIONS – 2  Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups Unit-4  Number of lectures = 08  Title of the unit: BINARY OPERATIONS – 2  Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups Unit-5  Number of lectures = 08  Title of the unit: COMPLEX FUNCTIONS  Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's  cots bescribe and interpret Symmetric, Stew-symmetric, Hermitian and skew-Hermitian matrices, Elementary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency and papplications  cots cots cots cots cots cots cots co	Unit-2		Number of lectures =08	Title of the unit: POLYNOMIAL EQUATION									
Dift.3       Number of lectures = 08       Title of the unit: BINARY OPERATIONS         Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         Unit.4       Number of lectures = 08       Title of the unit: BINARY OPERATIONS – 2         Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         Unit.5       Number of lectures = 08       Title of the unit: COMPLEX FUNCTIONS         Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series.         11. CO-PO mapping       CO         Cos       Attributes       P01       P02       P03       P04       P05       P06       P07         Co1       persitions, Rank of Matrix, Linear independence of row and columns matrices, consistency and a 1       1       2       1       1         co2       Evaluate and Interpret Relation between roots and coefficient of general polynomial equation in one equations, algebraic structures, Definition of a group with examples and simple and simple roup series. Subroups, cyclic groups, Permutation groups       3       1       1       2       1       1         co2       Evaluate and Interpret Relation between roots and coefficient of genoup with examples and simple roup series. Subroups,	Relation be	etween roots and	coefficient of general polyno	mial equation in one variable, transformation of ed	quations, Desc	arte ru	ile of si	gn, solut	ion of	cubic (	Cardon		
Data of a constructures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         Junit 4       Number of lectures = 08       Title of the unit: BINARY OPERATIONS - 2         Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         Unit 5       Number of lectures = 08       Title of the unit: COMPLEX FUNCTIONS         Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series.         11. CO-PO mapping       PO1       PO2       PO3       PO4       PO5       PO6       PO7         Co1       Describe and interpret Symmetric, Skew-symmetric, Hermitian and skew-Hermitian matrices, consistency and inconsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications       1       1       2       1       1         Co2       Evaluate and Interpret Relation between roots and coefficient of general polynomial equation in one aproperties, subgroups, cyclic groups, Permutation groups       3       1       1       2       1       1         co3       Evaluate and Interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       2       1       1         <	Linit-3		Number of lectures = 08	Title of the unit: BINARY OPERATIONS									
Cost       Poil Poil       POil       Poil	Binary oper	rations algebraic	structures. Definition of a grou	n with examples and simple properties subgroups cy	clic groups Pe	rmutat	ion grou	ins					
Unit-4         Number of lectures = 08         Title of the unit: BINARY OPERATIONS – 2           Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         Image: Complex functions, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation, Gregory's series, Summation of series.           COmplex functions and separation intor ceal and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series.           CO1         Describe and interpret Symmetric, Hermitian and skew-Hermitian matrices, Elementary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency and inconsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications         1         1         2         1         1           CO2         Evaluate and Interpret Relation between roots and coefficient of general polynomial equation in one avaiable, transformation of equations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         3         1         2         2         1         1           CO4         Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         3         1         2         2         1         1           CO4         Explain and interpret genops	billiary open				ene Broups,i e	matat	ion Broc	<b>P</b> 2					
Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups         Unit-5       Number of lectures = 08       Title of the unit: COMPLEX FUNCTIONS         Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series.         11. CO-PO mapping       PO1       PO2       PO3       PO4       PO5       PO6       PO7         C01       Describe and interpret Symmetric, Skew-symmetric, Hermitian and skew-Hermitian matrices, consistency and inconsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications       3       1       1       2       1       1         C02       Evaluate and Interpret Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       2       1       1         C03       Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       2       1       1       1       2       2       1       1         C03       Explain and interpret Binary operations, algebraic structures, Definit	Unit-4		Number of lectures = 08	Title of the unit: BINARY OPERATIONS – 2									
Unit-5       Number of lectures = 08       Title of the unit: COMPLEX FUNCTIONS         Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series.         11. CO-PO mapping       COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO1       Describe and interpret Symmetric, Skew-symmetric, Hermittian and skew-Hermittian matrices, consistency and norsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its and interpret Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, Discrete rule of sign, solution of cubic(Cardon Method), biquadratic and interpret Binary operations, algebraic structures, Definition of a group with examples and simple and interpret Binary operations, algebraic structures, Definition of a group with examples and simple and interpret Binary operations, algebraic structures, Definition of a group with examples and simple and interpret Subgroups, cyclic groups, Permutation groups       1       2       1       1         CO2       Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple and interpret Binary operations, logarithmic function, foregory's series, Summation of series       1       2       1       1       1       2       1       1       1       2       1       1       1       2       1       1       1       2	Binary oper	rations, algebraic	structures, Definition of a grou	o with examples and simple properties, subgroups, cyc	clic groups,Per	mutati	on grou	ps					
Unit:5         Number of lectures - 08         Title of the unit: COMPLEX FUNCTIONS           Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series.           11. CO-PO mapping         Explant and interpret Symmetric, Skew-symmetric, Hermitian and skew-Hermitian matrices, Elementary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency and nconsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its and interpret Relation between roots and coefficient of general polynomial equation in one value between roots and coefficient of general polynomial equation in one value between roots and coefficient of general polynomial equation in one value in interpret Binary operations, algebraic structures, Definition of a group with examples and simple 3         1         2         1         1           CO4         Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple 3         1         2         2         1         1           CO4         Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple 3         1         2         2         1         1           CO4         Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple 3         1         2         2         1         1         1         2         2         1         1	· ·		· •		<b>-</b>								
Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series.         ICO-PO mapping         COS       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7         COI       Describe and interpret Symmetric, Skew-symmetric, Hermitian and skew-Hermitian matrices, Elementary operations, Rank of Matrix, Linear independence of row and columns matrices, consistency and inconsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications       3       1       1       2       1       1         CO2       Evaluate and Interpret Relation between roots and coefficient of general polynomial equation in ore variable, transformation of equations, Discrete rule of sign, solution of a group with examples and simple actions.       3       1       1       2       1       1       1       2       1       1       1       2       1       1       1       2       1       1       1       2       1       1       1       2       1       1       1       2       1       1       1       2       1       1       1       2       1       1       1       2       1       1       1       2       1       1       1       1       1	Unit-5		Number of lectures = 08	Title of the unit: COMPLEX FUNCTIONS		_			_				
Submitted of 19 Series.         11. CO-PO mapping         COS       PO1       PO2       PO3       PO4       PO5       PO6       PO7         COS       Describe and interpret Symmetric, Skew-symmetric, Hermitian and skew-Hermitian matrices, consistency and a speciations, appendix time independence of row and columns matrices, consistency and a speciations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications       3       1       1       2       1       1         COS       PO4       PO3       PO4       PO5       PO6       PO7         COS       Post independence of row and columns matrices, consistency and a speciations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications       3       1       1       2       1       1       2       1       1       2       1       1       2       2       1       1       2       2       1       1       2 <th 2"2"2"2<="" colspan="2" t<="" td=""><td>Complex fu</td><td>inctions and sepa</td><td>ration into real and imaginary</td><td>parts, Exponential, direct and inverse trigonometric</td><td>and hyperbo</td><td>ic func</td><td>tions, lo</td><td>garithmi</td><td>c func</td><td>tion, Gi</td><td>regory's</td></th>	<td>Complex fu</td> <td>inctions and sepa</td> <td>ration into real and imaginary</td> <td>parts, Exponential, direct and inverse trigonometric</td> <td>and hyperbo</td> <td>ic func</td> <td>tions, lo</td> <td>garithmi</td> <td>c func</td> <td>tion, Gi</td> <td>regory's</td>		Complex fu	inctions and sepa	ration into real and imaginary	parts, Exponential, direct and inverse trigonometric	and hyperbo	ic func	tions, lo	garithmi	c func	tion, Gi	regory's
COs       Attributes       PO1       PO2       PO3       PO4       PO5       PO6       PO7         CO1       Describe and interpret Symmetric, Skew-symmetric, Hermitian and skew-Hermitian matrices, consistency and neonsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications       3       1       1       2       1       1         CO2       Evaluate and Interpret Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups bernic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       1       1         CO3       Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       2       1       1         CO4       Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       2       1       1         CO4       Explain and interpret Binary operations, logarithmic function, Gregory's series, Summation of series       3       1       2       2       1       1       1         CO4<													
Cost       Post	11. CO-PO r	mapping											
CO1       Describe and interpret Symmetric, Skewsymmetric, Networking and Skewsymmetrics, Consistency and inconsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications       3       1       1       2       1       1         CO2       Evaluate and Interpret Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, Discrete rule of sign, solution of cubic(Cardon Method), biquadratic autority, equations.       3       1       1       2       1       1         CO2       Evaluate and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       2       1       1         CO4       Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       2       1       1         CO4       Explain and interpret Complex functions and separation into real and imaginary parts, Exponential, direct and prove trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series       3       1       2       2       1       1         CO4       Explain and interpret Binary operation, 2 Average contribution , 1 Low contribution       3       1       2       2       1       1       1       <		occribe and inter			<b>DO1</b>	<b>DO</b> 2		004	DOT	POC	807		
Inconsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its applications     applications     inconsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its     applications     inconsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its     applications     inconsistency of linear equations, eigen values and eigen vectors, Cayley Hamilton theorem and its     applications     inconsistency of linear equations, eigen values and coefficient of general polynomial equation in one     variable, transformation of equations, Discrete rule of sign, solution of cubic(Cardon Method), biquadratic     aguations.     Interpret Binary operations, algebraic structures, Definition of a group with examples and simple     aguations, cyclic groups, Permutation groups     properties, subgroups, cyclic groups, Permutation groups     ind and interpret Binary operations, algebraic structures, Definition of a group with examples and simple     aguation and interpret Binary operations, algebraic structures, Definition of a group with examples and simple     aguations, and interpret Binary operations, algebraic structures, Definition of a group with examples and simple     aguations, and interpret Binary operations, algebraic structures, Definition of a group with examples and simple     aguations, and interpret Binary operations, algebraic structures, Definition of a group with examples and simple     aguations, and interpret Binary operations, algebraic structures, Definition of a group with examples and simple     aguations, and interpret Binary operations, algebraic structures, Definition of a group with examples and simple     aguations, algebraic structures, Definition of a group with examples and simple     aguations, algebraic structures, Definition of a group with examples and simple     aguations, algebraic structures, Definition, algebraic structures, Definition, algebraic structures, Definition, algebraic	CO1	rescribe and inter	prot Summatric Skow summe	Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07		
applications       applications       applications         CO2       Evaluate and Interpret Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, Discrete rule of sign, solution of cubic(Cardon Method), biquadratic       3       1       1       2       1       1         CO3       Evaluate and Interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       2       1       1         CO4       Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       2       1       1         CO4       Explain and interpret Binary operations and separation into real and imaginary parts, Exponential, direct and niverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series       2       1       2       2       1       1         It is a strong contribution, 2 Average contribution, 1 Low contribution         12. Brief description of self-learning / E-learning component         1.       https://nacs.ac.in/nasc/images/StudyMaterials/Physics/UGCGATEmatrix.pdf         1. https://nptel.ac.in/courses/111106113/         3 <t< td=""><td>~</td><td>nerations Rank</td><td>pret Symmetric, Skew-symme</td><td>Attributes etric, Hermitian and skew-Hermitian matrices, Elem</td><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td></t<>	~	nerations Rank	pret Symmetric, Skew-symme	Attributes etric, Hermitian and skew-Hermitian matrices, Elem	PO1	PO2	PO3	PO4	PO5	PO6	PO7		
CO2       Evaluate and Interpret Relation between roots and coefficient of general polynomial equation in one variable, transformation of equations, Discrete rule of sign, solution of cubic(Cardon Method), biquadratic equations.       3       1       1       2       1       1         CO3       Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       2       1       1         CO4       Explain and interpret Binary operations, algebraic structures, Definition of a group with examples and simple properties, subgroups, cyclic groups, Permutation groups       3       1       2       2       1       1         CO4       Explain and interpret Complex functions and separation into real and imaginary parts, Exponential, direct and niverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series       3       1       2       2       1       1         CO5       Find and interpret Relearning / E-learning component       3       1       2       2       1       1         Interpret/Relearning / E-learning component         I.       https://nasc.ac.in/nasc/images/StudyMaterials/Physics/UGCGATEmatrix.pdf         I. https://nwww.youtube.com/watch?v=WaNdQh0w6Xc         IIII Interpret Subgroups, K.B. Datta, Prentice Hall of India Pvt. Ltd. New Delhi. <td>l in</td> <td>perations, Rank</td> <td>pret Symmetric, Skew-symme of Matrix, Linear independ near equations, eigen value</td> <td>Attributes etric, Hermitian and skew-Hermitian matrices, Elem lence of row and columns matrices, consistenc s and eigen vectors. Cavley Hamilton theorem a</td> <td>PO1 nentary cy and and its</td> <td>PO2</td> <td>PO3</td> <td>PO4</td> <td>PO5 2</td> <td>PO6</td> <td>P07</td>	l in	perations, Rank	pret Symmetric, Skew-symme of Matrix, Linear independ near equations, eigen value	Attributes etric, Hermitian and skew-Hermitian matrices, Elem lence of row and columns matrices, consistenc s and eigen vectors. Cavley Hamilton theorem a	PO1 nentary cy and and its	PO2	PO3	PO4	PO5 2	PO6	P07		
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<ol> <li>https://www.youtube.com/watch?v=WaNdQh0w6Xc</li> <li>Books recommended:         <ol> <li>Topics in Algebra; I.N. Hernstein, Wiley Eastern Ltd., New Delhi.</li> <li>Matrix &amp; Linear Algebra; K.B.Datta, Prentice Hall of India Pvt. Ltd. New Delhi.</li> <li>Basic Abstract Algebra; P.B.Bhattacharya, S.K. Jain &amp; S.R Nagpaul, Cambridge University Press, Indian Edition.</li> <li>Higher Algebra; H.S. Hall, S.R. Knight, H.M. Publications.</li> <li>Text Book on Algebra &amp; theory of equations; Chandrika Prasad, Pothishala Private Ltd., Allahabad.</li> </ol> </li> </ol>	CO2 EV va ecc CO3 E> pr CO4 Ex pr CO5 Fit in 12. Brief c 1. ft	perations, Rank noonsistency of li pplications valuate and Inter ariable, transform quations. xplain and interpr roperties, subgrou xplain and interpret noperties, subgrou ind and interpret noerse trigonomet <b>3</b> S description of self http://nasc.ac.in/	pret Symmetric, Skew-symme of Matrix, Linear independ near equations, eigen value rpret Relation between roots ation of equations, Discrete r et Binary operations, algebraid ups, cyclic groups, Permutation et Binary operations, algebraid ups, cyclic groups, Permutation complex functions and separa ric and hyperbolic functions, lo trong contribution, 2 Average Flearning / E-learning compon nasc/images/StudyMaterials/F	Attributes etric, Hermitian and skew-Hermitian matrices, Elemi lence of row and columns matrices, consistence is and eigen vectors, Cayley Hamilton theorem a is and coefficient of general polynomial equation ule of sign, solution of cubic(Cardon Method), bique is structures, Definition of a group with examples and a groups is structures, Definition of a group with examples and a groups is toructures, Definition of a group with examples and a groups ation into real and imaginary parts, Exponential, direct ogarithmic function, Gregory's series, Summation of secontribution tornibution , 1 Low contribution tent Physics/UGCGATEmatrix.pdf	PO1 hentary by and and its in one adratic 3 simple 3 simple 3 sect and series 2	PO2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO3         1         1         2         2         2         2	P04	PO5 2 2 2 2 2 2 2	PO6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
13. Books recommended:         1.       Topics in Algebra; I.N. Hernstein, Wiley Eastern Ltd., New Delhi.         2.       Matrix & Linear Algebra; K.B.Datta, Prentice Hall of India Pvt. Ltd. New Delhi.         3.       Basic Abstract Algebra; P.B.Bhattacharya, S.K. Jain & S .R Nagpaul, Cambridge University Press, Indian Edition.         4.       Higher Algebra; H.S. Hall, S.R. Knight, H.M. Publications.         5.       Text Book on Algebra & theory of equations; Chandrika Prasad, Pothishala Private Ltd., Allahabad.	CO2 EV vz ec CO3 Ex pr CO4 Ex pr CO4 Ex pr CO5 Fii in 12. Brief c 1. H 2. H	perations, Rank noonsistency of li pplications valuate and Inter ariable, transform quations. xplain and interpr roperties, subgrou xplain and interpret noperties, subgrou ind and interpret noerse trigonomet <b>3</b> S description of self http://nasc.ac.in/	pret Symmetric, Skew-symme of Matrix, Linear independ near equations, eigen value rpret Relation between roots lation of equations, Discrete r et Binary operations, algebraid ups, cyclic groups, Permutation et Binary operations, algebraid ups, cyclic groups, Permutation Complex functions and separa ric and hyperbolic functions, lo trong contribution, 2 Average F-learning / E-learning compon nasc/images/StudyMaterials/F h/courses/111106113/	Attributes etric, Hermitian and skew-Hermitian matrices, Elemi lence of row and columns matrices, consistence is and eigen vectors, Cayley Hamilton theorem a is and coefficient of general polynomial equation ule of sign, solution of cubic(Cardon Method), bique is structures, Definition of a group with examples and a groups is structures, Definition of a group with examples and a groups ition into real and imaginary parts, Exponential, direct ogarithmic function, Gregory's series, Summation of secontribution , 1 Low contribution nent Physics/UGCGATEmatrix.pdf	PO1 nentary ty and and its in one adratic 3 simple 3 simple 3 ect and series 2	PO2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO3         1         1         2         2         2         2	P04	P05 2 2 2 2 2 2 2 2	PO6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
<ol> <li>I opics in Algebra; I.N. Hernstein, Wiley Eastern Ltd., New Delhi.</li> <li>Matrix &amp; Linear Algebra; K.B.Datta, Prentice Hall of India Pvt. Ltd. New Delhi.</li> <li>Basic Abstract Algebra; P.B.Bhattacharya, S.K. Jain &amp; S .R Nagpaul, Cambridge University Press, Indian Edition.</li> <li>Higher Algebra; H.S. Hall, S.R. Knight, H.M. Publications.</li> <li>Text Book on Algebra &amp; theory of equations; Chandrika Prasad, Pothishala Private Ltd., Allahabad.</li> </ol>	in           ał           co2           Ex           va           ecc           co3           pr           co4           pr           co5           in           12. Brief c           1. H           2. H           3. H	perations, Rank noonsistency of li pplications valuate and Inter ariable, transform quations. xplain and interpr roperties, subgrou xplain and interpr roperties, subgrou ind and interpret twerse trigonomet <b>3</b> S <b>description of sel</b> http://nasc.ac.in/ https://nptel.ac.ir https://www.you	pret Symmetric, Skew-symme of Matrix, Linear independ near equations, eigen value rpret Relation between roots lation of equations, Discrete r et Binary operations, algebraid ups, cyclic groups, Permutatior et Binary operations, algebraid ups, cyclic groups, Permutatior complex functions and separa ric and hyperbolic functions, Ic trong contribution, 2 Average F-learning / E-learning compon nasc/images/StudyMaterials/F h/courses/111106113/ tube.com/watch?v=WaNdQh0	Attributes etric, Hermitian and skew-Hermitian matrices, Elemi lence of row and columns matrices, consistence s and eigen vectors, Cayley Hamilton theorem a s and coefficient of general polynomial equation ule of sign, solution of cubic(Cardon Method), bique estructures, Definition of a group with examples and a groups estructures, Definition of a group with examples and a groups ation into real and imaginary parts, Exponential, direct ogarithmic function, Gregory's series, Summation of secontribution tent Physics/UGCGATEmatrix.pdf w6Xc	PO1 nentary ty and and its in one adratic 3 simple 3 simple 3 ect and series 2	PO2 1 1 1 1 1 1 1	PO3         1         1         2         2         2         2	P04	PO5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO7 1 1 1 1 1 1 1		
<ol> <li>Matrix &amp; Lifear Algebra; K.B.Datta, Prentice nan of india PVL Ltd. New Defin.</li> <li>Basic Abstract Algebra; P.B.Bhattacharya, S.K. Jain &amp; S.R. Nagpaul, Cambridge University Press, Indian Edition.</li> <li>Higher Algebra; H.S. Hall, S.R. Knight, H.M. Publications.</li> <li>Text Book on Algebra &amp; theory of equations; Chandrika Prasad, Pothishala Private Ltd., Allahabad.</li> </ol>	in           ap           co2           co3           co4           pr           co5           rin           12. Brief of           1. H           2. H           3. H           13. Books r	perations, Rank noonsistency of li pplications valuate and Inter ariable, transform quations. xplain and interpre- roperties, subgrou ind and interpret ind and interpret verse trigonomet <b>3 S</b> <b>description of seli-</b> http://nasc.ac.in/ https://nptel.ac.in https://www.you <b>recommended</b> :	pret Symmetric, Skew-symme of Matrix, Linear independ inear equations, eigen value rpret Relation between roots iation of equations, Discrete r et Binary operations, algebraid ups, cyclic groups, Permutatior complex functions, and separa ric and hyperbolic functions, lo <b>trong contribution, 2 Average</b> <b>F-learning / E-learning compoi</b> nasc/images/StudyMaterials/F n/courses/111106113/ tube.com/watch?v=WaNdQh0	Attributes etric, Hermitian and skew-Hermitian matrices, Elemi lence of row and columns matrices, consistence is and eigen vectors, Cayley Hamilton theorem a s and coefficient of general polynomial equation ule of sign, solution of cubic(Cardon Method), bique estructures, Definition of a group with examples and in groups estructures, Definition of a group with examples and in groups ation into real and imaginary parts, Exponential, direct ogarithmic function, Gregory's series, Summation of secontribution tent Physics/UGCGATEmatrix.pdf w6Xc	PO1 hentary by and and its in one adratic simple simple sect and series 2	PO2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO3         1         1         2         2         2         2	P04	PO5 2 2 2 2 2 2 2	PO6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO7 1 1 1 1 1 1		
<ol> <li>Higher Algebra; H.S. Hall, S.R. Knight, H.M. Publications.</li> <li>Text Book on Algebra &amp; theory of equations; Chandrika Prasad, Pothishala Private Ltd., Allahabad.</li> </ol>	in           ap           co2           co3           pr           co4           pr           co5           fin           12. Brief c           1.           2.           3.           13. Books r	perations, Rank nonsistency of lipplications valuate and Inter ariable, transform quations. xplain and interpre- roperties, subgrou xplain and interpret werse trigonomet <b>3 S</b> description of self http://nasc.ac.in/ https://nptel.ac.in https://www.you recommended: Topics in Algebra;	pret Symmetric, Skew-symme of Matrix, Linear independ inear equations, eigen value rpret Relation between roots iation of equations, Discrete r et Binary operations, algebraid ups, cyclic groups, Permutatior complex functions and separa ric and hyperbolic functions, lo trong contribution, 2 Average f-learning / E-learning compor nasc/images/StudyMaterials/F n/courses/111106113/ tube.com/watch?v=WaNdQh0	Attributes etric, Hermitian and skew-Hermitian matrices, Elemi lence of row and columns matrices, consistence is and eigen vectors, Cayley Hamilton theorem a s and coefficient of general polynomial equation ule of sign, solution of cubic(Cardon Method), biqui estructures, Definition of a group with examples and a groups estructures, Definition of a group with examples and a groups estructures, Definition of a group with examples and a groups estructures, Definition of a group with examples and a groups ation into real and imaginary parts, Exponential, direct ogarithmic function, Gregory's series, Summation of s contribution , 1 Low contribution nent Physics/UGCGATEmatrix.pdf w6Xc Ltd., New Delhi. Ltd. New Delhi.	PO1 hentary y and and its and its and its and its and its and its and and and and and and and and	PO2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO3         1         1         2         2         2         2	P04	PO5 2 2 2 2 2 2	PO6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO7 1 1 1 1 1 1		
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	in           ap           co2           co3           pr           co4           pr           co5           fi           n           1.           2.           1.           2.           1.           2.           1.           2.           1.           3.           4.	perations, Rank noonsistency of li pplications valuate and Inter ariable, transform quations. xplain and interpre- roperties, subgrou xplain and interpre- nor and interpre- nor and interpre- nor and interpre- nor and interpre- nor and interpre- nor and interpre- <b>3 S</b> description of self http://nasc.ac.in/ https://nptel.ac.ir https://nptel.ac.i	pret Symmetric, Skew-symme of Matrix, Linear independ inear equations, eigen value rpret Relation between roots lation of equations, Discrete r et Binary operations, algebraid ups, cyclic groups, Permutation et Binary operations, algebraid ups, cyclic groups, Permutation Complex functions and separa ric and hyperbolic functions, la trong contribution, 2 Average Flearning / E-learning compon nasc/images/StudyMaterials/F n/courses/111106113/ tube.com/watch?v=WaNdQh0 I.N. Hernstein, Wiley Eastern I lgebra; K.B.Datta, Prentice Hal ebra; P.B.Bhattacharya, S.K. Ja S. Hall S.B. Knjipht H.M. Publi	Attributes etric, Hermitian and skew-Hermitian matrices, Elem lence of row and columns matrices, consistence s and eigen vectors, Cayley Hamilton theorem a s and coefficient of general polynomial equation ule of sign, solution of cubic(Cardon Method), bique estructures, Definition of a group with examples and a groups estructures, Definition of a group with examples and a groups ation into real and imaginary parts, Exponential, dire bogarithmic function, Gregory's series, Summation of s contribution , 1 Low contribution tent Physics/UGCGATEmatrix.pdf w6Xc Ltd., New Delhi. I of India Pvt. Ltd. New Delhi. in & S .R Nagpaul, Cambridge University Press, Indiar cations	PO1 entary y and and its and its and its and its and and and and and and and and	PO2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO3         1         1         2         2         2         2	P04	PO5 2 2 2 2 2 2	PO6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
6. Plane Trigonometry Part II: S.L.Loney, Macmillan & company, London.	In         In           alp         alp           co2         Experimental           co3         pr           co4         pr           co5         fi           in         in           12. Brief c         in           1.         fi           3.         fi           13. Books r         in           2.         fi           3.         fi           4.         fi           5.         in	perations, Rank noonsistency of li pplications valuate and Inter ariable, transform quations. xplain and interpr roperties, subgrou xplain and interpret norese trigonomet <b>3</b> S <b>description of sel</b> http://nasc.ac.in/ https://nptel.ac.ir https://nptel.ac.ir https://nptel.ac.ir Matrix & Linear A Basic Abstract Alg Higher Algebra; H	pret Symmetric, Skew-symme of Matrix, Linear independ near equations, eigen value rpret Relation between roots lation of equations, Discrete r et Binary operations, algebraic ups, cyclic groups, Permutatior et Binary operations, algebraic ups, cyclic groups, Permutatior Complex functions and separa ric and hyperbolic functions, lo trong contribution, 2 Average F-learning / E-learning compor nasc/images/StudyMaterials/F n/courses/111106113/ tube.com/watch?v=WaNdQh0 I.N. Hernstein, Wiley Eastern I lgebra; K.B.Datta, Prentice Hal ebra; P.B.Bhattacharya, S.K. Ja .S. Hall, S.R. Knight, H.M. Publi bra & theory of equations: Ch	Attributes etric, Hermitian and skew-Hermitian matrices, Elem lence of row and columns matrices, consistence s and eigen vectors, Cayley Hamilton theorem a s and coefficient of general polynomial equation ule of sign, solution of cubic(Cardon Method), bique estructures, Definition of a group with examples and a groups estructures, Definition of a group with examples and a groups ation into real and imaginary parts, Exponential, dire ogarithmic function, Gregory's series, Summation of s contribution , 1 Low contribution nent Physics/UGCGATEmatrix.pdf w6Xc Ltd., New Delhi. I of India Pvt. Ltd. New Delhi. in & S .R Nagpaul, Cambridge University Press, Indiar cations. andrika Prasad, Pothishala Private Ltd Allahabad.	PO1 nentary and its in one adratic simple simple act and series A b c t adtion.	PO2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO3         1         1         2         2         2         2	P04	PO5 2 2 2 2 2	PO6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

1. Nam	e of the Departmen	t: MATHEMATICS								
2. Cour	se Name	CALCULUS		L		٦	Г		Р	
3. Cour	se Code	MT122		3		1	L		0	
4. Type	of Course (use tick	mark)		Core ( √ )		DE	()		FC (	)
5. Pre-	requisite (if any)	10+2	6. Frequency (use tick marks) Even ()	Odd (√)		Either	Sem ( )	) E'	very Se	m()
7. Tota	Number of Lecture	s, Tutorials, Practicals								
	Lectu	ures = 30	Tutorials = 10			Practic	al = Nil			
8. COUF	SE OBJECTIVES: Th	e course is aimed to develop	the skills in mathematics specially in calculus whic	h is necessary	for gro	ooming	them in	nto suc	cessful	science
graduate	. The topics introduc	ced will serve as basic tools for	specialized studies in science field.			0				
9. COUR	SE OUTCOMES (CO)	):								
After the	successful course c	ompletion, learners will develo	op following attributes:							
COUR	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Take limits of algebraic and tri (positive or negative) infinity,	gonometric expressions of the form 0/0 (that simplif imits that don't exist and limits that are finite.	y), non-zero nu	umber	over 0, i	ncluding	g limits	that go	to
	CO2	Use and understand the limit of continuity and consequences.	lefinitions of derivative for polynomial, rational and	some trigonom	netric fi	unction	s; under	stand d	efinitio	n of
	CO3	Differentiate all polynomial, ra differentiation and compute h	tional, radical, and trigonometric functions and com gher order derivatives.	positions of the	ose fun	octions;	perform	implic	it	
	<u> </u>	Compute indefinite integrals a	nd find anti-derivatives, including finding constants	of integration g	viven in	itial cor	ditions.			
	04	Apply the definite integral to a	amente area batucan two aurus, volumos of solide		orela		rface or	oo for a	fo.co.	of
	CO5	revolution and work problems		orrevolutions	, arc lei	ngth, su	nace an		unaces	, 01
10. Uni	t wise detailed cont	tent	multiple for the state of the s							
Unit-1		Number of lectures = 08	litie of the unit:	Chairman	C					
-o definit	tion of the limit of a	Tunction, Continuous function	s and classification of discontinuities, Differentiabili	ty, Chain rule o	of alffer	entiabli	Ity, Rolle	e's theo	orem, F	irst and
second n		Number of lestures -08	Title of the weite				lieoren	1.		
Unit-2	e officientions (in Te	Number of lectures =08	litie of the unit:							
Expansio	n of functions (in Ta	ylor's and Maclaurin's series),	ndeterminate forms, Partial differentiation and Eule	er's theorem, Ja	icobian	is.				
Unit-3	1.1.1.1.16.6	Number of lectures = 08	litle of the unit:							
Maxima a	and Minima (for fun	ctions of two variables), Tange	nts and normals (polar form only), Curvature, Envelo	pes and evolut	tes.					
Unit-4		Number of lectures = 08	Title of the unit:							
Asympto formulae	tes, Tests for conca . Beta and Gamma f	vity and convexity, Points of functions.	nflexion, Multiple points, Tracing of curves in Cart	esian and pola	ir co-o	rdinates	. Integr	al Calc	ulus Re	duction
Unit-5	,	Number of lectures = 08	Title of the unit:							
Qudratur Liouville'	e, Rectification, Vo s integral formulae.	lumes and surfaces of solids	of revolution, Pappus theorem, Double and triple	integrals, Char	nge of	order o	of integr	ation,	Dirichle	et's and
11. CO-P	0 mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
C01	Take limits of algeb	vraic and trigonometric express	ions of the form 0/0 (that simplify), non-zero numbe	er over 3	1	1		2	1	1
CO2	Use and understand	d the limit definitions of deriva	tive for polynomial, rational and some trigonometric	3 3	1	1		2	1	1
	functions; understa	and definition of continuity and	consequences.		-	_		_		
СОЗ	Differentiate all pol functions; perform	lynomial, rational, radical, and implicit differentiation and cor	trigonometric functions and compositions of those npute higher order derivatives.	3	1	2		2	1	1
CO4	Compute indefinite conditions.	e integrals and find anti-derivat	ives, including finding constants of integration given	initial 3	1	2		2	1	1
CO5	Apply the definite i length, surface area	ntegral to compute area betwe a for surfaces of revolution and	en two curves, volumes of solids of revolutions, arc work problems.	2	1	2		2	1	1
	3 St	trong contribution, 2 Average	contribution , 1 Low contribution							
12. Brie	of description of self	f-learning / E-learning compon	ent							
1.	https://nptel.ac.ir	/content/storage2/courses/11	1101109/W3A1.pdf							
2.	http://www.cdee	p.iitb.ac.in/webpage_data/npt	el/Core%20Science/Mathematics%20I/Course home	e 27.2.html						
3.	https://nptel.ac.ir	n/content/storage2/nptel_data	3/html/mhrd/ict/text/111105121/lec19.pdf	-						
4.	https://nptel.ac.ir	n/content/storage2/nptel_data	3/html/mhrd/ict/text/111101109/lec35.pdf							
5.	https://www.you	tube.com/watch?v=t4T0ru5LW	aO							
13. Bool	s recommended:									
1.	Gabriel Kiambaue	r, Mathematical Analysis, Marc	el Dekkar, Inc. New York,							
2.	Murray R. Spiegel	, Theory & Problem of Advance	d Calculus, Schaum's outline series, Schaum's Publis	shing Co., New	York					
3.	N.Piskunov, Differ	ential & Integral Calculus, Pead	e publishers, Moscow.							
4.	P.K.Jain & S.K. Kau	ushik, An Introduction to Real A	nalysis, S.Chand & Co. New Delhi							
5.	Differential Calcul	us by Gorakh Prasad, Seventee	nth Edition, Reprint 2007,							
6.	Integral Calculus b	oy Gorakh Prasad, Fourteenth I	dition, Reprint 2007, Pothishala Private Limited, Alla	ahabad.						

6. Integral Calculus by Gorakh Prasad, Fourteenth Edition, Reprint 2007, Pothishala Private Limited, Allahabad.

1. Nam	me of the Department: PHYSICS												
2. Cour	se Name	MECHANICS LAB					L		1	Г		Р	
3. Cour	se Code	PY107					0		(	)		6	
4. Type	of Course (use tick	mark)				Co	re ( √ )		DE	()		FC (	)
5. Pre-	requisite (if any)	10+2 with Physics	6.	Frequency (use tick marks)	Even ( )	0	dd (√)		Either	Sem (	) E	very Se	.m()
7. Tota	I Number of Lecture	es, Tutorials, Practicals											
	Lect	ures = 00		Tutorials = 00	<u> </u>				Practic	al = 10			
to its the	oreical course.	e purpose of this undergradua	te coi	urse is to impart practical know	vledge/measure	ements	n mecha	anics tr	nrough	differen	t expei	riments	related
9. COUR After the	SE OUTCOMES (CO successful course o	): ompletion. learners will devel	op fo	llowina attributes:									
COUR	SE OUTCOME (CO)			Α	TTRIBUTES								
	CO1	Determine elastic properties c	of rigio	d materials.									
	CO2	Demonstrate capillary rise and	l dete	ermine physical properties of w	ater.								
	CO3	Demonstrate simple harmonic	moti	ion through damped and force	d oscillators and	d measu	re relate	d quan	itities.				
10.0.1	CO4	Demonstrate uses of Sextant I	by me	easuring dimensions of a given	object.								
10. Syll	abus												
Exp – 0	1	Determination of Modulus of	Rigid	dity of the material by Statistica	l method.								
Exp – 0	2	Determination of Young's Mo	dulus	s of the Material by Flexure Me	thod.								
Exp - 0	3	Determination of Coefficient	of Vis	scosity of Water.									
Exp - 0	-	Determination of Surface Ten	sion	of water.									
Exp = 0		Determination of Acceleratio	n aue	C Mains with the help of coper	uium.								
Exp = 0	7	Measurement of height of a t		c. Mains with the help of sonor	leter.								
Exp = 0	0	Study of oscillations of mass i	under	r different combination of carir									
Exp = 0	o 0	To find the capacity of a cond	ancer	r with electrical vibrator using	$\frac{g_{3}}{2}$	<u>а па</u>							
Exp 0	0	To study of moment of inertia	ense a of a	hody with the help of inertia t	ahle	5112.							
11 CO-P	0 manning	ro study of moment of mertic		body with the help of merida t									
COs			∆ttrik	hutes			PO1	PO2	PO3	PO4	PO5	PO6	PO7
				Sules			101	102	105	104	POS	100	107
CO1	Determine elastic p	properties of rigid materials.					3	2	2		3	1	3
CO2	Demonstrate capill	ary rise and determine physica	l proj	perties of water.			3	2	2		3	1	3
СОЗ	Demonstrate simp quantities.	le harmonic motion throug	n daı	mped and forced oscillators	and measure	related	3	2	2		3	1	3
CO4	<b>CO4</b> Demonstrate uses of Sextant by measuring dimensions of a given object.							2	2		3	1	3
	3 S	trong contribution, 2 Average	contr	ribution , 1 Low contribution									
12. Brie	ef description of sel	f-learning / E-learning compor	nent										
1.	https://www.phy	we.com/en/physics/university,	/mecl	hanics/									
2.	www.youtube.co	M itanaa blaganat aam (2016/08/		anning by r k shulda and a srive	actoria adf dorr	alaad bt							
3. 4.	http://www.rossi	nazirullah.com/BSc/BSc.html.	mecr	hanics-by-r-k-shukia-and-a-sriva	istava-por-dowr	nioad.nt	mi						
13. Bool	ks recommended:												
1.	Practical Physics.	by R. K. Shukla, New Age Interi	natior	nal Private Limited; Third editio	n.								
2.	B.Sc.Practical Phy	sics by Harnam Singh and Hem	me, S	S. Chand.									
3.	B. Sc. Practical Ph	ysics by CL Arora, S Chand & Co	ompa	any									
4.	<ul> <li>Practical Physics by Kumar P.R.S., Prentice Hall India Learning Private Limited</li> </ul>												

1. Nam	e of the Departmen	t: CHEMISTRY								
2. Cour	se Name	CHEMISTRY PRACTICAL – I		L			Г		Р	
3. Cour	se Code	CH118		0		(	2	_	4	
4. Type	e of Course (use tick	mark)		Core ( √ )		DE	<u>()</u>	<u> </u>	FC (	)
5. Pre-	requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ()	Odd (V)		Either	Sem (	) Ev	very Sei	m()
7. Tota	I Number of Lecture	es, Tutoriais, Practicais	Tutorials = 00			Dractic	al = 10			
8 0011	RSE OBJECTIVES: Th	ne nurnose of the undergradu	ate chemistry Lab program at the Integral University	sity is to provi	de the	key kn		hase :	and lah	oratory
resource	s to prepare student	ts for careers as professionals i	n the field of chemistry, and various other industries	s.	ac the	KCY KIN	Juicage	. buse t		oratory
9. COUF	RSE OUTCOMES (CO)	):								
After the	e successful course c	ompletion, learners will develo	op following attributes:							
COUR	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Understand the basic analytica	al and technical skills and technical skills to work effe	ectively in the v	various	fields of	f chemis	stry		
	CO2	Understand the basic titration	methods and technical skills to work in the different	t fields of chem	nistry.					
	CO3	Able to detect presence of ele	ments and functional group in organic compounds.							
	CO4	Remember to keep records of	all performed experiments in the manner which is r	equired in labo	ratory					
10. Syl	labus									
Ехр — О	1	Preparation of standard solut	ion related to normality & molarity.							
Ехр — О	2	Preparation of buffer solution	n, pH measurement.							
Ехр — О	3	Acid - base titration.								
Ехр — О	94	Oxidation-reduction (redox) t	itrations. a) To determine the strength of oxalic acid							
Exp – 0	5	To determine the strength of	potassium permanganate solution by using sodium	thiosulphate so	olution.	lodome	etrically.			
Ехр — О	6	To determine the strength of	given copper sulphate solution by using sodium thic	osulphate solut	ion. loc	lometric	cally.			
Exp – 0	17	Complexometric titrations. a) with EDTA.	To estimate the concentration of calcium ions with	EDTA. b) To es	timate	the con	centratio	on of m	agnesiu	um ions
Ехр — О	8	Detection of element present	in the given organic compounds.							
Exp – 0	9	Detection of functional group g) Amine h) Amide	present in the given organic compounds. a) Carbox	ylic b) Phenolic	c) Alco	holic d)	Aldehy	dic e) Ke	etonic f	) Ester
Exp – 1	.0	To determine the strength of	ferrous ammonium sulphate (Mohr's salt) solution b	by using extern	al indic	ator.				
11. CO-P	O mapping									
COs		-	Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	Understand the ba fields of chemistry	asic analytical and technical sl	kills and technical skills to work effectively in the	various 3	2	2		3	1	3
CO2	Understand the bas	sic titration methods and techr	nical skills to work in the different fields of chemistry	<i>.</i> 3	2	2		3	1	3
CO3	Able to detect pres	ence of elements and function	al group in organic compounds.	3	2	2		3	1	3
CO4	Remember to keep	records of all performed expe	riments in the manner which is required in laborato	ry <b>3</b>	2	2		3	1	3
CO5	Analyze the import	ance of personal safety and ca	re of equipment's and chemicals.	2	2	1		1		3
	3 S	trong contribution, 2 Average	contribution , 1 Low contribution							
12. Brie	ef description of self	f-learning / E-learning compor	ient							
1.	https://www.fand	dm.edu/uploads/files/7964570	1812579729-genchem-reference-for-web.pdf							
2.	http://file.akfarm	ahadhika.ac.id/E-BOOK/12-121	L3-akfarmahad-16-1-vogelqu-d.pdf	16						
3. 1	https://faculty.ps	au.edu.sa/filedownload/doc-6-	·pdt-tub110et2e1e1ae119cbact71dd17732-original.p 3959/practical-chemistry	pdf						
4. 13. Boo	ks recommended									
1.	Advance Practical	Chemistry: Jagdamba Singh. L.	D.S Yadav, Jaya Singh, I.R. Siddiqui, PragatiEdition.							
2.	Practical Organic	Chemistry, A.I.Vogel.	. ,							
3.	Practical Physical	Chemistry: B. Viswanathan and	l P.S.Raghavan.							

4. Experimental Inorganic Chemistry – W.G.Palmer.

1. Nam	e of the Departmer	t: ENVIRONMENTAL SCIENCE								
2. Cour	se Name	FUNDAMENTAL OF ENVIRO	NMENTAL SCIENCE	L		٦	•		Р	
3. Cour	se Code	ES115		3		1	<u>_</u>		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 S	Sem (	) E <sup>.</sup>	very Se	m()
7. Tota	Number of Lecture	es, Tutorials, Practicals								
	Lectu	ures = 30	Tutorials = 10			Practica	al = Nil			
8. COUR	SE OBJECTIVES: Th	e main objective of this course	e is to study various types of pollutants, their source	es, control and	d their	harmful	effects	on livi	ng spec	cies and
environm	nent.									
9. COUR	SE OUTCOMES (CO	):								
After the	successful course c	ompletion, learners will develo	op following attributes:							
COUR	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Evaluate different types of air and Ozone Layer Depletion. Ox	pollutants, their harmful effects on living and non liv kygen, nitrogen and carbon cycle.	ing species; S	tudy of	Global	Warmin	ıg, Gree	en Hous	e Effect
	CO2	Analyze the various factors of	water quality assessment parameters, water pollutan	nts and Waste	water t	treatme	nt proc	esses.		
	CO3	Understand the soil composition	on, soil pollutants, their control, National and Interna	ational Standa	rds.					
	CO4	Evaluate the various types was	ste and their toxicity aspects and management.							
	CO5	Understand the sources of hea	avy metals and their related toxicity.							
10. Uni	t wise detailed cont	tent								
Unit-1		Number of lectures = 08	Title of the unit: AIR POLLUTANTS							
CO, CO2, standard	ozone, CFC; ozone	depletion; global warming & N	IOx; Harmful effects of pollutants on living and non-l	living species;	Oxyger	n, nitrog	gen and	CO2 cy	/cle, Air	<sup>.</sup> quality
Linit-2	, briopar gas trageay	Number of lectures =08	Title of the unit: OUALITY PARAMETERS AND WAT		N					
Water ou	iality narameters: ii	nternational and national stan	dards: Water quality assessment. Water pollution a	nd its control	· water	nolluta	nts: to	vicity V	Vater s	ampling
techniqu	es. Preservation.				, water	ponuta	1113, 107	vicity. v	vater 5	amping
Unit-3		Number of lectures = 08	Title of the unit: AGRICULTURAL POLLUTANTS							
Fertilizer	s, insecticides, pesti	cides, plastics, toxic metals, dy	es, surfactants and their toxicity; international and na	ational standa	rds; cor	ntrol.				
Unit-4		Number of lectures = 08	Title of the unit: INDUSTRIAL WASTE							
Industria	l waste: toxic aspect	ts, management and disposal. F	Radioactive, municipal, and biomedical waste – toxici	ty hazards, m	anagem	ient and	l dispos	al.		
Unit-5		Number of lectures = 08	Title of the unit: CHEMICAL TOXICOLOGY							
Toxic che	micals in the Enviro	nment, biochemical effects of	Mercury and Lead. Carcinogens. Vector-borne disease	e. water-born	e diseas	se. Pollu	tion an	d Public	: Health	ı issues.
		-	,							
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Evaluate different	types of air pollutants, their	harmful effects on living and nonliving species; Stu	udy of						
CO1	Global Warming, G	reen House Effect and Ozone L	ayer Depletion. Oxygen, nitrogen and carbon cycle.	Ý 3	2	3	3	3	3	2
<u> </u>	Analyze the variou	is factors of water quality ass	sessment parameters, water pollutants and Waste	water	2	2	2	2	2	2
02	treatment processe	es.		3	2	3	2	2	3	2
СО3	Understand the soi	l composition, soil pollutants, t	heir control, National and International Standards.	3	2	3	3	3	3	2
CO4	Evaluate the variou	is types waste and their toxicity	aspects and management.	3	2	3	3	3	3	2
CO5	Understand the sou	urces of heavy metals and their	related toxicity.	3	2	3	3	2	3	2
	3 5	trong contribution, 2 Average	contribution , 1 Low contribution	•						
12. Brie	of description of sel	f-learning / E-learning compon	ent							
1.	https://www.brita	annica.com/science/pollution-e	environment							
2.	https://www.lives	science.com/22728-pollution-fa	acts.html							
3.	https://www.hind	dawi.com/journals/jeph/2012/3	341637/							
4.	https://www.con	serve-energy-future.com/cause	es-and-effects-of-environmental-pollution.php							
13. Bool	ks recommended:									
1.	Environmental Ch	emistry Manahan, Stanley E, 2	004, Taylor & Francis Ltd							
2.	Basic Concepts of	Environmental Chemistry, Des	ley W. Connell, 1 edition, CRC-Press							
3.	Environmental Ch	emistry: A Global Perspective,	Gary W. Vanloon Stephen J. Duffy, Oxford Univ Pr (Sc	d)						
4.	Introduction To E	nvironmental Chemistry, Reid,	Brian J. Blackwell Science Ltd							
5.	Chemistry of the I	Environment, Thomas G. Spiro,	William M. Stigliani, 2nd Edition, Prentice Hall public	ation.						
6.	Environmental Ch	iemistry, vanioon, Gary W Duff	y, stephen J., Oxford Higher Education publication							

1. Nam	ne of the Department: PHYSICS										
2. Cour	rse Name	PHYSICAL OPTICS AND LASE	RS	L		1	Г		Р		
3. Cour	rse Code	PY108		3		-	1		0		
4. Туре	e of Course (use tick	mark)		Core ( √ )		DE	()		FC (	)	
5. Pre-	requisite (if any)	10+2 with Physics	6. Frequency (use tick marks) Even ( √ )	Odd (	)	Either	Sem ( )	) E'	very Se	m()	
7. Tota	l Number of Lecture	es, Tutorials, Practicals									
	Lectu	ures = 30	Tutorials = 10			Practic	al = Nil				
8. COUF	RSE OBJECTIVES: This	s course provides students with	n a working knowledge of optical physics, including d	liffraction, pol	arizatio	n and la	ser phys	ics			
9. COUF	RSE OUTCOMES (CO)	):									
After the	e successful course c	ompletion, learners will devel	op following attributes:								
COUR	SE OUTCOME (CO)		ATTRIBUTES								
	CO1	The student will be introduced	to the design of optical systems and aberrations, w	ith an emphas	is on in	hage for	ming sys	tems.			
	CO2	be able to determine the wave	elengths of light sources using concepts of interferen	knowledge wi	thin int	errerom	etry and	coner	ence. I	ney will	
	CO3	Students will be able to dete instruments.	rmine the wavelength of light using the phenome	ena of diffract	ion and	d Resolv	ving pov	ver of	various	optical	
	CO4	Students will learn to analyse	the polarization in optical systems and will be able to	o represent po	larized	light usi	ng Jones	forma	lism.		
	CO5	The students will be introduce	d to lasers. They will be able to explain various appli	cations and w	orking o	of differe	ent type	s of las	ers.		
10. Uni	it wise detailed cont	tent									
Unit-1		Number of lectures = 08	Title of the unit: GEOMETRICAL OPTICS AND NAT	FURE OF LIGH	Г						
Fermat's	principle and its a	pplication to obtain laws of	eflection and refraction, cardinal points of an op	tical system,	chroma	tic and	spherica	al aber	rations	, coma,	
astigmat	ism. Idea of wave, e	lectromagnetic and quantum t	neory of light, Definition and properties of wave from	nt, Huygens' Pi	rinciple						
Unit-2		Number of lectures =08	Title of the unit: INTERFERENCE OF LIGHT								
The prin	ciple of superpositio	on, two-slit interference, coher	ence requirement for the sources, optical path reta	ardations, late	ral shift	of fring	ge, thin t	films, a	pplicat	ions for	
precisior	measurements for	displacements, Haidinger frin	ges: Fringes of equal inclination, Michelson interfe	rometer, its	applica	tion for	precisio	nal de	termina	ation of	
wavelen	gth, wavelength diffe	erence, Newton's rings, Fabry-	Perrot interferometer and etalon.								
Unit-3		Number of lectures = 08	Title of the unit: DIFFRACTION								
Fresnel	half-period zones, p	plates, straight edge, rectiline	ar propagation, Fraunhoffer diffraction: diffractio	n at a slit, h	alf-peri	od zone	es, the i	ntensit	y distr	ibution,	
diffractic	on at a circular aper	ture and a circular disc, resolu	ition of images, Rayleigh criterion, resolving power	of telescope	and mi	croscop	ic systen	ns, refl	ection	grating,	
Resolving	g power of a grating	and comparison with resolving	powers of prism.								
Unit-4	afrantian in uniquin	Number of lectures = 08	Title of the unit: POLARIZATION	Amphusia of m		ما انمامه	Ontinal				
ovnlanat	ion Half shade and I	n crystals, Nicol prism, polaro Biguartz polarimeters Matrix r	as and relatuation plates, Babinet's compensator,	nolarizers re	tardati	u ligiit, an nlate	optical s and ro	dClivily	anu F	resners	
Unit-5		Number of lectures = 08	Title of the unit: LASERS	1 polarizers, re	uruuu		5 0110 10				
Purity of	a special line, coh	erence length and coherence	time, spatial coherence of a source. Einstein's A	and B coeffic	ients.	pontan	eous an	d indu	ced em	issions.	
condition	ns for laser action, p	opulation inversion, 3 and 4 Le	vel Systems (Ruby, Nd:YAG, CO2, liquid dye and He-I	Ne laser), Prop	erties a	ind appl	ications	of lase	r.	,	
11. CO-P	O mapping	•									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
	The student will be	introduced to the design of o	ntical systems and aberrations, with an emphasis on	image							
CO1	forming systems.	nort of the course will give	the student of thereway fundamental languages	3	1			2		1	
CO2	interferometry and concepts of interfe	d coherence. They will be at rence.	le to determine the wavelengths of light sources	s using <b>3</b>	2			2		1	
CO3	Students will be ab	le to determine the wavelengt ptical instruments.	h of light using the phenomena of diffraction and Re	solving 3	1			2	1	3	
CO4	Students will learn using Jones formali	to analyse the polarization in o	pptical systems and will be able to represent polarize	ed light 3	1			2		1	
COS The students will be introduced to lasers. They will be able to explain various applications and working of 2 1									1	3	
	3 St	trong contribution. 2 Average	contribution , 1 Low contribution	I	1	1	L L			L	
12. Brie	ef description of self	f-learning / E-learning compor	ent								
1.	http://textofvideo	onptel.ac.in/104105033/lec39	pdf								
2.	http://nptel.ac.in/	/courses/104101006/download	ds/lecture-notes/mod10/lec3.pdf								
3.	https://www.vou	tube.com/watch?v=1iRo5fTg0I	Υ								
13. Boo	ks recommended:	, ,									
1.	K. Ghatak, "Physic	cal Optics" (Tata McGrew Hill).									
2.	D. P. Khandelwal;	"Optics and Atomic Physics" (H	limalaya, Publishing House, Bombay, 1988).								
3.	F. Smith and J.H T	homson; "Manchester Physics	sries; Optics" (English Language Book Society and Jo	hn Wiley, 197	7).						
4.	Born and Wolf; "C	Optics" (University of Rochester	, New York)								
5.	K. D. Moltey; "Op	tics" (Oxford University Press).									
6.	Jenkins and White	e; "Fundamental of Optics" (Mo	:Graw-Hill).								
7.	Smith and Thoms	on; "Optics" (John Wiley and S	ons).								
8.	B.B. Laud; "Lasers	s" (New Age).									

1. Name	e of the Departmer	it: CHEMISTRY											
2. Cours	se Name	GENERAL CHEMISTRY-II		L		٦	Γ		Р				
3. Cours	se Code	CH119		3		1	L		0				
4. Type	of Course (use tick	mark)		Core ( √ )		DE	()		FC (	)			
5. Pre-r	equisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ( √ )	Odd ()		Either	Sem (	) E	very Se	m()			
7. Total	Number of Lecture	es, Tutorials, Practicals											
0.00110		ires = 30	Tutorials = 10			Practic	al = Nil						
8. COUR	SE OBJECTIVES: In	e purpose of this course is to le vide first law of thermodynamic	earn the structure and properties of ionic solids, sha	pes & geomet	ries of	molecul	es and	their st	ereocne	emistry.			
After the	successful course c	,. ompletion, learners will develo	op following attributes:										
COURS	SE OUTCOME (CO)		ATTRIBUTES										
	CO1	Analyze the properties, structu	re of ionic solids by applying Born-Haber cycle, Fajar	n's rule etc.									
	CO2	Predict the geometry and shap	be of molecules by applying VB & VSEPR theories. Pre	edict the prope	erties of	f moleci	ules by a	applyin	g MO th	neory			
	CO3	Interpret the reactivity and sta	bility of an organic molecule based on structure, incl	luding conforn	nation a	and ster	eochen	nistry.					
	CO4	Able to prepare different type	s of colloids.										
	CO5 Understand the concepts of thermodynamics, different thermodynamic quantities such as heat and work and their measurements.												
10. Unit	Init wise detailed content           Init wise detailed content           Image: Second state												
Unit-1		Number of lectures = 08	Title of the unit: IONIC SOLIDS				1.0			1			
energy ar	ctures, radius ratio id solubility of ionic	effect and coordination numbe solids, polarizing power and po	er, limitation of radius ratio rule, lattice defects, semi olarisability of ions, Fajan's rule. Metallic bond-free e	lectron, valen	ttice er ce bond	nergy an d and ba	id Born- and theo	Haber ories.	cycle, s	olvation			
Unit-2		Number of lectures =08	Title of the unit: CHEMICAL BONDING:										
Covalent	Bond; Valence bor	nd theory and its limitations,	directional characteristics of covalent bond, variou	us types of hy	bridiza	tion and	d shape	es of si	mple in	organic			
molecule	s and ions. Valence	shell electron pair repulsion (	VSEPR) theory to NH3, H3O+, SF4, CIF3, ICI2- and H	120. MO theor	y, hom	onuclea	ar and h	eteron	uclear (	CO and			
NO) diato	micmolecules, bon	d strength and bond energy, pe	ercentage ionic character from dipole moment and e	lectronegativit	y differ	rence.							
Unit-3	of icomorism Onti	Number of lectures = 08	distancement, chiral and achiral moscules with tw		SANIC			figurat	ion cor	auoncos			
rules, D 8	L and R & S system	is of nomenclature. Geometrica	al isomerism - E & Z system of nomenclature, in alker	nes oximes and	d cyclor	oropane	deriva	tive con	npound	is.			
Unit-4		Number of lectures = 08	Title of the unit: COLLOIDAL STATE										
Definition	of colloids, classif	ication of colloids. Sols: prope	rties -kinetic, optical and electrical; stability of collo	oids, protective	ecolloid	ls, Hard	y- Schu	lze rule	, gold r	າumber.			
Emulsion:	s: types of emulsion	is, preparation. Gels: classificat	Ion, preparation and properties										
First law	of thermodynamic	rs: statement definition of in	ternal energy and enthalphy. Heat canacity. Heat	t canacities at	t const	ant vol	ume ar	d nres	sure ar	nd their			
relationsh	nip. Joule-Thomson	coefficient and inversion ter	nperature. Calculation of w,q, dU & dH for the e	expansion of i	deal ga	ises und	der isot	hermal	and a	diabatic			
condition	s for reversible pro	cess. Problems.		·									
11. CO-PO	O mapping												
COs		1	Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07			
CO1	Analyze the proper	ties, structure of ionic solids by	applying Born-Haber cycle, Fajan's rule etc.	3	2	1	1	2	2	3			
603	Predict the geomet	ry and shape of molecules by a	pplying VB & VSEPR theories. Predict the properties	of 3	1	1	1	2	2	3			
02	molecules by apply	ing MO theory	molecule based on structure, including conformation	a and	_	_	_	_	_				
CO3	stereochemistry.	vity and stability of an organic	molecule based on structure, including conformation	3 <b>3</b>	2	1	1	1	1	3			
CO4	Able to prepare dif	ferent types of colloids.		3	1	2	1	1	3	3			
COF	Understand the co	ncepts of thermodynamics, diff	erent thermodynamic quantities such as heat and w	ork 3	2	2	1	2	2	3			
05	and their measurer	ments.		Ĵ	-	-		-	-				
12 Dr:0	3 S	trong contribution, 2 Average	contribution , 1 Low contribution										
12. brie	tos://www.voutub	e.com/watch2v=082d8ailS5V	ent										
2. h	ttps://ocw.mit.edu/	high-school/chemistry/exam-r	prep/structure-of-matter/chemical-bonding/										
3. ht	ttps://nptel.ac.in/co	ourses/104103110/											
4. h	ttps://nptel.ac.in/co	ourses/104103023/											
5. h	ttps://nptel.ac.in/co	ourses/104105086/											
1 No	w Concise Inorgani	Chemistry by LD Lee Edition	III Compton Printing Ltd London										
2. Pri	nciples of Inorganic	Chemistry by HR Puri. R. Sharr	na & S.P. Jauhar, Vishal Publications Jalandhar.										
3. Ba	sic Inorganic Chemi	stry F.A. Cotton and G. Willkins	on III Edition.										
4. Or	ganic Chemistry, S.M	M. Mukherji, S.P. Singh and R.P	. Kapoor, Wiley Eastern Ltd. (New Age International).										
5. Mo	odern Organic Chem	nistry, M. K. Jain and S.C. Sharm	na, Vishal Publications Jalandhar.										
6. Ph	ysical Chemistry, P.	W. Atkins, Oxford University Pr	ess.										

1. Name	e of the Departmer	it: MATHEMATICS								
2. Cours	se Name	VECTOR ANALYSIS AND GEO	METRY	L			Г		Р	
3. Cours	se Code	MT123		3			1		0	
4. Type	of Course (use tick	mark)		Core ( √ )		DE	()		FC (	)
5. Pre-r	equisite (if any)	10+2	6. Frequency (use tick marks) Even ( √ )	Odd ( )		Either	Sem (	) E	very Se	m()
7. Total	Number of Lecture	es, Tutorials, Practicals								
	Lectu	ures = 30	Tutorials = 10			Practic	al = Nil			
8. COUR	SE OBJECTIVES: Th	e purpose of this undergraduate	ate course is to impart basic and key knowledge c	of vector analy	sis and	geome	try. By	using t	he prin	cipal of
applied m	to their respective	ain quantitative relations which	are very important for higher studies. After succe	sstully comple	tion of	course,	the stu	dent w	iii adie	explore
9. COUR										
After the	successful course c	completion, learners will develo	op following attributes:							
COURS	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Find and interpret Scalar & ve divergence and curl for a funct	ector product of three vectors, Product of four vec ion at a given point.	tors, Reciproc	al Vecto	ors, Vec	tor Diff	erentia	tion, g	radient
	CO2	Evaluate and Interpret line, su theorem.	rface and volume integrals. Evaluate integrals by ι	using Green's t	heorem	۱, Stoke	s theor	em, Ga	uss Dive	ergence
	CO3	Describe the General equation	of second degree, System of conics, Confocal conic	s, Polar equation	on of a	conic.				
	CO4	Find and Interpret the various	forms of the equations of a line, Plane, Sphere, Con	e and Cylinder.						
	CO5	Find the Central Conicolds, Par	aboliods, Plane sections of conicolds, reduction of	second degree	equation	ons.				
10. Unit	wise detailed con	tent								
Unit-1		Number of lectures = 08	Title of the unit:							
Scalar & v	ector product of th	ree vectors. Product of four ve	ctors. Reciprocal Vectors. Vector Differentiation. Gra	adient, Diverge	nce, Cu	iri.				
Unit-2		Number of lectures =08	Title of the unit:							
Vector int	egration. Line integ	gral, Surface integral, Volume ir	itegral, Gauss divergence theorem, Stokes theorem,	, Greens theore	em.					
Unit-3		Number of lectures = 08	Title of the unit:							
General e	quation of second (	degree. System of conics. Confo	ocal conics. Polar equation of a conic.							
Unit-4		Number of lectures = 08	Title of the unit:							
Straight L ,Cylinder	ine: Introduction,	Various forms of the equation	is of a line Plane: Introduction, particular planes,	various forms	of the	equatio	ons of a	a plane	, Spher	e, Cone
Unit-5		Number of lectures = 08	Title of the unit:							
Central Co	onicoids, Paraboloio	ds, Plane sections of conicoids,	reduction of second degree equations							
11. CO-PC	) mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Find and interpret Vector Differentiat	Scalar & vector product of this	ree vectors, Product of four vectors, Reciprocal V curl for a function at a given point.	/ectors, 3	1	1	1	2	3	3
CO2	Evaluate and Inter Stokes theorem, G	rpret line, surface and volume auss Divergence theorem.	e integrals. Evaluate integrals by using Green's th	eorem, 3	2	1	1	2	1	2
CO3	Describe the Gene conic.	eral equation of second degree	e, System of conics, Confocal conics, Polar equation	on of a <b>3</b>	2	1	1	2	1	1
CO4	Find and Interpret	the various forms of the equati	ons of a line, Plane, Sphere, Cone and Cylinder.	3	2	2	1	1	1	1
CO5	Find the Central Co	nicoids, Paraboliods, Plane sec	tions of conicoids, reduction of second degree equa	ations. 2	2	1	1	2	1	2
	3 S	trong contribution, 2 Average	contribution , 1 Low contribution		L					1
12. Brie	f description of sel	f-learning / E-learning compon	ent							
1.	https://www.you	tube.com/watch?v=SZCsFS9izf(	2							
2.	https://www.digi	mat.in/nptel/courses/video/11	1105122/L37.html							
3.	http://www.bhoj	virtualuniversity.com/slm/bsc1	_maths3.pdf							
4.	https://nptel.ac.ir	n/courses/104103023/								
13. Book	s recommended:	Voctor Analysis Schoum Publ	ishing Company, New York							
1. 2	Shanti Naravan	A Text Book of Vector Calculus	S Chand & Co New Delhi							
3.	Gorakh Prasad &	H.C.Gupta, Text Book on Coord	inate Geometry, Pothishala Private Ltd. Allahabad							
4.	R.J.T.Bill, Element	tary Treatise on coordinate Gec	metry of three Dimensions, Macmillan India Ltd.							
5.	P.K.Jain & Khalil A	hmad, A Text Book of two dim	ensions , Wiley Eastern Ltd.							
6.	N.Saran & R.S.Gu	pta, Analytical Geometry of thr	ee dimensions, Pothishala Private Ltd., Allahabad.							

1. Nam	e of the Departmer	t: MATHEMATICS									
2. Cour	se Name	DIFFERENTIAL EQUATIONS			L			Г		Р	
3. Cour	se Code	MT124			3			1		0	
4. Type	of Course (use tick	mark)			Core	(∨)	DE	()		FC (	)
5. Pre-	requisite (if any)	10+2	6.	Frequency (use tick marks) Even ( V )	Odd	( )	Either	Sem (	) E <sup>.</sup>	very Se	m ( )
7. Tota	l Number of Lecture	es, Tutorials, Practicals									
	Lectu	ıres = 30		Tutorials = 10			Practic	al = Nil			
8. COUR	SE OBJECTIVES: The	e purpose of this undergraduat	e cou	se is to impart basic and key knowledge of or	dinary and	partial di	ferential	equatio	ns and	their so	lutions.
Students	will be able to appl	y different methods to solve the	he dif	erent categories of equations. After successf	ul completi	on of cou	rse, the s	tudent	will be	able to	explore
subject ir	nto their respective	dimensions.									
9. COUR	SE OUTCOMES (CO)	): omplotion, logrners will double	on fol	owing attributor							
	SE OUTCOME (CO)	l	<i>op                                    </i>								
COOK		Students will gain an understa	nding	and formations of ordinany differential equa	tions Thou	will bo at	lo to coly		ions of	first or	dor and
	CO1	first degree homogeneous lir	nung near a	nd exact equations along with higher order	r linear diff	erential e		with co	nstant	coeffic	rients &
	001	homogeneous linear different	ial equ	lations.			quations	when ee	Jinstanit	coerne	
		Students will be able to under	erstar	d and solve differential equations of the fir	rst order bu	it not of	the first	degree,	Claira	ut's equ	uations,
	CO2	simultaneous linear different	ial eq	uations and linear differential equations of	the secon	d order	(including	the m	ethod (	of varia	ation of
		parameters).									
		Students will gain an underst	andin	g of formations of partial differential equat	ions and w	ill be abl	e to solv	e them	by dire	ct Inte	gration,
	CO3	Lagrange's method for first o	order	linear partial differential equations and first	st order no	nlinear I	partial dif	ferentia	l equa	tions in	ncluding
-		Charpit's method.									
	CO4	Students will create the own u	under	standing to classify of linear partial differenti	ial equation	s of seco	nd order	and to c	btain t	he solu	tions of
-	604	linear partial differential equa	tions	with constant coefficients of second order.							
	CO5	Students will gain an understa	andin	g of power series and series solution of diffe	erential equ	ations to	ordinary	point a	ina sing	gular po	oints by
10 110	t wise detailed con	ant									
Lipit 1	t wise detailed com	Number of lectures = 08	Tit	a of the unit:							
Formatio	n of a differential e	aguation (D.E.) Degree order	and s	olution of a D.E. Equations of first order and	l first doore	o · Sonai	ation of	variable	s moth	od Soli	ution of
homoger	neous equations, line	ear equations and exact equations	ons. I	inear differential equations with constant coefficients	officients. H	omogene	ous linea	differe	ntial eq	uations	
Unit-2		Number of lectures =08	Titl	of the unit:		Sinogene	ousinicu	untere	inclui eq	aations	
Different	ial equations of th	e first order but not of the	first o	legree Clairaut's equations and singular so	lutions Sin	ultaneo	ıs linear	differen	tial en	lations	Linear
different	ial equations of the	second order (including the me	ethod	of variation of parameters).		iuncore or	is mean	uncren	tion eq	actions	, Emeai
Unit-3		Number of lectures = 08	Titl	e of the unit:							
Partial di	fferential equations	, Order, Method of forming P	artial	Differential Equations, Solution of Equations	by Direct I	ntegratio	n, First o	der Line	ear Par	tial Diff	erential
Equation	s, Lagrange's Metho	d, First order non linear Partia	l diffe	rential equations, Charpit's method.			,				
Unit-4		Number of lectures = 08	Titl	e of the unit:							
Classifica	tion of linear partia	l differential equations of seco	nd or	der, linear partial differential equations with	constant co	efficients	of secon	d order,	Homo	geneou	s & non
homoger	neous partial differe	ntial equations.						,			
Unit-5	·	Number of lectures = 08	Titl	e of the unit:							
Power Se	eries, Solution of Dif	ferential Equations, Ordinary P	oint, S	ingular point, Frobenius Method.							
11. CO-P	O mapping										
COs			Attrib	utes	P	01 PO	2 PO3	PO4	PO5	PO6	PO7
<b>CO1</b>	Students will gain	an understanding and formation	ons of	ordinary differential equations .They will be	able to						
	solve equations of	first order and first degree ho	moge	neous, linear and exact equations, along with	h higher	3 2	2	1	1	1	2
	order linear differe	ntial equations with constant c	coeffic	ients & homogeneous linear differential equa	itions.						
CO2	Students will be al	ole to understand and solve d	iffere	ntial equations of the first order but not of	the first						
	degree, Clairaut's e	equations, simultaneous linear	diffe	rential equations and linear differential equa	itions of	3 1	2	1	1	1	2
-	the second order (i	ncluding the method of variation	on of	parameters).	ta ashis			-			
CO3	students will gain a	an understanding of formation	is of p	artial differential equations and will be able	to solve			1	1	1	2
	order poplinear pa	rtial differential equations inclu	uding	conder intear partial differential equations a			2	-	т	1	2
	Students will creat	the own understanding to	rlassi	v of linear partial differential equations of	second						
CO4	order and to obtain	the solutions of linear partial	diffe	rential equations with constant coefficients of	f second	3 1	2	1	1	1	2
	order.	· · · · · · · · · · · · · · · · · · ·				-			_	_	_
	Students will gain a	an understanding of power seri	es an	d series solution of differential equations for o	ordinary		-				_
CO5	point and singular	points by Frobenius method.				3 1	2	1	1	1	2
	3 S	trong contribution, 2 Average	contr	bution , 1 Low contribution							
12. Brie	ef description of sel	f-learning / E-learning compon	nent								
1.	https://nptel.ac.ir	n/courses/111107111/									
2.	https://www.digi	mat.in/nptel/courses/video/11	1105	093/L01.html							
3.	https://www.libra	ary.gscgandhinagar.in/assets/a	dmin/	images/MAT-102(UNIT1,2).pdf							
13. Bool	ks recommended:										
1.	Erwin Kreyszig, Ad	dvanced Engineering Mathema	tics, J	ohn Wiley & Sons Inc.,New York.							
2.	D.A. Murray, Intro	oductory Course on Differential	l Equa	tions, Orient Longman,(India) .							
3.	A.R.Forsyth, A Tre	atise on Differential Equations	, Mac	millan & Co. Ltd., London.							
4.	Ian N. Sneddon, E	lements of Partial Differential I	Equat	ons, McGraw-Hill Book Company.							
5.	D.G Zill, A First Co	urse In Differential Equations v	with N	Iodelling Applications, Cengage Learning							
6.	G.F Simmons Diffe	erential Equations with Applica	tions	and Historical Notes McGraw Hill Education; 2	2 edition						
7.	M.D Raisinghania	, Ordinary and Partial Different	ial Eq	uations, S. Chand Publishing, Twentieth edition	on.						

1. Nam	ame of the Department: PHYSICS													
2. Cour	rse Name	OPTICS LAB						_					Р	
3. Cour	rse Code	PY109						)		(	)		4	
4. Type	e of Course (use tick	mark)					Core	(√)		DE	( )		FC (	)
5. Pre-	requisite (if any)	10+2 with Physics	6.	Frequency (use tick ma	arks)	Even ( V )	Od	d ( ) t		Either	Sem (	) E	very Sei	m()
7. Tota	I Number of Lecture	es, Tutorials, Practicals												
0.0011		ires = 00		Tutorials =	00					Practic	al = 10			
8. COUR	oreical course	e purpose of this undergradua	te col	irse is to impart practica	I KNOWI	eage/measure	ements in	mechar	ncs tr	rougn	ameren	t exper	iments	related
		•												
After the	e successful course c	,. ompletion, learners will devel	op fol	lowing attributes:										
COUR	SE OUTCOME (CO)	• •		-	AT	TRIBUTES								
	CO1	Determine wavelength of ligh												
	CO2	Determine resolving power of	teles	cope and dispersive pow	er of pr	ism and gratir	g etc.							
	CO3	Demonstrate the use of lenses	and	measure the distance at	which t	wo lenses sho	uld be pla	ced in o	rder	to get d	esired f	ocal ler	igth.	
	CO4	Determine refractive index of	given	liquid and prism.										
10. Syl	labus													
Exp – 0	)1	Determination of wavelength	of so	dium light by Newton's R	lings.									
Exp – 0	12	Determination of Specific Rot	ation	of Sugar solution by half	shade	Polarimeter.								
Exp – 0	13	Determination of refractive ir	idex c	f a material of a prism by	y specti	ometer.								
Exp – 0	)4	Verification of Brewster's law												
Exp – 0	15	Determination of wavelength	of so	dium light of by using Fre	esnel's I	Biprism.								
Exp – 0	16	Determination of wavelength	of m	ercury light by using Plan	e diffra	ction grating.								
Exp – 0	17	To determine the dispersive	ower	of a plane transmission	diffract	ion grating.								
Exp – 0	8	To determine the resolving p	ower	of a telescope.										
Exp – 0	9	Determination of refractive in	idex c	f water using laser.										
		To determine the focal len	gth o	f combination of two ler	nses se	parated by a	distance c	with tl	he he	lp of a	nodal s	lide an	d to ve	rify the
Exp – 1	.0	formula: $\frac{1}{2} = \frac{1}{2} + \frac{1}{2} - \frac{x}{2}$	_•											
		$\mathbf{F}  \mathbf{f}_1  \mathbf{f}_2  \mathbf{f}_1 \mathbf{f}_2$	2											
11. CO-P	O mapping													
COs			Attrib	utes				PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Determine waveler	ngth of light.						3	2	2		3	1	3
CO2	Determine resolvin	g power of telescope and disp	ersive	power of prism and grat	ing etc.			3	2	2		3	1	3
CO3	Demonstrate the u	se of lenses and measure the	dista	nce at which two lenses	should	be placed in	order to	3	2	2		3	1	3
	get desired focal length.							-		_		-		-
CO4	Determine refractiv	ve index of given liquid and pri	sm.					3	2	2		3	1	3
	3 SI	trong contribution, 2 Average	contr	ibution , 1 Low contribut	tion									
12. Brie	ef description of self	f-learning / E-learning compor	ent											
1.	https://ov-au.vlabs	.ac.in/												
2.	http://vlab.amrita.	ac.iii/ edu/?sub=1&brcb=281												
13. Boo	ks recommended:													
1.	Practical Physics. by	y R. K. Shukla, New Age Interna	tiona	l Private Limited; Third e	dition.									
2.	B. Sc. Practical Phys	sics by Harnam Singh and Hem	me, S	Chand.										
3.	B. Sc. Practical Phys	sics by CL Arora, S Chand & Co	npan	/										
4.	Practical Physics by	Kumar P.R.S., Prentice Hall Ind	lia Le	arning Private Limited										

1. Nam	ne of the Departmer	nt: CHEMISTRY						-		
2. Cour	rse Name	CHEMISTRY PRACTICAL – II		L			г		Р	
3. Cour	rse Code	CH120		0			0		4	
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 ( V )	Odd (	)	Either	Sem (	) E	very Se	m ( )
7. Tota	I Number of Lecture	es, Tutorials, Practicals								
	Lectu	ures = 00	Tutorials = 00			Practic	al = 10			
8. COU	RSE OBJECTIVES: Th	ne purpose of the undergradu	ate chemistry Lab program at the Integral Univer	sity is to provi	de the	key kn	owledge	base	and lab	oratory
resource	es to prepare studen	ts for careers as professionals i	n the field of chemistry, and various other industrie	s.						
8.	COURSE OUTCOM	AES (CO):								
After the	e successful course c	ompletion, learners will devel	op following attributes:							
COUR	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Remember to keep records of	all performed experiments in themanner which is r	equired in labo	ratory.					
	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 differen	nt fields of chen	nistry.					
	CO4	Know about the principles of c	ualitative and quantitative analysis of inorganic mix	xtures.						
	CO5	Analyze the importance of per	sonal safety and care of equipment's and chemicals	5.						
10. Syl	labus	-								
Exp – C	01	To determine the solubility of	benzoic acid at different temperatures and to dete	ermine ∆H of th	e dissol	ution p	rocess.			
Exp – C	)2	To determine the enthalpy of using Born Haber Cycle.	solution of solid calcium chloride and calculate the	lattice energy	of calci	um chlo	ride fror	m its ei	nthalpy	data
Exp – C	)3	To determine the heat of solu	tion of KNO3 by solubility method.							
Exp – C	)4	Estimation of hardness of wat	ter by EDTA.							
Exp – C	)5	Determination of Rf values ar	d identification of organic compounds							
Exp – C	06	Separation of green leaf pign	nents (spinach leaves may be used.							
Exp – C	)7	Preparation of separation of 2 (40:60).	<ol> <li>4-dinitrophenylhydrazones of acetone, 2-butanor</li> </ol>	ne, hexan-2, an	d 3-one	using t	oluene a	and ligh	t petro	leum
Exp – C	08	Determination of Rf values ar nbutanol: acetic acid:water (4	d identification of organic compounds:Separation c 1:1:5), Spray reagent – ninhydrin.	of a mixture of	D, L – a	lanine,	glycine,	and L-L	eucine	using
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	Remember to keep	records of all performed expe	riments in the manner which is required in laborato	ory. <b>3</b>	1	2		3	1	2
CO2	Able to Evaluate w	ater quality parameters like ch	oride content and alkalinity.	3	1	1		2		2
СОЗ	Understand the ba	sic titration methods and techr	ical skills to work in the different fields of chemistry	y. <b>3</b>	1	2		1	1	2
CO4	Know about the pr	inciples of qualitative and quar	ititative analysis of inorganic mixtures.	3	1	1		1	1	2
CO5	Analyze the import	ance of personal safety and ca	re of equipment's and chemicals.	2	1	1		2	1	2
	3 S	trong contribution, 2 Average	contribution , 1 Low contribution							
12. Bri	ef description of sel	f-learning / E-learning compor	ient							
1.	https://www.fand	dm.edu/uploads/files/7964570	1812579729-genchem-reference-for-web.pdf							
2.	http://file.akfarm	ahadhika.ac.id/E-BOOK/12-12	13-akfarmahad-16-1-vogelqu-d.pdf							
3.	https://faculty.ps	au.edu.sa/filedownload/doc-6	pdf-f06110ef2e1e1ae119cbacf71dd17732-original.	pdf						
4.	https://www.ster	m.org.uk/resources/collection/	3959/practical-chemistry							
13. Boo	ks recommended:									
1.	Advance Practical	Chemistry: Jagdamba Singh, L	D.S Yadav, Jaya Singh, I.R. Siddiqui, PragatiEdition.							
2.	Practical Division	Chemistry: B. Viswanathan and	P S Raghavan							
5. 4	Experimental Inco	rganic Chemistry –W G Palmer	a i .s.nagilavali.							

1. Nam	1. Name of the Department: PHYSICS													
2. Cour	Course Name         CIRCUIT FUNDAMENTAL AND BASIC ELECTRONICS         L         T         P													
3. Cour	se Code	PY201				3		1	_		0			
4. Type	of Course (use tick	mark)				Core ( √ )		DE	( )		FC (	)		
5. Pre-	requisite (if any)	10+2 with Physics	6.	Frequency (use tick marks)	Even ( )	Odd (√)		Either S	Sem (	) Ev	very Sei	m ( )		
7. Tota	Number of Lecture	es, Tutorials, Practicals												
	Lectu	ıres = 30		Tutorials = 10				Practic	al = Nil					
8. COUR •	SE OBJECTIVES: To understand the	e basic concepts of Growth and	d deca	y of currents through inductive re	sistances, R	C and RLC and	explain	princip	le of op	eration	for var	ious AC		
•	bridges. To understand the	e basic concepts of various ser	ni-con	ductor material .										
•	To learn the conce	ept of BJT and feedback amplif	ier .											
•	To understand the	e basic concepts of oscillators	and op	o-amp .										
•	To understand the	e basic concepts of modulation	and le	earn the working of electronic inst	ruments.									
9. COUR	SE OUTCOMES (CO)	): 												
	SE OUTCOME (CO)	l	JP JUI	owing attributes.	DUTEC									
coon		Student will be able to solve o	omnle	x circuit using theorems	DUIES									
	CO1	Student will be able to measur	e the	passive component through bridge	es.									
	CO2	Student will be able to design Student will be able to differer	power htiate f	supply. the semiconductor.										
	CO3	Learn the signal amplification	throug	h BJT and how to increase the gain	n.									
	CO4Design the different oscillator circuits for various frequencies Student will be able to design the mathematical operation using op-amp.													
		Student will be able to design	uie ina	attlethatical operation using op-an	np.									
		1. Use of different modulation	and d	emodulation techniques used in a	nalog comr	nunication								
	<ul> <li>CO5</li> <li>Student will be able to</li> <li>1. Use of different modulation and demodulation techniques used in analog communication</li> <li>2. Identify and solve basic communication problems</li> </ul>													
		3. Measure the voltage, phase	and fr	requency using CRO										
10 11=	turing datailad agai	4. Measure the voltage, resista	ance, c	current and capacitance using mult	timeter.									
Linit-1	t wise detailed com	Number of lectures - 08	Ti+L	e of the unit: CIRCUIT EUNDAMEN										
Growth a	and decay of curren	its through inductive resistance	es ch	arging and discharging in R C and		uits Time cons	tant n	neasure	ment o	f hiøh r	esistan	ce A C		
Bridges, I	Maxwell's and Scher	rings Bridges, Wien Bridge, THE	VENIN	I, NORTON and superposition theo	prems and t	heir application	s	leasare			constant			
Unit-2		Number of lectures =08	Title	of the unit: THEORY OF SEMICON	NDUCTOR									
Semicono	ductors, intrinsic an	d extrinsic semiconductors, n	type a	and p-type semiconductors, unbia	ased diode	forward bias a	nd reve	rse bia	6 diodes	s, diode	e as a r	ectifier,		
diode cha	aracteristics, zener c	liode, avalanche and zener bre	akdow	n, power supplies, rectifier, bridge	e rectifier, c	apacitor input f	filter, vo	oltage re	egulatio	n,				
Unit-3		Number of lectures = 08	Title	of the unit: TRANSISTOR BASICS										
Bipolar tı divider bi and volta	ransistors, three do ias, DC load line, Ba ge gain B C, counte	ped regions, forward and reve sic AC equivalent circuits, low d amplifier gain frequency res	erse bi freque	as, DC alpha, DC beta transistor o ency model, small signal amplifier equivalent circuit at low mediur	curves. Trai rs, common m and high:	nsistor biasing ( collector ampl frequencies fee	circuits: ifiers, a odback	base k nd com	ias, em mon ba	itter bia Ise amp	as and olifiers,	voltage current		
Unit-4	ge guilt, h.e. coupie	Number of lectures = 08	Title	of the unit: OSCILLATORS AND O	PAMP	irequencies, rec	JUDUCK							
Input and	d output impedance	, transistor as an oscillator, ge	neral	discussion and theory of Hartley o	scillator on	ly. Operational	amplifi	ier (blac	k box a	pproacl	h) and i	its ideal		
character	ristics, virtual groun	d, inverting and non-inverting a	amplifi	ers, adder, integrator and differen	ntiator.		•	•						
Unit-5		Number of lectures = 08	Title	e of the unit: MODULATION AND I	INSTRUME	NTATION								
Elements	of transmission and	d reception, basic principles of	ampli	tude and frequency modulation a	ınd demodu	lation. Principle	e and d	esign o	f linear	multim	eters ar	nd their		
applicatio	on, cathode ray osci	llograph and its simple applicat	ions.											
11. CO-P	O mapping													
COs			Attribu	utes		PO1	PO2	PO3	PO4	PO5	PO6	P07		
CO1	Student will be able Student will be able	e to solve complex circuit using e to measure the passive comp	theor onent	ems. through bridges.		3	1	1				1		
CO2	Student will be able	e to design power supply.	uctor			3	1	1				1		
CO3	Learn the signal am	plification through BJT and ho	w to ir	crease the gain.		3	1	1				1		
604	Design the differen	t oscillator circuits for various	freque	ncies			-	1						
04	Student will be able to design the mathematical operation using op-amp.     3     1     1													
CO5	1. Use of different i	modulation and demodulation	techni	iques used in analog communicatio	on									
	<ol><li>Identify and solv</li></ol>	e basic communication probler	ns			3	1	1				1		
	<ol><li>Measure the volt</li></ol>	tage, phase and frequency usin	ig CRO											
	4. Measure the vol	tage, resistance, current and ca	apacita	ince using multimeter.							[			
12 -	3 S	trong contribution, 2 Average	contri	pution , 1 Low contribution										
12. Brie 1	https://nptel.ac.ir	r-iearning / E-learning compon	ient											
2.	www.youtube.com	m												
13. Book	s recommended:													
1.	B. G. Streetman; "	'Solid State Electronic Devices"	, lind i	Edition (Prentice Hall of India, New	v Delhi, 198	6).								
2.	W.D. Stanley: "Ele	ectronic Devices, Circuits and A	pplicat	tions" (Prentice-Hall).										
3.	J.D. Ryder, "Electr	onics Fundamentals and Applic	cations	5" 2nd Edition (Prentice-Hall of Ind	lia, New De	lhi, 1986).								
4.	Willman and A. G	rapel, "Microelectronics", Inter	nation	al Edition (McGraw Hill Book Com	ipany, New	YOrk, 1988).								
5.	Bollested, R. and I	washelksky, L. "Electronic Devic	les and	a Circuit Theory" (Prentice Hall).										

1. Name	L. Name of the Department: PHYSICS 2. Course Name KINETIC THEORY AND THERMODYNAMICS I T P											
2. Cours	se Name	KINETIC THEORY AND THER	MODYNAMICS	L		1	Γ		Р			
3. Cours	se Code	PY202		3		1	1		0			
4. Type	of Course (use tick	mark)		Core ( √ )		DE	()		FC (	)		
5. Pre-r	equisite (if any)	10+2 with Physics	6. Frequency (use tick marks) Even ( )	Odd (√	)	Either	Sem (	) Ev	/ery Sei	m()		
7. Total	Number of Lecture	es, Tutorials, Practicals										
	Lectu	ıres = 30	Tutorials = 10			Practic	al = Nil					
8. COUR	SE OBJECTIVES: To	provide the basic knowledge	of ideal and real gases, thermodynamics of a syste	m, basic princi	ples and	d their a	applicat	ions. Tl	hermod	ynamic		
potentials	s, heat engine and t	heory of radiation and to give	the students a thorough understanding of the theor	y kinetic theory	/ gases.							
9. COUR	SE OUTCOMES (CO)	):										
After the	successful course c	ompletion, learners will develo	op following attributes:									
COURS	SE OUTCOME (CO)		ATTRIBUTES									
	CO1	Students will gain an understa	nding of the basic properties of ideal and real gases	like equation o	of state i	related	to these	e gases.				
	CO2	Students will be able to develo properties.	op a deep understanding of various transport pheno	mena in ideal a	and real	gases a	and tem	peratu	e depe	ndence		
	CO3	Students will be able to under	stand basic laws of thermodynamics methods and th	neir effects, wo	orking of	f ideal a	nd real	engine.				
	CO4	Students will be able to development to development by the second seco	velop a deep understanding of various thermody	ynamic potent	ials, eff	fect and	d heat	equatio	ons of	various		
	CO5	Students will be able to gain k	nowledge of theory of Radiation and basic laws of ra	idiation.								
10. Unit	10. Unit wise detailed content Unit 1 Number of loctures = 08 Title of the unit: IDEAL AND REAL GASES											
Unit-1		Number of lectures = 08	Title of the unit: IDEAL AND REAL GASES									
Ideal Gas	: Kinetic model, de	duction of Boyle's law, interpre	etation of temperature, estimation of r.m.s. speeds	of molecules,	Brownia	an moti	on, esti	mate of	the Av	ogadro		
number, e	equipartition of ene	ergy, specific heat of monatomi	c gas, extension to di- and triatomic gases, adiabatic	expansion of	an ideal	gas.						
Real Gas Waals gas	: Vander Waals gas 5, Joule coefficient.	, equation of state, nature of V	Van der Waals forces, comparison with experimenta	al P-V curves, J	oule ex	pansior	of idea	il gas ai	nd of a	Vander		
Unit-2		Number of lectures =08	Title of the unit: LIQUEFACTION OF GASES AND T	RANSPORT PH	ENOME	NON						
Liquefact	ion of gases: Boyle	temperature and inversion te	mperature, principle of regenerative cooling and of	cascade coolir	ng, lique	efaction	of hydr	ogen a	nd helii	um gas,		
Retrigerat	tion cycles, meaning	g of efficiency.	с и I III									
Transport	t phenomena in gas	ses: Molecular collisions mean	free path and collision cross sections. Transport of n	nass, momenti	im and	energy	and inte	rrelatio	onsnip.			
Unit-3	h low vorious indi	Number of lectures = 08	Title of the unit: THE LAWS OF THERMODYNAMI	LS ntornal anorm		tata fun	ation of	ad atha	r onnli	otions		
Povorsible	n law, various inuit	cator diagrams, work done by	and on the system, first law of thermodynamics, i	medunamics d	ifforont	vorsior	s of the		appin Alow E	ntrony		
principle	of increase of entro	ny, third law of thermodynami	cs, impossibility of attaining the absolute zero. Seeb	eck. Peltier an	d Thom	son effe	is of the	Secon	1 Iaw, L	паору,		
Unit-4		Number of lectures = 08	Title of the unit: THERMODYNAMIC POTENTIALS			Son ene						
Thermody	vnamic variables: I	Extensive and intensive. Entha	lpy, Gibbs, Helmholtz and internal energy function	ns. Maxwell's t	hermo	dvnami	cal rela	tions &	applic	ations -		
Joule-Tho	mpson Effect, Claus	sius- Clapeyron heat Equation,	Expression for ( $CP - CV$ ), $CP/CV$ , TdS equations.			-,						
Unit-5		Number of lectures = 08	Title of the unit: THEORY OF RADIATION									
Blackbody	y radiation, pure te	mperature dependence, Stefar	n-Boltzmann law, pressure of radiation, spectral dist	ribution of Bla	ck body	/ radiati	on. Wie	n's disp	laceme	ent law,		
Rayleigh-J	lean's law, Planck's	law the ultraviolet catastrophy	<i>.</i>									
11. CO-PC	) mapping											
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07		
CO1	Students will gain related to these ga	an understanding of the basic ses.	c properties of ideal and real gases like equation of	of state 3	1	1				1		
CO2	Students will be al	ole to develop a deep underst	anding of various transport phenomena in ideal a	nd real 3	1	1				1		
CO3	Students will be al	ble to understand basic laws o	of thermodynamics methods and their effects, wor	king of 3	1	1				1		
CO4	Students will be ab	le to develop a deep understar	nding of various thermodynamic potentials, effect a	nd heat 3	1	1				1		
COT	equations of variou	is thermodynamic systems.	of Padiation and basis laws of radiation	-	-	-				-		
3 Strong contribution 2 Average contribution 1 Low contribution												
12 Brie	f description of self	f-learning / F-learning compor	ent									
1	https://www.yout	tube com/watch?v=AKvJwJ5iki	s									
2	https://www.you	tube.com/watch?v=iu7akwzEm	a Aw									
3.	https://www.vou	tube.com/watch?v=4G_dLx4M	76A									
13. Book	s recommended:	,										
1.	G. G. Agarwal and	H.P. Sinha "Thermal Physics".										
2.	S. K. Agarwal and	B.K. Agarwal "Thermal Physics"										
3.	M.W. Zemansky, '	"Heat and thermodynamics (6t	h Edition Mcgraw Hill).									

1. Nam	e of the Departmer	t: CHEMISTRY		T						
2. Cour	rse Name	INORGANIC AND PHYSICAL	CHEMISTRY – I	L		י	Г		Р	
3. Cour	se Code	CH221		2		1	L		0	
4. Type	e 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 (	/)	Either !	Sem (	) E	very Se	m ( )
7. Tota	I Number of Lecture	s, Tutorials, Practicals	· · · · · · · · · · · · · · · · · · ·		<u> </u>					
	Lect	ures = 30	Tutorials = 10			Practic	al = Nil			
8. COUR	RSE OBJECTIVES: To	learn about simple quantum	mechanical treatments of atoms and molecules, a	tomic struct	ires, per	iodic pre	operties	of ele	ments,	various
electroni	c displacement effe	cts in organic compounds, med	chanisms of organic reactions. States of matters with	n an emphasis	on the	gaseous	state.		,	
9. COUF		):		•						
After the	successful course d	ompletion, learners will devel	op following attributes:							
COUR	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Explain the properties of alkal	i and alkaline earth metals, and their oxides, hydride	as atc. Diagon	al rolati	onshin				_
	001					<u>, , , , , , , , , , , , , , , , , , , </u>			<u> </u>	
	CO2	Discuss the structure of dibo applications of nitride.hydrazi	prane, Lewis acid nature of boron trihalides, pre ne & hydroxylamine.	paration of c	arbides	& silicor	nes, pre	eparatio	on & in	idustrial
	CO3	Explain types of oxides and ox	yacids, their structure and of interhalogen compour	nds, pseudo h	alogens	&clather	ate com	npound	s	
		Use thermochemical equation	ns to relate the amount of heat energy transferred	l in reactions	in react	ions at c	onstant	pressu	ıre (ΔH	) to the
	CO4	amount of substance involved	in the reaction							,
		Demonstrate understanding of	of key concepts related to the second law of therm	odynamics, i	Icluding	alternat	ive stat	ements	of the	second
	CO5	law, the internally reversible p	process, and the Kelvin temperature scale		0					
10. Uni	it wise detailed con	tent								
Unit-1		Number of lectures = 08	Title of the unit: CHEMISTRY OF s-BLOCK ELEME	INTS						
General	characteristics: mel	ting point, flame colour, reduc	ing nature, diagonal relationships and anomalous l	pehavior of fi	st mem	ber of e	ach gro	up. Rea	octions	of alkali
and alka	ine earth metals wit	th oxygen, hydrogen, nitrogen	and water. solvation and complex formation by S- b	lock.						
Unit-2		Number of lectures =08	Title of the unit: CHEMISTRY OF p-BLOCK ELEME	NTS						
Compara	ative study (includin	g diagonal relationship) of gro	oups 13-17 elements, compounds like oxides, oxya	acids and of a	roup 13	3-16, hyc	drides o	f boror	n-dibora	ane and
higher bo	oranes, borazine, flu	orocarbons, silicates (structura	al principle), tetrasulphur tetra nitride, basic proper	ies of haloge	ıs, inter	halogens	and po	lyhalide	es.	
Unit-3		Number of lectures = 08	Title of the unit: CHEMISTRY OF NOBLE GASES							
Chemica	l properties of the n	oble gases, discovery of O2 + O	hemistry PtF6 <sup>-</sup> and O2XeF6. of xenon, structure, an	d bonding in	(enon co	ompound	ds.			
Unit-4		Number of lectures = 08	Title of the unit: THERMOCHEMISTRY							
Standard	l state, standard en	thalpy of formation – Hess's	Law of heat summation and its applications, Heat	of reaction a	t consta	int press	ure and	d at co	nstant	volume,
Enthalpy	of neutralization, B	ond dissociation energy and its	calculation from thermo-chemical data, temperatu	re dependen	e of ent	halpy,Kir	rchhoff'	s equat	ion	
Unit-5		Number of lectures = 08	Title of the unit: SECOND LAW OF THERMODYN	AMICS	6.					
Need for	the law, different s	tatements of the law, Cornot	s cycle and its efficiency, Carnot's theorem. Thermo	dynamic scal	e of tem	perature	e. Entro	py as a	state f	unction,
entropy :	as a function of V &	I, entropy as a function of P &	( ), entropy change in physical change, clausius inec	quality, entrop	iy as a c	riteria of	sponta	neity a	na equi	librium.
		ris: Gibbs function (G) and Heir	nnotz function (A) as thermodynamic quantities.							
11. CO-P			And the second				504	DOF	DOC	007
COS	Evalain the prope	rtics of alkali and alkaling	Attributes	PU	POZ	P03	P04	P05	PUb	P07
CO1	explain the prope	erties of alkali and alkaline	earth metals, and their oxides, hydrides etc. L	agonal 3	1	1	1	2	1	3
		re of diborano. Lowis acid pat	ure of boron tribalides, proparation of carbides & s	liconos	-					
CO2	preparation & indu	istrial applications of nitride, hy	rdrazine & hydroxylamine.	<b>3</b>	2	1	1	1	1	3
(O)	Explain types of c	xides and oxyacids, their stru	acture and of interhalogen compounds, pseudo h	alogens	4	1	1	1	1	2
cos	&clatherate compo	ounds		3	1	1	1	1	1	3
CO4	Use thermochemic	al equations to relate the amo	ount of heat energy transferred in reactions in reac	tions at 3	1	2	2	2	2	3
	constant pressure	$(\Delta H)$ to the amount of substand	ce involved in the reaction	-						
CO5	Demonstrate unde	erstanding of key concepts r	elated to the second law of thermodynamics, in	s coolo 3	2	2	2	2	2	3
		trong contribution 2 Average	contribution 1 low contribution	rescale						<u> </u>
13 D.	5 5 of docariation of col	f learning / F learning compare								
12. Drie 1	https://pptol.og.iv	-learning / E-learning compo	1eni							
1.	https://nptel.ac.ii	a/content/storage2/inptel_date	2/html/mhrd/ict/text/104101090/lec1.pdf							
2.	https://ocw.mite	ndu/high-school/chemistru/eva	m-prep/structure-of-matter/chemical-honding/							
13. Boo	ks recommended									
1.	Lee, J.D. Concise	norganic Chemistry, Pearson F	ducation.							
2.	Huheey, J.E., Keit	er, E.A., Keiter, R. L., Medhi. O.	K. Inorganic Chemistry, Principles of Structure and R	eactivity, Pea	rson Edu	ucation 2 <sup>,</sup>	006.			
3.	Douglas, B.E. and	Mc Daniel, D.H., Concepts & N	Iodels of Inorganic Chemistry, Oxford, 1970.							
4.	Castellan, G. W. P	Physical Chemistry, Published b	y Narosa.							
5.	Physical Chemistr	y, Puri Sharma &Pathania. Pet	er, A. & Paula, J. de. Physical Chemistry 9th Ed., Oxfo	ord University	Press.					

1. Name of the Departmer	it: CHEMISTRY									
2. Course Name	ORGANIC AND PHYSICAL CH	EMIS	FRY – I	L		-	Г		Р	
3. Course Code	CH222			3			L		0	
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 (	/)	Either	Sem ( )	E١	ery Se	m()
7. Total Number of Lecture	es, Tutorials, Practicals									
Lectu	ures = 30		Tutorials = 10			Practic	al = Nil			
8. COURSE OBJECTIVES: St	udents will be able to underst	and t	he about the chemistry of aliphatic hydrocal	rbons, prope	rties, m	echanisn	n of addi	ition a	nd elim	ination
reactions, conformational an	naiysis of alkanes and cycloalka	nes, m	stability and reactivity, aromaticity and substi	tution reacti	ons of n	iomocyci	ic & nete	erocyci	ic com	sounas,
9. COURSE OUTCOMES (CO	):									
After the successful course c	ompletion, learners will develo	op fol	owing attributes:							
COURSE OUTCOME (CO)			ATTRIBUTES							
CO1	Understanding of Mechanism	of eli	ninations, oxymercuration-demercuration, hy	droboration-	oxidatio	on, ozono	olysis, red	ductior	ı (catalı	ytic and
	chemical), syn and anti-hydrox	ylatic	n, Allylic and benzylic bromination.							
CO2	Comprehension of Conforma	tiona	analysis, Relative stability and Energy dia	grams of all	anes, C	Chair, Bo	at and	Twist	boat fo	orms of
	Cyclonexane with energy diagn	ams,	Hückol's rule of homosyclic & hotorocyclic	ompounds	cycloalk	anes.	cubatitut	ion ro	actions	8. thair
CO3	mechanism. Directing effects c	of the	groups.	ompounds, e	iectiopi		Substitut	lion rea	actions	a their
	Able to evaluate different typ	bes Co	Iligative Properties like relative lowering of	vapour press	ure, ele	vation o	f boiling	point,	depres	ssion of
CO4	freezing point, osmotic press	ure a	nd amount of solute.Know about lowering	of vapour pr	essure,	Raoult's	and He	nry's L	aws ar	nd their
	applications,									
C05	Analyze the criteria of thermo	dynar	nic equilibrium, chemical equilibria in ideal ga	ses, Le Chate	lier Prin	ciple, eq	uilibrium	betwe	een ide	al gases
10 Unit wice detailed cont	and a pure condensed phase.									
Linit 1	Number of lectures = 08	Tit	a of the unit: CHEMISTRY OF ALIGHATIC HYD							
General methods of prepara	ation physical and chemical pr	roner	ies of alkenes and alkynes. Mechanism of F	1 E2 E1CB r	eaction	s Savtze	ff and H	ofmani	n elimi	nations
Electrophilic additions their	r mechanisms (Markownikoff	/ Ant	i Markownikoff addition), mechanism of c	xymercuratio	on-dem	ercuratio	n, hydro	borati	on- ox	idation,
ozonolysis, reduction (cataly	tic and chemical), syn and anti-	-hydro	oxylation (oxidation). 1, 2 and 1,4-addition rea	, ctions in con	ugated	dienes a	nd Diels-	Alder r	eactior	ı; Allylic
and benzylic bromination an	d mechanism, e.g. propene, 1-	buter	e, toluene, ethyl benzene.							
Unit-2	Number of lectures =08	Titl	e of the unit: CONFORMATIONAL ANALYSIS O	F ALKANES A	ND CYC		NES			
Conformational analysis of a	Ikanes: Relative stability and E	nergy	diagrams. Types of cycloalkanes and their re	lative stabilit	y, Baey	er strain	theory: (	Chair, I	Boat an	d Twist
boat forms of cyclohexane w	ith energy diagrams; Relative s	tabili	y of mono substituted cycloalkanes, cycloprop	bane ring, bai	iana bo	nds.				
Unit-3	Number of lectures = 08		of the unit: AROMATIC HYDROCARBONS	ith cuitable	wampla		anhilia a	romoti	o. cubct	itution
halogenation nitration sul	nhonation and Friedel-Craft's	alkv	ation/acylation with their mechanism. Dire	rting effects	of the	grouns.	Activati	ng an	d deac	tivating
substituents, orientation ar	nd ortho/para ratio, Side cha	ain re	actions of benzene derivatives, Birch reduc	ction; Metho	ds of f	formation	and ch	nemica	l react	ions of
alkylbenzenes, alkynylbenzer	nes and biphenyl, naphthalene	and A	nthracene	,						
Unit-4	Number of lectures = 08	Titl	e of the unit: SOLUTIONS AND COLLIGATIVE P	ROPERTIES						
Dilute solutions; lowering of	vapour pressure, Raoult's and	l Hen	ry's Laws and their applications. Thermodyna	mic derivatio	n using	chemica	l potenti	al to d	erive re	elations
between the four colligative	properties (i) relative lowering	g of va	pour pressure, (ii) elevation of boiling point,	(iii) depression	on of fre	eezing po	int, (iv) c	osmoti	c press	ure and
amount of solute. Applicatio	ns in calculating molar masses of	of nor	mai, dissociated and associated solutes in solu	ition.						
Criteria of thermodynamic e	quilibrium degree of advancer	nont	of the unit: Chemical equilibria in ideal gases	Thermodyna	mic der	ivation o	frelation	hotw	oon Gib	ahs free
energy of reaction and react	tion quotient. Equilibrium cons	tants	and their quantitative dependence on tempe	rature, press	ure and	l concent	ration (L	e Chat	elier Pr	rinciple.
Quantitatively). Free energy	of mixing and spontaneity. equ	ilibriu	m between ideal gases and a pure condensed	phase .						,
11. CO-PO mapping										
COs		Attrib	utes	PO	. PO2	PO3	PO4	PO5	PO6	PO7
CO1 Understanding of	Mechanism of eliminations, c	oxyme	rcuration-demercuration, hydroboration- ox	idation, 3	1	1		2	1	1
ozonolysis, reducti	on (catalytic and chemical), syn	and	anti-hydroxylation, Allylic and benzylic bromin	ation.				_	-	_
Comprehension of	Conformational analysis, Rela	tive s	tability and Energy diagrams of alkanes, Cha	ir, Boat	1	1		2	1	1
substituted cycloal	his of cyclonexane with energy kanes	diag	ams, analyse and compare relative stability o	1 mono 3	1	1		2	T	1
To create basics fo	or the aromaticity. Hückel's rul	e. of	homocyclic & heterocyclic compounds, electr	ophillic						
co3 and substitution re	actions & their mechanism, Dir	ectin	g effects of the groups.	3	1	2		2	1	1
Able to evaluate di	fferent types Colligative Prope	rties l	ike relative lowering of vapour pressure, eleva	ation of						
boiling point, depr	ession of freezing point, osmot	tic pre	ssure and amount of solute.Know about low	ering of <b>3</b>	1	2		2	1	1
vapour pressure, R	aoult's and Henry's Laws and th	heir a	oplications,							
CO5 Analyze the criteria	3 of thermodynamic equilibrium on ideal gases and a pure conder the second	n, che	emical equilibria in ideal gases, Le Châtelier Pr	inciple, 3	1	2		2	1	1
	trong contribution 2 Average	contr	phase.	I		-				
12 Brief description of sel	f loarning / E loarning compon	cont								
1. https://pntel.ac.iv	n/courses/115101003/	Citt								
2. https://nptel.ac.ir	n/courses/115105100/									
3. https://www.free	bookcentre.net/physics-books	-dowr	lload/Atomic-and-Molecular-Physics-NPTEL.ht	ml						
13. Books recommended:			·							
1. Morrison, R. N. &	Boyd, R. N. Organic Chemistry,	Dorli	ng Kindersley (India) Pvt. Ltd. Published by Pea	arson Educati	on.					
2. Finar, I. L. Organio	: Chemistry (Volume 1), Dorling	g Kind	ersley (India) Pvt. Ltd. Published by Pearson Ec	lucation.						
3. Francis Carey Org	anic Chemistry, Published by M	IcGra	v-Hill Education.							
4. Castellan, G. W. P 5. Physical Chemistr	nysical chemistry, Published by v Puri Sharma & Pathania	y ward	l5d.							
6. Peter, A. & Paula,	J. de. Physical Chemistry 9th E	d., Ox	ford University Press.							

2. Course	of the Departmen	t: MATHEMATICS								
	Name	NUMERICAL COMPUTING		L			Г		Р	
3. Course	e Code	MT211		3			1		0	
4. Type of	of Course (use tick	mark)		Core ( √ )		DE	()		FC (	)
5. Pre-rec	quisite (if any)	10+2	6. Frequency (use tick marks) Even ()	Odd (v)	)	Either	Sem (	) E	very Se	m ( )
7. Total N	Number of Lecture	es, Tutorials, Practicals								
	Lectu	ires = 30	Tutorials = 10			Practic	al = Nil			
8. COURSE	E OBJECTIVES: The	e course is aimed to develop th	e skills in mathematics specially in numerical computi	ing which is i	necessa	ary for g	roomin	g them	into su	ccessful
science grad	duate. The topics	introduced will serve as basic t	ools for specialized studies in science field.							
9. COURSE	E OUTCOMES (CO)	:								
After the su	CUTCOME (CO)	ompletion, learners will develo	op following attributes:							
COOKSE		The course is simed to devel	ATTRIBUTES	Computing	which i	ic nocor	son, fo	, groop	ning th	om into
	CO1	successful science graduate. T	he topics introduced will serve as basic tools for special	alized studies	in scie	nce fiel	d.	giuun	ing th	
	CO2	Apply different interpolation	methods and finite difference concepts							
	CO3	Apply central interpolation me	thods and interpolation techniques for unequal interv	vals						
	CO4	Work out numerical differentia	ation and integration whenever and wherever routine	methods are	e not ap	plicable	2.			
	CO5	Work numerically on the ordir	ary differential equations using different method thro	ugh the theo	ory of fi	nite diff	erences	i.		
10. Unit v	wise detailed cont	ent								
Unit-1		Number of lectures = 08	Title of the unit:							
Solution of	f Algebraic and Tr	anscendental Equations: Bise	ction Method, Method of False Position, Iteration M	ethod, Secar	nt Meth	hod, Ne	wton-R	aphson	's Meth	nod and
their conve	ergence. Linear Sys	stem of Equations: LU decompo	osition Method, Gauss- Seidel Method.							
Unit-2		Number of lectures =08	Title of the unit:							
Finite Differ	rences: Forward a	nd Backward Difference Opera	tors, Difference Table, Shift and Averaging operators,	Relation bet	ween O	perator	rs, Facto	rial pol	ynomia	ls.
Interpolatic	on: Polynomial int	erpolation, Newton-Gregory fo	rward and backward interpolation formulae.							
Unit-3		Number of lectures = 08	Title of the unit:							
Central Inte	erpolation: Gauss	forward and backward formula	n, Stirling's, Bessel's and Laplace-Everett's formulae.	:		·				
Interpolatio	on for Unequal Int	ervais: Lagrange's interpolation	h formula, divided differences and Newton's divided di	Interence inte	erpolati	ion torn	nula.			
Unit-4		Number of lectures = 08	Title of the unit:			L. T.				
Numerical Boole's, We	Differentiation an eddle's and Euler I	id Integration: Numerical diffe Maclaurin's formulae.	erentiation and errors in Numerical differentiation, N	lewton-Cote	s formi	ula, Traj	pezoida	l rule, s	simpsor	r's rule,
Unit-5		Number of lectures = 08	Title of the unit:							
Numerical	Solutions of Ordi	nary Differential Equations: P	icard's and Taylor's Series, Euler's Method, Runge-K	utta fourth	order N	Mothod				
problem by	y finite difference l	Method				vietnou	, Soluti	on of B	oundar	y value
11. CO-PO r	mapping	Wethou .				vietnou	, Soluti	on of B	oundar	y value
		Methou .				vietnou	, Soluti	on of B	oundar	y value
COs	11 0		Attributes	PO1	PO2	PO3	, Solution	on of B	oundar	y value
COs CO1	he course is aim	ed to develop the skills in n	Attributes nathematics especially in Numerical Computing whi	PO1	PO2	PO3	, Solution PO4	on of B	oundar PO6	y value
COs CO1	he course is aim ecessary for groo	ed to develop the skills in n ming them into successful sc	Attributes nathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as	PO1 ich is basic 3	PO2 2	PO3 2	, Solution PO4	on of B PO5 3	PO6	y value
COs CO1	he course is aim ecessary for groo ools for specialized	ed to develop the skills in n ming them into successful sc d studies in science field.	Attributes hathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as	PO1 ch is basic 3	PO2 2	PO3	, Solution PO4	PO5	PO6	y value
COs CO1 tc CO2 A	he course is aim ecessary for groo ools for specialized	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite	Attributes nathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts	PO1 ich is basic 3 3	PO2 2 2	PO3 2 2	, Solution <b>PO4</b> 1 1	on of B PO5 3 2	PO6 3 2	y value PO7 3 2
COs CO1 Ti nu tc CO2 Aj CO3 Aj	he course is aim lecessary for groo ools for specialized apply different inter apply central interp	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite	Attributes nathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals	PO1 ch is basic 3 3 3 3	PO2 2 2 2	PO3 2 2 3	PO4 1 1	PO5 3 2 3	PO6 3 2 2	y value
CO3 CO1 CO2 CO2 A CO3 A CO4 M	he course is aim eccessary for groo ools for specialized opply different inter opply central interp Vork out numeric policable	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite polation methods and interpola	Attributes hathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals ition whenever and wherever routine methods are	PO1 ch is basic 3 3 3 2 not 3	PO2 2 2 2 2 2	PO3           2           2           3           3	, Solution PO4 1 1 1 1 1 1	PO5 3 2 3 3	PO6           3           2           2           3	y value PO7 3 2 3 2 3
CO3 CO1 CO2 CO2 CO3 A CO3 A CO4 M ap	he course is aim lecessary for groo ools for specialized apply different inter poly central interp Vork out numeric pplicable. Vork numerically c	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite polation methods and interpola cal differentiation and integra	Attributes nathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals ation whenever and wherever routine methods are nations using different method through the theory of f	PO1 ich is basic 3 3 3 e not 3 finite 2	PO2 2 2 2 2 2 2	PO3 2 2 3 3 1	, Solution PO4 1 1 1 1	PO5 3 2 3 3 3	PO6 3 2 2 3	y value PO7 3 2 3 2 2 3
COS CO1 TI tc CO2 A CO3 A CO3 A CO4 M a G	he course is aim eccessary for groo ools for specialized apply different inter poly central interp Vork out numeric pplicable. Vork numerically c ifferences.	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite polation methods and interpola cal differentiation and integra on the ordinary differential equ	Attributes nathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals ition whenever and wherever routine methods are nations using different method through the theory of f	PO1 ich is basic 3 3 3 2 not 3 finite 2	PO2 2 2 2 2 2 2 2 2 2	PO3         2           2         3           3         1	, Solution PO4 1 1 1 1 1 1 1	PO5 3 2 3 3 3 3 3	PO6         3           2         2           3         2           2         3           2         3	y value PO7 3 2 3 2 1
COS CO1 TI tc CO2 A CO3 A CO4 M ap CO5 M di	he course is aim ecessary for groo ools for specialized opply different inter poly central interp Vork out numeric pplicable. Vork numerically c lifferences. <b>3 S</b>	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite colation methods and interpola cal differentiation and integra on the ordinary differential equ	Attributes nathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals ition whenever and wherever routine methods are nations using different method through the theory of the theor	PO1 ich is basic 3 3 3 2 not 3 finite 2	PO2 2 2 2 2 2 2 2	PO3           2           2           3           1	PO4           1           1           1           1           1           1           1	PO5 3 2 3 3 3 3	PO6           3           2           2           3           2           3	y value PO7 3 2 3 2 1
COS CO1 TI tc CO2 A CO3 A CO3 A CO4 M a i CO5 M di I CO5 M	the course is aim lecessary for groo ools for specialized apply different inter poly central interp Vork out numeric pplicable. Vork numerically c lifferences. <b>3 Si</b> <b>description of self</b>	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite colation methods and interpola cal differentiation and integra on the ordinary differential equ trong contribution, 2 Average f-learning / E-learning compor	Attributes nathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals ition whenever and wherever routine methods are nations using different method through the theory of f contribution , 1 Low contribution lent	PO1 ich is basic 3 3 3 2 not 3 finite 2	PO2 2 2 2 2 2 2 2	PO3           2           2           3           1	, Solution PO4 1 1 1 1 1 1 1	PO5         3           2         3           3         3           3         3	PO6         3           2         2           3         2           2         3           2         3	y value PO7 3 2 3 2 1
COs         TI           CO1         TI           tc         CO2           CO3         A           CO4         Mag           CO5         Mi           CO5         I           12. Brief c         1.	the course is aim lecessary for groo ools for specialized apply different interp vork out numeric pplicable. Vork numerically c lifferences. 3 St description of self https://www.yout	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite collation methods and interpola cal differentiation and integra on the ordinary differential equ trong contribution, 2 Average f-learning / E-learning compor tube.com/watch?v=_f_Pu7t9el	Attributes nathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals ation whenever and wherever routine methods are nations using different method through the theory of the contribution , 1 Low contribution nent 28	PO1 ich is basic 3 3 3 2 not 3 finite 2	PO2 2 2 2 2 2 2 2	PO3         2           2         3           3         1	, Solution PO4 1 1 1 1 1 1 1	PO5         3           2         3           3         3           3         3	PO6         3           2         2           3         2           2         3           2         3	y value PO7 3 2 3 2 1
COs         Ti           CO1         Ti           tc         CO2           CO3         A           CO4         M           ar         CO5           M         di           12. Brief c         1.           2.         1.	the course is aim eccessary for groo ools for specialized apply different interp vork out numeric pplicable. Vork numerically c ifferences. <b>3</b> St <b>description of self</b> https://www.yout	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite colation methods and interpola cal differentiation and integra on the ordinary differential equ trong contribution, 2 Average F-learning / E-learning compor tube.com/watch?v=_f_Pu7t9el tube.com/watch?v=3B3IGO7w	Attributes hathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals ation whenever and wherever routine methods are lations using different method through the theory of f contribution , 1 Low contribution lent 28 ERE	PO1 ich is basic 3 3 3 a not 3 finite 2	PO2 2 2 2 2 2 2	PO3           2           3           1	, Solution PO4 1 1 1 1 1 1	PO5         3           2         3           3         3           3         3	PO6 3 2 2 3 2	y value PO7 3 2 3 2 1
COs         Ti           CO1         Ti           tc         CO2           CO3         A           CO3         A           CO4         aj           CO5         M           di         di           12. Brief (         1.           2.         I           3.         I	he course is aim eccessary for groo ools for specialized apply different inter vork out numeric pplicable. Vork numerically of ifferences. <b>3 St</b> <b>description of self</b> https://www.yout https://www.yout	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite colation methods and interpola cal differentiation and integra on the ordinary differential equ trong contribution, 2 Average f-learning / E-learning compor tube.com/watch?v=_f_Pu7t9el tube.com/watch?v=_1g0G_kjA5	Attributes hathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals ation whenever and wherever routine methods are vations using different method through the theory of f contribution , 1 Low contribution tent 28 ERE 60&list=PLq-Gm0yRYwTguDcfylj1ZicXxzdZCAr5S&inde	PO1 ich is basic 3 3 3 e not 3 finite 2 x=4	PO2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO3           2           3           1	, Solution PO4 1 1 1 1 1 1	PO5         3           2         3           3         3	PO6 3 2 2 3 2	y value PO7 3 2 3 2 1
COs         Ti           CO1         Ti           tc         CO2           CO2         A           CO3         A           CO4         Aj           CO5         Mi           CO5         Mi           12. Brief c         A           4.         A	he course is aim eccessary for groo ools for specialized apply different inter vork out numeric pplicable. Vork numerically of ifferences. <b>3 Si</b> <b>description of self</b> https://www.yout https://www.yout https://www.yout	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite colation methods and interpola cal differentiation and integra on the ordinary differential equ trong contribution, 2 Average f-learning / E-learning compor tube.com/watch?v=_f_Pu7t9el tube.com/watch?v=1g0G_kjA5 tube.com/watch?v=K193avJM0	Attributes hathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals ation whenever and wherever routine methods are rations using different method through the theory of f contribution , 1 Low contribution lent 28 ERE 60&list=PLq-Gm0yRYwTguDcfylj1ZicXxzdZCAr5S&inde: Cd4&list=PLq-Gm0yRYwTguDcfylj1ZicXxzdZicAr5S&inde: Cd4&list=PLq-Gm0yRYwTguDcfylj1ZicXxzdZicAr5&inde: Cd4&list=PLq-Gm0yRYwTguDcfylj1Z	PO1       ch is basic     3       3     3       a     3       a     3       a     3       a     3       a     3       a     3       a     3       b     3       a     3       a     3       b     3       a     3       b     3       b     3       a     3       b     3       b     3       b     3       b     3       b     3       b     3       b     3       b     3       b     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c     3       c	PO2 2 2 2 2 2 2	PO3 2 2 3 1	, Solution PO4 1 1 1 1 1 1	PO5         3           2         3           3         3           3         3	PO6 3 2 2 3 2	y value PO7 3 2 3 2 1
COs         Time           CO1         Time           tc         Time           CO2         A           CO3         A           CO4         Maj           CO5         Maj           CO5         Maj           CO5         Maj           CO5         Maj           12. Brief d         A           3.         A           4.         Books           13. Books         A	he course is aim eccessary for groo ools for specialized apply different inter vork out numeric pplicable. Vork numerically of ifferences. <b>3 Si</b> <b>description of self</b> https://www.yout https://www.yout https://www.yout https://www.yout	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite colation methods and interpola cal differentiation and integra on the ordinary differential equ trong contribution, 2 Average f-learning / E-learning compor tube.com/watch?v=_f_Pu7t9el tube.com/watch?v=1g0G_kjA5 tube.com/watch?v=K193avJM0	Attributes hathematics especially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals ation whenever and wherever routine methods are rations using different method through the theory of f contribution , 1 Low contribution lent 28 ERE 60&list=PLq-Gm0yRYwTguDcfylj1ZicXxzdZCAr5S&inder Cd4&list=PLq-Gm0yRYwTguDcfylj1Zi	PO1       ich is basic     3       3     3       a     3       a     3       a     3       a     3       a     3       a     3       a     3       b     3       a     3       a     3       b     a       a     a       b     a       b     a       b     a	PO2 2 2 2 2 2 2 2 0015	PO3           2           3           1	, Solution PO4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO5         3           2         3           3         3           3         3	PO6 3 2 2 3 2	y value PO7 3 2 3 2 1
COS CO1 CO1 CO2 CO2 A CO3 A CO3 A CO4 M a) CO5 M di CO5 A CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3	he course is aim eccessary for groo ools for specialized apply different inter vork out numeric pplicable. Vork numerically of ifferences. 3 St description of self https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and finite colation methods and interpola cal differentiation and integra on the ordinary differential equ trong contribution, 2 Average f-learning / E-learning compor tube.com/watch?v=_f_Pu7t9el tube.com/watch?v=_f_Pu7t9el tube.com/watch?v=_fgOG_kjA5 tube.com/watch?v=K193avJM0 d, Zubair Khan and Shadab Ahr rengar and B K Jain Numerical	Attributes The topics introduced will serve as Computing which is a serve as a serve as a serve as a serve as a server and the topics introduced will serve as a server and the serve as a server and the server and the server and the server as a server as a server and wherever routine methods are server as a server and the server and through the server of the server and the server as a ser	PO1 ch is basic 3 3 3 e not 3 finite 2 x=4 ex=5 Books India, 2 7th Ed Nor	PO2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO3         2           2         3           3         1	PO4 1 1 1 1 1 1 1	PO5 3 2 3 3 3	PO6 3 2 2 3 2	y value PO7 3 2 3 2 1
COs         T           CO1         T           tc         CO2           CO3         A           CO3         A           CO4         M           aj         CO5           M         M           CO5         M           CO5         M           1.         C           3.         4.           1.         C           3.         1.           2.         3.	he course is aim lecessary for groo cols for specialized apply different inter vork out numeric pplicable. Vork numerically c lifferences. <b>3 Si</b> <b>description of self</b> https://www.yout https://www.yout https://www.yout https://www.yout nttps://www.yout Mttps://www.yout Mttps://www.yout Mttps://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout https://www.yout	ed to develop the skills in n ming them into successful sc d studies in science field. erpolation methods and interpola cal differentiation and integra on the ordinary differential equ trong contribution, 2 Average Flearning / E-learning compor tube.com/watch?v=_f_Pu7t9el tube.com/watch?v=_f_Pu7t9el tube.com/watch?v=_f0G_kjA5 tube.com/watch?v=K193avJM0 d, Zubair Khan and Shadab Ahr rengar and R.K. Jain, Numerical ds by P. Kandasamy S. Chand J	Attributes attenuation sepecially in Numerical Computing whi ience graduate. The topics introduced will serve as difference concepts ation techniques for unequal intervals ation whenever and wherever routine methods are contribution , 1 Low contribution tent 28 ERE 60&list=PLq-Gm0yRYwTguDcfylj1ZicXxzdZCAr5S&indee Cd4&list=PLq-Gm0yRYwTguDcfylj1ZicXxzdZCAr5S&indee Cd4&list=PLQ-Gm0yRYwTguDcfyljXicXicXicXicXicXicXicXicXicXicXicXicXicX	PO1 ch is basic 3 3 3 a 13 a 2 ch not 3 finite 2 x=4 ex=5 Books India, 2 , 7th Ed., New	PO2 2 2 2 2 2 2 2 2 2 015. w Age In	PO3 2 2 3 3 1	PO4 1 1 1 1 1 1 1 0 0 0 0 1 0 0 0 1 0 0 0 0 1 0	PO5 3 2 3 3 3 blishers	PO6 3 2 2 3 2 3 5, 2007.	y value PO7 3 2 3 2 1

#### SEMESTER – III

1. Name of the Department: PHYSICS										
1. Name of the Department				•		-				
2. Course Name	ELECTRONICS AND THERIMA			<u> </u>		1		-	<u>Р</u>	
3. Course Code				0		0	•		4	
4. Type of Course (use tick			<b>Europ</b> (				)	5	FC (	)
5. Pre-requisite (if any)	10+2 With Physics	6. Frequency (use tick marks)	Even ()	Odd (V)		Either S	em ()	E	ery Sei	m ( )
7. Total Number of Lecture	s, rutoriais, Practicais	Tutorials = 00				Dractica	1 - 10			
8. COURSE OBJECTIVES:	Tes – 00					FIdelied	ii - 10			
9. COURSE OUTCOMES (CO)	:									
After the successful course co	ompletion, learners will develo	op following attributes:								
COURSE OUTCOME (CO)		ATT	RIBUTES							
C01										
CO2										
СОЗ										
CO4										
10. Syllabus	-									
Exp - 01										
Exp – 02										
Exp – 03										
Exp – 04										
Exp – 05										
Exp – 06										
Exp – 07										
Exp – 08										
Exp – 09										
Exp – 10										
11. CO-PO mapping										
COs	1	Attributes		PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1										
CO2										
CO3										
CO4										
3 St	rong contribution, 2 Average	contribution , 1 Low contribution								
12. Brief description of self	-learning / E-learning compon	nent								
13. Books recommended:										

1. Nam	e of the Departmen	t: CHEMISTRY								
2. Cour	se Name	CHEMISTRY PRACTICAL – III		L			Г		Р	
3. Cour	se Code	CH223		0		(	)		4	
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. Tota	Number of Lecture	s, Tutorials, Practicals		•						
	Lectu	ires = 00	Tutorials = 00			Practic	al = 10			
8. COUF	RSE OBJECTIVES: Th	e purpose of the undergraduate	ate chemistry Lab program at the Integral Univer	sity is to provi	de the	key kno	owledge	e base	and lab	oratory
resource	s to prepare student	s for careers as professionals in	n the field of chemistry, and various other industrie	s.			0			
9. COUR	SE OUTCOMES (CO)	):								
After the	successful course c	ompletion, learners will develo	op following attributes:							
COUR	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Remember to keep records of	all performed experiments in themanner which is r	equired in labo	ratory.					
	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 differen	t fields of chem	nistry.					
	CO4	Know about the principles of q	ualitative and quantitative analysis of inorganic mix	ctures.						
	CO5	Analyze the importance of per	sonal safety and care of equipment's and chemicals	5.						
10. Syll	abus									
Ехр — 0	1	Volumetric Analysis: (Execute Determination of acetic acid in Determination of alkali conten Estimation of calcium content Estimation of ferrous and ferr Estimation of copper using thi	e any two of the following) n commercial vinegar using NaOH. nt – antacid tablet using HCI. . in chalk as calcium oxalate by permanganometry. ic by dichromate method. iosulphate.							
Exp – 0	2	Determination of alkali conter	nt – antacid tablet using HCl.							
Exp – 0	3	Estimation of calcium content	in chalk as calcium oxalate by permanganometry.							
Exp – 0	4	Gravimetric Analysis: Analysis	of Cu as CuSCN and Ni as Ni (dimethylglyoxime).							
Exp – 0	5	Detection of following functio	nal groups present in the given mono-functional or	ganic compoun	ds: a) C	Carboxyl	ic acid ,	b) Phe	enol	
Exp – 0	6	To determine the enthalpy of ionization of the weak acid/w	neutralization of a weak acid/weak base versus stro eak base.	ong base/ stron	g acid a	and dete	ermine t	the ent	halpy of	f
Exp – 0	7	Chemical Equilibrium: The equ	uilibrium between Fe3+ and Fe(CNS)2+.							
Exp – 0	8	Determination of molecular w	reight of a non-volatile solute by Rast method/ Beck	kmann freezing	point n	nethod.				
Exp – 0	9	To study the effect of concent	ration on equilibrium.							
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
		-								
CO1	Remember to keep	records of all performed expension	riments in themanner which is required in laborator	ry. <b>3</b>	1	2		3	1	2
CO2	Able to Evaluate wa	ater quality parameters like chl	oride content and alkalinity.	3	1	1		2		2
CO3	Understand the bas	sic titration methods and techn	ical skills to work in the different fields of chemistry	y. <b>3</b>	1	2		1	1	2
CO4	Know about the pri	nciples of qualitative and quan	titative analysis of inorganic mixtures.	3	1	1		1	1	2
CO5	Analyze the import	ance of personal safety and car	re of equipment's and chemicals.	2	1	1		2	1	2
	3 S1	trong contribution, 2 Average	contribution , 1 Low contribution							
12. Brie	ef description of self	f-learning / E-learning compon	ent							
1.	https://www.fanc	lm.edu/uploads/files/7964570	1812579729-genchem-reference-for-web.pdf							
2.	http://file.akfarm	ahadhika.ac.id/E-BOOK/12-121	.3-akfarmahad-16-1-vogelqu-d.pdf							
3.	https://faculty.psa	au.edu.sa/filedownload/doc-6-	pdf-f06110ef2e1e1ae119cbacf71dd17732-original.	pdf						
4.	https://www.sten	n.org.uk/resources/collection/3	3959/practical-chemistry							
13. Bool	ks recommended:									
1.	Advance Practical	Chemistry: Jagdamba Singh, L.	D.S Yadav, Jaya Singh, I.R. Siddiqui, PragatiEdition.							
2.	Practical Organic	Chemistry, A.I.Vogel.								
3.	Practical Physical	Chemistry: B. Viswanathan and	I P.S.Raghavan.							
4.	Experimental Inor	ganic Chemistry –W.G.Palmer.								

SEMESTER - III

1. Name of the Department: MATHEMATICS											
2. Course Name	NUMERICAL COMPUTING LA	В			L		1	•		Р	
3. Course Code	MT212				0		C	)		4	
4. Type of Course (use tick	mark)				Core ( √ )		DE	)		FC (	)
5. Pre-requisite (if any)	10+2	6. Frequen	ncy (use tick marks)	Even ( )	Odd (√)		Either S	Sem ( )	) Ev	very Ser	n( )
7. Total Number of Lecture	s, Tutorials, Practicals			<u> </u>							
Lectu	ires = 00		Tutorials = 00				Practic	al = 10			
8. COURSE OBJECTIVES:											
9. COURSE OUTCOMES (CO) After the successful course co	: ompletion, learners will develo	p following att	ributes:								
COURSE OUTCOME (CO)			AT	TRIBUTES							
C01											
CO2											
СОЗ											
CO4											
CO5											
10. Syllabus											
Exp - 01											
Exp – 02											
Exp – 03											
Exp – 04											
Exp – 05											
Ехр — 06											
Exp – 07											
Exp – 08											
Exp - 09											
Exp – 10											
11. CO-PO mapping							-				
COs		Attributes			PO1	PO2	PO3	PO4	PO5	PO6	P07
C01											<u> </u>
CO2											
СОЗ											
CO4											L
CO5											
3 St	trong contribution, 2 Average	contribution , 1	Low contribution								
12. Brief description of self	-learning / E-learning compon	ent									
13. Books recommended:											

1. Nam	ne of the Departmer	nt: PHYSICS									
2. Cour	rse Name	ELECTRICITY AND MAGNETI	ISM			L		т		Р	
3. Cour	rse Code	PY204				3		1		0	
4. Type	e of Course (use tick	mark)			Cor	e(√)	1	DE()		FC (	)
5. Pre-	requisite (if any)	10+2 with Physics	6.	Frequency (use tick marks) Even ( V )	Od	ld ( )	Eith	er Sem (	) E	very Se	m ( )
7. Tota	I Number of Lecture	es, Tutorials, Practicals					•				
	Lect	ures = 30		Tutorials = 10			Prac	tical = Nil			
8. COUF	RSE OBJECTIVES: Th	e purpose of this undergradua	ate cou	irse is to impart basic and key knowledge of	electricity	y and ma	gnetism	by using t	he prino	cipal of	physics
and mat	hematics to obtain	quantitative relations which a	are vei	ry important for higher studies. After succes	sfully con	npletion,	of cours	e, the stu	dent w	ill able	explore
subject i	nto their respective	dimensions.									
9. COUF	RSE OUTCOMES (CO	):									
After the	e successful course c	ompletion, learners will devel	lop fol	owing attributes:							
COUR	SE OUTCOME (CO)			ATTRIBUTES							
	CO1	To learn basic mathematical to	ools w	ith their physical significance as a prerequisite	e for the c	ourse.					
	CO2	To understand and explain the practical systems.	he prir	nciples/methods of evaluation of electric fiel	ld, potent	ial due t	o charge	distributi	on and	apply t	them to
	CO3	To learn the principles and me	ethods	of evaluation of magnetic field and scalar magnetic properties of dial para and ferromagnet	agnetic po	otential d	ue to du	e to currer	it or ma	gnetic	dipoles.
		To describe the principles of e		magnetic induction and study the devices has	od upop	to invocti	gato tho	r ovnorim	ontalw	orking	
	CO4							· c		UI KIIIg.	
	CO5	To formulate Maxwell's equa	ations	and apply them to investigate the propagat	tion of ele	ectromagi	netic wa	es in free	e space,	dielec	tric and
10 110	it wice detailed con	conducting medium.									
Lipit 1	it wise detailed con	Number of lectures = 08	Tit	a of the unit: VECTOR ANALYSIS AND ELECTE	ροστατιο	s_1					
Dint-1	of voctor algebra (	Scalar and Vector product) a	radion	t divergence. Curl and their physical signifi		s = I	gration	oloctrocto	tic field	d alact	ric flux
Coulomb	o's law electric field	and notentials Field due to a u	uniforr	n charged sphere derivations of Poisson and	Lanlace F	austions	with anr	lications I	Iniquer	ness the	orem
Linit_2	s aw, ciccule lield	Number of lectures -08	Ti+L	of the unit: ELECTROSTATICS - II	Lupidee L	quations	with upp		Jinquei	1033 1110	Jorenn.
Gauss la	w and its application	The Field of a conductor	oloctr	ic dipole, field and potential due to an ele	ctric dino	la Dinal		imation f	or on o	rhitran	chargo
distribut	ion method of elect	rical images electric quadruph	e field	I due to a quadruple electrostatic energy of a	charged	uniform s	nhere e	nergy of a	conder	i biti ai y iser	charge
Unit-3		Number of lectures = 08	Title	of the unit: MAGNETOSTATICS AND MAGN		PFRTIFS (		RIALS	contact		
Magneti	c field and force of	a current. Magnetic Induction	and B	iot-Savart Law, Lorentz Force, Vector and Sc	alar Magr	netic pote	ntials. N	lagnetic D	ipole. N	/lagnet@	omotive
force and	d Ampere's Circuital	theorem and its applications	to cald	ulate magnetic field due to wire carrying cur	rent and	solenoid.	Intensit	of magne	etization	n and m	nagnetic
susceptil	bility, Properties of [	Dia, Para and Ferromagnetic m	aterial	s, Curie temperature, Hysteresis and its expe	rimental d	letermina	ition	0			0
Unit-4		Number of lectures = 08	Title	e of the unit: ELECTROMAGNETIC INDUCTION	N						
Faraday'	s laws of electroma	gnetic induction, Lenz's law, se	elf-ind	uctance (L) of single coil, mutual inductance (	(M) of two	o coils, Er	nergy sto	red in ma	gnetic f	ield. M	otion of
electron	in changing magn	etic field, Betatron, Magnetic	ener	gy, Induced magnetic field (Time varying e	electric fie	eld), theo	ry and	vorking o	f movir	ng coil	ballistic
galvanor	neter.		_								
Unit-5		Number of lectures = 08	Title	e of the unit: MAXWELL'S EQUATIONS AND E	ELECTRON	AGNETI	C WAVES				
Idea of o	displacement currer	t and Maxwell's modification	of An	pere's law, Integral and differential forms of	of Maxwe	ll's equat	ions and	their phy	sical sig	gnifican	ice, skin
effect. II	he wave: (equation	satisfied by E and B, plane ele	ectrom	agnetic waves in vacuum), Poynting vector, r	reflection	at a plan	e bound	ary of diel	ectrics,	EIM wa	ives in a
	ng meulum, renecu	of and refraction by the lonos	phere.								
11. CO-P			A +++-: h					2 004	DOL	DOC	007
COS			Attrib	utes		PO1 P	02 PC	3 PU4	P05	P06	P07
CO1	To learn basic mat	nematical tools with their phys	sical sig	inificance as a prerequisite for the course.		3	2 1		1	1	1
CO2	To understand and distribution and ap	d explain the principles/metho ply them to practical systems.	ods of	evaluation of electric field, potential due to	o charge	3	2 2		3	1	1
CO3	To learn the princip	ples and methods of evaluation	n of ma	agnetic field and scalar magnetic potential du	e to due				_		
	to current or mag	gnetic dipoles. Thereby apply	y them	n to analyse magnetic properties of dia, p	ara and	3	2 2		3	1	1
	ferromagnetic mat	erials.		a and should be deviced beend one to in-							
CO4	their experimental	working	iductio	in and study the devices based upon, to inv	estigate	3	2 2		3	1	1
	To formulate Max	well's equations and apply the	m to ir	westigate the propagation of electromagneti	ic waves						
CO5	in free space, diele	ctric and conducting medium.		resultate the propulsation of electromagnetic	ie mares	2	2 1		2	1	1
-	35	trong contribution, 2 Average	contri	bution . 1 Low contribution					1		
12. Brid	ef description of sel	f-learning / E-learning compor	nent								
1.	https://nptel.ac.i	1/courses/115104088/									
2.	http://library.iul.a	ac.in/ELibrary.aspx									
3.	https://www.you	tube.com/watch?v=XJYY4jlwZz	zo								
4.	https://www.you	tube.com/user/imperialcollege	evideo	/search?query=eric+laithwaite							
13. Boo	ks recommended:			· ·							
1.	Berkeley Physics	Course; Electricity and Magnet	ism, E	d. E.M. Purcell (McGraw Hill).							
2.	D. J. Griffith; "Intr	oduction to Electrodynamics"	(Prent	ice-Hall of India).							
3.	Reitz and Milford	; "Electricity and Magnetism (A	Addiso	n-Wesley).							
4.	S. Mahajan and A	. A. Rangwala; "Electricity and	Magne	etism" (Tata McGraw- Hill).							
5.	M. Portis; "Electro	omagnetic Fields".									
6.	Pugh and Pugh; "	Principles of Electricity and Ma	agnetis	m" (Addison-Welsley).							
7.	Panofsky and Phil	lips; "Classical Electricity and N	Magne	tism" (India Book House),							
	S. S. Atwood: "Ele	ectricity and Magnetism" (Dove	er).								

1. Nam	e of the Departmen	t: CHEMISTRY								
2. Cour	se Name	INORGANIC AND PHYSICAL	CHEMISTRY-II	L		1			Р	
3. Cour	se Code	CH224		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 S	Sem()	E٧	very Sei	m()
7. Tota	l Number of Lecture	es, Tutorials, Practicals								
	Lectu	ires = 30	Tutorials = 10			Practic	al = Nil			
8. COUF	RSE OBJECTIVES: The	e purpose of this course is to o	develop the deep understanding of general charact	eristic properti	es of tr	ansition	elements	s, nom	nenclati	ure and
isomerisr	n in coordination co	ompounds, organometallic che	emistry of transition elements , chemistry of Lanth	anide and acta	anides,	solid sta	te chemis	stry a	nd to g	ain the
knowled	ge of basics of electr	ochemistry and construction o	of cells for the calculation of EMF/ Gibbs free energy	value.						
9. COUR After the	SE OUTCOIVIES (CO)	): omnletion_learners.will.devel	on following attributes:							
COUR	SF OUTCOMF (CO)									
		Student will be able to unde	rstand the approaches to the development of d	olock fundame	ntal wi	th CET/	/BT/MOT	and i	ts wide	espread
	CO1	applications.					51/101	unu i		.spicuu
	600	Students will have a firm fou	indation in the IUPAC nomenclatures of the comp	lexes and the	bondir	ng mode	ls, structu	ures, I	reactivi	ty, and
	02	applications of coordination co	omplexes, boron hydrides, metal carbonyls, and org	anometallics.						
	603	Students will be able to under	rstand about the key concepts of inorganic and org	anometallic ch	emistry	y includii	ng those r	relate	d to sy	nthesis,
	03	reaction chemistry, and struct	ure and bonding.							
	CO4	Students will be able to und	lerstand about the key concepts of solid state cl	nemistry, struc	ture e	lucidatio	n throug	h X ra	ay diffr	actions
	04	methods. Students will have a firm fo	underline in the basis of the electropheneista. In							40 4kg
	CO5	development of electron trans	undation in the basic of the electrochemistry, the	ansport priend	menor	and co	nauction	appro	bacnes	to the
10 Uni	t wise detailed cont	ant								
Unit-1	t wise detailed cont	Number of lectures = 08	Title of the unit: CHEMISTRY OF FLEMENTS OF T	<b>RANSITION SE</b>	RIFS					
Chemistr	v of Elements of Fire	st Transition Series: Character	istic properties of d-block elements Binary compo	unds (hydrides	carbid	les and c	vides) of	the e	ement	s of the
first trans	sition series and con	plexes with respect to relative	e stability of their oxidation states, coordination nur	nber and geom	, euroie netrv.			the e	cificitie	J OF the
Chemistr	y of Elements of Se	cond and Third Transition Seri	ies: General characteristics, comparative treatment	t of Zr/Hf, Nb/	Ta, Mo	/W in re	spect of i	onic r	adii, ox	dation
states, m	agnetic behavior, sp	ectral properties and stereoch	emistry							
Unit-2		Number of lectures =08	Title of the unit: COORDINATION COMPOUNDS							
Werner's	coordination theor	ry and its experimental verific	cation, effective atomic number concept, chelates	, nomenclature	e of co	ordinatio	on compo	ounds,	isome	rism in
coordina	tion compounds, val	lence bond theory of transitior	n metal complexes.							
Unit-3		Number of lectures = 08	Title of the unit: CHEMISTRY OF ELEMENTS OF IN	INER TRANSITI	ON SEF	RIES				
Chemistr	y of Lanthanide Elei	ments: Electronic structure, o	kidation states and ionic radii and lanthanide contr	action, comple	ex form	ation, or	currence	andi	solatio	n, cerie
ammoniu from LL	im sulphate and its	analytical uses. Chemistry of	Actinides: configuration, oxidation states and magn	letic properties	s, chem	istry of	separatio	n of N	ip, Pu a	and Am
Unit-4		Number of lectures = 08	Title of the unit: SOLID STATES							
Definition	n of space lattice, u	nit cell. X-ray diffraction by c	rystals. Derivation of Bragg equation. Determinatio	n of crystal str	ucture	of NaCl.	KCl and (	CsCl (I	aue's i	method
and powe	der method). Defect	s in crystals.		· · <b>,</b> · · · · ·		,				
Unit-5		Number of lectures = 08	Title of the unit: ELECTROCHEMISTRY – I							
Electrical	transport - Conduc	tion in metals and in electroly	te solutions, specific conductance, equivalent con	ductance, varia	ation of	equival	ent and s	pecifi	c condu	uctance
with dilu	tion. Kohlrausch's la	w, weak and strong electrolyte	e, Arrhenius theory of electrolyte dissociation and it	s limitations. O	stwald'	s dilutio	n law its u	ises ar	nd limit	ations.
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4 I	PO5	PO6	PO7
<b>CO1</b>	Student will be ab	ble to understand the approa	aches to the development of d block fundament	tal with 3	1	1		2	1	2
01	CFT/VBT/MOT and	its widespread applications.			_	_		-		_
	Students will have a	a firm foundation in the IUPAC	nomenclatures of the complexes and the bonding	models,	1	1		2	1	2
CO2	organometallics	ty, and applications of coord	mation complexes, boron nyundes, metal carbon	yis, anu <b>s</b>	1	1		2	T	2
	Students will be a	hle to understand about the	key concepts of inorganic and organometallic ch	emistry						
CO3	including those rela	ated to synthesis, reaction che	mistry, and structure and bonding.	3	1	2		2	1	3
	Students will be ab	ble to understand about the k	ey concepts of solid state chemistry, structure elu	cidation				-		_
CO4	through X ray diffra	actions methods.		3	1	2		2	1	3
	Students will have	a firm foundation in the ba	asic of the electrochemistry, transport phenomen	ion and g	1	2		2	1	2
CO5	conduction approa	ches to the development of ele	ectron transfer process for the cell reactions.	3	-	2		2	-	3
	3 SI	trong contribution, 2 Average	contribution , 1 Low contribution							
12. Brie	ef description of self	f-learning / E-learning compor	ient							
1.	https://www.fandn	n.edu/uploads/files/79645701	812579729-genchem-reference-for-web.pdf							
2.	http://file.akfarmal	hadhika.ac.id/E-BOOK/12-121	3-aktarmahad-16-1-vogelqu-d.pdf							
3.	https://faculty.psau	u.edu.sa/filedownload/doc-6-p	dt-f06110ef2e1e1ae119cbact/1dd1//32-original.p	df						
13. 800	Loo LD Consise In	organic Chemistry Dearson Ed	ucation							
1. 2	Hubeev IF Keiter	organic chemistry, Pearson Ed · F Δ Keiter R Ι Medhi Ο K	ucation. Inorganic Chemistry, Principles of Structure and Re	activity Pearcy	on Educ	ation 20	06			
3.	Douglas. B.E. and M	Ic Daniel, D.H Concepts & Mc	odels of Inorganic Chemistry, Oxford. 1970.	activity, i calst						
4.	Castellan, G. W. Ph	ysical Chemistry, Published by	Narosa.							
5.	Physical Chemistry,	Puri Sharma & Pathania.								
6.	Peter, A. & Paula, J.	. de. Physical Chemistry 9th Ed	., Oxford University Press.							

#### SEMESTER - IV

1. Nam	1. Name of the Department: CHEMISTRY																						
2. Cour	se Name	ORGANIC AND PHYSICAL CH	HEMIST	RY-II		L		1	г		Р												
3. Cour	se Code	CH225				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 (v)	( ) bb0	<i>,</i>	Fither	Sem (	E F	verv Ser	, m ( )											
7. Total	Number of Lecture	s Tutorials Practicals	0.		Licit ( )			Littler			very ser												
711010	Lectu			Tutorials - 10				Practic	al – Nil														
8. COUR	RSE OBJECTIVES: Stu	dents will be able to understa	nd Alky	/l and Aryl Halides, Alcohols, pl	nenols. Aldehv	des and Ketone	s. Chen	nical Kin	etics. Ph	ase Eq	uilibriu	m.											
				, ,	,		-,		,														
9. COUR	SE OUTCOMES (CO)	:																					
After the	successful course c	ompletion, learners will devel	lop foll	owing attributes:																			
COUR	SE OUTCOME (CO)			AT	TRIBUTES																		
	601	Comprehension of classificati	ion, m	ethods of formation and che	mical reaction	s of alkyl halid	es, Me	chanism	of nuc	leophil	ic subs	titution											
	01	reaction of alkyl halides (SN1 a	and SN	2 reactions) with energy profile	e diagrams.																		
	<u> </u>	To create basic knowledge o	of nom	nenclature, methods of forma	ition, Hydroge	n bonding. Ac	dic nat	ure, Re	actions	of alco	ohols, D	Dihydric											
	602	alcohols and phenols.																					
	<u> </u>	Able to evaluate different typ	pes of S	Synthesis of aliphatic aldehyde	s and ketones,	alcohols, carb	oxylic a	cids and	l named	reactio	ons as F	Reimer-											
	03	Tiemann reaction, gatterman	n-koch	reaction and aromatic ketones	by Friedel cra	ft acylation.				<u> </u>													
	CO4	Analyze and compare Theorie	es of ch	emical kinetics, Molecularity a	nd order of re	action, concept	of acti	vation e	energy n	nethod	of integ	gration,											
Understand the terms-phase, component and degree offreedom, derivation of Gibb's phase rule, one component system-water, two																							
	CO5	Understand the terms-phase	e, comp d oquili	ponent and degree offreedon	n, derivation of	of GIDD's phas	e ruie,	one co	mponer	it syste	em-wate	er, two											
10 110	t wise detailed cent	component system sond liquit	u equili	ibria simple eutectic – Bi-Cd, Pi	D-Ag systems, t		nieau																
10. Unit 1	t wise detailed cont	Number of lectures = 09	Titl	a of the unity ALKYL AND ARYL																			
Unit-1	of formation show	Number of lectures = 08		e of the unit: ALK IL AND ARTI	f alled balidas	SN2 and SN1	roactio	ac with	000000	profile	diagram	nc And											
halidas	Nothods of formation	nical reactions. Mechanism of	rtions	Mochanisms of pucloophilic ar	omatic substit		reaction	ns with	energy	profile	diagrar	ns, Aryı											
I lucit 2		Number of lestures -09	Title	of the weite al could can be																			
Unit-2	luia alaabala maaaa	Number of lectures =08	Inte	of the unit: ALCOHOLS AND P	HENOLS	and astans th		la a sa alisa	- Asidi		a Daaw												
	and pipacel pipacel	iciature, methods of formatio	ion of	netion of aldenydes, ketones, c	arboxylic acids	s and esters. Hy	arogen	bonain lie strop	g. Acidic	: natur	e, React	tions of											
reconanc	and pillacol-pillacoli o stabilization of r	phenovide ion Reactions of	nhenc	plienois, physical properties at	ubstitution a	culation and c	arboyul	ation F	rios ro	arconge	is anu p mont	Claison											
rearrange	ement & Reimer-Tie	mann reaction	prierie		abstitution, a		anboxyi		nes rec	inunge	.mem,	claisen											
Unit-3		Number of lectures = 08	Title	of the unit: ALDEHYDES AND	KETONES																		
Synthesis	of aliphatic aldehv	tes and ketones with particula	ar refer	ence to acid chlorides, alcohol	s. carboxylic a	ids. Grignard r	eagent.	alkenes	and 1	3-dithia	anes. Sv	nthesis											
of aroma	atic aldehvdes by o	xidation of alkyl benzene. Re	eimer-	Tiemann reaction. Gatterman	n-Koch reactio	n and aromati	c ketor	nes by I	Friedal (	Craft A	cvlatior												
				,																			
condensa	ation, Cannizzaro rea	action, Clemmensen reduction	and W	/olff-Kishner reduction.								ondensation Cannizzaro reaction. Clemmensen reduction and Wolff-Kishner reduction.											
condensa Unit-4	ation, Cannizzaro rea	action, Clemmensen reduction Number of lectures = 08	and W	/olff-Kishner reduction. of the unit: CHEMICAL KINET	ICS																		
condensa Unit-4 (i)Molecu	ation, Cannizzaro rea ularity and order of	action, Clemmensen reduction Number of lectures = 08 reaction, concentration depen	n and W Title	/olff-Kishner reduction. • of the unit: CHEMICAL KINET • of rates, integrated rate expr	I <b>CS</b> ression for- zei	o order, first o	rder, se	econd o	rder, ps	eudo o	rder rea	actions,											
condensa Unit-4 (i)Molecu half-life.	ation, Cannizzaro rea	action, Clemmensen reduction Number of lectures = 08 reaction, concentration depen	n and W Title	Iolff-Kishner reduction. of the unit: CHEMICAL KINET of rates, integrated rate expr	I <b>CS</b> ression for- zer	o order, first o	rder, se	econd o	rder, ps	eudo o	rder rea	actions,											
condensa Unit-4 (i)Molecu half-life. (ii) Detern	ation, Cannizzaro rea ularity and order of mination of the orde	action, Clemmensen reduction Number of lectures = 08 reaction, concentration depen er of reaction: Differential met	n and W Title ndence	Iolff-Kishner reduction. of the unit: CHEMICAL KINET of rates, integrated rate expr nethod of integration, half-life I	iCS ression for- zer method and iso	o order, first o	rder, se	econd o	rder, ps	eudo o	rder rea	actions,											
condensa Unit-4 (i)Molecu half-life. (ii) Detern (iii) Theon	ation, Cannizzaro rea ularity and order of mination of the order ries of chemical kine	action, Clemmensen reduction Number of lectures = 08 reaction, concentration deper er of reaction: Differential met etics: Arrhenius theory of react	n and W Title ndence thod, m	Volff-Kishner reduction. of the unit: CHEMICAL KINET e of rates, integrated rate expr nethod of integration, half-life i te, effect of temperature on ra	ICS ression for- zer method and iso te of reaction,	o order, first o blation method concept of act	rder, se	econd or energy.	rder, pso Simple o	eudo o collisior	rder rea	actions, y based											
condensa Unit-4 (i)Molecu half-life. (ii) Detern (iii) Theor on hard s	ation, Cannizzaro rea ularity and order of mination of the order ries of chemical kine phere model, transi	action, Clemmensen reduction Number of lectures = 08 reaction, concentration deper er of reaction: Differential met tics: Arrhenius theory of react tion state theory (equilibrium	thod, main and W	Volff-Kishner reduction. of the unit: CHEMICAL KINET of rates, integrated rate expr method of integration, half-life in te, effect of temperature on ran mesis).Thermodynamics aspect	ICS ression for- zer method and iso te of reaction, of transition st	o order, first o plation method concept of act rate theory.	rder, se ivation	econd or energy.	rder, pse Simple e	eudo o collisior	rder rea	actions, y based											
condensa Unit-4 (i)Molecu half-life. (ii) Detern (iii) Theor on hard s Unit-5	ation, Cannizzaro rea ularity and order of mination of the order ries of chemical kine phere model, transi	Action, Clemmensen reduction Number of lectures = 08 reaction, concentration dependent er of reaction: Differential met titics: Arrhenius theory of reaction tion state theory (equilibrium Number of lectures = 08	thod, m tion ration rat	Volff-Kishner reduction. of the unit: CHEMICAL KINET of rates, integrated rate expr method of integration, half-life in te, effect of temperature on ra- mesis). Thermodynamics aspect of the unit: PHASE EQUILIBRI	ICS ression for- zer method and iso te of reaction, of transition st UM	o order, first o olation method concept of act rate theory.	rder, se	econd or energy.	rder, pse Simple e	eudo o collisior	rder rea	y based											
condensa Unit-4 (i)Molecu half-life. (ii) Detern (iii) Theor on hard s Unit-5 Statemer	ation, Cannizzaro rea ularity and order of mination of the order ries of chemical kine sphere model, transi nt and meaning of th	Action, Clemmensen reduction Number of lectures = 08 reaction, concentration dependent er of reaction: Differential met tics: Arrhenius theory of reaction tion state theory (equilibrium Number of lectures = 08 ne terms-phase, component a	thod, m tion ration ration thod, m tion ration ration hypoth <b>Title</b> nd deg	Volff-Kishner reduction. of the unit: CHEMICAL KINET of rates, integrated rate expr method of integration, half-life in te, effect of temperature on ra- mesis). Thermodynamics aspect of the unit: PHASE EQUILIBRI ree of freedom, derivation of the section of the unit with the section of the section of the section of the unit with the section of the section	ICS ression for- zer method and iso te of reaction, of transition st UM Gibb's phase ru	o order, first o olation method concept of act rate theory.	rder, se ivation ibria of	econd or energy.	rder, pso Simple o	eudo o collisior t syster	rder rea	y based											
condensa Unit-4 (i)Molecu half-life. (ii) Detern (iii) Theor on hard s Unit-5 Statemer and 'S' sy	ation, Cannizzaro rea ularity and order of mination of the order ries of chemical kine sphere model, transi nt and meaning of th rstems. Phase equilit	Action, Clemmensen reduction Number of lectures = 08 reaction, concentration dependent er of reaction: Differential met tics: Arrhenius theory of reaction tion state theory (equilibrium Number of lectures = 08 ne terms-phase, component a pria of two component system	thod, m tion rai hypoth <b>Title</b> nd deg n – solid	Volff-Kishner reduction. of the unit: CHEMICAL KINET of rates, integrated rate expr method of integration, half-life is te, effect of temperature on ra- nesis). Thermodynamics aspect of the unit: PHASE EQUILIBRI is of freedom, derivation of of d liquid equilibria simple eutect	ICS ression for- zer method and iso te of reaction, of transition st UM Gibb's phase ru ic – Bi-Cd, Pb-/	o order, first o plation method concept of act ate theory. Ile, phase equil Ag systems, des	rder, se ivation ibria of ilverisa	econd or energy.	rder, pso Simple o mponen ead.	eudo o collisior t syster	rder rea	actions, y based rr, 'CO2'											
condensa Unit-4 (i)Molecu half-life. (ii) Detern (iii) Theol on hard s Unit-5 Statemer and 'S' sy 11. CO-Pd	ation, Cannizzaro rea ularity and order of mination of the order ries of chemical kine sphere model, transi nt and meaning of th stems. Phase equilit O mapping	Action, Clemmensen reduction Number of lectures = 08 reaction, concentration dependent er of reaction: Differential met actics: Arrhenius theory of reaction tion state theory (equilibrium Number of lectures = 08 ne terms-phase, component and pria of two component system	thod, m tion ration ration hypoth <b>Title</b> nd deg n – solic	Volff-Kishner reduction. of the unit: CHEMICAL KINET of rates, integrated rate expr nethod of integration, half-life is te, effect of temperature on ra- nesis).Thermodynamics aspect of the unit: PHASE EQUILIBRI ree of freedom, derivation of of liquid equilibria simple eutect	ICS ression for- zer method and iso te of reaction, of transition st UM Gibb's phase ru ic – Bi-Cd, Pb-/	o order, first o plation method concept of act ate theory. Ile, phase equil Ag systems, des	rder, se vation ibria of ilverisa	econd or energy. one cor tion of l	rder, pso Simple o mponen ead.	eudo o collisior t syster	rder rea	y based											
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condensa Unit-4 (i)Molecu half-life. (ii) Detern (iii) Theoro on hard s Unit-5 Statemer and 'S' sy 11. CO-Pr COS CO1 CO2 CO3 CO4 CO5 12. Brie 1. 2. 3. 13. Bool 1. 2. 3.	ation, Cannizzaro rea ularity and order of mination of the order ries of chemical kine sphere model, transi Int and meaning of the stems. Phase equility O mapping Comprehension of of nucleophilic subs To create basic kr Reactions of alcoho Able to evaluate di and named reaction Friedel craft acylati Analyze and comp activation energy n transition state the Understand the te component system systems, desilverisa 3 St ef description of self https://file.akfarmal https://faculty.psat sc recommended: Morrison, R. N. & B Finar, I. L. Organic O Francis Carey Organ	Anticipation of the second state in the second	A and W Title ndence thod, m tion ra- hypoth Title nd deg n – solic Attribu mation les (SN: method nols. aliphat tion, g cinetics, e method degree tem so contril 181257 3-akfar pdf-f06 Dorling Kinder cGraw-	Volff-Kishner reduction. e of the unit: CHEMICAL KINET e of rates, integrated rate expr hethod of integration, half-life in te, effect of temperature on ra- hesis).Thermodynamics aspect e of the unit: PHASE EQUILIBRI ree of freedom, derivation of of and chemical reactions of alk 1 and SN2 reactions) with ener ds of formation, Hydrogen bo- cic aldehydes and ketones, alco- attermann-koch reaction and , Molecularity and order of od and isolation method, Ther e offreedom, derivation of G lid liquid equilibria simple eu- bution , 1 Low contribution 9729-genchem-reference-for-v- mahad-16-1-vogelqu-d.pdf 110ef2e1e1ae119cbacf71dd17 g Kindersley (India) Pvt. Ltd. Published Hill Education.	ICS ression for- zer method and iso te of reaction, of transition st UM Gibb's phase ru- ic – Bi-Cd, Pb-/ yl halides, Mer gy profile diago onding. Acidic ohols, carboxy aromatic keto reaction, con modynamics a ibb's phase ru- tectic – Bi-Cc veb.pdf 7732-original.p blished by Pear	ro order, first or plation method concept of act rate theory. Ile, phase equil Ag systems, des <b>PO1</b> Chanism ams. <b>PO1</b> Chanism <b>3</b> nature, <b>3</b> lic acids pones by <b>3</b> cept of spect of <b>3</b> Ile, one I, Pb-Ag <b>3</b> Concept of <b>3</b> Concept of Concept of <b>3</b> Concept of <b>3</b> Concept of <b>3</b> Concept of <b>3</b> Concept of <b>3</b> Concept of <b>3</b> Concept of <b>3</b> Concept of Concept of Concept of <b>3</b> Concept of Concept of Conce	rder, se ivation ibria of ilverisa PO2 1 1 1 1	econd or energy. one cor tion of la 1 1 2 2 2 2	rder, pso Simple of mponen ead.	eudo o collisior t syster 2 2 2 2 2 2 2	rder reamine theory m-wate	y based r, 'CO2' PO7 1 1 1											

6. Peter, A. & Paula, J. de. Physical Chemistry 9th Ed., Oxford University Press.

1. Nam	e of the Departmer	It: MATHEMATICS		1									
2. Cour	rse Name	TENSOR ANALYSIS		L		1	<u>г                                     </u>		Р				
3. Cour	se Code	MT213		3		1	L		0				
4. Type	e of Course (use tick	mark)		Core (√	)	DE	()		FC (	)			
5. Pre-	requisite (if any)	10+2	6. Frequency (use tick marks) Even ( √ )	Odd (	)	Either	Sem ( )	E	very Se	m ( )			
7. Tota	I Number of Lecture	es, Tutorials, Practicals											
	Lect	ures = 30	Tutorials = 10			Practic	al = Nil						
8. COUF	RSE OBJECTIVES: Th	e purpose of this undergradu	ate course is to impart basic and key knowledge	of vector anal	ysis and	d geome	try. By ι	using t	he prin	cipal of			
applied r	nathematics to obt	ain quantitative relations which	h are very important for higher studies. After succ	essfully comple	tion of	course,	the stud	dent w	ill able	explore			
subject in	nto their respective	dimensions											
9. COUR After the	SE OUTCOIVIES (CO successful course o	): completion_learners will develo	on following attributes:										
COUR	SE OUTCOME (CO)												
		Students will be able to under	stand Vector Spaces, dual spaces, tensor product o	f vector spaces	and al	so abou	t transfo	rmatio	n form	ulae for			
	CO1	tensors.	······································		,								
	(0)	Students will gain an understa	nd of Tensors and their types: Contravariant and co	ovariant vecto	s and te	ensors, r	nixed te	nsors,	Symme	tric and			
	02	skewsymmetric tensors, Assoc	iated tensors, Reciprocal tensors.										
	<b>CO3</b>	Students will be able to learn	and implement Algebra of tensors, Contraction an	d inner produ	ct. They	will also	o study a	about (	Quotien	it law 8			
	05	Riemannian metric tensor											
	CO4	Students will create the own of Cradient divergence and our	understanding of Christoffel Symbols. They will lea	rn covariant di	Iferentia	ation of	tensors	and al	so stud	y about			
	Students will gain an understanding of The fundamental theorem of local Riemannian geometry, Differential operators, curvature tensor,												
	CO5	Geodesics, geodesics coordina	ite system, geometrical interpretation of the curvat	ure tensor.	uy, Din	lerentiai	operate	Jis, cui	vature	tensor			
10. Uni	it wise detailed con	tent											
Unit-1		Number of lectures = 08	Title of the unit:										
Vector S	paces, dual spaces, t	tensor product of vector spaces	s, transformation formulae.										
Unit-2		Number of lectures =08	Title of the unit:										
Tensor, O	Contravariant and co	ovariant vectors and tensors, m	ixed tensors, Symmetric and skewsymmetric tenso	rs, Associated	ensors								
Linit-3		Number of lectures - 08	Title of the unit:										
Algebra (	of tensors Contract	ion and inner product. Quotien	t law Reciprocal tensors Riemannian metric tensor	r						-			
Algebra		on and miler product, quotien	r law, Recipioear tensors, Remainian metre tenso										
Unit-4		Number of lectures = 08	Title of the unit:										
Christoff	el Symbols, covariar	1t differentiation, Gradient, div	ergence and curl in tensor notation.										
Unit-5		Number of lectures = 08	Ifferential exercises exercises for desire		udia at a					-			
the curve	amental theorem o	r local Riemannian geometry, L	Differential operators, curvature tensor, Geodesics,	geodesics coo	rdinate	system,	geomet	rical in	terpret	ation of			
11. CO-P			Adduthere		003	0.02	<b>DO</b> 4	DOF	DOC	007			
cos	Students will be a	hle to understand Vector Space	All induces	POI	PUZ	P03	PU4	PU5	PU6	P07			
CO1	about transformat	ion formulae for tensors.		3	2	2	1	1	1	2			
600	Students will gain	an understand of Tensors a	nd their types: Contravariant and covariant vect	ors and		-				_			
02	tensors, mixed ten	sors, Symmetric and skewsymr	netric tensors, Associated tensors, Reciprocal tenso	ors. 3	1	2	1	1	1	2			
603	Students will be a	ole to learn and implement Al	gebra of tensors, Contraction and inner product. T	hey will	1	2	1	1	1	2			
	also study about Q	uotient law & Riemannian met	ric tensor	5	<b></b>	-	-	-	-	-			
CO4	Students will creat	e the own understanding of Cl	hristoffel Symbols. They will learn covariant differe	ntiation 3	1	2	1	1	1	2			
	of tensors and also	study about Gradient, diverge	nce and curl in tensor notation.		<u> </u>								
CO5	Students will gain a	an understanding of The fundal	mental theorem of local Riemannian geometry, Diff	rerential	1	2	1	1	1	2			
	curvature tensor.	ile tensor, deduesits, geodes	its coordinate system, geometrical interpretation		1	2	-	-	-	2			
	35	trong contribution. 2 Average	contribution . 1 Low contribution		_	1	1 1						
12. Brie	ef description of sel	f-learning / E-learning compor	ent										
1.	https://cosmoleari	ning.org/video-lectures											
2.	https://content.ko	pykitab.com/ebooks/2016/02/	5649/sample/sample_5649.pdf										
3.	https://www.win.t	ue.nl/casa/education/AntWisk	Dict/_3/e.%20Algebra,%20Meetkunde%20en%20D	iscrete%20Wis	kunde/7	TENSOR	Dictaat	-2004-					
13. Boo	ks recommended:												
1.	Tensor Calculus, Za	afar Ahsan, Anamaya Publicatio	n, New Delhi.										
2.	Differential Geome	etry of manifolds, U.C.De & A.A	Shaikh, Narosa Publishing House Pvt. Ltd, 2007.										
3.	Schaum's Outlines	of Tensor Calculus.											
4.	Tensor Calculus &	Riemannian Geometry, D.C. Ag	arwal, Krishna Publications.										

1. Nam	1. Name of the Department: MATHEMATICS												
2. Cou	rse Name	ABSTRACT ALGEBRA					L			т		Р	
3. Cou	rse Code	MT214					3			1		0	
4. Туре	e of Course (use tick	mark)					Core (	√)	DE	()		FC (	)
5. Pre-	-requisite (if any)	10+2	6.	Frequency (use ti	ick marks)	Even ( V )	Odd	()	Either	Sem (	) E	very Sei	m()
7. Tota	I Number of Lecture	es, Tutorials, Practicals											
	Lectu	ures = 30		Tutori	ials = 10				Practi	cal = Nil			
8. COUI	RSE OBJECTIVES: Th	e objective is to introduce the	e basi	c concept to the sub	bject of alge	bra. The cours	e deals with	the sor	ne algeb	raic stru	ctures i	namely	groups,
rings, fie	lds and some related	d structures. Abstract algebra e	enable	es students to build	mathematic	al thinking and	l skill.						
9. COUR	RSE OUTCOMES (CO	):											
After the	e successful course c	completion, learners will develo	ор јо	llowing attributes:	A.T.								
000				<b>C</b> 1 1 1	AI								
	CO1	Students will be able to explain	in the	fundamental conce	ept of Group a	and its well be	haved subse	ets.					
	CO2	Students will be able to descri	ibe fu	ndamental propertion	es of Ring an	d its related st	ructures.						
	CO3	Students will be an understand	iding o	of Elementary row o	perations an	d their applica	itions to solu	ution of a	a system	of linear	equati	ons.	
	CO4	Students will be able to descri	ibe Ve	ector spaces and its	properties.								
	CO5	Students will be able to explai	in Line	ear transformation a	and its prope	rties as well as	application	s.					
10. Un	it wise detailed con	tent											
Unit-1		Number of lectures = 08	Tit	tle of the unit:									
Group, h	iomomorphism, ison	norphism, conjugacy relation, r	norma	alizer, centre of grou	up.								
Unit-2		Number of lectures =08	Tit	le of the unit:									
Ring, rin	g homomorphism, ic	deals, integral domain, introduc	ction	to field.									
Unit-3		Number of lectures = 08	Tit	le of the unit:									
Vector s	paces, Subspaces, Sp	oan of a set, Linear dependence	e and	independence, Dim	ension and b	asis.							
Init-4		Number of lectures = 08	Tit	le of the unit:									
Vector s	naces, Subspaces, Sr	an of a set. Linear dependence	e and	independence. Dim	ension and h	asis.							
			e una	independence, 2mi									
Unit-5		Number of lectures = 08	Tit	le of the unit:									
Linear tr	ansformation and th	eir matrix representation, rank	k nulli	ity theorem.									
11. CO-P	O mapping												
COs			Attrik	outes			PC	01 PO	2 PO3	PO4	PO5	PO6	PO7
CO1	Students will be ab	le to explain the fundamental o	conce	ept of Group and its	well behaved	d subsets.	3	1	1	2	3	1	3
CO2	Students will be ab	le to describe fundamental pro	operti	es of Ring and its re	lated structu	res.	з	2	2	2	3	1	2
CO3	Students will be a	n understanding of Elementa	ry ro	w operations and t	their applicat	tions to solution	on of a	2	2	2	2	1	2
604	System of lifear eq							2	-	2	2	4	2
C04	Students will be ab	ne to describe vector spaces ar	naits	properties.			3	2	2	2	2	1	3
CO5	Students will be ab	le to explain Linear transforma	ation	and its properties as	s well as appl	ications.	2	2	1	2	3	1	2
	3 S	trong contribution, 2 Average	conti	ribution , 1 Low con	tribution								
12. Bri	ef description of sel	f-learning / E-learning compor	nent										
1.	https://nptel.ac.in/	/courses/111/105/111105112/	/										
2.	https://nptel.ac.in/	/courses/111/101/111101115/	/Partia	al%20Translation.pd	lf								
13. Boo	ks recommended:												
1.	University Algebra	by N.S. Gopalakrishnan, New A	ige Int	ternational publishir	ng house, Ne	w Delhi.							
2.	Modern Algebra by	y Surjeet Singh, Vikas Publishing	ig Hou	ise Pvt. Ltd., New De	elhi.								
3.	An introduction to	Linear Algebra by V. Krishnamı	urthy	, V.P. Mainra & J. L. /	Arora, East V	Vest Press Pvt.	Ltd., New D	elhi.					

1. Nam	e of the Departmen	it: PHYSICS											
2. Cour	se Name	ELECTRICITY AND MAGNETIS	SM LA	B		L			1	Г		Р	
3. Cour	se Code	PY205				0			C	)		6	
4. Type	of Course (use tick	mark)				Core (	√)		DE	( )		FC (	)
5. Pre-	requisite (if any)	10+2 with Physics	6.	Frequency (use tick marks)	Even ( V )	Odd	()	E	Either	Sem (	) E	very Se	m()
7. Tota	I Number of Lecture	es, Tutorials, Practicals						_					
0. 0011	Lectu	ires = 00		Tutorials = 00				P	ractic	al = 10			1:66 a wa wa t
experime	ents related to its the	e purpose of this undergradu		ourse is to impart practical i	cnowledge/mea	surements	n elect	ricity	anu	magneu	ism tm	ougn u	merent
9. COUR	SE OUTCOMES (CO)	:											
After the	successful course c	ompletion, learners will develo	op foll	lowing attributes:									
COUR	SE OUTCOME (CO)			Α	TTRIBUTES								
	CO1	Determine the energy band ga	ip of a	given semiconductor.									
	CO2	Measurement of high and low	resist	ance and capacitance of a cap	acitor.								
	CO3	Determine the coefficient of se	elf anc	d mutual inductance between	two given coils.								
	CO4	Study the characteristics of Ba	llistic (	Galvanometer.									
10. Syll	abus	1											
Ехр — О	1	Study of characteristics of a ba	allistic	: Galvanometer.									
Ехр — О	2	Measurement of low resistant	ce by (	Carey-Foster Bridge									
Ехр — О	3	Measurement of inductance u	using i	mpedance at different freque	ncies.								
Ехр — 0	4	Determination of energy band	d gap o	of a semiconductor using p-n	unction diode.								
Exp - 0	5	To measure high Resistance b	y the I	method of Leakage of a conde	enser.								
Ехр — О	6	To determine the coefficient of	of Mut	tual Inductance between two	coils.								
Ехр — О	7	To determine the coefficient of	of Self	Inductance of a single coil.									
Ехр — О	8	To determine the capacity of	conde	enser by absolute method.									
Ехр — О	9	To study of characteristic of a	choke	2.									
Exp – 1	0	Measurement of inductance b	by And	derson's bridge.									
11. CO-P	O mapping												
COs			Attrib	utes		PC	01 PC	02	PO3	PO4	PO5	PO6	P07
CO1	Determine the ener	rgy band gap of a given semico	nduct	or.		з	2	1	2		2	1	1
CO2	Measurement of hi	gh and low resistance and capa	acitan	ce of a capacitor.		3	2	!	2		2	1	1
СОЗ	Determine the coef	fficient of self and mutual indu	ctance	e between two given coils.		3	2	2	2		2	1	1
CO4	Study the character	ristics of Ballistic Galvanometer	r.			3	2		2		2	1	1
	3 S1	trong contribution, 2 Average	contri	bution , 1 Low contribution									
12. Brie	ef description of self	f-learning / E-learning compon	ent										
1.	https://www.explo	ratorium.edu/snacks/subject/e	electri	city-and-magnetism	2007/								
2.	nttps://ocw.mit.ed	u/courses/pnysics/8-02-pnysic	s-II-ele	ectricity-and-magnetism-sprin	g-2007/experim	ients/							
3. 4.	http://www.rossna	zirullah.com/BSc/BSc.htm											
13. Bool	ks recommended:												
1.	Practical Physics. by	y R. K. Shukla, New Age Interna	tional	Private Limited; Third edition									
2.	B. Sc. Practical Phys	sics by Harnam Singh and Hemi	me, S.	Chand.									
3.	B. Sc. Practical Phys	sics by CL Arora, S Chand & Cor	npany	1									
4.	Practical Physics by	Kumar P.R.S., Prentice Hall Inc	dia Lea	arning Private Limited									

1. Nam	e of the Departmen	It: CHEMISTRY								
2. Cour	rse Name	CHEMISTRY PRACTICAL – IV		L			Г		Р	
3. Cour	rse Code	CH226		0		(	3		4	
4. Туре	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 (	)	Either	Sem (	) E <sup>.</sup>	very Se	m ( )
7. Tota	l Number of Lecture	es, Tutorials, Practicals								
	Lectu	ures = 00	Tutorials = 00			Practic	al = 10			
8. COUF	RSE OBJECTIVES: Stu	dents will have a firm foundati	on in the fundamentals and application of current of	chemical and so	ientific	theorie	s includ	ing thos	se in an	alytical,
inorganio	c, organic and physic	cal chemistry along with the la	aboratory safety, use of an analytical balance for n	nass measuren	ient, us	e of the	ermome	eters an	d temp	erature
probes,	use of graduated	cylinders, graduated pipett	es, and volumetric pipettes for volumetric me	easurement, t	trations	s, the	calibrat	tion an	d use	simple
spectrop	hotometers, pH met	ters, centrifuges.								
9. After the		AES (CO):	on following attributes:							
	SE OUTCOME (CO)									
	<u></u>	Chudaat will be able to wadaw								
	01	Student will be able to unders	tand the approaches to sample analysis with acid ba	ase titrimetric r	nethod.					
	CO2	Students will have a firm foun	dation in the preparation of coordination complexe	s and duble sal	ts.					
	СОЗ	Students will be able to under	stand about the key concepts of conductometric tit	rations.						
	CO4	Students will be able to under	stand about the key concepts of compexometric tit	rations.						
	605	Students will have a firm fo	undation in the basic of the electrochemistry, tr	ansport pheno	menon	and co	onductio	on appr	oaches	to the
	105	development of electron trans	fer process for the cell reactions.							
10. Syl	labus									
Exp – 0	)1	Acetylation of salicylic acid, a	niline, glucose and hydroquinone, Benzoylation of a	iniline and pher	าอไ					
Exp – 0	12	Oxidation: Preparation of ber Reduction: Preparation of ani	izoic acid from toluence line from nitrobenzene							
Exp – 0	13	To study the effect of concen	tration on the rate of reaction between sodium thic	sulphate and	hydroc	hloric a	cid.			
Exp – 0	)4	To determine the pKa of acet	ic acid							
Exp – 0	)5	Determination Critical Solution	n Temperature (CST) for the Phenol – Water System	n.						
Exp – 0	16	Inorganic Chemistry: Prepara 1. Chrome Alum 2. Potash Alum	ation of the following: 1. Chrome Alum, 2.Potash A	Alum , 3.Sodiur	n Ferrio	xalate				
Exp – 0	)7	Aliphatic electrophlic substitu	ution: Preparation of iodoform from ethanol and ac	etone						
Exp - 0	8	To determine the strength of	given acetic acid solution conductometrically by titi	rating against a	standa	rd solut	ion.			
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
604	Charles III has abe		and the second					_		_
C01	Student will be able	e to understand the approache	is to sample analysis with acid base titrimetric meth	od. 3	1	2		3	1	2
CO2	Students will have	a firm foundation in the prepa	ration of coordination complexes and duble salts.	3	1	1		2		2
CO3	Students will be ab	le to understand about the key	concepts of conductometric titrations.	3	1	2		1	1	2
CO4	Students will be ab	le to understand about the key	concepts of compexometric titrations.	3	1	1		1	1	2
CO5	Students will have	a firm foundation in the ba	asic of the electrochemistry, transport phenomer	non and 2	1	1		2	1	2
	3 5	trong contribution 2 Average	contribution 1 low contribution		1	1	1		<u>.                                    </u>	
12. Brid	ef description of self	f-learning / F-learning compor	ent							
1.	https://www.fandr	n.edu/uploads/files/79645701	812579729-genchem-reference-for-web.pdf							
2.	http://file.akfarmal	hadhika.ac.id/E-BOOK/12-121	3-akfarmahad-16-1-vogelqu-d.pdf							
3.	https://faculty.psau	u.edu.sa/filedownload/doc-6-r	odf-f06110ef2e1e1ae119cbacf71dd17732-original.p	df						
4.	https://www.stem	.org.uk/resources/collection/3	959/practical-chemistry							
13. Boo	ks recommended:									
1.	Advance Practical C	Chemistry: Jagdamba Singh, L.D	D.S Yadav, Jaya Singh, I.R. Siddiqui, PragatiEdition.							
2.	Practical Organic Cl	hemistry, A.I.Vogel.								
3.	Practical Physical C	hemistry: B. Viswanathan and	P.S.Raghavan.							
4.	Experimental Inorg	anic Chemistry –W.G.Palmer.								

1. Name	e of the Departmen	t: CHEMISTRY						-		
2. Cours	e Name	ADVANCE INORGANIC CHEM	1ISTRY	L					Р	
3. Cours	e Code	CH314		3		1	L		0	
4. Type	of Course (use tick	mark)		Core ( √ )		DE	()		FC (	)
5. Pre-r	equisite (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 Lecture	s, Tutorials, Practicals								
	Lectu	res = 30	Tutorials = 10			Practic	al = Nil			
8. COUR	SE OBJECTIVES: The	e main objective of this course	e is to understand the bonding in coordination com	npounds, electr	onic sp	ectra ar	nd magr	netic be	haviou	r of the
coordinat	ion compounds and	some important inorganic co	mpounds. The other important objective is to stud	y the reaction	mechar	nism in	coordin	ation c	ompour	าds and
importan	ce of inorganic meta	als in Bio-inorganic chemistry.								
9. COUR: After the	successful course co	: mnletion learners will develo	on following attributes:							
COURS										
	CO1	Understand the concept of coo	ordination chemistry with different theories.							
	CO2	Understand and evaluate the e	electronic spectra and magnetism of transition meta	al complexes.						
	CO3	Study of some important inorg	anic compounds and their applications							
	CO4	Understand the different react	ion mechanisms in coordination compounds.							
	CO5	Understand the concept of Bio	-inorganic chemistry and the role of metal ions in h	uman body.						
10. Unit	wise detailed cont	ent								
Unit-1		Number of lectures = 08	Title of the unit: BONDING IN COORDINATION C	OMPOUNDS					_	
Electronic	configuration (3d,	4d, 5d) and general periodic tr	ends, comparative study of first/second/third trans	sition series ele	ments,	IUPAC r	nomenc	lature o	of coord	lination
compoun Elomonto	as, VBT (nybridization)	on/magnetism/geometry) of N	I(CN)42-, NI(CO)4, NI(CI)42-, Fe(CN)63-, Fe(CN)64	de factionae aff	focting	10 Da v	alua cr	ustal fig	ld stabi	lization
energy, p	airing energy. Magn	etic moment from crystal field	theory, high spin and low spin complexes. Static an	id Dynamic Jah	n-Tellar	distorti	on.	ystai ne		112811011
Unit-2		Number of lectures =08	Title of the unit: SPECTRA AND MAGNETISM OF 1	TRANSITION M	ETALS					
Spectro-c	hemical series of lig	gands, Laporte's selection rule	, colour of complexes, spectroscopic ground states	s, selection rule	es for e	lectroni	ic spect	ral tran	sitions,	charge
transfer s	pectra, LS coupling	g. Types of magnetism and to	emperature dependence of magnetic susceptibility	y, Curie and C	urie-W	eiss law	, Meas	uremer	nt of m	agnetic
susceptib	ility by Gouy metho	d, Faraday method.								
Unit-3		Number of lectures = 08	Title of the unit: SELECTED TOPICS IN ADVANCED	INORGANIC C	ομροι	JNDS				
Structure, Structure,	/synthesis/various /synthesis/various (	chemical reactions of chemical reactions of fluoride	potassium dichromate, potassium permanga es and oxides of xenon, Zeise's salt, silicones, bo	anate, potass prazine, phospl	sium hazine.	chroma S4N4,	ite, so P4, P40	odium 06, P40	thiosu 10. Ex	ilphate. tractive
metallurg	y for self reduction	method (Copper and lead), cya	nide process and chemical reactions (silver and gol	d).						
Unit-4		Number of lectures = 08	Title of the unit: REACTION MECHANISM OF LIGA	AND DISPLACEN	VENT R	EACTIO	NS			
Substituti	on reaction in squa	are planar complexes (Trans	effect), mechanism of substitution reaction, Electi	ron transfer re	actions	and its	s classif	ication.	Outer	sphere
electron t	transfer mechanism	n, chemical activation, Marcus	s theory, cross-reactions, thermodynamical/kinetic	parameters, i	nner-sp	here el	ectron	transfe	r mech	anısms,
Linit-5		Number of lectures - 08	Title of the unit: BIOINORGANIC CHEMISTRY							
Biological	role of inorganic	metals in human hody (descr	intion only) Electron transfer proteins. Metal ion	transport and	l storad	e Ferit	in and	its stri	icture	Ovygen
transport	by heme proteins.	hemoglobin and myoglobin. Di	oxygen transport (hemoglobin, hemocyanin and Bl	ue copper prot	eins). B	liomine	ralizatio	n (ferri	tin). zin	c finger
protein, C	arbonic anhydrase,	carboxy peptidase, carboxype	ptidase A/B.						,,	
11. CO-PC	) mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	Understand the con	ncept of coordination chemistr	y with different theories.	3	2	1		1		3
CO2	Understand and eva	aluate the electronic spectra a	nd magnetism of transition metal complexes.	2	2	1		2		3
CO3	Study of some impo	ortant inorganic compounds ar	d their applications	3	3	1		1		3
CO4	Understand the diff	erent reaction mechanisms in	coordination compounds.	2	3	1		1		3
CO5	Understand the cor	ncept of Bio-inorganic chemistr	y and the role of metal ions in human body.	2	2	1		1		3
40.5	3 St	rong contribution, 2 Average	contribution , 1 Low contribution							
12. Brie	r description of self	-learning / E-learning compon	ent							
1.	https://nptel.ac.in/	courses/104/105/104105033/	nciples of chemical science fall 2005 hidee lesture	c/locture 22 co	ordinat	ion cor	nnlovos	and lie	ands/	
3.	https://www.chem	.tamu.edu/rgroun/marcetta/cl	neipics-or-chemical-science-rail-2005/video-lecture	20TM%20lectur	e%20n	otes nd	f	anu-ng	unus/	
13. Book	s recommended:				2. 22011	pu				
1.	Inorganic Chemistry	: Structure and Reactivity. Jam	nes E. Huheey, Harper and Row Publishers, New Yor	k						
2.	Advanced Inorganic	Chemistry: F.A. Cotton and G.	Wilkinson, Interscience.							
	Inorganic Reaction	Mechanism, Basolo and R.G. P	earson. John Willey.							

1. Nam	e of the Departmer	It: CHEMISTRY								
2. Cour	rse Name	ADVANCE ORGANIC CHEMIS	STRY	L		1			Р	
3. Cour	rse Code	CH315		2		1			0	
4. Туре	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 S	Sem (	) E <sup>.</sup>	very Se	m()
7. Tota	l Number of Lecture	es, Tutorials, Practicals								
	Lectu	ures = 30	Tutorials = 10			Practica	al = Nil			
8. COU	RSE OBJECTIVES: Th	e main objective of this course	e is to study the nomenclature of organic compound	ds, structure an	id bond	ing of c	organic i	nolecu	les con	sidering
inductive	e effect, hyperconjug	gation, mesomeric effects, hydr	rogen bonding etc., and mechanism of various types	s of organic read	ctions.					
9. COUF	RSE OUTCOMES (CO	): 	- fallening attacked							
After the	e successful course c	ompletion, learners will develo	op jollowing attributes:							
COOK			ATRIBUTES							
	CO1	Analyze structure and chemica	al reactions of organomagnesium and organolithium	compounds.						
	CO2	Understand and evaluate the s	structure and related reactions of heterocyclic comp	oounds.						
	СО3	Understand and analyze the cl	assification, configuration and conformation of carb	oohydrates.						
	CO4	Understand and evaluate the s	structure of amino acids, peptides, proteins and nuc	leic acids						
	CO5	Understand and analyze the st	ructure and classification of dyes.							
10. Uni	it wise detailed con	tent								·
Unit-1		Number of lectures = 08	Title of the unit: ORGANOMETALLIC AND ORGA	NOSULPHUR CO	OMPOL	INDS				
Organon methods	nagnesium Compounts of formation and ch	nds: the Grignard reagents, structure of the substant of the s	ucture and chemical reactions Organolithium Com	pounds :forma	tion an	d chem	ical rea	ctions.	Nomen	clature,
Unit-2		Number of lectures =08	Title of the unit: HETEROCYCLIC COMPOUNDS							
Molecula	ar orbital picture an	d aromatic charecteristics of n	wrole, furan, thiophene and pyridine. Comparison	of basicity of p	vridine	niperio	line an	d pyrro	le. Met	hods of
synthesis	s and chemical read	ctions of indole, guinoline an	d isoquinoline with special reference to Fisher in	dole synthesis	, Skrau	p synth	esis an	d Bisch	ler-Ner	pieralski
synthesis	5.									
Unit-3		Number of lectures = 08	Title of the unit: CARBOHYDRATES							
Carbohy	drates: classificatio	n and configuration and co	onformation of monosaccharides, Erythro and	threodiastereo	mers, i	mechan	ism of	osazo	ne for	mation,
Intercon	version of glucose a	nd fructose, chain lengthening	and chain shortening of aldoses. Formation of glyco	osides, ether an	d ester	s. Cyclic	structu	ire of D	(+) gluc	ose. An
introduc	tion to disaccharides	s (maltose, sucrose, lactose) an	d polysaccharides/starch and cellulose.		_					
Unit-4		Number of lectures = 08	Title of the unit: ACIDS, PEPTIDES, PROTIENS AN	D NUCLEIC ACI	<b>D</b>	<b>.</b> .				
Classifica Nucleic a	ition, structure and acids: Introduction –	stereochemistry of amino ac Classification of Nucleic Acids P	ids, isoelectric point. Classification of protiens, pe Ribonucleosides and Ribonucleotides. The double be	eptides, structu elical structure o	ire dete	erminat	ion, and	d end g	group a	inalysis.
Unit-5		Number of lectures = 08	Title of the unit: DYES							
Dyes: Int	roduction of the his	tory of dyes. Landmarks in the	historical development from Natural to synthetic (	dyes. Introducti	ion and	classifi	cation c	of dyes	on the	basis of
, structure	e Colour and chemic	al constitution of dyes. Structu	re and uses of phenolphthalein, fluorescein , Eosin,	, Malachite gree	en, Met	hylene	blue , Ir	, ndigo. N	lapthol	yellow-
S, Crysta	l violet.									
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	Analyze structure a	ind chemical reactions of organ	nomagnesium and organolithium compounds.	3	2	1		1		3
CO2	Understand and ev	aluate the structure and relate	d reactions of heterocyclic compounds.	2	2	1		2		3
CO3	Understand and an	alyze the classification, configu	ration and conformation of carbohydrates.	3	3	1		1		3
CO4	Understand and ev	aluate the structure of amino a	acids, peptides, proteins and nucleic acids	2	3	1		1		3
CO5	Understand and an	alyze the structure and classific	cation of dyes.	2	2	1		1		3
	3 S	trong contribution, 2 Average	contribution , 1 Low contribution							-
12. Brie	ef description of sel	f-learning / E-learning compon	lent							
1.	https://www.khan	academy.org/science/organic-c	chemistry							
2.	https://chem.libret	exts.org/Bookshelves/Organic	_Chemistry/Map%3A_Organic_Chemistry_(Smith)/0	Chapter_06%3A	_Under	rstandin	ig_Orga	nic_Re	actions	
3.	https://www.dumr	nies.com/education/science/bi	iology/the-basics-of-organic-chemistry/							
4.	nttps://www.toppi	.com/guides/chemistry/organi	c-cnemistry/						_	
15. 800	Advanced Organiz	Chamistry Rahle Rahl C. Cham								
1. 2	Auvanceu Organic	Vol 18 II 11 Finar								
3.	Fundamentals of O	rganic Chemistry, NafisHaider.	S. Chand & Co. Ltd.							
4.	A text book of Orga	anic Chemistry, Bahl&Bahl, S. C	hand & Co. Ltd.							
5.	Organic Chemistry	Vol.I, II & III, Dr. Jagdamba Sing	gh, L.D.S. Yadav, PragatiPrakashan.							

1. Nam	e of the Departmer	It: CHEMISTRY								
2. Cour	se Name	BASICS OF CHROMATOGRA	PHIC TECHNIQUES	L		٦	Г		Р	
3. Cour	se Code	CH319		2		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 <sup>,</sup>	very Se	m()
7. Tota	Number of Lecture	es, Tutorials, Practicals		· · · ·						
	Lectu	ures = 30	Tutorials = 10			Practic	al = Nil			
8. COUF	RSE OBJECTIVES: St	udents able to understand Se	paration techniques such as Thin layer chromatog	raphy, Paper	chroma	tograph	y, Gas c	:hroma <sup>-</sup>	tograph	iy, High
performa	nce Liquid Chromat	ography and Ion exchange chr	omatography.							
9. COUR	SE OUTCOMES (CO	):								
After the	successful course c	ompletion, learners will devel	op following attributes:							
COUR	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Understand the chromatograp	phic techniques and its classification.					<u> </u>		
	CO2	Evaluate Thin layer chromato mixture.	graphy; principle and its applications. Paper chron	natography a	nd its a	pplicatio	ns. Sepa	aration	of ami	no acid
	CO3	Comprehension of Principles of	of gas-liquid chromatography, Instrumentation and in	ts Industrial a	pplicatio	ons.				
	CO4	detector and Industrial applic	ations of HPLC.	on, instrumer	itation;	mobile	onase r	eservoi	r, colur	nn and
	CO5	Analyze the action of resins, removal of interfering radicals	experimental techniques, applications, separation 5.	n of metal io	ıs, sepai	ration of	chlorid	e and I	3romid	e ions -
10. Uni	t wise detailed con	tent								
Unit-1		Number of lectures = 08	Title of the unit: SEPARATION TECHNIQUES							
Chromate	ography, Classificat	ion of Chromatographic meth	nods, Elution in column chromatography, chromat	ograms, dist	ribution	constar	it, reter	ition ti	me, sta	ationary
phase, m elution.	obile phase, princi	ple of adsorption and partitio	n chromatography, column chromatography; princi	iple, adsorbe	nts used	l, prepai	ation o	f colum	ın, adso	orption,
Unit-2		Number of lectures =08	Title of the unit: THIN LAYER CHROMATOGRAPH	Y						
Principle,	choice of adsorbe	nt and solvent, Rf value, appl	ications. Paper chromatography; solvents used, pri	nciple, Rf va	ue, fact	ors influ	encing I	Rf value	e, appli	cations.
Separatic	on of amino acid mix	cture.								
Unit-3		Number of lectures = 08	Title of the unit: GAS CHROMATOGRAPHY				_			
Introduct Electron	ion, Principles of g capture and Therma	as-liquid chromatography, Ins al conductivity) and Industrial a	trumentation; Carrier gas system, Sample injection applications.	, Columns, S	tationar	y phase,	Detecto	ors (Fla	me lon	ization,
Unit-4		Number of lectures = 08	Title of the unit: HIGH PERFORMANCE LIQUID CH	IROMATOGR	АРНҮ					
Introduct absorptic	ion of HPLC, Norm	nal and reverse phase HPLC,	Isocratic and gradient elution, Instrumentation; r	mobile phase	reservo	oir, colu	mn and	detec	tor (UV	/-visible
Unit-5	,	Number of lectures = 08	Title of the unit: ION EXCHANGE CHROMATOGRA	АРНҮ						
Principle,	resins, action of r	esins, experimental technique	es, applications, separation of metal ions, separati	on of chloric	e and B	romide	ions - r	emova	l of int	erfering
radicals.										0
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
<b>CO1</b>	Understand the ch	romatographic techniques and	its classification.	3	1	1	2	2	1	2
	Evaluato Thin lay	or chromatography principl	a and its applications. Dapar shromatography	and its	-	_	_			
CO2	applications. Separ	ation of amino acid mixture.	e and its applications. Paper chromatography	anu its <b>3</b>	1	1	2	2	1	2
CO3	Comprehension of	Principles of gas-liquid chroma	atography, Instrumentation and its Industrial applica	tions. 3	1	1	2	2	1	2
CO4	phase reservoir, co	lumn and detector and Indust	rial applications of HPLC.	3	1	1	2	2	1	2
CO5	Analyze the action chloride and Bromi	of resins, experimental techr de ions - removal of interferin	niques, applications, separation of metal ions, separa gradicals.	ation of 3	1	1	2	2	1	2
	3 5	trong contribution, 2 Average	contribution , 1 Low contribution	•				_	_	
12. Brie	f description of sel	f-learning / E-learning compo	nent							
1.	https://microbenot	tes.com/chromatography-prin	ciple-types-and-applications/							
2.	https://www.khana	academy.org/science/class-11	-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-cl	hemistry-som	e-basic-	principle	s-and-			
_	techniques/xfbb6c	b8fc2bd00c8:in-in-methods-of	-purification-of-organic-compounds/v/basics-of-chro	omatography						
3.	https://www.slides	hare.net/nadeemakhter7374/	chromatography-34247423							
4.	nttp://www.biolog	yaiscussion.com/biochemistry	/cnromatograpny-techniques/top-12-types-of-chror	natographic-	echniqu	es-bioch	emistry	/12/30		
13. 800	Chomical Theres	unamics by D. D. Destant at all								
1.	Principles of physic	ynamics by K.P.Kastogi et al	nd Pathan							
2. २	Essentials of Physic	al Chemistry Bahl & Tuli S CF	and & Co. Ltd							
4.	Principles of Physic	al Chemistry, Puri. Sharma & F	Pathania, Vishal Publishing Co.							
5.	Simplified course in	Physical Chemistry, Madan &	Tuli, S. Chand & Co. Ltd.							
6.	Atkin's Physical Che	emistry, Atkin, Oxford Press.								

2. Cours 3. Cours		· · · · · · · · · · · · · · · · · · ·		[				-		
3. Cours	se Name	ADVANCED CALCULUS		L			Г	_	Р	
	se Code	MT301		3			1		0	
4. Type	of Course (use tick	mark)		Core ( (	√)	DE	()		FC (	)
5. Pre-r	requisite (if any)	10+2	6. Frequency (use tick marks) Even ()	Odd (	√)	Either	Sem (	) E	very Se	m()
7. Total	l Number of Lecture	es, Tutorials, Practicals								
	Lectu	ıres = 30	Tutorials = 10			Practic	al = Nil			
8. COUF	RSE OBJECTIVES: T	ne course is aimed to develop	the skills in mathematics especially in Numerica	al Computin	g which	is neces	sary for	<sup>r</sup> groon	ning the	em into
successfu	ul science graduate.	The topics introduced will serve	ve as basic tools for specialized studies in science fi	eld. The pur	pose of	this unde	rgradua	te cou	rse is to	impart
basic and	l key knowledge of a	differential & integral calculus.	Students will be able to evaluate derivative of sever	ral functions	using di	fferent te	echnique	es. The	y will al	so learn
to evalua	ite different types of	f integrals. After successful con	pletion of course, the student will be able to explor	re subject in	o their r	espective	e dimen	sions.		
9. COUR	SE OUTCOMES (CO)	):								
After the	e successful course c	ompletion, learners will develo	op following attributes:							
COURS	SE OUTCOME (CO)		ATTRIBUTES							
		Students will gain an underst	anding of Function of several variables, Domains a	and Range, I	unction	al notatio	on, Limi	ts and	continu	uity and
	CO1	differentiability. They will also	learn to find Partial derivatives, Differential of func	tions of n va	riables, l	Different	ials of c	omposi	te func	tions by
		using the chain rule.								
		Students will be able to under	stand Implicit functions, Inverse functions, They wi	ill also study	directio	nal deriv	atives a	nd will	be able	e to find
	02	Partial derivatives of higher o	rder, Higher derivatives of composite functions. If	ney will lear	n to find	iviaxim	a and n	ninima	of func	tions of
		Several variables.	nding of Line integrals in the plane. Desig properties	c of Line int	arala Li	an intagr	als as in	tograls	of your	tors and
		students will gain an understa	nuing of Line integrals in the plane, Basic properties	s of Line inte	grais, Li	imply co	als as in	itegrais 1 domo	inc Ev	tonsion
	CO3	of result of multiply connected	I domains	ependence o	patri,	simply co	mecter	uuiiia	IIIS, LA	lension
		Students will create the own u	nderstanding and used to find Double integral over	a rectangul	ar region	Double	integra	l as vol	ime A	rea of a
	<b>CO</b> 4	region in a plane. Transforma	tion of double integral from Cartesian to polar co -	ordinate an	d vice ve	ersa. They	/ will stu	ıdv trir	ole inter	gral and
	C04	learn to solve them in Cartesia	n . cylindrical and spherical co – ordinate.					,		Brai aria
		Students will gain an underst	anding of solution of Improper integrals, conver	gence of C	amparis	on test.	converg	ence o	f Abe	el's test.
	CO5	Dirichlet's test, convergence o	f . They will also study convergence of beta and ga	mma functio	ns.	,	0			,
10. Unit	t wise detailed cont	tent	· · · · · ·							
Unit-1		Number of lectures = 08	Title of the unit:							
Function	of several variable	s, Domains and Range, Funct	ional notation, Limits and continuity and differen	tiability, Pa	tial deri	vatives,	Differer	itial of	functio	ns of n
variables,	, Differentials of con	nposite functions, chain rule.		17						
Unit-2	•	Number of lectures =08	Title of the unit:							
Implicit f	unctions, Inverse fu	inctions, The directional derivation	atives, Partial derivatives of higher order, Higher d	erivatives o	compo	site funct	tions, N	laxima	and mi	nima of
functions	s of several variables									
Unit-3		Number of lectures = 08	Title of the unit:							
Line integ	grals in the plane, Ba	asic properties of Line integrals	, Line integrals as integrals of vectors, Green's theo	orem, indep	endence	of path	, simply	y conne	cted do	, mains
Extension	n of result of multipl	y connected domains.								
Unit-4		Number of lectures = 08	Title of the unit:							
Double in	ntegral over a rectar	ngle region, Double integral as	volume, Area of a region in a plane, Transformati	ion of doubl	e integra	l from Ca	artesian	A second sector		
and vice v	versa, Triple integra	al in Cartesian, cylindrical and	spharical co - ordinato					to pola	ar co - c	ordinate
Unit-5								to pola	ar co - c	ordinate
		Number of lectures = 08	Title of the unit:					to pola	ar co - c	ordinate
Improper	r integrals, converge	Number of lectures = 08 nce of Camparison test, conve	Title of the unit: rgence of Abel's test, Dirichlet's test, convergence	of , conver	gence of	beta and	d gamm	to pola	ions.	ordinate
11. CO-P	r integrals, converge	Number of lectures = 08 nce of Camparison test, conve	Title of the unit: rgence of Abel's test, Dirichlet's test, convergence	of , conver	gence of	beta and	d gamm	to pola	ions.	ordinate
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Improper           11. CO-P(           COs           CO1           CO2           CO3           CO4           CO5           12. Brie           1.	o mapping Students will gain notation, Limits a Differential of funct Students will be al derivatives and wi functions. They will Students will gain integrals as integral knowledge of indegrad domains. Students will creat Double integral as polar co - ordinate cylindrical and sphe Students will gain convergence of Al gamma functions. <b>3</b> St <b>5</b> description of self file:///C:/Users/Ad	Number of lectures = 08 nce of Camparison test, conve an understanding of Function nd continuity and differentiat tions of n variables, Differentiat ble to understand Implicit fund Il be able to find Partial deri learn to find Maxima and mind an understanding of Line inter als of vectors and will be ab- beendence of path, simply com- te the own understanding and volume, Area of a region in a pre- e and vice versa. They will stre- erical co – ordinate. an understanding of solution- bee's test, Dirichlet's test, conve- trong contribution, 2 Average F-learning / E-learning compon- min/Downloads/Vector%20Cal	Title of the unit:         rgence of Abel's test, Dirichlet's test, convergence         Attributes         on of several variables, Domains and Range, Fur         ability. They will also learn to find Partial derivatives         ls of composite functions by using the chain rule.         ctions, Inverse functions, They will also study directions, Inverse functions, They will also study directions of functions of several variables.         grals in the plane, Basic properties of Line integral         le to solve line integral by Green's theorem , and         heated domains , Extension of result of multiply conditional dear to solve them in Carter         dused to find Double integral over a rectangular         lane., Transformation of double integral from Carter         udy triple integral and learn to solve them in Cart         of Improper integrals, convergence of Camparise         ergence of . They will also study convergence of be         contribution , 1 Low contribution         ent         culus%20by%20Krishna%20Series.pdf	of , conver PO nctional vatives, 3 ectional mposite 3 als, Line and get nnected region, esian to tesian , 3 on test, eta and 2	gence of 2 2 2 2 2 2 2 2 2 2	<ul> <li>PO3</li> <li>2</li> <li>2</li> <li>3</li> <li>3</li> <li>1</li> </ul>	PO4 1 1 1 1	a functi PO5 3 2 3 3 3	PO6 3 2 2 3 2	PO7 3 2 3 2 1
Improper           11. CO-P(           COs           CO1           CO2           CO3           CO4           CO5           12. Briet           1.           1.           1.           1.           1.           1.           1.           1.           1.           1.           1.           1.	O mapping Students will gain notation, Limits a Differential of funct Students will be al derivatives and wi functions. They will Students will gain integrals as integra- knowledge of indegrading domains. Students will creat Double integral as y polar co - ordinate cylindrical and sphe Students will gain convergence of Al gamma functions. <b>3</b> St <b>5</b> description of self file:///C:/Users/Add https://www.acade	Number of lectures = 08 nce of Camparison test, conve an understanding of Function nd continuity and differentiat tions of n variables, Differentiat ble to understand Implicit fund Il be able to find Partial deri learn to find Maxima and mind an understanding of Line inter als of vectors and will be ab- beendence of path, simply com- tere the own understanding and volume, Area of a region in a pre- erand vice versa. They will stre- erical co – ordinate. an understanding of solution- bee's test, Dirichlet's test, conve- trong contribution, 2 Average Filearning / E-learning compon- min/Downloads/Vector%20Cal emia.edu/8509213/Advanced_	Title of the unit:         rgence of Abel's test, Dirichlet's test, convergence         Attributes         on of several variables, Domains and Range, Fur         ability. They will also learn to find Partial derivatives         ls of composite functions by using the chain rule.         ctions, Inverse functions, They will also study directions, Inverse functions, They will also study directions of functions of several variables.         grals in the plane, Basic properties of Line integral         le to solve line integral by Green's theorem , and         heated domains , Extension of result of multiply contail         d used to find Double integral over a rectangular         lane., Transformation of double integral from Carter         udy triple integral and learn to solve them in Cart         of Improper integrals, convergence of Camparise         ergence of . They will also study convergence of be         contribution , 1 Low contribution         ent         culus%20by%20Krishna%20Series.pdf         Calculus_Fifth_Edition-Wifred_Kaplan	of , conver PO nctional vatives, 3 ectional mposite 3 als, Line and get nected 3 region, esian to tesian , 3 on test, eta and 2	gence of 2 2 2 2 2 2 2 2 2 2	<ul> <li>PO3</li> <li>2</li> <li>2</li> <li>3</li> <li>3</li> <li>1</li> </ul>	PO4 1 1 1 1	a functi PO5 3 2 3 3 3	PO6 3 2 2 3 2	PO7 3 2 3 2 1
Improper           11. CO-P(           COs           CO1           CO2           CO3           CO4           CO5           12. Brie           1.           2.           13. Book	O mapping Students will gain notation, Limits a Differential of funct Students will be al derivatives and wi functions. They will Students will gain integrals as integra knowledge of indegrading domains. Students will creat Double integral as y polar co - ordinate cylindrical and sphe Students will gain convergence of Al gamma functions. <b>3</b> St <b>5</b> description of self file:///C:/Users/Ad https://www.acade	Number of lectures = 08 nce of Camparison test, conve an understanding of Function nd continuity and differentiat tions of n variables, Differentiat ble to understand Implicit fund Il be able to find Partial deri learn to find Maxima and mind an understanding of Line inter als of vectors and will be ab- beendence of path, simply com- tere the own understanding and volume, Area of a region in a pre- e and vice versa. They will stre- erical co – ordinate. an understanding of solution beel's test, Dirichlet's test, conve- trong contribution, 2 Average Flearning / E-learning compon min/Downloads/Vector%20Cal emia.edu/8509213/Advanced_	Title of the unit:         rgence of Abel's test, Dirichlet's test, convergence         Attributes         on of several variables, Domains and Range, Fur         ability. They will also learn to find Partial derivatives         ls of composite functions by using the chain rule.         ctions, Inverse functions, They will also study direvatives of higher order, Higher derivatives of comina of functions of several variables.         grals in the plane, Basic properties of Line integral         le to solve line integral by Green's theorem , and         heated to find Double integral over a rectangular         lane., Transformation of double integral from Carter         udy triple integral and learn to solve them in Cart         of Improper integrals, convergence of Camparise         ergence of . They will also study convergence of be         contribution , 1 Low contribution         ent         culus%20by%20Krishna%20Series.pdf         Calculus_Fifth_Edition-Wifred_Kaplan	of , conver nctional vatives, 3 ectional mposite 3 als, Line and get and get region, esian to tesian, 3 on test, eta and 2	gence of 2 2 2 2 2 2 2 2	<ul> <li>PO3</li> <li>2</li> <li>2</li> <li>3</li> <li>3</li> <li>1</li> </ul>	PO4 1 1 1 1	a functi PO5 3 2 3 3 3	PO6 3 2 2 3 2	PO7 3 2 3 2 1
Improper           11. CO-P(           COs           CO1           CO2           CO3           CO4           CO5           12. Brie           1.           2.           13. Book	or integrals, converge O mapping Students will gain notation, Limits a Differential of funct Students will be al derivatives and wi functions. They will Students will gain integrals as integr knowledge of indeg domains. Students will creat Double integral as polar co - ordinate cylindrical and sphe Students will gain convergence of Al gamma functions. 3 Si ef description of self file:///C:/Users/Ad https://www.acade ks recommended: G. B. Thomas, M.D.	Number of lectures = 08 nce of Camparison test, conve an understanding of Function nd continuity and differentiat tions of n variables, Differentiat ble to understand Implicit fun Il be able to find Partial deri learn to find Maxima and min an understanding of Line inter als of vectors and will be ab- bendence of path, simply com- te the own understanding and volume, Area of a region in a po- e and vice versa. They will stu- erical co – ordinate. an understanding of solution bel's test, Dirichlet's test, convection trong contribution, 2 Average F-learning / E-learning compone min/Downloads/Vector%20Cal emia.edu/8509213/Advanced_ Wier, J. Hass: Calculus, Pearson understanding and vice versas.	Title of the unit:         Title of the unit:         regence of Abel's test, Dirichlet's test, convergence         Attributes         on of several variables, Domains and Range, Fur         ability. They will also learn to find Partial derivability. They will also learn to find Partial derivatives of composite functions by using the chain rule.         ctions, Inverse functions, They will also study direvatives of higher order, Higher derivatives of comma of functions of several variables.         grals in the plane, Basic properties of Line integral         le to solve line integral by Green's theorem , and the plane, Basic properties of multiply cometed domains , Extension of result of multiply cometed domains , Extension of result of multiply cometed domains , Extension of double integral from Carter and the plane, and learn to solve them in Carter and the proper integrals, convergence of Camparise ergence of . They will also study convergence of be contribution , 1 Low contribution         ent       culus%20by%20Krishna%20Series.pdf         Calculus_Fifth_Edition-Wifred_Kaplan       stude to fund	of , conver potional vatives, 3 ectional mposite 3 als, Line and get region, esian to tesian, 3 on test, eta and 2	gence of 2 2 2 2 2 2 2 2	<ul> <li>PO3</li> <li>2</li> <li>2</li> <li>3</li> <li>3</li> <li>1</li> </ul>	9 gamm PO4 1 1 1 1 1 1	a functi PO5 3 2 3 3 3	PO6 3 2 2 3 2	PO7 3 2 3 2 1

1. Nam	e of the Departmen	IT: MATHEMATICS										
2. Cour	se Name	MATHEMATICAL STATISTICS				L			Г		Р	
3. Cour	se Code	MT302				2		-	1		0	
4. Type	of Course (use tick	mark)				Core ( (	V)	DE	()		FC (	)
5. Pre-	requisite (if any)	10+2	6	Frequency (use tick marks)	Even()	) bbO	, v)	Fither	Sem (	) F	verv Se	, m()
7 Tota	Number of Lecture	s Tutorials Practicals	0.	frequency (use tiek marks)	21011()	044 (	- /	2.1.1.0.1	00111	/ _	,	
7. 10ta	loct			Tutorials = 10	l.			Dractic				
0.0011		ares = 30			unlinetie une feur			Practic			a the are d	fields of
8. COUR	SE OBJECTIVES: IN	e course explores the basic cor	icepts	of modern statistics and its ap	oplications for	decision-mak	ing in eo	conomics	, busine	ess, and	other	leids of
sciences.	Our everyday lives	, as well as economic and bus	iness i	activities, are full of data analy	ysis and distric	oution theory	offer u	setul tec	nniques	for qu	antiryin	g these
uncertair	ities. The course is r	leavily oriented towards the to	rmula	tion of mathematical statistics	and practical a	pplications.						
9. COUR	SE OUTCOMES (CO)	): omnlation lography will double	n fall	aurine attributes.								
Ajter tile	Successful course c	I develo	<i>, p                                   </i>	owing attributes.								
COOK				AI	TRIBUTES		1 0					
		To understand the definition a	nd sco	ope of Statistics, concepts of sta	atistical popula	ition and sam	ple. Qua	antitative	and qu	alitativ	e data,	primary
	CO1	and secondary sources of dat	a coll	ection, scales of measurement	t- nominal, or	dinal, interva	and ra	tio. Pres	entation	of dat	ta: tabu	ilar and
		graphical form including bar di	agram	n, histogram, pie chart, frequen	icy curve and f	requency pol	/gon		<u> </u>			<del></del>
		Able to solve Measures of C	Centra	I Tendency: Arithmetic mean	i, median, mo	de, geometr	ic mear	n and ha	rmonic	mean,	quarti	les and
	CO2	percentiles. Measures of Dispe	ersion	range, quartile deviation, mea	an deviation, s	tandard devia	ation and	d varianc	e, coeff	icient o	of variat	ion and
		coefficient of skewness										
	<u> </u>	To understand Bivariate data:	Defini	tion, scatter diagram, Karl Pear	rson's coefficie	ent of correla	tion Spe	arman co	pefficien	t rank o	correlat	ion and
-	03	tied ranks. Simple linear regres	ssion,	principle of least squares								
	CO4	To understand Definitions of	Proba	ability – classical, statistical, a	and axiomatic,	random exp	eriment	ts, sampl	e space	e and e	vents,	laws of
	C04	addition and multiplication, in	depen	dent events, conditional Proba	bility and Baye	es' theorem						
	COF	To understand Mathematical	expe	ctation, Probability mass fund	ction (pmf) an	d Probability	density	y functio	n (pdf).	Binom	nial Pro	bability
	203	distributions, Poisson Probabil	ity dis	tributions, and Normal Probabi	ility distributio	ns.						
10. Uni	t wise detailed cont	tent										
Unit-1		Number of lectures = 08	Titl	e of the unit:								
The defir	ition and scope of S	Statistics, concepts of statistica	l popu	ulation and sample. Quantitativ	ve and qualitat	ive data, prir	nary and	d seconda	ary sour	ces of o	data co	llection,
scales of	measurement- nom	inal, ordinal, interval and ratio	. Prese	entation of data: tabular and gr	aphical form in	ncluding bar o	liagram,	histogra	m, pie c	hart		
Unit-2		Number of lectures =08	Title	e of the unit:								
Measure	s of Central Tenden	cy: Arithmetic mean, median, r	node,	geometric mean and harmonic	c mean, quarti	les and perce	ntiles. N	/leasures	of Disp	ersion:	range,	quartile
deviation	, mean deviation, st	andard deviation and variance	, coeff	icient of variation and coefficie	ent of skewnes	s						
Unit-3		Number of lectures = 08	Title	of the unit:								
Bivariate	data: Definition, s	catter diagram, Karl Pearson's	s coef	ficient of correlation Spearma	an coefficient	rank correlat	ion and	l tied rar	nks. Sim	ple line	ear reg	ression,
principle	of least squares	5 /		•							0	
Unit-4		Number of lectures = 08	Title	of the unit:								
Definitio	ns of Probability – c	lassical, statistical, and axioma	tic. ra	ndom experiments, sample sp	ace and event	s. laws of ad	dition ar	nd multip	lication	. indep	endent	events.
condition	al Probability and B	aves' theorem	,	······································		-,				,		,
Unit-5		Number of lectures = 08	Title	of the unit:								
Mathema	tical expectation P	robability mass function (pmf)	and P	robability density function (ndf	F) Binomial Pro	hability distr	ibutions	Poisson	Probab	ulity dis	tributic	ns and
Normal P	robability distributi	ons	anu i	robability density function (pu			ibutions	, 1 0133011		inty uis	libutic	/13, anu
	O manning											
			۰. <del>۱</del> ۰۰ - ۱۰			DO		0.000	004	DOF	DOC	007
COS	To and and a set of the		Attrib	utes	. Inthe and	PU.	L PO2	2 PO3	P04	P05	P06	P07
	To understand the	e definition and scope of St	atistic	s, concepts of statistical po	pulation and	sample.						
CO1	Quantitative and q	ualitative data, primary and sec	conda	ry sources of data collection, so	cales of measu	rement-	2	2	1	3	3	3
	nominal, ordinal, ir	terval and ratio. Presentation	or dat	a: tabular and graphical form i	including bar d	liagram,						
	nistogram, pie char	t, frequency curve and frequer	1Cy po	iygon								
	Able to solve ivie	asures of Central Tendency:	Arithr	netic mean, median, mode,	geometric me	an and	2	2	4	2	2	2
CO2	narmonic mean, o	quartiles and percentiles. Me	easure	es of Dispersion: range, qual	rtile deviation	, mean Z	2	2	1	2	2	2
-	deviation, standard	deviation and variance, coefficient	cient c	of variation and coefficient of si	kewness							1
603	I o understand Biva	irlate data: Definition, scatter d	liagrai	n, Karl Pearson's coefficient of	correlation Sp	earman 2	2	3	1	3	2	3
	coefficient rank cor	relation and tied ranks. Simple	linear	r regression, principle of least s	quares							
	To understand Def	Initions of Probability – classic	al, sta	tistical, and axiomatic, random	i experiments,	sample				•	•	
CO4	space and events,	laws of addition and multipl	Icatio	n, independent events, condi	tional Probabi	ity and Z	2	3	1	3	3	2
	Bayes theorem						_					
	I o understand Mar	thematical expectation, Proba	onity r	nass function (pmf) and Proba	ibility density i	unction				•	•	
CO5	(par). Binomiai P	robability distributions, Pols	son i	Probability distributions, and	i Normai Pro		2	1	1	3	2	3
	distributions.											
	3 S <sup>.</sup>	trong contribution, 2 Average	contri	bution , 1 Low contribution								
12. Brie	f description of self	f-learning / E-learning compon	ent									
1.	https://www.youtu	<pre>ibe.com/watch?v=be9e-Q-jC-0</pre>										
2.	https://www.youtu	ibe.com/watch?v=bQ5_PPRPjG	64									
3.	https://www.youtu	ube.com/watch?v=jauhoR7w1Y	M									
13. Book	s recommended:											
1.	Sampling technique	es: W.G. Cochran, Wiley										
2.	Sampling methodo	logies and applications: P.S.R.S	. Rao,	Chapman and Hall/CRC 2000								
3.	Elements of sampli	ng theory and methods: Z. Gov	indraj	alu, Prentice Hall, 1999								
4.	Theory of sample s	urveys with applications: P.V.S	ukhatr	ne, B.V.Sukhatme, S. Sukhatme	e and C. Asok, I	ASRI, Delhi, 1	984.					
5.	Sampling Techniqu	es: Daroga Singh & Chaudhry, F	S Ne	w age International								

1. Nam	e of the Departmer	t: MATHEMATICS										
2. Cour	se Name	NUMBER THEORY				L		٦	Г		Р	
3. Cour	se Code	MT303				2		1	L		0	
4. Type	of Course (use tick	mark)				Core ( ( √	)	DE	()		FC (	)
5. Pre-	requisite (if any)	10+2	6.	Frequency (use tick marks)	Even ( )	Odd (√	)	Either	Sem (	) E	very Se	m()
7. Tota	l Number of Lecture	es, Tutorials, Practicals										
	Lectu	ures = 30		Tutorials = 10				Practic	al = Nil			
8. COU	RSE OBJECTIVES: Th	ne course is intended to allow	w stud	ents to be exposed to some fo	undational ide	as in number	theory	without	the te	chnical	baggag	ge often
associate	d with a more adva	anced courses. The course pro	ovides	students an opportunity to dev	elop an appre	ciation of pure	mathe	ematics v	while er	igaged	in the	study of
number	neoretic results. In	e course is also designed to pro	rovide	students an opportunity to wor	k with conjecti	ires, proots, ar	nd analy	ysing ma	tnemat	CS.		
After the	successful course c	): ompletion. learners will devel	lop fol	lowina attributes:								
COUR	SE OUTCOME (CO)			AT	TRIBUTES							
	CO1	Can be able to demonstrate C	Cartes	ian product of sets, Equivalence	e relation and	partition, Fund	lamenta	al theore	em of eo	quivale	nce of r	relation,
		Equivalence sets. Demonstrate knowledge and	1 unde	rstanding of tonics including	ut not limited	to divisibility	cardir	al num	hers co	ngruen	re's n	uadratic
	CO2	reciprocity, Diophantine equa	ations	and cantor's theorem			, carun			ngruen	ce 3, qi	
	CO3	Can analyse hypotheses and c factorization	conclu	sions of mathematical stateme	nts of divisibilit	ty, congruence	, greate	est comr	non divi	sor, pr	ime, an	d prime
	CO4	Can apply different technique contradiction	ues of	congruence to verify mathema	atical assertior	ns, including p	roof by	inducti	on, by (	contrap	ositive	and by
	CO5	Can solve systems of Diophan	ntine e	quations using the Chinese Rem	ainder Theore	m & the Euclid	ean alg	orithm a	nd Lagr	ange's	theore	m
10 Uni	t wise detailed cont	ient i							0			
Unit-1	t mise detailed com	Number of lectures = 08	Tit	le of the unit:								
Cartesiar	product of sets, Eq	uivalence relation and partitio	on, Fur	damental theorem of equivaler	nce of relation,	Equivalence s	ets.					
Linit 2		Number of lost mos -00		<b>fab</b>	•	•						
Unit-2	numbers neuror of	Number of lectures =08		e of the unit:	oorom Cobrod	lar Doration Th						
Carumai	numbers, power of	continuum, cardinai antrimetic	ic, mec	danties in cardinais, cantor's th	eorem, schrod	lar Berntien In	eorem					
Unit-3		Number of lectures = 08	Titl	e of the unit:								
Division /	Algorithm, greatest	common divisor, least commoi	on mult	iplier, prime number, unique fa	ctorisation the	orem.						
Unit-4		Number of lectures = 08	Titl	e of the unit:								
Congrue	nce, Complete resid	ue theorem, Euler's theorem										
Unit-5		Number of lectures = 08	Titl	e of the unit:								
Linear co	ngruence, Chinese r	remainder theorem, problem b	based	on Chinese remainder theorem,	Lagrange's the	eorem						
11. CO-P	O mapping											
COs			Attrib	outes		PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	Can be able to de theorem of equival	monstrate Cartesian product	t of se sets.	ts, Equivalence relation and p	artition, Funda	amental 2	2	2	1	3	3	3
	Demonstrate know	vledge and understanding of	f topic	s including, but not limited t	o divisibility,	cardinal		_				
CO2	numbers, congruer	nce's, quadratic reciprocity, Did	iophan	tine equations and cantor's the	orem	Z	2	2	1	2	2	2
CO3	common divisor n	rime and prime factorization	unema	fical statements of divisibility,	congruence, §	2 greatest	2	3	1	3	2	3
	Can apply differe	nt techniques of congruence	e to v	verify mathematical assertions	. including p	roof by						
CO4	induction, by contr	apositive and by contradiction	1	- ,	,	2	2	3	1	3	3	2
CO5	Can solve systems algorithm and Lagr	s of Diophantine equations ( ange's theorem	using	the Chinese Remainder Theo	rem & the Eu	uclidean 2	2	1	1	3	2	3
	3 5	trong contribution. 2 Average	e contr	ibution . 1 Low contribution								
12. Brie	of description of sel	f-learning / E-learning compor	nent									
1.	https://www.youtu	ube.com/watch?v=SCvtxjpVQm	ms									
2.	https://www.youtu	ube.com/watch?v=-Qtl4nn7R4	1A									
13. Boo	ks recommended:											
1.	J Hunter: Number	Theory										
2.	Sevmour Linschutz	ementary Number Theory	5									
CO3	common divisor, pi Can apply differen	rime, and prime factorization nt techniques of congruence	e to v	verify mathematical assertions	, including p	roof by	2	3	1	3	2	3
CO4	induction, by contr	apositive and by contradiction	1		, mereding pr	2	2	3	1	3	3	2
(05	Can solve systems	s of Diophantine equations	using	the Chinese Remainder Theo	rem & the Eu	uclidean 2	2	1	1	3	2	3
CO5	algorithm and Lagr	ange's theorem	5			2	2	1	1	3	2	3
12 Brid	3 S	trong contribution, 2 Average	e contr	ibution , 1 Low contribution								
1.	https://www.voutu	ube.com/watch?v=SCvtxinVOm	ms									
2.	https://www.youtu	ube.com/watch?v=-Qtl4nn7R4	1A									
13. Boo	ks recommended:	-1										
2	David M. Burton <sup>•</sup> F	lementary Number Theory										
3.	Seymour Lipschutz	: Set theory and related topics	S									

1. Nam	e of the Departmen	t: CHEMISTRY								
2. Cour	rse Name	CHEMISTRY PRACTICAL – V		L			Г		Р	
3. Cour	rse Code	CH316		0	$ \rightarrow $	(	)		4	
4. Туре	e of Course (use tick	mark)		Core ( √ )	L         T         P           0         0         4           Core ( v)         DE ( )         FC (           Odd ( v)         Either Sem ( )         Every Set           Practical = 10         Practical = 10           cical/technical/ communication skills, concepts         set           aired in laboratory.         set           elds of chemistry.         set           es.         set           f the given solution         set           f the given solution         set           f the given solution         set           a         2         a         1           a         2         a         1           a         2         a         3         1           a         3         2         a         3         1	FC (	)			
5. Pre-	requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ()	Odd (√		very Se	m()			
7. Tota	I Number of Lecture	es, Tutorials, Practicals	The data of							
° (0)		Jres = UU Jdopt will be able to work off	L - V       L       T         0       0       0         10       0       0         10       0       0         11       Core (V)       DE()         12       Tutorials = 00       Practical = 1         13       Ike effectively and safely in a laboratory environment, practical/technical/ communication ills like ability to work in teams as well as independently.         develop following attributes:       ATTRIBUTES         Tration methods and technical skills to work in the different fields of chemistry.         es of qualitative and quantitative analysis of inorganic mixtures.         of personal safety and care of equipment's and chemicals.         Of the Potassium trioxalatoferrate (III), K3[Fe(C204)3] and determination of its composition by ferrate (III), K3[Fe(C204)3] and determination of its composition by ferrate (III), K3[Fe(C204)3] and determination of the given solution         content by thiocyanate method.         in and methylene blue by column chromatography.         entit from leaves         ixiture of (+) mandelic acid         PO1       PO2       PO3       PO         dexperiments in the manner which is required in laboratory.       3       2       2         dextributes       PO1       P	al = 10	ille cor	aconto i	to colvo			
o. COOr	ve and quantitative r	problems transferable skills like	a bility to work in teams as well as independently.		al/ con	Innunica	JUOII SK	ilis, coi	icepts i	to solve
9. COUR	RE OUTCOMES (CO)	):								
After the	e successful course c	ompletion, learners will develo	op following attributes:							
COUR	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Remember to keep records of	all performed experiments in the manner which is r	equired in labo	ratory.					
	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 differen	t fields of chem	nistry.					
	CO4	Know about the principles of c	jualitative and quantitative analysis of inorganic mix	tures.						
	CO5	Analyze the importance of per	sonal safety and care of equipment's and chemicals							
10. Syll	labus			1	6.11					
Ехр — 0	)1	(a) Potassium trioxalatoferrat	Potassium trioxalatoferrate (III), K3[Fe(C2O4)3] and e (III), K3[Fe(C2O4)3] and determination of its comp	determination osition by perr	of its co nagnor	omposit netry.	lion by p	bermag	nometr	у.
Ехр — О	12	Preparation of cis-and trans –	bisoxalatodiaqua chromate (III) ion.							
Ехр — О	3	To verify Beer-Lambert law fo	r KMnO4/K2Cr2O7 and determine the concentratio	n of the given s	olution	1				
Exp - 0	)4	Determination of Fe3+ conter	nt by thiocyanate method.	L         T           0         0           Core (V)         DE ( )         FC           marks)         Even ( )         Odd (V)         Either Sem ( )         Every           s = 00         Practical = 10         Oratory environment, practical/technical/ communication skills, conceptivelia is independently.           ATTRIBUTES         Practical = 10         Oratory environment, practical/technical/ communication skills, conceptivelia is independently.           ATTRIBUTES         In the manner which is required in laboratory.         Intent and alkalinity.         Is to work in the different fields of chemistry.           analysis of inorganic mixtures.         uipment's and chemicals.         Image: State Stat						
Ехр — О	95	Separation of Fluorescein and	I methylene blue by column chromatography.							
Exp – 0	16	Separation of leaf pigments fi	rom leaves							
Exp - 0	17	Resolution of racemic mixture	e of (+) mandelic acid							
Exp - 0	18	Diazotization/coupling: Prepa	aration of methyl orange and methyl red							
Exp – 0	19	Oxidation: Preparation of ber	zoic acid from toluence							
Exp – 1	.0	Reduction: Preparation of ani	line from nitrobenzene							
11. CO-P	O mapping		Attributor	<b>DO1</b>	DO3	<b>DO2</b>	<b>DO4</b>	DOF	DOG	DO7
cos			Attributes	POI	PUZ	PU3	PU4	P05	PU6	PU7
CO1	Remember to keep	records of all performed expe	riments in the manner which is required in laborato	ry. <b>3</b>	2	2		3	1	3
CO2	Able to Evaluate wa	ater quality parameters like ch	oride content and alkalinity.	3	2	2		3	1	3
CO3	Understand the bas	sic titration methods and techr	ical skills to work in the different fields of chemistry	<i>.</i> <b>3</b>	2	2		3	1	3
CO4	Know about the pri	inciples of qualitative and quar	ititative analysis of inorganic mixtures.	3	2	2		3	1	3
CO5	Analyze the import	ance of personal safety and ca	re of equipment's and chemicals.	3	2	2		3	1	3
	3 S	trong contribution, 2 Average	contribution , 1 Low contribution							
12. Brie	ef description of self	f-learning / E-learning compor	lent							
1.	https://www.fandr	n.edu/uploads/files/79645701	812579729-genchem-reference-for-web.pdf							
2.	http://file.akfarmal	hadhika.ac.id/E-BOOK/12-121	B-aktarmahad-16-1-vogelqu-d.pdf	4f						
3. 1	https://tacuity.psau	u.euu.sa/medownload/doc-6-p	au-iuoiiuoii2eieiaeii9coact/1001//32-original.p 959/practical-chemistry	ui						
13. Bool	ks recommended:									
1.	Practical Physics, by	y R. K. Shukla, New Age Interna	ational Private Limited; Third edition.							
2.	B.Sc.Practical Physi	cs by Harnam Singh and Hemn	ne, S. Chand.							
3.	B. Sc. Practical Phys	sics by CL Arora, S Chand & Cor	npany							
4.	Practical Physics by	Kumar P.R.S., Prentice Hall Ind	lia Learning Private Limited							

1. Name of the Departmen	nt: MATHEMATICS										
2. Course Name	STATISTICAL TECHNIQUES LA	٨B			L		Т	•		Р	
3. Course Code	MT304				0		C	)		4	
4. Type of Course (use tick	mark)				Core ( √ )		DE (	)		FC (	)
5. Pre-requisite (if any)	10+2	6.	Frequency (use tick marks)	Even ( )	Odd (v)		Either S	Sem (	) Ev	very Ser	m()
7. Total Number of Lecture	es, Tutorials, Practicals										
Lect	ures = 00		Tutorials = 00				Practic	al = 10			
8. COURSE OBJECTIVES:											
9. COURSE OUTCOMES (CO After the successful course c	): completion, learners will develo	op foll	owing attributes:								
COURSE OUTCOME (CO)			AT	TRIBUTES							
C01											
CO2											
CO3											
CO4											
CO5											
10. Syllabus											
Exp – 01											
Exp – 02											
Exp – 03											
Exp – 04											
Exp – 05											
Exp – 06											
Exp – 07											
Exp - 08											
Ехр — 09											
Exp – 10											
11. CO-PO mapping											
COs	1	Attrib	utes		PO1	PO2	PO3	PO4	PO5	PO6	PO7
C01											
CO2											
СОЗ											
CO4											
CO5											
3 S	trong contribution, 2 Average	contri	bution , 1 Low contribution								
12. Brief description of sel	f-learning / E-learning compon	ent									
13. Books recommended:											

2. Cour	le of the Departmen								-		
	se Name	SPECTROSCOPIC TECHNIQU	JES		L			Т		Р	
3. Cour	se Code	СН308			3			1		0	
4. Type	of Course (use tick	mark)			Core (	√)	DE	()		FC (	)
5. Pre-	requisite (if any)	10+2 with Chemistry	6.	<b>Frequency (use tick marks)</b> Even $(\vee)$	Odd	()	Either	Sem ()	E١	/ery Sei	m ( )
7. Tota	I Number of Lecture	es, Tutorials, Practicals						. ,		,	. /
	Lectu	res = 30		Tutorials = 10			Practic	al = Nil			
8. COUI	RSE OBJECTIVES: St	udents able to understand the	e inter	action of electromagnetic radiation with th	e materials, s	spectrosc	opic tech	nniques li	ike Ult	raviolet	t, FT-IR,
			liomet	ý.							
9. COUR	SE OUTCOIVIES (CO	): completion learners will devel	lon fol	owing attributes:							
	SE OUTCOME (CO)	l	iop jon								
COOK		Linderstanding Mayo like or		ATTRIBUTES	montotion	coniugat	ad austa	mc and	tranci	tion of	aaraiaa
	CO1	Woodward – Fieser rules for c	calcula	tion of light, electronic transitions, instruction of wave length.	imentation,	conjugat	ed syste	ms and	transi	tion ei	nergies,
	CO2	Comprehension of absorption vibrational frequencies, chara	n in the acterist	infrared region, theory of infrared spectroso ic absorptions in common classes of compou	opy, instrum inds.	entation,	molecul	ar vibrati	ons, fa	ictors a	ffecting
	CO3	To create basics of NMR spec coupling.	trosco	py, instrumentation, chemical shift, equivale	nt and none	quivalent	protons,	, spin-spi	n splitt	ing and	d vicinal
	CO4	Able to evaluate the NMR spe of NMR spectroscopy.	ectra c	f some representative compounds: Hydroca	rbons, Aldeh	ydes, Ket	ones, Ac	ids and A	Alcohol	s, Appli	ications
	CO5	Analyze the theory, instrume patterns of various functional	entatio group	n, important useful terms in mass spectror s (alkanes, alkenes, alkynes, alcohols, ketone	netry; molec s, aldehydes	ular ion   , Mclaffe	peak, me rty rearra	etastable angemen	peak, its.	fragme	ntation
10. Uni	it wise detailed con	tent									
Unit-1		Number of lectures = 08	Tit	e of the unit: UV SPECTROSCOPY							
Wave-lik transitior	e propagation of light n energies, Woodwa	ht, absorption of electromagne Ird – Fieser rules; unsaturated	etic rac carboi	liation by organic molecules allowed and for nyl compounds, conjugated dienes and polye	bidden transi nes.	tions, ins	trumenta	ation, cor	njugate	ed syste	ms and
Unit-2		Number of lectures =08	Title	of the unit: IR SPECTROSCOPY							
Introduct	tion absorption in	the infrared region theory	of inf	rared spectroscopy instrumentation mole	cular vibrati	ons fact	ors affe	rting vih	rationa	al frequ	iencies
characte	ristic absorptions in	common classes of compound	ds. chai	racteristic vibrational frequencies of some or	ganic compo	unds.	ors are		latione	in nequ	ieneics,
Unit-3		Number of lectures = 08	Title	of the unit: NMR SPECTROSCOPY	<u>Barrie corripo</u>						
Introduct	tion theory of NMR	spectroscopy instrumentatio	on che	mical shift, equivalent and nonequivalent p	otons snin-s	nin snlitt	ing vicin	al counli	ng Int	ternret;	ation of
NMR spe	ectra of some repres	entative compounds.	, che		otons, spin s	pin spin	ing, vien	ai coupii	1.8,, 111	leipieu	
Unit-4	•	Number of lectures = 08	Title	of the unit: MASS SPECTROSCOPY							
Introduct	tion, basic theory, in	strumentation, important use	ful ter	ms in mass spectrometry, fragmentation pat	terns of vario	us functi	onal grou	ups (alkai	nes, all	enes. a	alkynes
alcohols	ether, phenols and	amines, ketones, aldehydes, e	sters.	acids, anhydrides), molecular ion peak, meta	stable neak.	Mclaffert	v rearran	igements	Nitro	gen rul	лкупс <i>э,</i> Р.
Unit-5		Number of lectures = 08	Titl	of the unit: ATOMIC ABSORPTION SPECTR		RY	, rearran		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	bennan	
Introduct	tion Principle Instru	imentation Sample preparatio	on Inte	ernal standard and standard addition calibra	tion and ann	lications	ofAAS				
introduct	tion, i meipie, matri					lications	01 445.				
11. CO-P	O mapping						_				
COs			Attrib	utes	PC	01 PO2	2 PO3	PO4	PO5	PO6	PO7
CO1	Understanding Wa and transition ener	ve-like propagation of light, e gies, Woodward – Fieser rules	electro s for ca	nic transitions, instrumentation, conjugated lculation of wave length.	systems 3	1	2			1	2
603	Comprehension of molecular vibration	absorption in the infrared u		· · · · · · · · · · · · · · · · · · ·					2	-	
02		s, factors affecting vibrationa	region, Il frequ	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo	entation, n classes	1	2		2	1	2
	of compounds.	ns, factors affecting vibrationa	region, Il frequ	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo	entation, n classes 3	1	2		2 2	1	2
CO3	of compounds. To create basics of protons, spin-spin s	of NMR spectroscopy, instru- splitting and vicinal coupling.	region, il frequ menta	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo tion, chemical shift, equivalent and none	entation, n classes 3 quivalent 3	1	2		2 2 2	1	2 3
CO3 CO4	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols,	of NMR spectroscopy, instru- splitting and vicinal coupling. NMR spectra of some repre- Applications of NMR spectros	menta esenta	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes,	entation, n classes a quivalent a Ketones, a	1 1 1	2 2 1		2 2 2 2 2	1 1 1 1 1	2 3 3
CO3 CO4	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory	of NMR spectroscopy, instru- splitting and vicinal coupling. NMR spectra of some repre- Applications of NMR spectros y, instrumentation, important	menta esenta scopy.	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular i	entation, n classes 3 quivalent 3 Ketones, 3 on peak,		2 2 1		2 2 2 2 2	1 1 1 1	2 3 3
CO3 CO4 CO5	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory metastable peak, f	of NMR spectroscopy, instru- splitting and vicinal coupling. NMR spectra of some repre- Applications of NMR spectros y, instrumentation, important ragmentation patterns of vari	region, Il frequ menta esenta scopy. t usefu ious fu	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo- tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular in nctional groups (alkanes, alkenes, alkynes,	entation, n classes quivalent Ketones, on peak, alcohols,	1 1 1 1	2 2 1 1		2 2 2 2 2 2	1 1 1 1 1	2 3 3 3
CO3 CO4 CO5	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory metastable peak, f ketones, aldehydes	of NMR spectroscopy, instru- splitting and vicinal coupling. he NMR spectra of some repre- , Applications of NMR spectros y, instrumentation, important ragmentation patterns of vari s), Mclafferty rearrangements.	region, Il frequ menta esenta scopy. t usefu ious fu	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo- tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular in nctional groups (alkanes, alkenes, alkynes,	entation, n classes 3 quivalent 3 Ketones, 3 on peak, alcohols, 3	1 1 1 1	2 2 1 1		2 2 2 2 2 2	1 1 1 1 1 1	2 3 3 3
CO3 CO4 CO5	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory metastable peak, f ketones, aldehydes <b>3 S</b>	of NMR spectroscopy, instru- of NMR spectroscopy, instru- splitting and vicinal coupling. he NMR spectra of some repre- , Applications of NMR spectros y, instrumentation, important ragmentation patterns of vari s), Mclafferty rearrangements. trong contribution, 2 Average	region, Il frequ menta esenta scopy. t usefu ious fu e contri	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo- tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular in nctional groups (alkanes, alkenes, alkynes, bution, 1 Low contribution	entation, n classes 3 quivalent 3 Ketones, 3 on peak, alcohols, 3	1 1 1	2 2 1 1		2 2 2 2 2 2	1 1 1 1 1	2 3 3 3
CO3 CO4 CO5 12. Brie	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory metastable peak, f ketones, aldehydes <b>3 S</b>	of NMR spectroscopy, instru- splitting and vicinal coupling. he NMR spectra of some repre- , Applications of NMR spectros y, instrumentation, important ragmentation patterns of vari s), Mclafferty rearrangements. trong contribution, 2 Average f-learning / E-learning component	region, il frequ menta esenta scopy. t usefu ious fu e contri nent	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo- tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular in nctional groups (alkanes, alkenes, alkynes, bution, 1 Low contribution	entation, n classes 3 quivalent 3 Ketones, 3 on peak, alcohols, 3		2 2 1 1		2 2 2 2 2	1 1 1 1 1	2 3 3 3
CO3 CO4 CO5 12. Brie	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory metastable peak, f ketones, aldehydes <b>3 S</b> <b>ef description of sel</b> https://www.you	of NMR spectroscopy, instru- splitting and vicinal coupling. The NMR spectro of some repre- Applications of NMR spectros y, instrumentation, important ragmentation patterns of vari s), Mclafferty rearrangements. <b>trong contribution, 2 Average</b> <b>f-learning / E-learning compon</b> tube.com/watch?v=2Y8pSoS00	region, il frequi menta esenta scopy. t usefu ious fu e contri nent d1g	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo- tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular in nctional groups (alkanes, alkenes, alkynes, bution , 1 Low contribution	entation, n classes 3 quivalent 3 Ketones, 3 on peak, alcohols, 3		2 2 1 1		2 2 2 2 2	1 1 1 1 1	2 3 3 3
CO3 CO4 CO5 12. Brie 1. 2.	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory metastable peak, f ketones, aldehydes <b>3 S</b> <b>ef description of sel</b> https://www.infoc	of NMR spectroscopy, instru- splitting and vicinal coupling. NMR spectra of some repre Applications of NMR spectros y, instrumentation, important ragmentation patterns of vari s), Mclafferty rearrangements. trong contribution, 2 Average f-learning / E-learning compointube.com/watch?v=2Y8pSoSoc cobuild.com/education/audio-v	region, il frequ menta esenta scopy. t usefu ious fu e contri nent d1g video-c	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo- tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular in nctional groups (alkanes, alkenes, alkynes, bution , 1 Low contribution	entation, n classes 3 quivalent 3 Ketones, 3 on peak, alcohols, 3 nicMethods-II	i   1     i   1     i   1	2 2 1 1 s/lecture	-25.html	2 2 2 2 2	1 1 1 1 1	2 3 3
CO3 CO4 CO5 1. 2. 3.	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory metastable peak, f ketones, aldehydes <b>3</b> S <b>ef description of self</b> https://www.infoc https://scrippslab	of NMR spectroscopy, instru- splitting and vicinal coupling. The NMR spectroscopy, instru- splitting and vicinal coupling. Applications of NMR spectros y, instrumentation, important ragmentation patterns of vari s), Mclafferty rearrangements. <b>trong contribution, 2 Average f-learning / E-learning compor</b> tube.com/watch?v=2Y8pSoSoc obuild.com/education/audio-vis. com/summary-of-spectroscoc	region, il frequ menta esenta scopy. t usefu ious fu e contri nent d1g video-co opic-te opic-te	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo- tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular in nctional groups (alkanes, alkenes, alkynes, bution , 1 Low contribution	entation, n classes 3 quivalent 3 Ketones, 3 on peak, alcohols, 3 nicMethods-II	1     1     1     1     1	2 2 1 1 s/lecture	-25.html	2 2 2 2 2	1 1 1 1 1	2 3 3
CO3 CO4 CO5 1. 2. 3. 4.	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory metastable peak, f ketones, aldehydes <b>3</b> S <b>ef description of self</b> https://www.infoc https://scrippslab https://nptel.ac.in	of NMR spectroscopy, instru- splitting and vicinal coupling. he NMR spectra of some repre- Applications of NMR spectros y, instrumentation, important ragmentation patterns of vari s), Mclafferty rearrangements. trong contribution, 2 Average f-learning / E-learning compo- tube.com/watch?v=2Y8pSoS00 cobuild.com/education/audio-v ss.com/summary-of-spectroscop	region, il frequ menta esenta scopy. t usefu ious fu e contri nent d1g video-co opic-te 02103	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo- tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular in nctional groups (alkanes, alkenes, alkynes, bution , 1 Low contribution courses/chemistry/ApplicationOfSpectroscop chniques/ 044/pdf/mod2.pdf	entation, n classes 3 quivalent 3 Ketones, 3 on peak, alcohols, 3 nicMethods-II	1 1 1 1 1 T-Madra	2 2 1 1 s/lecture	-25.html	2 2 2 2 2	1 1 1 1 1	2 3 3
CO3 CO4 CO5 1. 2. 3. 4. 13. Bool	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory metastable peak, f ketones, aldehydes <b>3</b> S <b>ef description of self</b> https://www.infoc https://scrippslab https://nptel.ac.in ks recommended:	of NMR spectroscopy, instru- splitting and vicinal coupling. The NMR spectra of some repre- Applications of NMR spectros y, instrumentation, important ragmentation patterns of vari s), Mclafferty rearrangements. <b>trong contribution, 2 Average</b> <b>f-learning / E-learning compoi</b> tube.com/watch?v=2Y8pSoS00 tobuild.com/education/audio-v is.com/summary-of-spectroscop h/content/storage2/courses/1	region, al frequi menta esenta scopy. t usefu ious fu e contri nent d1g video-to opic-te 02103	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo- tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular in nctional groups (alkanes, alkenes, alkynes, bution , 1 Low contribution courses/chemistry/ApplicationOfSpectroscop chniques/ 044/pdf/mod2.pdf	entation, n classes 3 quivalent 3 Ketones, 3 on peak, alcohols, 3 nicMethods-II	i   1     i   1     i   1	2 2 1 1 s/lecture	-25.html	2 2 2 2 2	1 1 1 1 1	2 3 3
CO3 CO4 CO5 12. Brie 1. 2. 3. 4. 13. Bool 1. 2	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory metastable peak, f ketones, aldehydes <b>3</b> S <b>ef description of self</b> https://www.infoc https://scrippslab https://nptel.ac.in <b>ks recommeded:</b> Introduction to sp	ns, factors affecting vibrationa of NMR spectroscopy, instru- splitting and vicinal coupling. The NMR spectra of some repre- Applications of NMR spectros y, instrumentation, important ragmentation patterns of vari s), Mclafferty rearrangements. trong contribution, 2 Average f-learning / E-learning compo- tube.com/watch?v=2Y8pSoSoc tobuild.com/education/audio-v- is.com/summary-of-spectroscoc n/content/storage2/courses/1	region, al frequ menta esenta scopy. t usefu ious fu e contri nent d1g video-to opic-te 02103 & Kriz, Willio	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo- tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular in nctional groups (alkanes, alkenes, alkynes, bution , 1 Low contribution courses/chemistry/ApplicationOfSpectroscop chniques/ 044/pdf/mod2.pdf	entation, n classes 3 quivalent 3 Ketones, 3 on peak, alcohols, 3 nicMethods-II	I     I     I     I     I     I     I     I	2 2 1 1 s/lecture	-25.html	2 2 2 2 2	1 1 1 1 1	2 3 3
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CO3 CO4 CO5 1. 2. Brie 1. 2. 3. 4. <b>13. Bool</b> 1. 2. 3. 4. <b>13. Bool</b>	of compounds. To create basics of protons, spin-spin s Able to evaluate th Acids and Alcohols, Analyze the theory metastable peak, f ketones, aldehydes <b>3</b> S <b>ef description of sel</b> https://www.infoc https://scrippslab https://nptel.ac.in <b>ks recommended:</b> Introduction to sp Spectroscopic me Organic spectrosco Fundamentals of	of NMR spectroscopy, instru- splitting and vicinal coupling. The NMR spectra of some repre- Applications of NMR spectros y, instrumentation, important ragmentation patterns of vari s), Mclafferty rearrangements. trong contribution, 2 Average f-learning / E-learning compoint tube.com/watch?v=2Y8pSoSO tobuild.com/education/audio- tobuild.com/education/audio- tobuild.com/summary-of-spectrosco n/content/storage2/courses/11 pectroscopy: Pavia, Lampman & thods in organic chemistry: H. topy: William Kemp, 3rd Editio Analytical chemistry. Douglas /	region, il frequ menta esenta scopy. t usefu ious fu e contri nent d1g video-co opic-te .02103 & Kriz, Willian m, Palg A, Skoc	theory of infrared spectroscopy, instrum encies, characteristic absorptions in commo- tion, chemical shift, equivalent and none tive compounds: Hydrocarbons, Aldehydes, I terms in mass spectrometry; molecular in nctional groups (alkanes, alkenes, alkynes, bution , 1 Low contribution courses/chemistry/ApplicationOfSpectroscop chniques/ 044/pdf/mod2.pdf 3rd Ed, Books/cole. ms and Ian fleminig, V Edition Tata Mc Grawl rave publications. pg. Donald M. West, F. James Holler. 7th edit	entation, n classes 3 quivalent 3 Ketones, 3 on peak, alcohols, 3 nicMethods-II	Image: state	2 2 1 1 s/lecture	-25.html	2 2 2 2 2	1 1 1 1 1	2 3 3
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2. Cour	rse Name	CHEMICAL PROCESS INDUST	RY	L		٦	Ē.		Р	
3. Cour	rse Code	CH309		3		1			0	
4. Type	e of Course (use tick	mark)		Core ( )		DE	(v)		FC (	)
5. Pre-	requisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even (V)	() bbQ		Either	Sem (	) E'	verv Sei	, m ( )
7. Tota	I Number of Lecture	es. Tutorials. Practicals						'	- 1	( )
	lectu	ires = 30	Tutorials = 10			Practic	al = Nil			
8.000	RSE OBJECTIVES: Th	e main objective of this course	is to study the composition preparation properties	and uses of	ammor	nia nitr	ic acid u	nhosnh	orus ch	emical
glass, cer	ment, ceramics and	refractories and their related to	is to study the composition, preparation, properties	und uses of		na, ma	ie dela, j	priospri		ienneui,
		).								
After the	e successful course o	,. ompletion, learners will develo	on following attributes:							
COUR	SE OUTCOME (CO)									
		Evaluate different preparation	processes for the manufacture of ammonia nitric aci	d ammoniu	n nitrat	te and a	mmonii	um sulr	hate a	nd their
	CO1	related guality control, hazard	s, safety and effluent management.	u, uninornu	in merer			ann saip	mate a	na trici
	<u> </u>	Evoluate different manufactur	ng mathada of coustie code and phoenhorus chemicals	and thair n	onortic					
-	02		ing methods of caustic soua and phosphorus chemicals	s and then pi	opertie	es anu u	ses.			
	CO3	Understand the composition o	f glass and their types, properties and uses.							
		Analyze the composition type	s properties and preparation of cement and its setting	time						
	CO4	Analyze the composition, type	s, properties and preparation of cement and its setting	s unic.						
	CO5	Understand the classification,	properties and uses of ceramics and refractoriness and	their respec	tive ch	aracter	stics.			
10. Uni	it wise detailed cont	tent								
Unit-1		Number of lectures = 08	Title of the unit: SYNTHETIC NITROGEN PRODUCTS							
Ammonia	a, nitric acid, ammoi	nium nitrate and ammonium su	Iphate their manufacture with reference to; consump	tion Pattern	Raw m	naterial	s, Produ	ction p	rocess,	Quality
control, I	Hazards and safety a	nd Effluent management.								
Unit-2		Number of lectures =08	Title of the unit: CHLOR-ALKALI INDUSTRIAL PRODU	JCTS						
Caustic s	soda Chlorine. Phos	phorus chemicals; Phosphoru	s, phosphoric acid, ammonium phosphate, superpho	osphate, trip	le supe	erphosp	hate. Li	ime, g	/psum,	Silicon,
calcium o	carbide.									
Unit-3		Number of lectures = 08	Title of the unit: GLASS							
Introduct	tion, Classification a	nd General Properties of Glass	, Characteristics, raw Materials, Chemical Reactions, M	lethods of M	anufac	ture an	d Uses.			
Unit-4		Number of lectures = 08	Title of the unit: CEMENT							
Introduct	tion, Classification a	nd General Properties of Glass	, Characteristics, raw Materials, Chemical Reactions, M	lethods of M	anufac	ture an	d Uses.			
Linit E		Number of lectures = 08	Title of the unit: CERAMICS AND REERACTORIES							
Unit-5	tion Types of coran	number of lectures - 08	applications. Refractories, classification of refractories	c charactori	tics of	rofract	orios m	atorials	propo	rtios of
refractor	rios Neutral refracto	ries: Silicon carbide Acid refra	applications. Refractories, classification of refractories	s, characteri		Tenact			, prope	i ties of
	nes. Neutrai renacto	nes, silicon carbide. Acid rena								
					000					
003			\++ributor	DO1			DO4	DOF	DOC	DO7
CO1	Evaluata different	propagation processos for the	Attributes	PO1	PUZ	PO3	PO4	PO5	PO6	PO7
	Evaluate different	preparation processes for the	Attributes manufacture of ammonia, nitric acid, ammonium nit	trate 3	2	PO3 3	PO4 3	PO5 2	PO6 3	P07 2
	Evaluate different and ammonium sul	preparation processes for the phate and their related quality	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management.	trate 3	2	PO3 3	PO4 3	PO5 2	PO6 3	PO7 2
CO2	Evaluate different and ammonium sul Evaluate different and uses	preparation processes for the phate and their related quality manufacturing methods of cau	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. Istic soda and phosphorus chemicals and their prope	trate 3 erties 3	2	PO3 3 3	PO4 3 3	PO5 2 1	PO6 3 3	PO7 2 2
CO2	Evaluate different and ammonium sul Evaluate different and uses.	preparation processes for the phate and their related quality manufacturing methods of car	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. Istic soda and phosphorus chemicals and their prope	PO1 trate 3 erties 3	2 2	PO3 3 3	PO4 3 3	PO5 2 1	PO6 3 3	PO7 2 2
CO2 CO3	Evaluate different and ammonium sul Evaluate different and uses. Understand the co	preparation processes for the lphate and their related quality manufacturing methods of car mposition of glass and their typ	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. Istic soda and phosphorus chemicals and their prope es, properties and uses.	trate 3 erties 3 3	2 2 2 2 2	PO3 3 3 3	PO4 3 3 3	PO5 2 1 1	PO6 3 3 3	PO7 2 2 2
CO2 CO3	Evaluate different and ammonium sul Evaluate different and uses. Understand the con Analyze the compo	preparation processes for the phate and their related quality manufacturing methods of car mposition of glass and their typ sition, types, properties and pr	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. istic soda and phosphorus chemicals and their prope es, properties and uses. eparation of cement and its setting time.	PO1 trate 3 erties 3 3 3 3	2 2 2 2 2 2 2	PO3 3 3 3 3 3	PO4 3 3 3 3 3	PO5 2 1 1 1	PO6 3 3 3 3 3	PO7 2 2 2 2 2
CO2 CO3 CO4	Evaluate different and ammonium sul Evaluate different and uses. Understand the con Analyze the compo	preparation processes for the phate and their related quality manufacturing methods of car mposition of glass and their typ sition, types, properties and pr assification, properties and u	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. istic soda and phosphorus chemicals and their prope es, properties and uses. eparation of cement and its setting time. ses of ceramics and refractoriness and their respe-	PO1 trate 3 erties 3 3 3 ctive	2 2 2 2 2 2	PO3 3 3 3 3 3	PO4 3 3 3 3 3	PO5 2 1 1 1	PO6 3 3 3 3	PO7 2 2 2 2 2 2
CO2 CO3 CO4 CO5	Evaluate different and ammonium sul Evaluate different and uses. Understand the con Analyze the compo Understand the cl characteristics.	preparation processes for the phate and their related quality manufacturing methods of car mposition of glass and their typ sition, types, properties and pr assification, properties and u	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. Istic soda and phosphorus chemicals and their prope es, properties and uses. eparation of cement and its setting time. ses of ceramics and refractoriness and their respen	PO1 trate 3 erties 3 3 3 ctive 3	2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3	PO4 3 3 3 3 3 3 3 3 3	PO5 2 1 1 1 1 1	PO6 3 3 3 3 3 3 3	PO7 2 2 2 2 2 2 2 2
CO2 CO3 CO4 CO5	Evaluate different and ammonium sul Evaluate different and uses. Understand the con Analyze the compo Understand the cl characteristics.	preparation processes for the phate and their related quality manufacturing methods of car mposition of glass and their typ sition, types, properties and pr assification, properties and u trong contribution. 2 Average	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. ustic soda and phosphorus chemicals and their prope es, properties and uses. eparation of cement and its setting time. ses of ceramics and refractoriness and their resper contribution . 1 Low contribution	PO1 trate 3 erties 3 3 3 ctive 3	2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 3 3	PO4           3           3           3           3           3           3           3           3           3           3	PO5 2 1 1 1 1 1	PO6           3           3           3           3           3           3           3	P07 2 2 2 2 2 2 2 2
CO2 CO3 CO4 CO5	Evaluate different and ammonium sul Evaluate different and uses. Understand the con Analyze the compo Understand the cl characteristics. 3 Se ef description of sel	preparation processes for the phate and their related quality manufacturing methods of car mposition of glass and their typ sition, types, properties and pr assification, properties and u trong contribution, 2 Average	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. ustic soda and phosphorus chemicals and their prope es, properties and uses. eparation of cement and its setting time. ses of ceramics and refractoriness and their resper contribution , 1 Low contribution ent	PO1 trate 3 erties 3 3 3 ctive 3	2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 3	PO4           3           3           3           3           3           3           3	PO5 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO6 3 3 3 3 3 3 3	P07 2 2 2 2 2 2 2
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CO2 CO3 CO4 CO5 12. Brie 1. 2. 3. 4. 13. Bool 1.	Evaluate different and ammonium sul Evaluate different and uses. Understand the con Analyze the compo Understand the cl characteristics. 3 Si ef description of self https://encyclope https://www.your https://www.brita ks recommended: Shreve R.N. Brink.	preparation processes for the lphate and their related quality manufacturing methods of car mposition of glass and their typ sition, types, properties and pr assification, properties and u trong contribution, 2 Average f-learning / E-learning compon dia2.thefreedictionary.com/ch tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphoru	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. ustic soda and phosphorus chemicals and their prope es, properties and uses. eparation of cement and its setting time. ses of ceramics and refractoriness and their respen- contribution , 1 Low contribution ent emical+process+industry us-chemical-element es, International student edition, Pubs: McGraw Hill Bo	PO1 trate 3 erties 3 3 ctive 3	2 2 2 2 2 2 2	PO3 3 3 3 3 3 1 9 1 9 1 9 1 9 1 9 1 9 1 9	PO4 3 3 3 3 3 3	PO5 2 1 1 1 1 1	PO6 3 3 3 3 3	P07 2 2 2 2 2 2
CO2 CO3 CO4 CO5 12. Brie 1. 2. 3. 4. 13. Bool 1. 2.	Evaluate different and ammonium sul Evaluate different and uses. Understand the con Analyze the compo Understand the cl characteristics. <b>3 Si</b> <b>ef description of self</b> https://encyclope https://www.your https://www.brita <b>ks recommended:</b> Shreve R.N. Brink. Groggins P.M., Ur	preparation processes for the lphate and their related quality manufacturing methods of car mposition of glass and their typ sition, types, properties and pr assification, properties and u trong contribution, 2 Average f-learning / E-learning compon dia2.thefreedictionary.com/ch tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphoru	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. ustic soda and phosphorus chemicals and their prope es, properties and uses. eparation of cement and its setting time. ses of ceramics and refractoriness and their respen- contribution , 1 Low contribution ent emical+process+industry us-chemical-element es, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo	PO1 trate 3 erties 3 3 ctive 3 ook Co. New raw-Hill Boo	2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PO4 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4	PO5 2 1 1 1 1 1	PO6 3 3 3 3 3	P07 2 2 2 2 2 2
CO2 CO3 CO4 CO5 12. Brie 1. 2. 3. 4. 13. Bool 1. 2. 3.	Evaluate different and ammonium sul Evaluate different and uses. Understand the con Analyze the compo Understand the cl characteristics. <b>3 Si</b> <b>ef description of self</b> https://encyclope https://www.your https://www.brita <b>ks recommended:</b> Shreve R.N. Brink. Groggins P.M., Ur Dryden's outlines	preparation processes for the lphate and their related quality manufacturing methods of car mposition of glass and their typ sition, types, properties and pr assification, properties and u trong contribution, 2 Average f-learning / E-learning compon dia2.thefreedictionary.com/ch tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphoru J.A., Chemical Process Industr nit Process in Organic Synthesis of Chemical Technology, edite	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. ustic soda and phosphorus chemicals and their prope es, properties and uses. eparation of cement and its setting time. ses of ceramics and refractoriness and their respen- contribution , 1 Low contribution ent emical+process+industry us-chemical-element es, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo	PO1 trate 3 erties 3 3 ctive 3 ctive 3 ook Co. New raw-Hill Boo East-West Pr	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 2 9 60. Iew Yor	PO4 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4	PO5 2 1 1 1 1 1	PO6 3 3 3 3 3	P07 2 2 2 2 2 2
CO2 CO3 CO4 CO5 12. Brie 1. 2. 3. 4. 13. Bool 1. 2. 3. 4.	Evaluate different and ammonium sul Evaluate different and uses. Understand the con Analyze the compo Understand the cl characteristics. <b>3</b> Si <b>ef description of self</b> https://encyclope https://www.your https://www.brita <b>ks recommended:</b> Shreve R.N. Brink. Groggins P.M., Ur Dryden's outlines Industrial Chemist	preparation processes for the lphate and their related quality manufacturing methods of car mposition of glass and their typ sition, types, properties and pr assification, properties and u trong contribution, 2 Average f-learning / E-learning compon dia2.thefreedictionary.com/ch tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphoru J.A., Chemical Process Industr nit Process in Organic Synthesis of Chemical Technology, edite- try B.K.Sharma, goel publishing	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. ustic soda and phosphorus chemicals and their prope des, properties and uses. eparation of cement and its setting time. ses of ceramics and refractoriness and their respec- contribution , 1 Low contribution ent emical+process+industry us-chemical-element es, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo	PO1 trate 3 erties 3 3 ctive 3 ctive 3 ook Co. New raw-Hill Boo East-West Pr	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 2 960. Iew Yor w Delhi	PO4 3 3 3 3 3 3 3 4 8 4 , 1998. , 2004.	PO5 2 1 1 1 1 1	PO6 3 3 3 3 3	P07 2 2 2 2 2 2
CO2 CO3 CO4 CO5 12. Brie 1. 2. 3. 4. 13. Bool 1. 2. 3. 4. 5.	Evaluate different and ammonium sul Evaluate different and uses. Understand the con Analyze the compo Understand the cl characteristics. <b>3</b> Si <b>ef description of self</b> https://encyclope https://www.your https://www.brita <b>ks recommended:</b> Shreve R.N. Brink. Groggins P.M., Ur Dryden's outlines Industrial Chemist	preparation processes for the lphate and their related quality manufacturing methods of car mposition of glass and their typ sition, types, properties and pr assification, properties and u trong contribution, 2 Average F-learning / E-learning compon dia2.thefreedictionary.com/ch tube.com/watch?v=RjZIjneJ5fk micalprocessing.com/ annica.com/science/phosphoru . J.A., Chemical Process Industr nit Process in Organic Synthesis of Chemical Technology, edite try B.K.Sharma, goel publishing industries N.R Nerris shreve.	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. ustic soda and phosphorus chemicals and their prope es, properties and uses. eparation of cement and its setting time. ses of ceramics and refractoriness and their respen- contribution , 1 Low contribution ent emical+process+industry us-chemical-element es, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo d and revised by Gopala Rao M. and Marshall S, Pubs: If house.	PO1 trate 3 erties 3 3 ctive 3 ctive 3 ook Co. New raw-Hill Boo East-West Pr	2 2 2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 2 960. Iew Yor w Delhi	PO4 3 3 3 3 3 3 4 8 4 , 1998. , 2004.	PO5 2 1 1 1 1 1	PO6 3 3 3 3 3	P07 2 2 2 2 2 2
CO2 CO3 CO4 CO5 12. Brie 1. 2. 3. 4. 13. Bool 1. 2. 3. 4. 5. 6.	Evaluate different and ammonium sul Evaluate different and uses. Understand the con Analyze the compo Understand the cl characteristics. <b>3</b> Si <b>ef description of self</b> https://encyclope https://www.your https://www.brita <b>ks recommended:</b> Shreve R.N. Brink. Groggins P.M., Ur Dryden's outlines Industrial Chemist Chemical process Chemical process	preparation processes for the lphate and their related quality manufacturing methods of car mposition of glass and their typ sition, types, properties and pr assification, properties and u trong contribution, 2 Average f-learning / E-learning compon dia2.thefreedictionary.com/ch tube.com/watch?v=RjZIjneJ5fk micalprocessing.com/ annica.com/science/phosphoru . J.A., Chemical Process Industr nit Process in Organic Synthesis of Chemical Technology, edite try B.K.Sharma, goel publishing industries N.R Nerris shreve. principales: part 1 & II – O.A /	Attributes manufacture of ammonia, nitric acid, ammonium nit control, hazards, safety and effluent management. ustic soda and phosphorus chemicals and their prope des, properties and uses. eparation of cement and its setting time. ses of ceramics and refractoriness and their respec- contribution , 1 Low contribution ent emical+process+industry us-chemical-element es, International student edition, Pubs: McGraw Hill Bo , 5th edition, International student edition, Pubs: McGraw Hill Bo d and revised by Gopala Rao M. and Marshall S, Pubs: I house. Hougen, K.M Watson RA Ragatz (CBS)	PO1 trate 3 erties 3 3 ctive 3 ctive 3 ook Co. New raw-Hill Boo East-West Pr	2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 2 9 60. Iew Yor w Delhi	PO4 3 3 3 3 3 3 4 8 4 4 5 5 6 6 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7	PO5 2 1 1 1 1 1	PO6 3 3 3 3 3	P07 2 2 2 2 2

7. Shrev's Chemical process Industries: 5th edition – George T. Austin, Mc Graw Hill.

1. Nam	e of the Departmen	t: CHEMISTRY						-		
2. Cour	rse Name	CHEMISTRY OF POLYMERS		L		1			Р	
3. Cour	rse Code	CH317		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 ()		Either S	Sem (	) E	very Sei	m()
7. Tota	l Number of Lecture	s, Tutorials, Practicals								
	Lectu	ires = 30	Tutorials = 10			Practica	al = Nil			
8. COU	RSE OBJECTIVES: T	he main objective of this co	urse is to study the mechanism of polymer prepar	ation, their	proce	ssing te	echniqu	es, cor	nmercia	al uses,
Identifica	ation techniques and	preparation process of vinyi p	olymers, polyamides, polyesters, synthetic rubbers, cell	ulose and c	opolym	er resir	IS.			
9. COUR	RSE OUTCOMES (CO)	: omnletion learners will develo	on following attributes:							
COUR	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Student will be able to evaluat	e the different mechanisms of polymer preparation and	l their class	ificatior	۱.				
	CO2	Student will be able explain va	rious polymer reactions such as hydrolysis, acidolysis, c	rosslinking	etc.					
	CO3	Understand the colligative pro	perties of Polymers and evaluate the identification tech	niques sucl	n as NN	IR and F	TIR of F	olymei	s.	
	CO4	Understand the degradation a	nd its types.							
	CO5	Understand the preparation p	rocess of vinyl polymers, polyamide, polyesters and rub	bers.						
10. Uni	it wise detailed cont	ent								
Unit-1		Number of lectures = 08	Title of the unit: INTRODUCTION							
Basic cor Free radi	ncepts of polymer so ical addition polyme	rization, lonic addition of polyme	rization, Coordination polymerization, Step growth poly	stribution. merization.	Polyme	rization	: Mech	anism a	ind kine	etics of:
Unit-2		Number of lectures =08	Title of the unit: POLYMER REACTIONS							
Introduct	tion; types- hydrolys	is, acidolysis, addition, substit	ution, halogenation, hydrogenation, crosslinking, curing	g, (brief me	chanisr	n and u	sefulne	ss of ea	ach read	ction to
be highlig	ghted with examples	Number of lectures = 08	Title of the unit: STRUCTURE AND PROPERTIES							
Thermal	transitions, Crystalli	nity, Molecular weight charact	erization, Nuclear Magnetic Resonance (NMR) and Four	ier Transfor	m Infra	red (FI	R) tech	niques.		
Unit-4		Number of lectures = 08	Title of the unit: POLYMER DEGRADATION	· · ·						
radiation	tion, Types of degra i, oxidative degradat	ion and hydrolytic degradation,	mechanical degradation, degradation by ultrasonic w	aves, phot	o degra	idation,	degrad	lation I	by high	-energy
Unit-5		Number of lectures = 08	Title of the unit: SYNTHESIS, PROPERTIES AND APPL	ICAIONS						
Polystyre	ene, Polyacrylonitril	e, Polymethacrylate, Polyme	thylmethacrylate, Polyethene, Polybutadiene, Polyvi	nylidene, F	Polycark	onates	, Polye	sters,	Polyure	thanes,
Phenolic	polyesters, Polyami	des, Polysulphones.								
11. CO-P	O mapping								1	
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Student will be able	e to evaluate the different mec	hanisms of polymer preparation and their classification.	. 1	2	2	2	3	1	2
CO2	Student will be able	e explain various polymer react	ions such as hydrolysis, acidolysis, crosslinking etc.	1	2	2	2	3	1	2
CO3	and FTIR of Polyme	rs.	s and evaluate the identification techniques such as N	1	2	2	2	3	1	2
CO4	Understand the deg	gradation and its types.		1	1	2	2	3	1	2
CO5	Understand the pre	eparation process of vinyl polyr	ners, polyamide, polyesters and rubbers.	1	1	2	2	3	1	2
	3 St	trong contribution, 2 Average	contribution , 1 Low contribution							
12. Brie	ef description of self	-learning / E-learning compon	ent							
÷										
1.	https://www.yout	tube.com/watch?v=kMHYNuyk	CQ2Q&list=PLBAcrca02tZdHmbDFvnOA6ZYTJPnF5sMe							
1. 2. 3	https://www.yout https://www.yout https://www.yout	tube.com/watch?v=kMHYNuyk tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tpl0v	CQ2Q&list=PLBAcrca02tZdHmbDFvnOA6ZYTJPnF5sMe UM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ vF							
1. 2. 3. 4.	https://www.yout https://www.yout https://www.yout https://www.yout	tube.com/watch?v=kMHYNuyk tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8	CQ2Q&list=PLBAcrca02tZdHmbDFvnOA6ZYTJPnF5sMe UM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ vE Y							
1. 2. 3. 4. <b>13. Bool</b>	https://www.yout https://www.yout https://www.yout https://www.yout ks recommended:	tube.com/watch?v=kMHYNuyk tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8v	XQ2Q&list=PLBAcrca02tZdHmbDFvnOA6ZYTJPnF5sMe UM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ vE Y							
1. 2. 3. 4. <b>13. Bool</b> 1.	https://www.yout https://www.yout https://www.yout https://www.yout ks recommended: Principles of poly	tube.com/watch?v=kMHYNuyk tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8 mer chemistry: A Ravve, 2nd E	CQ2Q&list=PLBAcrca02tZdHmbDFvnOA6ZYTJPnF5sMe UM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ vE Y dition, Kluwer Academic publications							
1. 2. 3. 4. <b>13. Bool</b> 1. 2.	https://www.yout https://www.yout https://www.yout https://www.yout ks recommended: Principles of poly Polymer Science a	tube.com/watch?v=kMHYNuyk tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8 mer chemistry: A Ravve, 2nd E ind technology: Joll. R. Fried, P	CQ2Q&list=PLBAcrca02tZdHmbDFvnOA6ZYTJPnF5sMe UM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ vE { dition, Kluwer Academic publications rentice – Hall.							
1. 2. 3. 4. <b>13. Bool</b> 1. 2. 3.	https://www.yout https://www.yout https://www.yout https://www.yout ks recommended: Principles of poly Polymer Science a Principles of polyr	tube.com/watch?v=kMHYNuyk tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8 mer chemistry: A Ravve, 2nd E ind technology: Joll. R. Fried, P ner systems: F. Rodriguez, Clau	CQ2Q&list=PLBAcrca02tZdHmbDFvnOA6ZYTJPnF5sMe UM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ vE dition, Kluwer Academic publications rentice – Hall. Ide Cohen, C.K. Ober, L.A. Archer, Vth Edition, Taylor &	Francis						
1. 2. 3. 4. <b>13. Bool</b> 1. 2. 3. 4.	https://www.yout https://www.yout https://www.yout https://www.yout ks recommended: Principles of poly Polymer Science a Principles of polyr Introduction to po	tube.com/watch?v=kMHYNuyk tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8 mer chemistry: A Ravve, 2nd E ind technology: Joll. R. Fried, P ner systems: F. Rodriguez, Clau blymers: R.J. Young and P.A. Lo	CQ2Q&list=PLBAcrca02tZdHmbDFvnOA6ZYTJPnF5sMe UM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ vE { dition, Kluwer Academic publications rentice – Hall. ide Cohen, C.K. Ober, L.A. Archer, Vth Edition, Taylor & vell, 2nd Edition, Netron Thornes publications	Francis						

1. Nam	ne of the Departmer	it: MATHEMATICS								
2. Cou	rse Name	BASIC MATHEMATICAL MOI	DELING	L		ד	Г		Р	
3. Cou	rse Code	MT307		3		1	1		0	
4. Type	e of Course (use tick	mark)		Core ( )		DE	(√)		FC (	)
5. Pre-	-requisite (if any)	10+2	6. Frequency (use tick marks) Even ( √ )	Odd ()		Either S	Sem (	) E	very Se	m()
7. Tota	al Number of Lecture	es, Tutorials, Practicals								
	Lecti	ures = 30	Tutorials = 10			Practic	al = Nil			
8. COU	IRSE OBJECTIVES: T	ne course is aimed to develop	the skills in mathematics especially in mathemati	cal modeling	which i	s neces	sary for	r groon	ning the	em into
successf	ul science graduate.	The topics introduced will serv	e as basic tools for specialized studies in science field	1.						
9. COUI	RSE OUTCOMES (CO	): 	- fallewine attaikator							
After the	e successful course c	ompletion, learners will develo	op jollowing attributes:							
COOP			ATTRIBUTES							
	CO1	Assess and articulate what typ	e of modeling techniques are appropriate for a giver	n physical syste	em					
	CO2	Construct a Mathematical mod	del of a given physical system and analyze it.							
	CO3	Make predictions of the behav	vior of a given physical system based on the analysis	of its Mathema	atical M	Iodel.				
	CO4	Demonstrate understanding on dynamical systems theory	of powerful mathematical tools such as calculus of	several varial	bles, di	fferenti	al equa	tions a	nd elen	nentary
	CO5	Recognize the power of mathe	ematical modeling and analysis and be able to apply t	their understar	nding to	o their f	urther s	tudies.		
10. Un	it wise detailed con	tent								
Unit-1		Number of lectures = 08	Title of the unit:							
Simple s models.	situations requiring Mathematical mode	mathematical modeling, techr ling through geometry, algebra	niques of mathematical modeling, classifications of a, trigonometry and calculus. Limitations of methodic	mathematical modeling.	l mode	ling, cha	aracteri	stics of	mathe	matical
Unit-2		Number of lectures =08	Title of the unit:							
Mathem	atical modeling thro	ough ordinary differential equa	tions first order linear growth and decay models, c	ompartment n	nodels,	mather	natical	modeli	ng in dy	namics
through	first order ODE. Mat	thematics modeling through Sy	stems of ODE of first order							
Unit-3		Number of lectures = 08	Title of the unit:							
Mathem motion.	natical modeling in p Planetary motions a	opulation dynamics, mathema nd motions of satellite.	itical modeling of epidemic, Compartment model th	rough system	of ODE	. Math	ematica	I Mode	ling of	circular
Unit-4	· · · · · · · · · · · · · · · · · · ·	Number of lectures = 08	Title of the unit:							
Mathem	atics modeling in ec	onomics, in medicine, Arms rad	ce, Battles, international trade in terms of system of	ODE and dyna	mic thr	rough or	dinary	differer	ntial equ	uations.
Mathem	atical Modeling thro	nugh ODE of second order	,,,,,	, .			/			
Unit-5		Number of lectures = 08	Title of the unit:							
Mathem	atical modeling thr	ough difference equations: Th	e need, basic theory, modeling in Economics and	finance, mode	eling in	popula	tion dv	namics	and G	enetics.
Modelin	g in probability theo	ry. Examples of Mathematical I	modeling through difference equations	,						,
11. CO-F	PO mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Assoss and articula	to what type of modeling tech	aiguos are appropriato for a given physical system	2	2	2	1	1	1	2
CO1				3	2	2	1			3
CO2	Construct a Matne	of the behavior of a given physic	al system and analyze it.	Z	2	2	1		1	2
СОЗ	Model.	or the behavior of a given pr	homotical tools such as coloulus of source up	riables	2	3	1	1	1	2
CO4	differential equation	ons and elementary dynamical	systems theory	ables, 3	2	3	3	1	1	1
CO5	Recognize the pow their further studie	ver of mathematical modeling	and analysis and be able to apply their understand	ding to 2	3	1	2	2	1	2
		3 Strong	g contribution, 2 Average contribution , 1 Low contr	ibution						
12. Bri	ef description of sel	f-learning / E-learning compon	ient							
1.	https://www.you	tube.com/watch?v=-uCwgZUz5	510							
2.	https://nptel.ac.ir	n/courses/11110/113/	thematical models html							
5. 4	https://study.com	tiersin org/articles/10.3389/fg	ene 2015 00354/fullodf							
5.	https://www.vou	tube.com/watch?v=iV4Hlh8gH	Ls							
13. Boo	ks recommended:									
1.	J.N. Kapur: Mathe	ematical modeling Wiley Easter	n limited, 1990.							
2.	Principles of Math	nematical Modeling, 2nd Editio	n, Clyve L. Dym, Elsevier Academic Press.							
3.	A Course in Mthe	matical Modeling, Douglus Mur	nee 4. Concepts in Mathematical Modeling, Walter J	Meyer						

1. Nam	e of the Departmer	nt: MATHEMATICS								
2. Cour	se Name	LINEAR PROGRAMMING		L		ד	Г		Р	
3. Cour	se Code	MT308		3		1	L		0	
4. Type	of Course (use tick	mark)		Core ( )		DE	(√)		FC (	)
5. Pre-	requisite (if any)	10+2	6. Frequency (use tick marks) Even ( √ )	Odd ()		Either S	Sem (	) Ev	very Ser	m()
7. Tota	Number of Lecture	es, Tutorials, Practicals								
	Lect	ures = 30	Tutorials = 10			Practic	al = Nil			
8. COUF	RSE OBJECTIVES: To	teach the basic concepts of Li	near Programming, Integer Linear Programming, M	ulti-objective	and Sto	chastic l	linear pr	rogram	ming. T	o make
students	able for Post opti	mal analysis and optimal dec	ision making problem. This is a great beginner co	ourse for thos	e intere	ested in	Mathe	matical	i Progra	amming
Optimiza	tion.	•								
9. COUR	SE OUTCOMES (CO	): completion learners will develo	on following attributes:							
	SE OUTCOME (CO)	iompletion, learners will develo								
coon			ATTRIBUTES							
	01	Formulation of real life proble	ms in the form of linear programming problem and	various metho	d to sol	ve the fo	ormulate	ed LPP		
	CO2	Can obtain the problem when	changing the parameters of the problem in later sta	ges.						
		Understanding pure and mixed	d integer programming problems with different met	hods of solving	thoso	problem				
	CO3				s those	problem	15. · · · ·		<u> </u>	
	CO4	Understand Multi-objective a	nd Stochastic programming problem and various	methods to	make t	hem de	terminis	stic in o	order to	o solve
		efficientry.								
	CO5	Learn decision making probler	ns under various environment explicitly the theory o	of games						
10. Uni	t wise detailed con	tent								
Unit-1		Number of lectures = 08	Title of the unit:							
Formulat	ion of linear progra	amming problem, simplex algo	rithm, Primal Dual relationship, Economical interpre	etation of the	dual, D	ual Simp	olex met	thod. R	evised a	simplex
method.	Bounded variable s	implex method								
Unit-2		Number of lectures =08	Title of the unit:							
Sensitivit	y Analysis: Change	in values of objective function	coefficient, Change in right hand side values, Chan	nge in coefficie	nt of c	oefficier	nt, Addir	ng a ne	w prod	uct and
adding a	constraint									
Unit-3		Number of lectures = 08	Title of the unit:							
Integer p	rogramming formu	lation, all integers and mixed	integer programming problems, Gomory's cutting	plane algorit	nm, Bra	anch and	d bound	l algori	thm. Kr	napsack
problem										
Unit-4		Number of lectures = 08	Title of the unit:							
C+ a ala a a+:				المحملة محمل محمد						
Stochasti	c programming mo	dels, Chance constraints optimi	zation, two stage problems. Goal Programming met	noos and appi	cations	•				
Unit-5		Number of lectures = 08	Title of the unit:							
Decision	Theory: Introductio	n, Elements of decision problem	n, Types of decision making environment, Decision 1	tree. Game Th	eory: Ba	asic defir	nitions,	Two-pe	erson Ze	ero-sum
games, P	ure and mixed strat	egy, Principle of Dominance, G	raphical method, Solution of games by linear progra	mming metho	d.					
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Formulation of rea	I life problems in the form of	linear programming problem and various method t	o solve	2		2	-		-
CO1	the formulated LPF	,		3	2	1	2	2	1	3
<u> </u>	Can obtain the pro	blem when changing the paran	neters of the problem in later stages.	3	1	1	1	2	1	3
02	Understanding pu	ro and mixed integer program	aming problems with different methods of solving	those	_		_			-
CO3	nrohlems	re and mixed meger program	inning problems with unterent methods of solving	<b>3</b> 1105e <b>3</b>	1	1	2	2	1	3
	Understand Multi-	objective and Stochastic prov	gramming problem and various methods to make	e them						
CO4	deterministic in or	der to solve efficiently.		3	2	3	1	1	1	3
	Learn decision mak	king problems under various en	vironment explicitly the theory of games	3	2	1	2	2	1	3
CO5			violiment explicitly the theory of games	3	2		2	2	-	3
		3 Stron	g contribution, 2 Average contribution , 1 Low cont	ribution						
12. Brie	f description of sel	f-learning / E-learning compor	ient							
1.	https://www.you	tube.com/watch?v=TwAvQJAN	19Hk							
2.	https://www.you	tube.com/watch?v=M8POtpPt								
3. 4	https://www.you	tube.com/watch?v=KLHWtBpP	DEC							
4. 5	https://www.you	tube.com/watch?v=0-N0JF0p0	1							
5. 6.	https://www.you	tube.com/watch?v=LAC2127w	- BB4							
7.	https://www.you	tube.com/watch?v=gkm6Wljm	bOk							
8.	https://www.you	tube.com/watch?v=EyVYAngxk	PA							
9.	https://www.you	tube.com/watch?v=hibV5YbZv	Bw							
13. Book	s recommended:									
1.	Mokhtar S. Bazara	a, John J. Jarvis <sup>"</sup> Linear Progran	nming and Network Flows" Fourth Edition. WILEY A	John Wiley & S	ons, In	c., Public	cation			
2.	H.A. TAHA "Opera	ations Research- An Introductio	n" Pearson.							
3.	K.Swarup, P.K.Gu	pta and A. Manmohan, "Opera	tions Research", S. Chand.							
4. -	Hiller And Liebarr	nan, "Introduction to Operation	ns kesearch", McGraw Hill Company.							
э.	Daviu K. J. IVILETW	a, Linear riogramming Parac	1150 publishers, US							

1. Nam	e of the Departmer	nt: MATHEMATICS									
2. Cour	se Name	STATICS AND DYNAMICS			L		7	Г	$\downarrow$	Р	
3. Cour	se Code	MT305			3		1	1		0	
4. Type	of Course (use tick	mark)			Core ( √ )		DE	<u>()</u>	<u> </u>	FC (	)
5. Pre-	requisite (if any)	10+2	6. Frequency (use tick marks	Even (V)	Odd (		Either	Sem (	) E	very Sei	m()
7. Tota	I Number of Lecture	es, Tutoriais, Practicais	Tutorials - 10				Practic	al – Nil			
8. COUF	RSF OBJECTIVES: Th	e purpose of this undergraduat	te course is to impart basic and ke	v knowledge of n	notion of body	on vario	ous type	s of sur	faces. S	tudent	s will be
able to le	earn about equilibri	ium and bodies acted upon by	forces under different condition	s. After successfu	I completion o	f course	e, the st	udent v	will be ;	able to	explore
subject ir	nto their respective	dimensions.									
9. COUR	SE OUTCOMES (CO	): completion learners will devel	an fallowing attributor								
COUR	SF OUTCOMF (CO)	ompletion, learners will develo	op jonowing attributes.	ATTRIBUTES							
		Students will be able to und	lerstand Velocity and acceleratio	n along radial ar	nd transverse of	direction	ns and	along T	angent	ial and	norma
	CO1	directions. They will also study	y Simple harmonic motion in vario	ous situations and	l about Motion	under	other la	ws of fo	orces, Ea	arth att	raction,
		Elastic strings.									
	CO2	Students will gain an understa	inding of Motion of bodies in resis	ting medium, Cor	strained motio	n (circu	lar and (	cycloida	l only).		
	603	Students will gain an understa	anding of motion of particle on s	mooth and rough	plane curves,	Rocket	motion	and als	o study	about	Central
	03	orbits and Kepler's law, Motio	n of a particle in three dimensions	<u>;.</u>					<u> </u>	<del></del>	
	CO4	Students will create the own	understanding of Common catena	ary, Centre of gra	vity and get kr	owledg	e of Sta	ble and	unstab	le equi	librium,
		Students will learn about Forc	os in three dimensions Deinset's	control ovic Wror	chos Null lino	and null	Inlana				
10.11.1	CO5	Students will learn about Ford			iches, Null line	and nui	piane.				
10. Uni	t wise detailed con	Number of lectures = 08	Title of the unit:								
Velocity a	and acceleration alo	ong radial and transverse direct	tions, and along Tangential and no	rmal directions. S	imple harmoni	c motio	n. Motic	on unde	r other	laws of	forces.
Earth att	raction, Elastic strin	gs					,	, and c			,
Unit-2		Number of lectures =08	Title of the unit:								
Mation is	a registing modium	Constrained motion (sincular a									
Notion I	h resisting mealum,	Constrained motion (circular a	ina cyciolaal only).								
Unit-3		Number of lectures = 08	Title of the unit:								
Motion o	on smooth and roug	h plane curves, Rocket motion,	. Central orbits and Kepler's law, N	lotion of a particl	e in three dime	nsions.					
Linit_4		Number of lectures = 08	Title of the unit:								
Unit-4		Number of lectures - 00	The of the unit.								
Common	catenary, Centre of	f gravity, Stable and unstable e	quilibrium, Virtual work.								
Unit-5		Number of lectures = 08	Title of the unit:								
Forcos in	three dimensions	Poincot's control avis Wronsho	Null line and pull plane								
i orces in	tillee differisions, i										
11. CO-P	O mapping										
COs			Attributes		PO1	PO2	PO3	PO4	PO5	PO6	P07
	Students will be a	ble to understand Velocity an nd normal directions. They wi	id acceleration along radial and i	ransverse directi	ons and	2	2	1	1	1	2
CO1	and about Motion	under other laws of forces, Ear	th attraction, Elastic strings.			2	2	-	-	-	2
	Students will gain	an understanding of Motion o	f bodies in resisting medium, Cor	strained motion	(circular	2	-	1	1	1	-
CO2	and cycloidal only)				3	2	2	1	1	1	2
603	Students will gain a	an understanding of motion of	particle on smooth and rough pla	ne curves, Rocket	t motion 3	2	2	1	1	1	2
	and also study abo	ut Central orbits and Kepler's la	aw, Motion of a particle in three d	imensions.	lodgo of		+		<u> </u>	<u> </u>	
CO4	Stable and unstable	e equilibrium. Virtual work.	common catenary, centre of grav	ity and get know	3 ieuge 01	2	2	1	1	1	2
	Students will learn	about Forces in three dimen	nsions, Poinsot's central axis, Wre	enches, Null line	and null	2	-	4			2
CO5	plane.				3	2	2	1	1	1	2
	3 S	trong contribution, 2 Average	contribution , 1 Low contribution	1							
12. Brie	ef description of sel	f-learning / E-learning compor	nent								
1.	https://nptel.ac.ii	n/courses/112/106/112106180	)/ phics/taria_mahmood_gadri								
3.	https://www.fisio	a.net/mecanicaclassica/introduce	uction to statics and dynamics	by rudra pratap	.pdf						
4.	https://www.msu	univ.ac.in/Download/Pdf/2c216	67ab44cf4fc		1						
13. Book	ks recommended:										
1.	R.S. Verma - A Te	xt Book on Statics., Pothishala I	Pvt. Ltd., Allahabad	ing Kabus i D. Li	have No. D. "						
2. 3	J.L. Synge & R A	ementary rreatise on the Dyna Griffith - Principles of Mechanic	mics of a Particle and of Rigid Bod	ies, Kalyani Publis	oners, New Dell						
4.	M.A. Pathan: Stat	ics	,								
5.	Jhonson and Beer	r: Vector Mechanics for Engine	ers								
6.	Zafar Ahsan: Lect	ures Notes on Mechanics									

2. Course Name       ANALYSIS       L       T         3. Course Code       MT306       3       1         4. Type of Course (use tick mark)       3       1         5. Pre-requisite (if any)       10+2       6. Frequency (use tick marks)       Even ( \forall )       Odd ( )       Either Sem ( )         7. Total Number of Lectures, Tutorials, Practicals         Lectures = 30       Tutorials = 10       Practical = Nil         8. COURSE OBJECTIVES: This is an introductory course on analysis for mathematics students. The aim of this course is to introduce and develop basic a of limit, convergence, integration and differentiation.         This course is aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity, Cauchy-Riemann relation functions are then introduced.         9. COURSE OUTCOMES (CO):       After the successful course completion, learners will develop following attributes:         COURSE OUTCOME (CO)       ATTRIBUTES	P 0 FC ( Every Se nalytic c is and ha	<b>)</b> m ( )	
3. Course Code       MT306       3       1         4. Type of Course (use tick mark)       Core (v)       DE ( )         5. Pre-requisite (if any)       10+2       6. Frequency (use tick marks)       Even (v)       Odd ( )       Either Sem ( )         7. Total Number of Lectures, Tutorials, Practicals         Lectures = 30       Tutorials = 10       Practical = Nil         8. COURSE OBJECTIVES: This is an introductory course on analysis for mathematics students. The aim of this course is to introduce and develop basic a of limit, convergence, integration and differentiation.       This course is aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity, Cauchy-Riemann relation functions are then introduced.         9. COURSE OUTCOMES (CO):       After the successful course completion, learners will develop following attributes:       COURSE OUTCOME (CO)	0 FC ( Every Se nalytic c	<b>)</b> m ( )	
4. Type of Course (use tick mark)       Core (√)       DE ( )         5. Pre-requisite (if any)       10+2       6. Frequency (use tick marks)       Even (√)       Odd ( )       Either Sem ( )         7. Total Number of Lectures, Tutorials, Practicals         Lectures = 30       Tutorials = 10       Practical = Nil         8. COURSE OBJECTIVES: This is an introductory course on analysis for mathematics students. The aim of this course is to introduce and develop basic a of limit, convergence, integration and differentiation.       This course is aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity, Cauchy-Riemann relation functions are then introduced.         9. COURSE OUTCOMES (CO):       After the successful course completion, learners will develop following attributes:         COURSE OUTCOME (CO)	FC ( Every Se nalytic c	) m()	
5. Pre-requisite (if any)       10+2       6. Frequency (use tick marks)       Even (√)       Odd ()       Either Sem ()         7. Total Number of Lectures, Tutorials, Practicals       Iteration       Practical = Nil         8. COURSE OBJECTIVES: This is an introductory course on analysis for mathematics students. The aim of this course is to introduce and develop basic a of limit, convergence, integration and differentiation.       Practical = Nil         This course is aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity, Cauchy-Riemann relation functions are then introduced.       9. COURSE OUTCOMES (CO):         After the successful course completion, learners will develop following attributes:       ATTRIBUTES	Every Se nalytic c	m ( )	
7. Total Number of Lectures, Tutorials, Practicals         Lectures = 30       Tutorials = 10       Practical = Nil         8. COURSE OBJECTIVES: This is an introductory course on analysis for mathematics students. The aim of this course is to introduce and develop basic a of limit, convergence, integration and differentiation.       This course is aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity, Cauchy-Riemann relation functions are then introduced.         9. COURSE OUTCOMES (CO):       After the successful course completion, learners will develop following attributes:         COURSE OUTCOME (CO)       ATTRIBUTES	nalytic c is and ha		
Lectures = 30       Tutorials = 10       Practical = Nil         8. COURSE OBJECTIVES: This is an introductory course on analysis for mathematics students. The aim of this course is to introduce and develop basic a of limit, convergence, integration and differentiation.       analysis for mathematics students. The aim of this course is to introduce and develop basic a of limit, convergence, integration and differentiation.         This course is aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity, Cauchy-Riemann relation functions are then introduced.         9. COURSE OUTCOMES (CO):         After the successful course completion, learners will develop following attributes:         COURSE OUTCOME (CO)	nalytic c is and ha		
<ul> <li>8. COURSE OBJECTIVES: This is an introductory course on analysis for mathematics students. The aim of this course is to introduce and develop basic a of limit, convergence, integration and differentiation.</li> <li>This course is aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity, Cauchy-Riemann relation functions are then introduced.</li> <li>9. COURSE OUTCOMES (CO):</li> <li>After the successful course completion, learners will develop following attributes:</li> <li>COURSE OUTCOME (CO)</li> </ul>	nalytic c is and ha		
of limit, convergence, integration and differentiation. This course is aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity, Cauchy-Riemann relation functions are then introduced. 9. COURSE OUTCOMES (CO): After the successful course completion, learners will develop following attributes: COURSE OUTCOME (CO) ATTRIBUTES	is and ha	oncepts	
This course is aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity, Cauchy-Riemann relation functions are then introduced. 9. COURSE OUTCOMES (CO): After the successful course completion, learners will develop following attributes: COURSE OUTCOME (CO) ATTRIBUTES	ns and h		
9. COURSE OUTCOMES (CO):         After the successful course completion, learners will develop following attributes:         COURSE OUTCOME (CO)         ATTRIBUTES		armonic	
9. COURSE OUTCOMES (CD):         After the successful course completion, learners will develop following attributes:         COURSE OUTCOME (CO)         ATTRIBUTES			
COURSE OUTCOME (CO) ATTRIBUTES			
ATTRIBUTES			
CO1 Describe fundamental properties of the real numbers that lead to the formal douglosment of real analysis			
COI Describe fundamental properties of the real numbers that lead to the formal development of real analysis.			
CO2 Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration	<u> </u>		
CO3 Understand and be able to use notions of convergence involving sequences of functions, including the difference between uniform convergence. Apply the Weierstrass M-test and the uniform convergence theorem for integrals to examples.	point w	/ise and	
CO4 Demonstrate understanding of the basic concepts underlying complex analysis.			
Find Laurent series about isolated singularities, and determine residues and use the residue theorem to compute seve	al kinds	of real	
integrals.			
10. Unit wise detailed content			
Unit-1 Number of lectures = 08 Title of the unit: TOPOLOICAL SPACES			
Axiomatic study of real numbers, Completeness property in , Archimedean property, Countable and uncountable sets, Neighborhood, Interior points, Limi and closed sets. Derived sets. Dense sets. Perfect sets. Bolzano – Weierstrass theorem.	t points,	Open	
Unit-2 Number of lectures =08 Title of the unit: HOMEOMORPHISM AND SEPARATION AXIOMS			
Sequence of real numbers, Subsequence, Bounded and monotonic sequences, Convergent sequences, Cauchy's theorems on limit, Cauchy sequence, Cau	hy gene	ral	
principle of convergence.	70		
Unit-3 Number of lectures = 08 Title of the unit: COMPACTNESS			
Uniform convergence of sequences and series of functions, Weierstrass - test, Abel's and Dirichlet's test, Boundedness and intermediate value properties	of contir	ious	
functions, Uniform continuity, Meaning of sign of derivative, Darboux theorem			
Unit-4 Number of lectures = 08 Title of the unit: CONNECTEDNSS			
Functions of Complex variables, Limit, Continuity and differentiability, CR – equations , Analytic functions, Harmonic functions, Construction of analytic fur	iction.		
Unit-5 Number of lectures = 08 Title of the unit: PRODUCT TOPOLOGY			
Unit-5         Number of lectures = 08         Title of the unit: PRODUCT TOPOLOGY           Cauchy fundamental theorem. Cauchy integral formula. Derivatives of analytic functions. Morera's and Lioville's theorem. Zeros of analytic functions.	n Singi	larities	
Unit-5         Number of lectures = 08         Title of the unit: PRODUCT TOPOLOGY           Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function Residues	n, Singu	ilarities,	
Unit-5         Number of lectures = 08         Title of the unit: PRODUCT TOPOLOGY           Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function           Residues and theorem of Residue           11         CO-PO manning	in, Singi	ilarities,	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function         Residues and theorem of Residue         11. CO-PO mapping         COs	n, Singu	Ilarities,	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function         Residues and theorem of Residue         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5	PO6	PO7	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function         Residues and theorem of Residue         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5         CO1       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2	PO6	PO7	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function         Residues and theorem of Residue         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5         C01       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         C02       Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and analysis.       3       1       2       3	PO6 1 1	PO7 1	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function Residues and theorem of Residue       Zeros of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function Residue         11. CO-PO mapping       COs       Attributes       PO1       PO2       PO3       PO4       PO5         CO1       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         CO2       Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration       3       1       2       3         Understand and be able to use notions of convergence involving sequences of functions, including the       Understand and be able to use notions of convergence involving sequences of functions, including the       Understand and be able       Understand and be able	PO6 1 1	PO7 1	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function Residues and theorem of Residue         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5         C01       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         C02       Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration       3       1       2       3         C03       Understand and be able to use notions of convergence involving sequences of functions, including the difference between point wise and uniform convergence. Apply the Weierstrass M-test and the uniform       3       1       2       3	PO6 1 1 1	PO7 1 1	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function Residues and theorem of Residue         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5         C01       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         C02       Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration       3       1       2       3         C03       Understand and be able to use notions of convergence involving sequences of functions, including the difference between point wise and uniform convergence. Apply the Weierstrass M-test and the uniform       3       1       2       3	n, Singu PO6 1 1 1	PO7 1 1 1	
Unit-5Number of lectures = 08Title of the unit: PRODUCT TOPOLOGYCauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function Residues and theorem of Residue11. CO-PO mappingCOsAttributesPO1PO2PO3PO4PO5C01Describe fundamental properties of the real numbers that lead to the formal development of real analysis.3112C02Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration3123C03Understand and be able to use notions of convergence involving sequences of functions, including the difference between point wise and uniform convergence. Apply the Weierstrass M-test and the uniform convergence theorem for integrals to examples.31123C04Demonstrate understanding of the basic concepts underlying complex analysis.3112	PO6 1 1 1 1	PO7 1 1 1 1 1	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function Residues and theorem of Residue         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5         CO1       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         CO2       Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration       3       1       2       3         Understand and be able to use notions of convergence involving sequences of functions, including the difference between point wise and uniform convergence. Apply the Weierstrass M-test and the uniform       3       1       2       3         CO3       Demonstrate understanding of the basic concepts underlying complex analysis.       3       1       1       2         CO4       Demonstrate understanding of the basic concepts underlying complex analysis.       3       1       1       2         CO4       Demonstrate understanding of the basic concepts underlying complex analysis.       3       1       1       2         CO4       Demonstrate understanding of the basic concepts underlying complex analysis. <td>PO6 1 1 1 1 1 1</td> <td>PO7 1 1 1 1 1 1</td>	PO6 1 1 1 1 1 1	PO7 1 1 1 1 1 1	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic functions escape and theorem of Residue         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5         CO1       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         CO2       Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration       3       1       2       3         Understand and be able to use notions of convergence involving sequences of functions, including the difference between point wise and uniform convergence. Apply the Weierstrass M-test and the uniform       3       1       2       3         CO4       Demonstrate understanding of the basic concepts underlying complex analysis.       3       1       1       2         CO5       Find Laurent series about isolated singularities, and determine residues and use the residue theorem to a langer as the real integrals.       3       1       1       2         CO5       Find Laurent series about isolated singularities, and determine residues and use the residue theorem to a langer as the real integrals.       3       1       1       2	PO6 1 1 1 1 1 1	PO7 1 1 1 1 1 1	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic functions         Residues and theorem of Residue         11. CO-PO mapping         C01       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         C02       Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration       3       1       2       3         C03       Understand and be able to use notions of convergence involving sequences of functions, including the difference between point wise and uniform convergence. Apply the Weierstrass M-test and the uniform       3       1       2       3         C04       Demonstrate understanding of the basic concepts underlying complex analysis.       3       1       1       2         C05       Find Laurent series about isolated singularities, and determine residues and use the residue theorem to a strong contribution, 2 Average contribution , 1 Low contribution       3       1       1       2	PO6 1 1 1 1 1	PO7 1 1 1 1 1 1	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic functions Residues and theorem of Residue       PO1       PO2       PO3       PO4       PO5         I1. CO-PO mapping       CO1       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         CO2       Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and ritegration       3       1       2       3         CO3       Understand and be able to use notions of convergence involving sequences of functions, including the difference between point wise and uniform convergence. Apply the Weierstrass M-test and the uniform       3       1       2       3         CO4       Demonstrate understanding of the basic concepts underlying complex analysis.       3       1       1       2       3         CO4       Demonstrate understanding of the basic concepts underlying complex analysis.       3       1       1       2       3         CO5       Find Laurent series about isolated singularities, and determine residues and use the residue theorem to compute several kinds of real integrals.       3       1       1       2         CO5       Find Laurent series about isolated singul	PO6 1 1 1 1 1 1	PO7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic functions, Residues and theorem of Residue         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5         CO1       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         CO2       Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration       3       1       2       3         CO3       Understand and be able to use notions of convergence involving sequences of functions, including the onvergence theorem for integrals to examples.       3       1       2       3         CO4       Demonstrate understanding of the basic concepts underlying complex analysis.       3       1       1       2         CO5       Find Laurent series about isolated singularities, and determine residues and use the residue theorem to an exercise at the series contribution, 2 Average contribution, 1 Low contribution       3       1       1       2         3 Strong contribution, 2 Average contribution, 1 Low contribution         1         Attributes <td cos<="" td=""><td>PO6 1 1 1 1 1 1</td><td>PO7 1 1 1 1 1 1</td></td>	<td>PO6 1 1 1 1 1 1</td> <td>PO7 1 1 1 1 1 1</td>	PO6 1 1 1 1 1 1	PO7 1 1 1 1 1 1
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function Residues and theorem of Residue         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5         CO1       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         CO2       Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration       3       1       2       3         Understand and be able to use notions of convergence involving sequences of functions, including the difference between point wise and uniform convergence. Apply the Weierstrass M-test and the uniform       3       1       2       3         CO4       Demonstrate understanding of the basic concepts underlying complex analysis.       3       1       1       2         CO5       Find Laurent series about isolated singularities, and determine residues and use the residue theorem to analyte several kinds of real integrals.       3       1       1       2         CO5       Find Laurent series about isolated singularities, and determine residues and use the residue theorem to analyte several kinds of real integrals.       3       1       1 <td< td=""><td>PO6 1 1 1 1 1</td><td>PO7 1 1 1 1 1</td></td<>	PO6 1 1 1 1 1	PO7 1 1 1 1 1	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function Residues and theorem of Residue       PO1       PO2       PO3       PO4       PO5         11. CO-PO mapping       COs       Attributes       PO1       PO2       PO3       PO4       PO5         CO1       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         CO2       Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration       3       1       2       3         Understand and be able to use notions of convergence involving sequences of functions, including the difference between point wise and uniform convergence. Apply the Weierstrass M-test and the uniform       3       1       2       3         CO4       Demonstrate understanding of the basic concepts underlying complex analysis.       3       1       1       2         CO5       Find Laurent series about isolated singularities, and determine residues and use the residue theorem to ampute several kinds of real integrals.       3       1       1       2         CO5       Find Laurent series about isolated singularities, and determine residues and use the residue theorem to ampute several kinds of real in	PO6 1 1 1 1 1	PO7 1 1 1 1 1 1 1	
Unit-5         Number of lectures = 08         Title of the unit: PRODUCT TOPOLOGY           Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic function Residues and theorem of Residue         Zeros of analytic function           11. CO-PO mapping         COs         Attributes         PO1         PO2         PO3         PO4         PO5           CO1         Describe fundamental properties of the real numbers that lead to the formal development of real analysis.         3         1         1         2         3           CO2         Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration         3         1         2         3           CO3         difference between point wise and uniform convergence. Apply the Weierstrass M-test and the uniform         3         1         2         3           CO4         Demonstrate understanding of the basic concepts underlying complex analysis.         3         1         1         2           CO5         Find Laurent series about isolated singularities, and determine residues and use the residue theorem to analytic function.         3         1         1         2           CO5         Find Laurent series about isolated singularities, and determine residues and use the residue theorem to analytic function.         3         1         1	PO6 1 1 1 1 1	PO7 1 1 1 1 1	
Unit-5       Number of lectures = 08       Title of the unit: PRODUCT TOPOLOGY         Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic functions and theorem of Residue         11. CO-PO mapping         CO1       PO2       PO3       PO4       PO5         CO2       Attributes       PO1       PO2       PO3       PO4       PO5         CO1       Describe fundamental properties of the real numbers that lead to the formal development of real analysis.       3       1       1       2         Openostrate an understanding of limits and how they are used in sequences, series, differentiation and and the tegration       3       1       2       3         Understand and be able to use notions of convergence involving sequences of functions, including the uniform convergence. Apply the Weierstrass M-test and the uniform       3       1       2       3         Outperstand and be able to use notions of concepts underlying complex analysis.       3       1       1       2       3         Otherstand and be able to seamples.       3       1       1       2       3         Otherstand and uniform convergence. Apply the Weierstrass M-test and the uniform       3       1       1       2       2	PO6 1 1 1 1 1	PO7 1 1 1 1 1	
Unit-5         Number of lectures = 08         Title of the unit: PRODUCT TOPOLOGY           Cauchy fundamental theorem, Cauchy integral formula, Derivatives of analytic functions, Morera's and Lioville's theorem, Zeros of analytic functio         Residues           11. CO-PO mapping         COS         PO1         PO2         PO3         PO4         PO5           CO1         Describe fundamental properties of the real numbers that lead to the formal development of real analysis.         3         1         1         2         3           OC01         Describe fundamental properties of the real numbers that lead to the formal development of real analysis.         3         1         1         2         3           OC01         Describe fundamental properties of the real numbers that lead to the formal development of real analysis.         3         1         2         3           OC01         Describe fundamental properties of the real numbers that lead to the formal development of real analysis.         3         1         2         3           OC1         Demonstrate and be able to use notions of convergence involving sequences of functions, including the difference between point wise and uniform convergence. Apply the Weierstrass M-test and the uniform         3         1         1         2         3           CO2         Demonstrate understanding of the basic concepts underlying complex analysis.         3         1	on, Singu PO6 1 1 1 1 1 1 0 0 0 of a C	PO7 1 1 1 1 1 1 1	

1. Nam	e of the Departmer	t: CHEMISTRY										
2. Cour	se Name	UG CHEMISTRY PROJECT				L		1			Р	
3. Cour	se Code	CH318				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 S	Sem (	) E <sup>.</sup>	very Sei	m()
7. Tota	Number of Lecture	es, Tutorials, Practicals										
	Lectu	ures = 30		Tutorials = 10				Practic	al = Nil			
8. COUF	RSE OBJECTIVES: The	e main objective is to enhance	the teo	chnical skills and to provide stud	dents industria	al exposure.						
9. COUR	SE OUTCOMES (CO)	):										
After the	successful course c	ompletion, learners will develo	op follo	owing attributes:								
COUR	SE OUTCOME (CO)			AT	RIBUTES							
	CO1	Hands on training										
	CO2	Integrate class room theory wi	ith labo	oratory scale practice.								
	CO3	Understanding professional et	hics of	industry and code of conduct.								
10. CO-	PO mapping											
COs			Attribu	ıtes		PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Hands on training					3	2	3	2	3	3	3
CO2	Integrate class room	m theory with laboratory scale	practio	ce.		3	2	2	3	3	3	3
CO3	Understanding pro	fessional ethics of industry and	l code o	of conduct.		3	2	2	2	3	3	3
	3 S	trong contribution, 2 Average	contrik	bution , 1 Low contribution								

	e of the Bepartmer					-							
2. Cours	se Name	ELEMENTS OF QUANTUM M	1ECHA	NICS, ATOMIC AND MOLECUL	AR SPECTRA		L	_   ¯	1	r		Р	
3. Cours	se Code	PY301					3		1			0	
4. Type	of Course (use tick	mark)				Co	ore (√)		DE	()		FC (	)
5. Pre-i	requisite (if any)	10+2 with physics	6	Frequency (use tick marks)	Even()	C	(v) bb(		Fither	Sem (	) F	verv Sei	, n()
7 Total	Number of Lecture	s Tutorials Practicals	0.	requerey (use tiek marks)	21011()		/44 (1)		2.0.00				
7. 100	Lection			Tutorials – 10					Practic	al – Nil			
8 0011		provide working knowledge	of the	Quantum Mechanics postulat	os on the nhy	vical sv	stoms ar	d to i	ntroduc		of the	hasic c	vetome
in atomic	nhysics To gain gr	ater familiarity with quantum	mech	anics by studying its application	to atomic svs	tome	sterris ai		ntiouuc	e some	or the	Dasic s	systems
		N.	meena		r to atomic sys	tems.							
9. COUR	SE OUTCOIVIES (CO	j: completion learners will develo	on foll	owing attributes:									
	SE OUTCOME (CO)		00 1011	AT									
coon		Would be able to applying the	inada	All autorian machanian	in stomis dom		h nrouida	tho u	ndorsta	nding o	6	um tho	onvof
	CO1	light in order to analyze the	naue	adiation	in atomic don	an an	a provide	the u	nuersta	nuing o	quant	um the	Ory Of
			JUUY K										
	CO2	Provided with the wavefunction	on of a	system students would be abl	e to normalize	it and d	letermine	e the e	xpectat	ion valu	es.		
		To solve the Schrodinger's equ	uation	for time independent problem	ns like free par	ticle, pa	irticle in	an infii	nite pot	ential w	ell, squ	lare po	tential
	03	well, the step potential and po	otentia	l barrier.									
	CO4	It includes an understanding o	of LS ar	d JJ coupling in order to be ab	le to use appro	priate q	luantum	numbe	ers for la	abelling	of ene	rgy leve	ls.
		To evolve the evicin of electro				مامعاما					lavala		
	CO5	To analyze the origin of electro	onic, v	ibrational and rotational energ	y levels and ur	аеттаке	e simple (	alcula	tions of	energy	levels.		
10. Uni	t wise detailed con	tent											
Unit-1		Number of lectures = 08	Titl	e of the unit: MATTER WAVES	1								
Inadequa	icies of classical m	echanics, black body radiatior	n, theo	pretical laws of black body ra	idiation, photo	pelectric	phenon	nenon,	Compt	on effe	ct, Pla	nck's qu	uantum
hypothes	sis, development of	quantum mechanics, Bohr's q	quantiz	ation condition, wave particle	duality, de- B	roglie h	ypothesi	s, velo	city of	de- Brog	glie wa	ves, pha	ase and
group vel	locities and their rel	ationship for a non-relativistic	particl	е.									
Unit-2		Number of lectures =08	Title	e of the unit: SCHRODINGER EC	QUATION – I								
Heisenbe	erg's uncertainty pri	nciple with derivation and its a	applica	ations, ground state energy of	Hydrogen ator	m & line	ear harm	onic o	scillator	Basic p	ostulat	es of qu	uantum
mechanic	cs, Schrodinger Equ	ation: time dependent and tin	ne ind	ependent form, Physical inter	pretation of th	ne wave	functior	, orth	ogonalit	y and r	ormali	zation o	of wave
functions	s, basic problem rela	ted to wave function, probabil	lity cur	rent density, Ehrenfest theore	m.								
Unit-3		Number of lectures = 08	Title	e of the unit: SCHRODINGER EC	QUATION – II								
Applicatio	ons of Schrodinger	wave equation: (free particle	e, a pa	rticle in 1-D infinitely deep p	otential well,	a partio	cle in 3-I	) infin	itely de	ep pote	ential v	vell, 1-D	) linear
harmonic	c oscillator, one di	mensional motion in step po	otentia	l, rectangular potential barri	er, square we	ll poter	ntial), ex	pectat	ion val	ues of	dynam	ical qua	antities,
momentu	um space wave fund	tion.	1										
Unit-4		Number of lectures = 08	Title	of the unit: ATOMIC SPECTRA	4								
Spectra c	of hydrogen, deuter	ron and alkali atoms, spectral	terms	, doublet fine structure, scree	ning constants	s for alk	ali spect	ra for	s n d	and f s	tator (	oloctio	n rular
Singlet ar	nd triplet fine struc								J, P, U,	unu i s	idles, s	selectio	ii iules,
Haunt's la		ture in alkaline earth spectra,	L-S ai	nd J-J couplings. Weak spectra	a: continuous >	K-ray sp	ectrum a	nd its	depend	lence o	n volta	ge, Dua	ine and
Haunt Sia	aw. Characteristics	ture in alkaline earth spectra, K-rays, Moseley's law, doublet	L-S an	nd J-J couplings. Weak spectra ure and screening parameters i	a: continuous > in X-ray spectra	K-ray sp a, X-ray	ectrum a absorpti	ind its	depeno ctra.	dence o	n volta	ge, Dua	ine and
Unit-5	aw. Characteristics 3	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08	L-S an structi Title	nd J-J couplings. Weak spectra ure and screening parameters of the unit: MOLECULAR SPE	a: continuous > in X-ray spectra CTRA	K-ray sp a, X-ray	ectrum a absorpti	ind its	depeno ctra.	lence o	n volta	ge, Dua	ine and
Unit-5 Discrete	aw. Characteristics 3 set of electronic en	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati	L-S an structo Title ion of	nd J-J couplings. Weak spectra ure and screening parameters is the of the unit: MOLECULAR SPE vibrational and rotational ene	a: continuous > in X-ray spectra CTRA rgies, determin	K-ray sp a, X-ray nation c	ectrum a absorption of internu	ind its on spe iclear	depeno ctra. distance	dence o	n volta	ge, Dua	otation-
Unit-5 Discrete s vibration	aw. Characteristics ) set of electronic en spectra, Dissociatio	ture in alkaline earth spectra, K-rays, Moseley's law, doublet Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe	L-S an structo Title ion of er elec	nd J-J couplings. Weak spectra ure and screening parameters is the of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules for	a: continuous > in X-ray spectra CTRA rgies, determin or pure vibratio	K-ray sp a, X-ray nation c on and e	ectrum a absorption of internue	ind its on spe iclear vibrat	depend ctra. distance	dence o e, pure i ctra.	n volta	ge, Dua	otation-
Unit-5 Discrete s vibration 11. CO-P	aw. Characteristics ) set of electronic en spectra, Dissociatio O mapping	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe	L-S an structo Title ion of er elec	nd J-J couplings. Weak spectra ure and screening parameters is of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules for	a: continuous > in X-ray spectra CTRA rgies, determin or pure vibratio	K-ray sp a, X-ray nation c on and e	ectrum a absorption of internu electronic	ind its on spe iclear vibrat	depend ctra. distance tion spe	dence o e, pure i ctra.	n volta	ge, Dua	otation-
Unit-5 Discrete s vibration 11. CO-Pe COs	aw. Characteristics > set of electronic en spectra, Dissociatio O mapping	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe	L-S an structo Title ion of er elec	nd J-J couplings. Weak spectra ure and screening parameters is of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules fo	a: continuous > in X-ray spectra CTRA rgies, determin or pure vibratic	K-ray sp a, X-ray nation c on and e	ectrum a absorption of internu electronic	ind its on special iclear iclear vibrat	depend ctra. distance tion spe	dence o e, pure i ctra.	rotation	n and ro	ptation-
Unit-5 Discrete s vibration 11. CO-Pe COs	aw. Characteristics ) set of electronic en spectra, Dissociatio O mapping Would be able to	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe analyze the inadequacies of	L-S an structo Title ion of er elec Attribu	nd J-J couplings. Weak spectra ure and screening parameters is a of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules for utes cal mechanics in atomic dom	a: continuous > in X-ray spectra CTRA rgies, determin or pure vibration main and provi	K-ray sp a, X-ray nation c on and e de the	ectrum a absorption of internu electronic PO1	ind its on special iclear i vibrat	depend ctra. distance tion spe	dence o e, pure i ctra.	rotation	n and ro	ptation-
Unit-5 Discrete s vibration 11. CO-Pe COs	aw. Characteristics ) set of electronic en spectra, Dissociatio O mapping Would be able to understanding of q	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe analyze the inadequacies of uantum theory of light in order	L-S an structo ion of er elec Attribo classion r to an	nd J-J couplings. Weak spectra ure and screening parameters is a of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules for utes cal mechanics in atomic dom alyze Blackbody Radiation.	a: continuous > in X-ray spectra CTRA rgies, determin or pure vibration hain and provi	K-ray sp a, X-ray nation c on and e de the	ectrum a absorption of internu electronic PO1 3	ind its on special iclear is vibrat PO2 2	depend ctra. distance tion spe	e, pure i ctra.	rotation PO5	n and ro	ptation- PO7
Unit-5 Discrete s vibration 11. CO-P( COs CO1	aw. Characteristics ) set of electronic en spectra, Dissociatio O mapping Would be able to understanding of q Provided with the	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe analyze the inadequacies of uantum theory of light in order wavefunction of a system stu	L-S an structure ion of er elec Attribure classing r to an udents	nd J-J couplings. Weak spectra ure and screening parameters is of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules for utes cal mechanics in atomic dom alyze Blackbody Radiation. would be able to normalize i	a: continuous > in X-ray spectra CTRA rgies, determin or pure vibratic nain and provi	K-ray sp a, X-ray nation c on and e de the ne the	ectrum a absorption of internu electronic PO1 3	ind its on special iclear is vibrat PO2 2	depend ctra. distance tion spe	e, pure r ctra.	rotation PO5	n and ro	PO7 3
Unit-5 Discrete s vibration 11. CO-PC COS CO1 CO2	aw. Characteristics ) set of electronic en spectra, Dissociatio O mapping Would be able to understanding of q Provided with the expectation values	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe analyze the inadequacies of uantum theory of light in order wavefunction of a system stu	L-S an structur ion of er elec Attribur classiver r to an udents	nd J-J couplings. Weak spectra ure and screening parameters is of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules for utes cal mechanics in atomic dom alyze Blackbody Radiation. would be able to normalize i	a: continuous > in X-ray spectra CTRA rgies, determin or pure vibration nain and provi- it and determi	K-ray sp a, X-ray nation c on and e de the ne the	ectrum a absorption of internu electronic PO1 3 3 3	ind its on special iclear of vibrat PO2 2 1	depend ctra. distance tion spe	e, pure r ctra.	rotation PO5 1 2	n and ro	PO7 3 3
Unit-5 Discrete s vibration 11. CO-Pe COs CO1 CO2	aw. Characteristics ) set of electronic en spectra, Dissociatio O mapping Would be able to understanding of q Provided with the expectation values To solve the Schro	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe analyze the inadequacies of uantum theory of light in order wavefunction of a system stu dinger's equation for time inde	L-S an structor ion of er elecc classion r to an udents epende	nd J-J couplings. Weak spectra ure and screening parameters is a of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules for utes cal mechanics in atomic dom alyze Blackbody Radiation. would be able to normalize is ent problems like free particle,	a: continuous > in X-ray spectra CTRA rgies, determin for pure vibratic hain and provi- it and determi particle in an i	K-ray sp a, X-ray nation c on and e de the ne the infinite	ectrum a absorption of internet electronic PO1 3 3 3	PO2 1	depend ctra. distance tion spe	e, pure r ctra.	rotation PO5 1 2	po6	PO7 3 3
Unit-5 Discrete s vibration 11. CO-PC COs CO1 CO2 CO3	aw. Characteristics 3 set of electronic en spectra, Dissociatio O mapping Would be able to understanding of q Provided with the expectation values To solve the Schroo potential well, squa	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe analyze the inadequacies of uantum theory of light in order wavefunction of a system stu dinger's equation for time inde are potential well, the step pote	L-S an structor ion of er elecc classion r to an udents epende ential	nd J-J couplings. Weak spectra ure and screening parameters is a of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules for utes cal mechanics in atomic dom alyze Blackbody Radiation. would be able to normalize is ent problems like free particle, and potential barrier.	a: continuous > in X-ray spectra CTRA rgies, determin or pure vibratic hain and provi- it and determi particle in an i	K-ray sp a, X-ray nation c on and e de the ne the infinite	ectrum a absorpti of internu electronic PO1 3 3 3 3	PO2 2 1	depend ctra. distance tion spe	e, pure r ctra.	rotation PO5 1 2 2	PO6	PO7 3 3 3
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Unit-5           Discrete s           vibration           11. CO-Pr           COs           CO1           CO2           CO3           CO4           CO5           12. Brie           1.           2.           3.           13. Book           1.           2.           3.           4.           5.	aw. Characteristics 3 set of electronic en spectra, Dissociatio O mapping Would be able to understanding of q Provided with the expectation values To solve the Schron potential well, squa It includes an unde for labelling of ene To analyze the o calculations of ene 3 S ef description of sel https://nptel.ac.in S recommended: H. S. Mani and G. A. Beiser, "Perspec	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe analyze the inadequacies of uantum theory of light in order wavefunction of a system stu- dinger's equation for time inde are potential well, the step pote rstanding of LS and JJ coupling rgy levels. rigin of electronic, vibrationa rgy levels. trong contribution, 2 Average f-learning / E-learning compon n/courses/115/101/115101107 n/courses/115/101/115101103 K. Mehta; "Introduction to Mo ectives of Modern Physics (McG oduction to Atomic Physics (McG oduction to Atomic Physics (McG	L-S ai structu ion of er elecc Attribu classii classii classii epende eential g in orcc al and contri nent 7/ 4/ 3/ dern F Graw H Van N Graw H	nd J-J couplings. Weak spectra are and screening parameters is a of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules for utes cal mechanics in atomic dom alyze Blackbody Radiation. would be able to normalize is ent problems like free particle, and potential barrier. ler to be able to use appropria i rotational energy levels an bution , 1 Low contribution Physics" (Affiliated East- West F ill). ostrand Company) till).	a: continuous > in X-ray spectra CTRA rgies, determin or pure vibratic hain and provi- it and determi particle in an i te quantum nu id undertake Press 1989).	K-ray sp a, X-ray nation c on and e de the ne the infinite umbers simple	PO1 3 3 3 3 3	PO2 2 1 1 1 1	PO3	PO4	PO5 1 2 2 2 2	PO6	PO7 3 3 3 3 3
CO1           CO2           CO3           CO4           CO5           11. 20.           3.           13. Book           1.           2.           3.           4.           5.	aw. Characteristics 3 set of electronic en spectra, Dissociatic O mapping Would be able to understanding of q Provided with the expectation values To solve the Schroo potential well, squa It includes an unde for labelling of ene To analyze the o calculations of ene 3 S f description of sel https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in in https://nptel.ac.in https://nptel.ac.in thtps://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in thtps://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in thtps://nptel.ac.in https://nptel.ac.in thtps://nptel.ac.in https://nptel.ac.in https://nptel.ac.in thtps://nptel.ac.in https://nptel.ac.in thtps://nptel.ac.in thtps://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in thtps://nptel	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe analyze the inadequacies of uantum theory of light in order wavefunction of a system stu- dinger's equation for time inde are potential well, the step pote rstanding of LS and JJ coupling rgy levels. rigin of electronic, vibrationa rgy levels. trong contribution, 2 Average f-learning / E-learning compon n/courses/115/101/115101107 n/courses/115/101/115101107 m/courses/115/101/115101103 K. Mehta; "Introduction to Mo excives of Modern Physics (McG boduction to Atomic Physics (McG B. Leighton and M. Sands; "The diverse in the state of the state of the state of the state of the state state of the state	L-S ai structu ion of er elecc Attribu classii classii classii epende ential i in orcc al and contri tent 7/ 4/ 3/ wdern F Graw H Van N Graw H	nd J-J couplings. Weak spectra are and screening parameters is a of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules for utes cal mechanics in atomic dom alyze Blackbody Radiation. would be able to normalize is ent problems like free particle, and potential barrier. ler to be able to use appropria i rotational energy levels an bution , 1 Low contribution Physics" (Affiliated East- West F ill). ostrand Company) till). man Lectures on Physics, Vol. I	a: continuous > in X-ray spectra CTRA rgies, determin or pure vibratic hain and provi- it and determi particle in an i te quantum nu id undertake Press 1989).	K-ray sp a, X-ray nation c on and e de the ne the infinite umbers simple	ectrum a absorpti of interno electronic 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	nd its on spe- iclear i vibrat 2 1 1 1 1 1 1	PO3	PO4	rotation PO5 1 2 2 2 2	PO6	PO7 3 3 3 3 3
CO1           CO2           CO3           CO4           CO5           11.           CO5           12.           Brie           1.           2.           3.           4.           5.           6.	aw. Characteristics 3 set of electronic en spectra, Dissociatic O mapping Would be able to understanding of q Provided with the expectation values To solve the Schron potential well, squa It includes an unde for labelling of ene To analyze the o calculations of ene 3 S f description of sel https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://nptel.ac.in https://introduc R. P. Feymann, R. T. A. Littlefield an	ture in alkaline earth spectra, K-rays, Moseley's law, doublet : Number of lectures = 08 ergies of molecules, quantizati in limit for the ground and othe analyze the inadequacies of uantum theory of light in order wavefunction of a system stu- dinger's equation for time inde are potential well, the step pote rstanding of LS and JJ coupling rgy levels. trong contribution, 2 Average f-learning / E-learning compon n/courses/115/101/115101107 n/courses/115/101/115101107 n/courses/115/101/115101103 K. Mehta; "Introduction to Mo excives of Modern Physics (McG boduction to Atomic Physics (McG B. Leighton and M. Sands; "The d N Thorley; "Atomic and Nucle	L-S ai structu ion of er elecc Attribu classii classii classii classii classii classii classii classii classii classii contri i in orc al and contri nent 7/ 4/ 3/ Wodern F Graw H Van N Graw H e Feyn ear Ph	nd J-J couplings. Weak spectra are and screening parameters is a of the unit: MOLECULAR SPE vibrational and rotational ene tronic states, transition rules for alyze Blackbody Radiation. would be able to normalize is ent problems like free particle, and potential barrier. ler to be able to use appropria rotational energy levels an bution , 1 Low contribution Physics" (Affiliated East- West F ill). ostrand Company) till). man Lectures on Physics, Vol. I sysics" (Engineering Language B	a: continuous > in X-ray spectra CTRA rgies, determin or pure vibratic hain and provi- it and determi particle in an i te quantum nu id undertake Press 1989).	K-ray sp a, X-ray nation c on and e de the ne the infinite umbers simple	ectrum a absorpti of interno electronic 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	nd its on spe- iclear i vibrat 2 1 1 1 1 1 1 1	PO3	PO4 Madras)	rotation PO5 1 2 2 2 2	PO6	PO7 3 3 3 3 3

1. Nam	e of the Departmen				_							
2. Cours	se Name	CLASSICAL MECHANICS, REL	ATIVI	TY AND STATISTICAL PHYSICS		L		Т	•		Р	
3. Cours	se Code	PY302				2		1	. <u> </u>		0	
4. Type	of Course (use tick	mark)			Co	re (√)		DE	()		FC (	)
5. Pre-i	equisite (if anv)	10+2 with physics	6.	Frequency (use tick marks) Even ()	00	dd (√)		Either S	Sem (	) Ev	very Sei	m ( )
7. Total	Number of Lecture	s. Tutorials. Practicals				( )				,	,	( )
	Lectu	ures = 30		Tutorials = 10				Practica	al = Nil			
8. COUF	SE OBJECTIVES: To	provide the dynamics of syst	em of	particles, motion of rigid body. Lagrangian	and Ham	niltonian	form	ulation	of mech	nanics a	nd to a	vive the
students	a thorough understa	anding of the theory and meth	ods of	statistical physics.								,
		· · · · · · · · · · · · · · · · · · ·										
After the	successful course of	,. ompletion. learners will devel	op foll	owina attributes:								
COURS	SE OUTCOME (CO)			ATTRIBUTES								
					( 5)					· .		
	01	Students will gain an understa	nding	of the Classical Mechanics and basic theorie	s of Physic	cs like La	grang	ian and	Hamilto	onian D	ynamic	s.
	CO2	Students will be able to devel	орас	leep understanding of various phenomena	of Special	Theory	of Rel	ativity a	and con	cept of	mass-e	energy
		equivalence.										
	<b>CO3</b>	Students will be able to ma	ster b	asic statistical methods and concepts like	probabili	ty, rand	om va	ariables	, expec	ted val	ue, var	iance,
	03	estimators and common proba	ability	distributions.								
	CO4	Students will be able to write t	the dis	tribution function of various systems and fu	rther calco	ulate var	ious t	hermod	ynamic	potent	ials.	
		Interpretation of Maxwellian	distri	oution. Analysis of statistical mechanical d	escription	of Ferr	ni- an	d Bose-	statist	ics for	electro	n and
	CO5	photon.										
10. Uni	t wise detailed cont	ent										
Unit-1		Number of lectures = 08	Tit	e of the unit: LAGRANGIAN AND HAMILTON	NAN DYN	AMICS						
Constrain	ts: holonomic and	non-holonomic time independent	dent a	nd time dependent. Generalized coordinate	s Lagran		tions	from D'	Alemhe	rt's prim	ncinle v	elocity
denender	nt notentials. Varia	tional principle. Technique of	the	calculus of variation Hamilton's variationa	l nrincinle	e lagrai	nge e	nuation	s using	Hamilt	on's nr	incinle
Generaliz	ed momenta, cyclic	coordinates. Definition of Han	niltoni	an and its physical significance. Hamilton's e	quations (	of motio	n from	n variati	onal pri	nciple	on s pi	meipie,
Unit-2		Number of lectures =08	Title	of the unit: SPECIAL THEORY OF RELATIVIT	<u>γ</u>			- ranae				
Reference	e systems inertial f	rames Galilean invariance an	d cons	servation laws propagation of light Michel	• on-Morle	v exneri	iment	search	for eth	er Pos	tulates	for the
special t	peory of relativity.	lorentz transformations, ler	nøth c	contraction, time dilation, velocity addition	n theorer	n, varia	tion c	of mass	with	velocity	mass	-energy
equivaler	ice, particle with a z	ero rest mass.				,					,	ee.87
Unit-3		Number of lectures = 08	Title	of the unit: THE STATISTICAL BASIS OF THE	RMODYN							
Prohabilit	v and thermodynar	nic probability, principle of equ	ial a n	riori probabilities, probability distribution an	d its narro	wing wi	ith inc	rease in	numbe	er of na	rticles	
Linit /		Number of lectures = 08	T:+1.									
	u) choco ronrocont	ation division of u (mu) space		e of the unit: Solvie Universal Laws		nnligatio	no to	ana din	oncion	alharn		sillator
ine μ (m	u)- space represent	ation, division of $\mu$ (mu)- space		energy sneets and into phase cells of arbitra	ary size, a	pplicatio	Static	one-ain	nension	iai narm		scillator
thormody	particles, Equilibriu	in before two systems in ther	mai C	Shtact, Probability and entropy, Boltzmann	entropy	elation,	Statis		erpreta	tion of	second	law of
	mannes.	Number of lectures = 08	Titl	of the unit OLIANTUNA STATISTICAL MECH								
Unit-5	an distribution of a	Number of lectures – 08								a avad		
maxwell	an distribution of s	peeds in an ideal gas: Distribu	tion o	speeds and of velocities, experimental veri	ication, u	istinction	Detw	veen me	an, r.m	i.s. anu	most p	lopapie
Transitio	ues. A to quantum stati	stice: (h' as a natural constan	t and	its implications cases of particle in a one	dimonsio	nal hov	and c	no dim	oncion	l harm	onic os	cillator
Indisting	ishability of particle	es and its consequences. Bose	-Finct	and Fermi-Dirac distributions, photons i	n black be	ndu chan	anu t	froo olo	ctrons i	n o mot	tal For	ni lovol
and Ferm	i energy	es and its consequences, bose	-Linsu				ibei,			ii a iiie	lai, i eii	III IEVEI
	) manning											
11. CO-FO			A ++ !			DO1	000	002	004	DOF	DOC	007
COS	Charles III as is a		Attrib	utes		POI	PUZ	PU3	P04	P05	PUb	P07
CO1	Students will gain a	in understanding of the Classic	al Me	chanics and basic theories of Physics like Lag	rangian	3	2	1	1		1	2
		ylidillics.	retar	ding of various phonomona of Cassiel Th	oon, of							
CO2	Students will be a	able to develop a deep unde	erstan	ung of various phenomena of special in	eory of	3	2	1	1		1	2
	Relativity and conce	ept of mass-energy equivalence	e.	de and concente like probability renderer	riables							
CO3	students will be ac	ble to master basic statistical r	netho	as and concepts like probability, random va	iriables,	3	1	1				1
	Experied value, var	ance, esumators and commol		ability uisti inductions and further colouters	various							
CO4	thormodynamic an	to write the distribution the topticals	unctio	ii oi various systems and further calculate	various	3	1				2	1
	Internousianic po	uciniais. Isywollian distribution Analysi	c of ot	atistical mochanical description of Formation	d Boss							
CO5	statistics for electro	narweman usunuulun. Andiysi an and nhoton	3 01 51	ansidar medianidar description of Fermi- ar	u pose-	3						2
				hution 1 low contribution		I						
10.0	5 51	Liong contribution, 2 Average	contri									
12. Brie	f description of self	-learning / E-learning compor	ient									
1.	https://nptel.ac.ir	1/courses/115/105/115105098	5/									
2.	https://nptel.ac.ir	n/courses/115/106/115106111	./									
12 D.												
13. BOOK	s recommended:											
1.	A. Beiser, "Concep	ots of Modern Physics" (McGra	w-Hill	). 								
2.	B. B. Laud, "Introc	Incline to Statistical Mechanics	s (IVIa	cmiian 1981).								
3.	r. Keit, Statistical	i Priysics (IVICGPaW-Hill 1988).	001									
4. r	K. Haung, "Statisti	ical Physics (Wiley Eastern, 19	oo).									
5.	n. Golustein, Cla	ssical Mechanics, 2 Edition (N	iarosa	J.								

1. Nam	e of the Departmer	nt: PHYSICS										
2. Cour	se Name	SOLID STATE, NUCLEAR AND	D PART	TICLE PHYSICS		L		Т	ī –		Ρ	
3. Cour	se Code	PY303				2		1	L		0	
4. Type	of Course (use tick	mark)				Core ( √ )		DE	()		FC (	)
5. Pre-	requisite (if any)	10+2 with physics	6.	Frequency (use tick marks)	Even ( )	Odd (√)		Either S	Sem()	Ev	ery Ser	n( )
7. Tota	Number of Lecture	es, Tutorials, Practicals										
	Lect	ures = 30		Tutorials = 10				Practica	al = Nil			
8. COUF	RSE OBJECTIVES: Th	e purpose of this undergraduat	te cour	se is to impart basic and key kr	nowledge of sc	lid state, nucle	ar and p	article p	physics. By	y usin	g the p	rincipa
of physic	s and mathematics	to obtain quantitative relation	ns whi	ch are very important for high	er studies. Aft	er successfully	comple	tion of	course, th	ne stu	ident w	ill able
explore s	ubject into their res	spective dimensions										
9. COUR	SE OUTCOMES (CO	): 	6-11									
After the	successful course (	completion, learners will develo	ор јон	owing attributes:								
COOK		Chudente will esia es underet		AI		al latticehick	la a lua dia					
	CO1	Students will gain an understa	anding	of crystal structure, diffractio	n and reciproc	al lattice which	neip ir	i detern	nine the c	rystai	struct	ure of
		ally illaterial. Students will gain an underst	anding	of crystal bonding and the vi	brations invol-	ved in crystal I	attice v	which he	oln thom t		dorstar	nd the
	CO2	concept of vibrational dynami	CS.	s of crystal boliding and the vi				vincii ne	sip them t		uerstar	iu the
		Students will gain an understa	nding	of materials (metals and semic	onductors) and	dable to find th	e band	gan bas	ed on whi	ich th	ev defi	ne the
	CO3	material type.					0.00110	54p 245			ey acm	
		Students will understand the	basic	properties of nucleus, know a	bout Nuclear	Forces and Nuc	lear Re	actions	which hel	lps in	definir	ng the
	CO4	type of nuclear reaction.										-
	CO5	Students will gain basic knowl	edge o	f particle physics and ability to	outline the ph	vsical origins of	particle	e physic	s.			
10 Uni	t wise detailed con	tont				,		- 1- 7				
Lipit 1	t wise detailed con	Number of lectures = 08	Titl	o of the unit: CRVSTAL STRUCT	IIDE							
Lattico tr	anslation voctors a	d lattice Symmetry operation	c Raci	s and Crystal structure. Primitiv	vo Lattico coll	Two-dimonsion	al lattic	o typos	systems	Num	hor of I	atticos
Number	of Lattices Index s	vstem for crystal planes. Mille	s, Dasi er indi	res Simple crystal structures	NaCl hen dia	mond Bragg's	anattic Iaw ex	nerimer	, systems, ntal diffrac	ction	metho	d Laue
method.	rotating crystal met	thod, powder method.	.i iliun	ses, simple erystar structures,		monu. Drugg 3	uw, cx	perimer		ction	metho	u, Luut
Unit-2		Number of lectures =08	Title	of the unit: CRYSTAL BONDIN	G AND LATTIC							
Crystal o	f inert gases, Van d	der Walls-London interaction,	repuls	ve interaction, Equilibrium lat	tice constants	, Cohesive ener	gy, con	npressib	bility and k	bulk r	nodulu	s, ionio
, crystal, N	/adelung energy, ev	valuation of Madelung constant	t, Cova	lent crystals, Hydrogen-bonded	d crystals, Ator	nic radii.	077		,			,
Lattice H	eat capacity, Einstei	in model. Vibrations of monato	mic la	ttice, derivation of dispersion re	elation, Force	constants, Latti	ce with	two ato	oms per pri	imitiv	e cell.	
Unit-3		Number of lectures = 08	Title	of the unit: BAND THEORY								
Hall effec	ct (metals and semi	conductors), Origin of band the	eory, K	ronig-Penney model, Number	of orbitals in a	band, conduct	or, Sem	i- condı	uctor and i	insula	itors, E	ffective
mass, Co	ncept of holes.											
			I		-							
Unit-4		Number of lectures = 08	Title	e of the unit: NUCLEAR PHYSIC	S							
General	Properties of Nucle	us: Brief survey of general Prop	perties	of the Nucleus, Mass defect an	id binding ene	rgy, charges, Siz	e, Spin	and Ma	gnetic mo	ment		
Nuclear I	Poactions: Nuclear	reactions and their conservation	es, Deu n Iowa	Cross section of nuclear react	ions Theory of	f fission (Quality	tivo) N	lucloar	roactors a	nd Nu	ucloar fi	ucion
Linit-E	Reactions. Nuclear I	Number of loctures = 08	Title	of the unit: PARTICLE PHYSIC			ative, i	lucieal i	eactors ar			151011.
Pasic pa	rticle interactions			k and strong interactions) B	sic classificati	ion based on i	oct ma	ec Spir	and half	f_lifo	nartic	06 200
antinarti	rles idea of resonar	ces conservation rules in func	lamen	tal interactions determination	of spin and pa	rity of nions st	ange n	articles		i-iiie,	partici	es and
			amen	tal interactions, acternination			unge p	ur tieles.				
11. CO-P	U mapping		A ! .				202	202		05	200	007
COS	Chudanta will sain		Attrib	utes	latticekiela I	PO1	POZ	PO3	P04 P	05	POb	P07
CO1	Students will gain	an understanding of crystal s	structu	re, diffraction and reciprocal	lattice which i	neip in 3	2	1		3	1	1
	Students will gain	an understanding of crystal be	nding	and the vibrations involved in	crystal Lattica	which			├			
CO2	help them to unde	rstand the concept of vibration	nung al dyn	and the vibrations involved in	crystal Lattice	3	2	2		3	1	1
	Students will gain	an understanding of materials	(met	als and semiconductors) and a	ble to find the	e hand						
CO3	gap based on whic	h they define the material type	), (ince			3	1	2		3	1	1
	Students will und	erstand the basic properties	of n	ucleus, know about Nuclear	Forces and N	luclear _	-				-	
CO4	Reactions which he	elps in defining the type of nucl	lear re	action.		3	1			3	1	
	Students will gain	basic knowledge of particle ph	iysics a	and ability to outline the physic	cal origins of p	article	1			2	1	
CO5	physics.					3	1			3	1	<u> </u>
	3 S	trong contribution, 2 Average	contri	bution , 1 Low contribution								
12. Brie	ef description of sel	f-learning / E-learning compor	nent									
13. Bool	ks recommended:											
1.	Puri and Babbar,	"Solid State Physics" (S. Chand)	).									
2.	C. Kittel, "Introdu	ction to Solid State Physics" - V	th Edit	ion (John Wiley & Sons).	1000							
3. 1	A Baisor "Dorra	K. Wenta, Introduction to Mo	Graw	mysics (Amiliated East-West Pi Hill)	ess—1989).							
4.	A. DEISEL. FEISDE	CUIVES OF IVIOLET IT FILYSICS (IVIC	-wbw									

A. Beiser, "Perspectives of Modern Physics" (McGraw-F
 Martin, B.R. and Shaw, Particle Physics (John Wiley).

1. Nam	e of the Departmen	t: CHEMISTRY										
2. Cour	se Name	ADVANCE INORGANIC CHEN	MISTRY			L			Г		Р	
3. Cour	se Code	CH314				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 ( )	Odd (√	)	Either	Sem (	) E	very Sei	m ( )
7. Tota	Number of Lecture	s, Tutorials, Practicals										
	Lectu	ıres = 30		Tutorials = 10				Practic	al = Nil			
8. COUF	RSE OBJECTIVES: Th	e main objective of this course	e is to understand	the bonding in co	ordination con	npounds, electr	onic sp	ectra ai	nd magr	netic be	haviou	r of the
coordina	tion compounds and	d some important inorganic co	ompounds. The oth	ner important obje	ctive is to stud	ly the reaction	mechai	nism in	coordina	ation c	ompour	nds and
importan	ce of inorganic meta	als in Bio-inorganic chemistry.										
9. COUR	successful course o	i: ompletion, learners will devel	op following attrib	outes:								
COUR	SE OUTCOME (CO)			AT	TRIBUTES							
	CO1	Understand the concept of co	ordination chemist	ry with different th	neories.							
	CO2	Understand and evaluate the	electronic spectra a	and magnetism of	transition met	al complexes.						
	CO3	Study of some important inor	ganic compounds a	ind their applicatio	ins							
	CO4	Understand the different reac	tion mechanisms ir	n coordination com	npounds.							
	CO5	Understand the concept of Bic	o-inorganic chemist	try and the role of	metal ions in h	uman body.						
10. Uni	t wise detailed cont	ent										
Unit-1	(i	Number of lectures = 08	Title of the unit	BONDING IN CO	ORDINATION C	COMPOUNDS						
Electroni	c configuration (3d,	4d, 5d) and general periodic ti	rends, comparative	e study of first/sec	ond/third trans	sition series ele	ments,	IUPAC	nomenc	lature	of coord	lination
Elementa	ius, VBT (Hybridizati irv Crystal Field The	ory: solitting of dn configuration	ancin octahedral s	square planar and t	tetrahedral fiel	lds factioras af	fecting	10 Da v	alue cr	istal fie	ld stahi	lization
energy, p	airing energy. Magr	netic moment from crystal field	theory, high spin a	and low spin comp	lexes. Static ar	nd Dynamic Jah	n-Tellar	distort	ion.	Juline		inzation
Unit-2	0 0 0 0 0 0 0 0	Number of lectures =08	Title of the unit:	SPECTRA AND MA	AGNETISM OF	TRANSITION M	ETALS					
Spectro-o	hemical series of li	gands, Laporte's selection rule	e, colour of comple	exes, spectroscopi	c ground state	s, selection rule	es for e	lectron	ic spect	ral trar	sitions,	charge
transfer	spectra, LS coupling	g. Types of magnetism and t	emperature deper	ndence of magnet	ic susceptibilit	ty, Curie and C	Curie-W	eiss lav	v, Meas	uremei	nt of m	agnetic
susceptib	ility by Gouy metho	d, Faraday method.										
Unit-3		Number of lectures = 08	Title of the unit:	SELECTED TOPICS	IN ADVANCE	D INORGANIC C	OMPO	UNDS				
Structure	/synthesis/various	chemical reactions of	potassium dichi	romate, potassiu	um permang	anate, potas	sium	chroma	ite, sc	odium	thiosu	Iphate.
Structure	/synthesis/various	chemical reactions of fluoride	es and oxides of	xenon, Zeise's sal	t, silicones, b	orazine, phosp	hazine.	S4N4,	P4, P4C	06, P40	010. Ex	tractive
metallurg	gy for self reduction	method (Copper and lead), cya	anide process and o	chemical reactions	(silver and gol	d).		E A CELO	NC			
Unit-4	ion rootion in cau	Number of lectures = 08	offect) mechanics	REACTION WECH	ANISIVI OF LIG	AND DISPLACE	VIEINIK		NS a alaccif	instian	Outor	sphore
electron	transfer mechanisn	n chemical activation Marcu	s theory cross-rea	actions thermody	namical/kineti	narameters i	nner-sr	here e	lectron	transfe	r mech	anisms
effect of	the nature of metal	/ligandss. bridging group effect	ts. cross reactions.	actions, thermough			inici sp		cetion	crunsic	meen	unisins,
Unit-5	,	Number of lectures = 08	Title of the unit:	BIOINORGANIC C	HEMISTRY							
Biologica	I role of inorganic	metals in human body (descr	ription only), Elect	ron transfer prote	eins, Metal ior	n transport and	d stora	ge, Feri	tin and	its stru	icture,	Oxygen
transport	by heme proteins,	hemoglobin and myoglobin, D	ioxygen transport (	(hemoglobin, hem	nocyanin and B	lue copper prot	teins), E	Biomine	ralizatio	n (ferri	tin), zin	c finger
protein, (	Carbonic anhydrase,	. carboxy peptidase, carboxype	eptidase A/B.									
11. CO-P	0 mapping											
COs			Attributes			PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Understand the cor	ncept of coordination chemistr	y with different the	eories.		3	2	1		1		3
CO2	Understand and ev	aluate the electronic spectra a	nd magnetism of tr	ransition metal cor	mplexes.	2	2	1		2		3
CO3	Study of some impo	ortant inorganic compounds ar	nd their application	15		3	3	1		1		3
CO4	Understand the dif	ferent reaction mechanisms in	coordination comp	pounds.		2	3	1		1		3
CO5	Understand the cor	ncept of Bio-inorganic chemist	ry and the role of n	netal ions in huma	n body.	2	2	1		1		3
12 D.	5 SI	trong contribution, 2 Average	contribution , 1 Lo	ow contribution								
12. Brie	t description of sen	-learning / E-learning compor										
1. 2	https://nptei.dC.lf	du/courses/104/105/104105033	v vrincinles-of-chemi	cal-science-fall-200	05/video-lectu	res/lecture_27_/	coordin	ation-co	mnleve	s-and-l	igands/	
3.	https://www.cher	m.tamu.edu/rgroup/marcetta/	chem362/lectures	/Lecture%2029%2	Osubset%20of	%20TM%20lect	ure%20	notes.n	df	s unu-l	. <sub>o</sub> u.iu3/	
13. Book	s recommended:	, <u> </u>	, , , , , , , , , , , , , , , , , , , ,					P				
1.	Inorganic Chemist	try: Structure and Reactivity, Ja	ames E. Huheey, Ha	arper and Row Pub	lishers, New Yo	ork						
2.	Advanced Inorgan	ic Chemistry: F.A. Cotton and	G. Wilkinson, Inters	science.								
3.	Inorganic Reaction	n Mechanism, Basolo and R.G.	Pearson, John Will	ey.								

1. Nam	e of the Departmer	t: CHEMISTRY								
2. Cours	se Name	ADVANCE ORGANIC CHEMIS	TRY	L		Т			Р	
3. Cours	se Code	СН315		2		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 S	Sem (	) Ev	very Se	m()
7. Total	Number of Lecture	s, Tutorials, Practicals								
	Lectu	ires = 30	Tutorials = 10			Practica	al = Nil			
8. COUR	RSE OBJECTIVES: Th	e main objective of this course	is to study the nomenclature of organic compound	ds, structure an	d bond	ing of o	rganic r	nolecul	es con	sidering
inductive	effect, hyperconjug	ation, mesomeric effects, hydr	ogen bonding etc., and mechanism of various types	of organic read	tions.					-
9. COUR	SE OUTCOMES (CO	):								
After the	successful course c	ompletion, learners will develo	op following attributes:							
COURS	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Analyze structure and chemica	I reactions of organomagnesium and organolithium	compounds.						
	CO2	Understand and evaluate the s	tructure and related reactions of heterocyclic comp	ounds.						
	CO3	Understand and analyze the cl	assification, configuration and conformation of carb	ohydrates.						
	CO4	Understand and evaluate the s	tructure of amino acids, peptides, proteins and nuc	leic acids						
	CO5	Understand and analyze the st	ructure and classification of dyes.							
10. Uni	t wise detailed cont	ent								
Unit-1		Number of lectures = 08	Title of the unit: ORGANOMETALLIC AND ORGA	NOSULPHUR CO	OMPOU	NDS				
Organom methods	agnesium Compour	nds: the Grignard reagents, structure of the superior of the s	ucture and chemical reactions Organolithium Com	pounds :format	tion and	d chem	ical read	ctions.	Nomen	clature,
Unit-2		Number of lectures =08	Title of the unit: HETEROCYCLIC COMPOUNDS							
Molecula	r orbital nicture and	aromatic charecteristics of n	vrole furan thiophene and pyridine Comparison	of basicity of p	vridine	ninerid	ine an	d nyrro	le Met	hods of
synthesis	and chemical read	tions of indole, guinoline and	d isoquinoline with special reference to Fisher in	dole synthesis.	Skrau	synth	esis an	d Bisch	ler-Ner	pieralski
synthesis				,		,				
Unit-3		Number of lectures = 08	Title of the unit: CARBOHYDRATES							
Carbohyd	Irates: classificatio	n and configuration and co	nformation of monosaccharides, Erythro and	threodiastereor	ners, r	nechan	ism of	osazo	ne for	mation,
, Interconv	version of glucose a	nd fructose, chain lengthening	and chain shortening of aldoses. Formation of glyco	sides, ether an	d esters	s. Cyclic	structu	re of D	(+) gluc	ose. An
introduct	ion to disaccharides	(maltose, sucrose, lactose) an	d polysaccharides/starch and cellulose.			-				
Unit-4		Number of lectures = 08	Title of the unit: ACIDS, PEPTIDES, PROTIENS AN	D NUCLEIC ACIE	)					
Classifica <sup>-</sup> Nucloic a	tion, structure and	stereochemistry of amino ac	ids, isoelectric point. Classification of protiens, pe	eptides, structu	re dete	erminat	on, and	d end g	group a	nalysis.
Unit-5		Number of lectures = 08	Title of the unit: DYES		n Diva.					
Dves: Inti	roduction of the his	tory of dyes. Landmarks in the	historical development from Natural to synthetic of	dves. Introducti	on and	classifi	ation o	f dves	on the	basis of
structure	Colour and chemic	al constitution of dyes. Structu	re and uses of phenolphthalein, fluorescein , Eosin,	Malachite gree	en, Metl	hylene l	olue , In	digo. N	lapthol	yellow-
S, Crystal	violet.	,		0		,	,	0		
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	Analyze structure a	nd chemical reactions of organ	omagnesium and organolithium compounds.	3	2	1		1		3
CO2	Understand and ev	aluate the structure and relate	d reactions of heterocyclic compounds.	2	2	1		2		3
CO3	Understand and an	alyze the classification, configu	ration and conformation of carbohydrates.	3	3	1		1		3
CO4	Understand and ev	aluate the structure of amino a	icids, peptides, proteins and nucleic acids	2	3	1		1		3
CO5	Understand and an	alyze the structure and classific	cation of dyes.	2	2	1		1		3
	3 5	trong contribution 2 Average	contribution 1 low contribution							L
12. Brie	f description of sel	f-learning / F-learning compon	ent							
1	https://www.kha	hacademy org/science/organic	-chemistry							
2.	https://chem.libro	etexts.org/Bookshelves/Organi	c Chemistry/Map%3A Organic Chemistry (Smith)	/Chapter 06%3	A Unde	erstand	ing Org	anic Re	eaction	s
3.	https://www.dum	mies.com/education/science/	biology/the-basics-of-organic-chemistry/		_		0 0	_		-
4.	https://www.top	or.com/guides/chemistry/orgai	nic-chemistry/							
13. Book	s recommended:									
1.	Advanced Organic	: Chemistry, Bahl&Bahl, S. Char	nd & Co. Ltd.							
2.	Organic Chemistr	y Vol.I& II, I.L. Finar								
3.	Fundamentals of	Organic Chemistry, NafisHaider	, S. Chand & Co. Ltd.							
4.	A text book of Org	ganic Chemistry, Bahl&Bahl, S.	Chand & Co. Ltd.							
5.	Urganic Chemistr	y voi.i, ii & iii, Dr. Jagdamba Sir	igri, L.D.S. Yadav, PragatiPrakashan.							

2. Course Name         BASICS OF CHROMATOGRAPHIC TECHNIQUES         L         T           3. Course Code         CH319         2         1           4. Type of Course (use tick mark)         Core { ( √ )         DE( )         FF           5. Pre-requisite (if any)         10-2 with Chemistry         6. Frequency (use tick marks)         Even ( )         Odd ( √)         Either Sem ( )         Even ( )           7. Total Number of Lectures: Locatials, Practicals         Tutorials = 10         Practical = NII         Even ( )         Course (use tick marks)         Even ( )         Odd ( √)         Either Sem ( )         Even ( )         Course (use tick marks)         Even ( )         Odd ( √)         Either Sem ( )         Even ( )         Course (use tick marks)         Even ( )         Odd ( √)         Either Sem ( )         Even ( )         Course (use tick marks)         Even ( )         Odd ( √)         Even ( )         Did ( √)         Even ( )         Course (use tick marks)         Even ( )         Did ( √)         Even ( ) <td< th=""></td<>
3. Course Code       CH319       2       1         4. Type of Course (use tick mark)       Core ({ V}       DE( )       F         5. Free-requisite (if any)       10-2 with Chemistry       6. Freequency (use tick marks)       Even ()       Odd (V)       Either Sem ()       Even ()         7. Total Number of Lectures. Tutorials, Practical       Tutorials = 10       Practical = Nit       Execures 30       Practical = Nit         8. COURSE OUTCOMES (CO):       Execures 30       Tutorials = 10       Practical = Nit       Execures 30         9. COURSE OUTCOMES (CO):       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 completion, learners will develop following attributes:       COURSE OUTCOME (CO)       Course outcome completion, learners will develop following attributes:       COURSE OUTCOME (CO)       Course outcome completion, learners will develop following attributes:       COURSE OUTCOME (CO)       Course outcome completion, learners will develop following attributes:       Course outcome completion, learners will develop following attributes:       Course outcome course completion, learners will develop following attributes:       Course outcome course completion, learners will de
4. Type of Course (use tick mark)       Core ((v)       DE()       FF         5. Pre-reguisite (if any)       10-2 with Chemistry       6. Frequency (use tick marks)       Even ()       Odd (v)       Either Sem ()       Even ()         7. Total Number of Lectures - 30       Tutorials = 10       Practical = Nill         8. COURSE DEETURES: Students able to understand Separation techniques such as Thin layer chromatography, Paper chromatography, Gas chromatography.       9. COURSE COUTCOMES (CO)       Practical = Nill         6. OURSE DEGUSE Students able to understand Separation techniques such as Thin layer chromatography.       9. COURSE COUTCOMES (CO)       Practical = Nill         7. OURSE OUTCOMES (CO)       Course completion, learners will develop following attributes:       ATTRIBUTES       Verture.         CO3       Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications. Separation of mixture.       Able to discus Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, or emoval of interfering radicals.         10. Unit wise detailed content       Uniterfering radicals.       Title of the unit: SEPARATION TECHNIQUES       Interfering radicals.         10. Unit wise detailed on discuss Normal and preverse on Separation of metal cons, separation of coloride and solvent, fix or and solvent, fix or the unit: THIN LAYEE CHROMATOGRAPHY       Interfering radicals.         10. Unit wise detailed content       Uniterfering radicals. </td
S. Pre-requisite (if any)       10-2 with Chemistry       6. Frequency (use tick marks)       Even ( )       Odd ( ∨)       Either Sem ( )       Ever         7. Total Number of Lectures = 30       Tutorials = 10       Practical = Nil         8. COURSE OBJECTIVES: Students able to understand Separation techniques such as Thin layer chromatography, Paper chromatography, Gas chromatography       9. Practical = Nil         8. COURSE OUTCOMES (CO):       Attrained to completion, learners will develop following attributes:       Attrained to completion, learners will develop following attributes:         COURSE OUTCOME (CO)       Understand the chromatographic techniques and its classification.       CO2       Evaluate Thin layer chromatography, principle and its applications. Paper chromatography and its applications. Separation of mixture.         CO3       Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.       Separation of develop and develop andevelop and develop andevelop and develop andevelop and develop a
Instal Number of Lectures, Tutorials, Practical = Nil           Lectures = 30         Tutorials = 10         Practical = Nil           8. COURSE OBJECTIVES: Students able to understand Separation techniques such as Thin layer chromatography, Paper chromatography, Gas chromatography.         9. COURSE OUTCOMES (CO)           After the successful course completion, learners will develop following attributes:         ATTRIBUTES           COURSE OUTCOMES (CO)         ATTRIBUTES           COURSE OUTCOMES (CO)         ATTRIBUTES           COURSE OUTCOME (CO)         Understand the chromatographic techniques and its classification.           CO2         Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of mixture.           CO3         Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.           CO4         Able to discuss Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, or detector and Industrial applications of HPLC.           Lonit wise detailed content         Intel of the unit: SEPARATION TECHNIQUES           Chromatography, Classification of Chromatographic methods, Elution in column chromatography, chromatograph, distribution constant, retention time phase, mobile phase, principle of adsorption and partition chromatography, column chromatography, principle, adsorbents used, preparation of column, elution.           Unit 2         Number of lectures = 08         Title of the unit: CAS CHR
Lectures = 30         Tutorials = 10         Practical = Nil           8. COURSE DECITIVES: Students able to understand Separation techniques such as Thin layer chromatography, Paper chromatography, Gas chromatography.         3. COURSE OUTCOME (CO)         ATTRIBUTES           9. COURSE OUTCOME (CO)         ATTRIBUTES         ATTRIBUTES           COU         Understand the chromatography, principle and its applications. Paper chromatography and its applications. Separation of mixture.           CO2         Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of mixture.           CO3         Comprehension of Principles of gas-liquid chromatography, instrumentation and its industrial applications. Separation of chioride and Bro mixture.           CO4         Able to discuss. Normal and reverse phase HPLC. Isocratic and gradient elution, instrumentation; mobile phase reservoir, charave the action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bro removal of interfering radicals.           10. Unit wise detailed content         Number of lectures = 08         Title of the unit: SEPARATION TECHNQUES           Chromatography, Classification of Chromatographi. Every phase HPLC.         Number of lectures = 08         Title of the unit: THIN LAYER CHROMATOGRAPHY           Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography, principle, Rf value, factors influencing Rf value, aspenation of mino acid mixture.           Unit 3         Number of lectur
8. COURSE OBJECTIVES: Students able to understand Separation techniques such as Thin layer chromatography, Paper chromatography, Gas chromatography.         9. COURSE OUTCOMES (CO): After the successful course completion, learners will develop following attributes: CO1       Understand the chromatography: principle and its applications. Paper chromatography and its applications. Separation of mixture.         CO2       Evaluate Thin layer chromatography: principle and its applications. Paper chromatography and its applications. Separation of mixture.         CO3       Comprehension of Principles of gas-liquid chromatography, Instrumentation and its industrial applications.         Able to discuss. Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, of detector and industrial applications of HPLC.         CO4       Analyze the action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bro removal of interfering radicals.         10. Unit wise detailed content       Number of lectures = 08       Title of the unit: SEPARATION TECHNIQUES         Unit-2       Number of lectures = 08       Title of the unit: CARCMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; principle, adsorbents used, preparation of column, elution.         Unit-3       Number of lectures = 08       Title of the unit: CARCMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a Separation of min
Performance Liquid Chromatography and ion exchange chromatography. 9. COURSE OUTCOMES (CO) After the successful course completion, learners will develop following attributes: CO1 Understand the chromatographic techniques and its classification. CO2 Evaluate Thin layer chromatography: principle and its applications. Paper chromatography and its applications. Separation of mixture. CO3 Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications. CO4 detector and Industrial applications of HPLC. Analyze the action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bro removal of interfering radicals. I. Unit vise detailed content Unit-1 Number of lectures = 08 Title of the unit: SEPARATION TECHNIQUES Chromatography, Classification of Chromatographic methods, Elution in column chromatography, chromatography, glistribution constant, retention time phase, mobile phase, principle of adsorption and partition. Principle, adsorbents used, preparation of column, elution. Unit-2 Number of lectures = 08 Title of the unit: THIN LAYER CHROMATOGRAPHY Frinciple, choice of adsorbent and solvent, Rf value, applications. Paper chromatography, solvents used, principle, Rf value, factors influencing Rf value, a geparation of amino acid mixture. Unit-3 Number of lectures = 08 Title of the unit: IGK PERFORMANCE LIQUID CHROMATOGRAPHY Introduction. Principles of gas-liquid chromatography, Isovents used, principle, Rf value, Bet value, a geparation of amino acid mixture. Unit-3 Number of lectures = 08 Title of the unit: IGK PERFORMANCE LIQUID CHROMATOGRAPHY Introduction of HPIC, Normal and reverse phase HPIC. Isocratic and gradient elution, Instrumentation; mobile phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial applications. Unit-3 Number of lectures = 08 Title of the unit: IGK PERFORMANCE LIQUID CHROMATOGRAPHY Introduction of HPIC, Normal and reverse phase HPIC. Isocratic and gradient elution, Instrumentat
9. COURSE OUTCOMES (CQ): After the successful course completion, learners will develop following attributes: CO1 Understand the chromatographic techniques and its classification. CO2 Evaluate Thin layer chromatographic techniques and its classification. CO3 Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications. Separation of mixture. CO4 Able to discuss Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, or detector and industrial applications of HPLC. CO5 Pervoval of interfering radicals. 10. Unit wise detailed content Unit-2 Number of lectures = 08 Title of the unit: SEPARATION TECHNIQUES Chromatography, Classification of Chromatography, column chromatography; principle, adsorbents used, preparation of column, elution. Unit-2 Number of lectures = 08 Title of the unit: THIN LAYER CHROMATOGRAPHY Principle, choice of adsorbent and solvent, RY value, applications, Carrier gas system, Sample injection, Columna, Stationary phase, Detectors (Flame Electron and Theorematography, Instrumentation; Columna, Stationary phase, Detectors (Flame Electron and Theorematography, Instrumentation; Columna, Stationary phase, Detectors (Flame Electron and Theorematography, Instrumentation; Carrier gas system, Sample injection, Columna, Stationary phase, Detectors (Flame Electron and Theorematography, Instrumentation; Carrier gas system, Sample injection, Columna, Stationary phase, Detectors (Flame Electron and Theorematography, Instrumentation; Carrier gas system, Sample injection, Columna and Bromide ions - removal of relations of PHLC. Unit-3 Number of lectures = 08 Title of the unit: IGM ECHAMATOGRAPHY Number of lectures = 08 Title of the unit: IGM ECHAMATOGRAPHY Number of lectures = 08 Title of the unit: IGM ECHAMATOGRAPHY Number of lectures = 08 Title of the unit: IGM ECHAMATOGRAPHY Number of lectures = 08 Title of the unit: IGM ECHAMATOGRAPHY Number of lectures = 08 Title of the unit: IGM ECHAMATOGRAPHY Number of lectures
After the successful course completion, learners will develop following attributes:         COURSE OUTCOME (CO)       ATTRIBUTES         COURSE OUTCOME (CO)       Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of mixture.         CO3       Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.       Separation of mixture.         CO4       Able to discuss Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, or detector and industrial applications of HPLC.         Analyze the action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bro removal of interfering radicals.         10. Unit wise detailed content       Title of the unit: SEPARATION TECHNIQUES         Onit-1       Number of lectures = 08       Title of the unit: THIN LAYER CHROMATOGRAPHY         Principle, choice of adsorbert and solvent, R value, applications. Paper chromatography, solvents used, principle, R value, factors influencing R value, a separation of amino acid mixture.       Number of lectures = 08       Title of the unit: THIN LAYER CHROMATOGRAPHY         Unit-2       Number of lectures = 08       Title of the unit: GAS CHROMATOGRAPHY       Number of lectures = 08       Title of the unit: HIN LAYER CHROMATOGRAPHY         Unit-3       Number of lectures = 08       Title of the unit: GAS CHROMATOGRAPHY       Number of lectures = 08       Title of the unit: HIN LAYER CHROM
Colspan="2">Colspan="2"Colspan="2">Colspan="2"Colspan="2">Colspan="2"Co
C01       Understand the chromatographic techniques and its classification.         C02       Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of mixture.         C03       Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.         C04       detector and Industrial applications of HPLC.         Analyze the action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bro removal of Interfering radicals.         10. Unit wise detailed content         Unit-1       Number of lectures = 08       Title of the unit: SEPARATION TECHNIQUES         Chromatography, Classification of Chromatographic methods, Elution in column chromatography, principle, adsorbents used, preparation of column, elution.         Unit-2       Number of lectures = 08       Title of the unit: THIN LAYER CHROMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; principle, adsorbents used, preparation of Rf value, applications.         Separation of Hhermal conductivity) and Industrial applications.       Title of the unit: GAS CHROMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications.       Title of the unit: IGM PERFORMANCE LIQUID CHROMATOGRAPHY         Introduction, Principles of gas-liquid chromatography. Instrumentation; Carrier gas system, Sample injection, Columns, Stationary phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial
Evaluate Thin layer chromatography: principle and its applications. Paper chromatography and its applications. Separation of mixture.         CO3       Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.         Able to discuss Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, of detector and Industrial applications of HPLC.         Analyze the action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bro removal of Interfering radicals.         10. Unit wise detailed content       Number of lectures -08       Title of the unit: SEPARATION TECHNIQUES         Unit-1       Number of lectures =08       Title of the unit: THIN LAYER CHROMATOGRAPHY         Principle, choice of adsorption and partition chromatography, column chromatography; solvents used, principle, Rd value, factors influencing Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a spearation of mino acid mixture.         Unit-3       Number of lectures =08       Title of the unit: GAS CHROMATOGRAPHY         Unit-4       Number of lectures =08       Title of the unit: GAS CHROMATOGRAPHY         Unit-4       Number of lectures =08       Title of the unit: GAS CHROMATOGRAPHY         Introduction, Principles of gas-liquid chromatography, Instrumentation; Carrier gas system, Sample injection, Columns, Stationary phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial applications.         Uni
Cot       mixture.         CO3       Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.         CO4       Able to discuss Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, or detector and Industrial applications of HPLC.         Analyze the action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bro removal of interfering radicals.         10. Unit wise detailed content         Unit-1       Number of lectures = 08       Title of the unit: SEPARATION TECHNIQUES         Chromatography, Classification of Chromatographic methods, Elution in column chromatography, chromatograms, distribution constant, retention time phase, mobile phase, principle of adsorption and partition chromatography, column chromatography, inscripte, adsorbent sued, preparation of column, elution.         Unit-2       Number of lectures = 08       Title of the unit: THIN LAYER CHROMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a separation of amino acid mixture.         Unit-3       Number of lectures = 08       Title of the unit: GAS CHROMATOGRAPHY         Introduction, Principles of gas-liquid chromatography, Instrumentation; carrier gas system, Sample injection, Columns, Stationary phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial applications.         Unit-4       Number of lectures = 08       Title of the unit:
CO3         Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.           Able to discuss Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, or detector and Industrial applications of HPLC.           Analyze the action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bro removal of interfering radicals.           10. Unit wise detailed content           Unit-1         Number of lectures = 08         Title of the unit: SEPARATION TECHNIQUES           Chromatography, Classification of Chromatographic methods, Elution in column chromatography, chromatograms, distribution constant, retention time phase, mobile phase, principle of adsorption and partition chromatography, column chromatography; principle, adsorbent used, preparation of column, elution.           Unit 2         Number of lectures = 08         Title of the unit: THIN LAYER CHROMATOGRAPHY           Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a Separation of amino acid mixture.           Unit 3         Number of lectures = 08         Title of the unit: GAS CHROMATOGRAPHY           Introduction, Principles of gas-liquid chromatography, Instrumentation; mobile phase reservoir, column and detector adsorbent and conductival applications.         Tele of the unit: GAS CHROMATOGRAPHY           Introduction, Principles of gas-liquid chromatography, Instrumentation; mobile phase reservoir, colum and detector adsorbent and conductival application
CO4         Able to discuss Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, of detector and Industrial applications of HPLC.           CO5         Analyze the action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bro removal of interfering radicals.           10. Unit wise detailed content         Integration         Title of the unit: SEPARATION TECHNIQUES           Chromatography, Classification of Chromatographic methods, Elution in column chromatography, chromatographs, distribution constant, retention time phase, mobile phase, principle of adsorption and partition chromatography, column chromatography, principle, adsorbents used, preparation of column, elution.           Unit-1         Number of lectures =08         Title of the unit: THIN LAYER CHROMATOGRAPHY           Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a separation of amino acid mixture.         Interdet of the unit: GAS CHROMATOGRAPHY           Introduction, Principles of gas-liquid chromatography, Instrumentation; Carifer gas system, Sample injection, Columns, Stationary phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial applications.         Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY           Introduction of HPLC, Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, column and detector absorption, Electrochemical) and Industrial applications of HPLC.         Number of lectures = 08         Title of the unit: HIGH PERFORMANCE LIQUID CHROM
CO4       detector and Industrial applications of HPLC.         Analyze the action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bro removal of interfering radicals.         10. Unit wise detailed content         Unit-1       Number of lectures = 08       Title of the unit: SEPARATION TECHNIQUES         Chromatography, Classification of Chromatographic methods, Elution in column chromatography, chromatograms, distribution constant, retention time phase, mobile phase, principle of adsorption and partition chromatography, column chromatography; principle, adsorbents used, preparation of column, elution.         Unit-2       Number of lectures = 08       Title of the unit: THIN LAYER CHROMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, as Separation of amino acid mixture.         Unit-3       Number of lectures = 08       Title of the unit: GAS CHROMATOGRAPHY         Introduction, Principles of gas-liquid chromatography, Instrumentation; Carrier gas system, Sample injection, Columns, Stationary phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial applications.         Unit-4       Number of lectures = 08       Title of the unit: IIGH PERFORMANCE LIQUID CHROMATOGRAPHY         Introduction of HPLC, Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, column and detector absorption, Electrochemical) and Industrial applications of HPLC.         Unit-5       Nu
CO5Analyze the action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bro removal of interfering radicals.10. Unit wise detailed contentUnit-1Number of lectures = 08Title of the unit: SEPARATION TECHNIQUESChromatography, Classification of Chromatographic methods, Elution in column chromatography, chromatography, adsorbents used, preparation of column, elution.Unit-2Number of lectures = 08Title of the unit: THIN LAYER CHROMATOGRAPHYPrinciple, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a Separation of amino acid mixture.Unit-3Number of lectures = 08Title of the unit: GAS CHROMATOGRAPHYUnit-4Number of lectures = 08Title of the unit: GAS CHROMATOGRAPHYUnit-3Number of lectures = 08Title of the unit: GAS CHROMATOGRAPHYUnit-4Number of lectures = 08Title of the unit: GAS CHROMATOGRAPHYUnit-4Number of lectures = 08Title of the unit: GAS CHROMATOGRAPHYUnit-4Number of lectures = 08Title of the unit: IIGH PERFORMANCE LIQUID CHROMATOGRAPHYUnit-4Number of lectures = 08Title of the unit: IIGH PERFORMANCE LIQUID CHROMATOGRAPHYUnit-5Number of lectures = 08Title of the unit: IIGN EXCHANGE CHROMATOGRAPHYUnit-5Number of lectures = 08Title of the unit: INO EXCHANGE CHROMATOGRAPHYUnit-5Number of lectures = 08Title of the unit: INO EXCHANGE CHROMATOGRAPHYUnit-5Number of lectures = 08Title of the
COS       [removal of interfering radicals.         10. Unit wise detailed content         Unit-1       Number of lectures = 08       Title of the unit: SEPARATION TECHNIQUES         Chromatography, Classification of Chromatographic methods, Elution in column chromatography, principle, adsorbents used, preparation of column, elution.         Unit-2       Number of lectures = 08       Title of the unit: THIN LAYER CHROMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a Separation of amino acid mixture.       Unit-3       Number of lectures = 08       Title of the unit: GAS CHROMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a Separation of amino acid mixture.       Unit-3       Number of lectures = 08       Title of the unit: GAS CHROMATOGRAPHY         Unit-4       Number of lectures = 08       Title of the unit: HIM LAYER CHROMATOGRAPHY         Unit-4       Number of lectures = 08       Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY         Introduction of HPLC, Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, c
10. Unit wise detailed content         Unit-1       Number of lectures = 08       Title of the unit: SEPARATION TECHNIQUES         Chromatography, Classification of Chromatographic methods, Elution in column chromatography, chromatograms, distribution constant, retention time phase, mobile phase, principle of adsorption and partition chromatography, column chromatography; principle, adsorbents used, preparation of column, elution.         Unit-2       Number of lectures =08       Title of the unit: THIN LAYER CHROMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a separation of amino acid mixture.         Unit-3       Number of lectures = 08       Title of the unit: GAS CHROMATOGRAPHY         Unit-3       Number of lectures = 08       Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY       Unit-4         Unit-4       Number of lectures = 08       Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY       Unit-5         Unit-4       Number of lectures = 08       Title of the unit: ION EXCHANGE CHROMATOGRAPHY       Unit-5         Unit-5       Number of lectures = 08       Title of the unit: ION EXCHANGE CHROMATOGRAPHY       Unit-5         Unit-5       Number of lectures = 08       Title of the unit: ION EXCHANGE CHROMATOGRAPHY       Unit-5
Unit-1       Number of lectures = 08       Title of the unit: SEPRATION TECHNIQUES         Chromatography, Classification of Chromatographic methods, Elution in column chromatography, chromatography, gistibution constant, retention time phase, mobile phase, principle of adsorption and partition chromatography, column chromatography; principle, adsorbents used, preparation of column, elution.         Unit-2       Number of lectures =08       Title of the unit: THIN LAYER CHROMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a Separation of amino acid mixture.       Unit-3       Number of lectures = 08       Title of the unit: GAS CHROMATOGRAPHY         Introduction, Principles of gas-liquid chromatography, Instrumentation; Carrier gas system, Sample injection, Columns, Stationary phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial applications.       Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY         Introduction of HPLC, Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, column and detector absorption, Electrochemical) and Industrial applications, separation of metal ions, separation of chloride and Bromide ions - removal of radicals.         11. CO-PO mapping       Kumber of lectures = 08       Title of the unit: ION EXCHANGE CHROMATOGRAPHY         Vinit-3       Number of lectures = 08       Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY         Introduction, Electrochemical) and Industrial applications, separation of metal ions, separation
Chromatography, Classification of Chromatographic methods, Elution in column chromatography, chromatograms, distribution constant, retention time phase, mobile phase, principle of adsorption and partition chromatography, column chromatography; principle, adsorbents used, preparation of column, elution.          Unit-2       Number of lectures =08       Title of the unit: THIN LAYER CHROMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a Separation of amino acid mixture.       Number of lectures = 08       Title of the unit: GAS CHROMATOGRAPHY         Introduction, Principles of gas-liquid chromatography, Instrumentation; Carrier gas system, Sample injection, Columns, Stationary phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial applications.       Introduction, Number of lectures = 08       Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY         Introduction of HPLC, Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, column and detector absorption, Electrochemical) and Industrial applications of HPLC.       Number of lectures = 08       Title of the unit: ION EXCHANGE CHROMATOGRAPHY         Principle, resins, action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bromide ions - removal of radicals.       Introduction of metal ions, separation of metal ions, separation of chloride and Bromide ions - removal of metalicals.         11. CO-PO mapping       CO3       Attributes       PO1       PO2       PO3       PO4       PO5       P
phase, mobile phase, principle of adsorption and partition chromatography, column chromatography; principle, adsorbents used, preparation of column, elution.           Unit-2         Number of lectures =08         Title of the unit: THIN LAYER CHROMATOGRAPHY           Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a           Separation of amino acid mixture.         Number of lectures = 08         Title of the unit: GAS CHROMATOGRAPHY           Unit-3         Number of lectures = 08         Title of the unit: GAS CHROMATOGRAPHY           Introduction, Principles of gas-liquid chromatography, Instrumentation; Carrier gas system, Sample injection, Columns, Stationary phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial applications.         Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY           Introduction of HPLC, Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, column and detector absorption, Electrochemical) and Industrial applications of HPLC.         Number of lectures = 08         Title of the unit: ION EXCHANGE CHROMATOGRAPHY           Principle, resins, action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bromide ions - removal of radicals.         Title of the unit: ION EXCHANGE CHROMATOGRAPHY           11. CO-PO mapping         COs         Attributes         PO1         PO2         PO3         PO4         PO5         P           CO1         Understand the chr
Unit-2       Number of lectures =08       Title of the unit: THIN LAYER CHROMATOGRAPHY         Principle, choice of adsorbent and solvent, Rf value, applications. Paper chromatography; solvents used, principle, Rf value, factors influencing Rf value, a Separation of amino acid mixture.       Value: A separation of amino acid mixture.         Unit-3       Number of lectures = 08       Title of the unit: GAS CHROMATOGRAPHY         Introduction, Principles of gas-liquid chromatography, Instrumentation; Carrier gas system, Sample injection, Columns, Stationary phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial applications.         Unit-4       Number of lectures = 08       Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY         Introduction of HPLC, Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, column and detector absorption, Electrochemical) and Industrial applications of HPLC.         Unit-5       Number of lectures = 08       Title of the unit: ION EXCHANGE CHROMATOGRAPHY         Principle, resins, action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bromide ions - removal of radicals.         11. CO-PO mapping       COs       Attributes       PO1       PO2       PO3       PO4       PO5       P         CO2       Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of amino acid mixture.       3       1       1       2       2 </td
Interformetable of integration of the unit of the unit trifte of the unit to trifte of the uni
Unit-3       Number of lectures = 08       Title of the unit: GAS CHROMATOGRAPHY         Introduction, Principles of gas-liquid chromatography, Instrumentation; Carrier gas system, Sample injection, Columns, Stationary phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial applications.         Unit-4       Number of lectures = 08       Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY         Introduction of HPLC, Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, column and detector absorption, Electrochemical) and Industrial applications of HPLC.         Unit-5       Number of lectures = 08       Title of the unit: ION EXCHANGE CHROMATOGRAPHY         Principle, resins, action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bromide ions - removal of radicals.         11. CO-PO mapping       COs       Attributes       PO1       PO2       PO3       PO4       PO5       P         CO1       Understand the chromatography; principle and its applications. Paper chromatography and its and its applications. Separation of amino acid mixture.       3       1       1       2       2         CO2       Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications.       3       1       1       2       2         CO3       Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.       <
Unit-3Number of lectures = 08Title of the unit: GAS CHROMATOGRAPHYIntroduction, Principles of gas-liquid chromatography, Instrumentation; Carrier gas system, Sample injection, Columns, Stationary phase, Detectors (Flame Electron capture and Thermal conductivity) and Industrial applications.Unit-4Number of lectures = 08Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHYIntroduction of HPLC, Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, column and detector absorption, Electrochemical) and Industrial applications of HPLC.Unit-5Number of lectures = 08Title of the unit: ION EXCHANGE CHROMATOGRAPHYPrinciple, resins, action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bromide ions - removal of radicals.11. CO-PO mappingCOsAttributesPO1PO2PO3PO4PO5PCO1Understand the chromatographic techniques and its classification.31122CO2Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.31122
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Unit-4Number of lectures = 08Title of the unit: HIGH PERFORMANCE LIQUID CHROMATOGRAPHYIntroduction of HPLC, Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, column and detector absorption, Electrochemical) and Industrial applications of HPLC.Unit-5Number of lectures = 08Title of the unit: ION EXCHANGE CHROMATOGRAPHYPrinciple, resins, action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bromide ions - removal of radicals.11. CO-PO mappingCOsAttributesPO1PO2PO3PO4PO5PriCO1Understand the chromatographic techniques and its classification.31122CO2Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of amino acid mixture.31122CO3Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.31122
Introduction of HPLC, Normal and reverse phase HPLC, Isocratic and gradient elution, Instrumentation; mobile phase reservoir, column and detector absorption, Electrochemical) and Industrial applications of HPLC. Unit-5 Number of lectures = 08 Title of the unit: ION EXCHANGE CHROMATOGRAPHY Principle, resins, action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bromide ions - removal of radicals. 11. CO-PO mapping COs Attributes PO1 PO2 PO3 PO4 PO5 PO3 CO1 Understand the chromatographic techniques and its classification. CO2 Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its 3 1 1 2 2 CO3 Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications. 3 1 1 2 2 CO3 Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications. 3 1 1 2 2 CO3 Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.
absorption, Electrochemical) and Industrial applications of HPLC. Unit-5 Number of lectures = 08 Title of the unit: ION EXCHANGE CHROMATOGRAPHY Principle, resins, action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bromide ions - removal of radicals. 11. CO-PO mapping COs Attributes PO1 PO2 PO3 PO4 PO5 P CO1 Understand the chromatographic techniques and its classification. CO2 Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its 3 1 1 2 2 applications. Separation of amino acid mixture. CO3 Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications. 3 1 1 2 2
Unit-5Number of lectures = 08Title of the unit: ION EXCHANGE CHROMATOGRAPHYPrinciple, resins, action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bromide ions - removal of radicals.11. CO-PO mappingCOsAttributesPO1PO2PO3PO4PO1Understand the chromatographic techniques and its classification.3111. CO-PO mappingCO1Understand the chromatographic techniques and its classification.3111. CO2Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of amino acid mixture.CO3Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.31122
Principle, resins, action of resins, experimental techniques, applications, separation of metal ions, separation of chloride and Bromide ions - removal of radicals.         11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5       P         CO1       Understand the chromatographic techniques and its classification.       3       1       1       2       2         CO2       Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of amino acid mixture.       Paper chromatography and its industrial applications.       3       1       1       2       2         CO3       Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.       3       1       1       2       2
radicals.11. CO-P mappingCOsAttributesPO1PO2PO3PO4PO5PC01Understand the chromatographic techniques and its classification.31122C02Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of amino acid mixture.31122C03Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.31122
11. CO-PO mapping         COs       Attributes       PO1       PO2       PO3       PO4       PO5       P         CO1       Understand the chromatographic techniques and its classification.       3       1       1       2       2         CO2       Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of amino acid mixture.       3       1       1       2       2       2         CO3       Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.       3       1       1       2       2
COsPO1PO2PO3PO4PO5PC01Understand the chromatographic techniques and its classification.31122C02Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of amino acid mixture.31122C03Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.31122
CO1Understand the chromatographic techniques and its classification.31122CO2Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of amino acid mixture.31122CO3Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.31122
CO2Evaluate Thin layer chromatography; principle and its applications. Paper chromatography and its applications. Separation of amino acid mixture.31122CO3Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.31122
CO2applications. Separation of amino acid mixture.31122CO3Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.31122
CO3       Comprehension of Principles of gas-liquid chromatography, Instrumentation and its Industrial applications.       3       1       1       2       2
Able to discuss Normal and reverse phase HDLC (scorptic and gradient division, instrumentation, mehila
CO4 phase reservoir, column and detector and industrial applications of HDIC
Analyze the action of resins experimental techniques applications separation of metal ions separation of
CO5 chloride and Bromide ions - removal of interfering radicals.
3 Strong contribution, 2 Average contribution, 1 Low contribution
12. Brief description of self-learning / E-learning component
1. https://microbenotes.com/chromatography-principle-types-and-applications/
2. https://www.khanacademy.org/science/class-11-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-chemistry-some-basic-principles-and-
,, ,
techniques/xfbb6cb8fc2bd00c8:in-in-methods-of-purification-of-organic-compounds/v/basics-of-chromatography
techniques/xfbb6cb8fc2bd00c8:in-in-methods-of-purification-of-organic-compounds/v/basics-of-chromatography 3. https://www.slideshare.net/nadeemakhter7374/chromatography-34247423
<ul> <li>techniques/xfbb6cb8fc2bd00c8:in-in-methods-of-purification-of-organic-compounds/v/basics-of-chromatography</li> <li>https://www.slideshare.net/nadeemakhter7374/chromatography-34247423</li> <li>http://www.biologydiscussion.com/biochemistry/chromatography-techniques/top-12-types-of-chromatographic-techniques-biochemistry/12730</li> </ul>
<ul> <li>techniques/xfbb6cb8fc2bd00c8:in-in-methods-of-purification-of-organic-compounds/v/basics-of-chromatography</li> <li>https://www.slideshare.net/nadeemakhter7374/chromatography-34247423</li> <li>http://www.biologydiscussion.com/biochemistry/chromatography-techniques/top-12-types-of-chromatographic-techniques-biochemistry/12730</li> <li>Books recommended:</li> </ul>
<ul> <li>techniques/xfbb6cb8fc2bd00c8:in-in-methods-of-purification-of-organic-compounds/v/basics-of-chromatography</li> <li>https://www.slideshare.net/nadeemakhter7374/chromatography-34247423</li> <li>http://www.biologydiscussion.com/biochemistry/chromatography-techniques/top-12-types-of-chromatographic-techniques-biochemistry/12730</li> <li>Books recommended:         <ol> <li>Chemical Thermodynamics by R.P.Rastogi et al</li> <li>Brinzipie of physical chomistry by Duri Sharma and Pathon</li> </ol> </li> </ul>
<ul> <li>techniques/xfbb6cb8fc2bd00c8:in-in-methods-of-purification-of-organic-compounds/v/basics-of-chromatography</li> <li>https://www.slideshare.net/nadeemakhter7374/chromatography-34247423</li> <li>http://www.biologydiscussion.com/biochemistry/chromatography-techniques/top-12-types-of-chromatographic-techniques-biochemistry/12730</li> <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>Escentials of Physical Chemistry &amp; Pull &amp; Tulli S. Chand &amp; Co. Ltd</li> </ol> </li> </ul>
<ul> <li>techniques/xfbb6cb8fc2bd00c8:in-in-methods-of-purification-of-organic-compounds/v/basics-of-chromatography</li> <li>https://www.slideshare.net/nadeemakhter7374/chromatography-34247423</li> <li>http://www.biologydiscussion.com/biochemistry/chromatography-techniques/top-12-types-of-chromatographic-techniques-biochemistry/12730</li> <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> </ol> </li> </ul>
<ul> <li>techniques/xfbb6cb8fc2bd00c8:in-in-methods-of-purification-of-organic-compounds/v/basics-of-chromatography</li> <li>https://www.slideshare.net/nadeemakhter7374/chromatography-34247423</li> <li>http://www.biologydiscussion.com/biochemistry/chromatography-techniques/top-12-types-of-chromatographic-techniques-biochemistry/12730</li> <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> </ul>

1. Name of the Departme	nt: PHYSICS				_		
2. Course Name	ADVANCE ELECTRICITY AND MAGNETISM LAB	L		т		Р	
3. Course Code	PY304	0		0	<u> </u>	4	
4. Type of Course (use tick	: mark)	Core ( √ )	DF	()		FC (	)
5. Pre-requisite (if any)	10+2 with physics 6. Frequency (use tick marks) Even ()	Odd (√)	Eithe	Sem ( )	E٧	/ery Ser	n()
7. Total Number of Lectur	es, Tutorials, Practicals		Due et	aal - 10			
	ures = 00 Tutoriais = 00		Pract	cai = 10			
S. COURSE OBJECTIVES.							
9. COURSE OUTCOMES (CO	):						
After the successful course of COURSE OUTCOME (CO)	completion, learners will develop following attributes:						
CO1	ATTRIBUTES						
CO2							
(03							
CO4							
C05							
10. Syllabus							
Exp - 01							
Exp - 02							
Exp – 03							
Exp – 04							
Exp – 05							
Exp – 06							
Exp - 07							
Exp – 08							
Exp – 09							
Exp — 10							
11. CO-PO mapping							
COs	Attributes	PO1	PO2 PO3	PO4	PO5	PO6	P07
CO1							
CO2							
СОЗ							
CO4							
				+-+			
							<u> </u>
3 S	trong contribution, 2 Average contribution , 1 Low contribution						
12. Dher description of se							
13. Books recommended:							

1. Nam	e of the Departmer	t: CHEMISTRY								
2. Cour	rse Name	CHEMISTRY PRACTICAL – V		L		T	г		Р	
3. Cour	se Code	CH316		0		(	)		4	
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	very Se	m()
7. Tota	I Number of Lecture	es, Tutorials, Practicals								
	Lectu	ires = 00	Tutorials = 00			Practic	al = 10			
8. COUF	RSE OBJECTIVES: Stu	udent will be able to work eff	ectively and safely in a laboratory environment, r	practical/technic	cal/ con	nmunica	ation ski	ills, cor	icepts 1	to solve
qualitativ	ve and quantitative i	broblems,transferable skills like	ability to work in teams as well as independently.							
9. COUR	SE OUTCOMES (CO	): ompletion learners will devel	on following attributes:							
COUR	SF OUTCOMF (CO)		ATTRIBUTES							
	CO1	Remember to keep records of	all performed experiments in the manner which is	required in labo	oratory.					
	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 differen	nt fields of chem	nistry.					
	CO4	Know about the principles of c	ualitative and quantitative analysis of inorganic mi	xtures.						
10.0.1	CO5	Analyze the importance of per	sonal safety and care of equipment's and chemical	s.						
10. Syll	labus				6.11					
Exp – 0	1	(a) Potassium trioxalatoferrat	e (III), K3[Fe(C2O4)3] and determination of its com	determination position by pern	of its co nagnor	omposit hetry.	ion by p	bermag	nometr	ү.
Exp – 0	2	Preparation of cis-and trans –	bisoxalatodiaqua chromate (III) ion.							
Ехр — 0	3	To verify Beer-Lambert law fo	r KMnO4/K2Cr2O7 and determine the concentration	on of the given s	olution	1				
Exp – 0	94	Determination of Fe3+ conter	t by thiocyanate method.							
Exp – 0	15	Separation of Fluorescein and	methylene blue by column chromatography.							
Exp – 0	16	Separation of leaf pigments fr	om leaves							
Exp – 0	17	Resolution of racemic mixture	e of (+) mandelic acid							
Exp – 0	18	Diazotization/coupling: Prepa	aration of methyl orange and methyl red							
Exp – U	19	Oxidation: Preparation of ben	zoic acid from toluence							
Exp – 1	.0	Reduction: Preparation of ani	ine from nitrobenzene							
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Remember to keep	records of all performed expe	riments in the manner which is required in laborate	ory. <b>3</b>	2	2		3	1	3
CO2	Able to Evaluate wa	ater quality parameters like chl	oride content and alkalinity.	3	2	2		3	1	3
CO3	Understand the ba	sic titration methods and techr	ical skills to work in the different fields of chemistr	y. <b>3</b>	2	2		3	1	3
CO4	Know about the pr	inciples of qualitative and quar	titative analysis of inorganic mixtures.	3	2	2		3	1	3
CO5	Analyze the import	ance of personal safety and ca	re of equipment's and chemicals.	3	2	2		3	1	3
	3 5	trong contribution, 2 Average	contribution , 1 Low contribution			1	<u> </u>			
12. Brie	ef description of sel	f-learning / E-learning compon	ent							
1.	https://www.fand	dm.edu/uploads/files/7964570	1812579729-genchem-reference-for-web.pdf							
2.	http://file.akfarm	ahadhika.ac.id/E-BOOK/12-121	.3-akfarmahad-16-1-vogelqu-d.pdf							
3.	https://faculty.ps	au.edu.sa/filedownload/doc-6-	pdf-f06110ef2e1e1ae119cbacf71dd17732-original	.pdf						
4.	https://www.ster	n.org.uk/resources/collection/	3959/practical-chemistry							
13. Bool	ks recommended:									
1.	Practical Physics.	by R. K. Shukla, New Age Interr	national Private Limited; Third edition.							
2.	B.SC.Practical Phy B.Sc. Practical Ph	sics by Harnam Singn and Hem vsics by CL Aroral S Chand & Co	me, S. Chano. Impany							
4.	Practical Physics b	y Kumar P.R.S., Prentice Hall Ir	idia Learning Private Limited							

#### SEMESTER – VI (Physics, Chemistry)

1. Nam	e of the Departmer	IT: PHYSICS										
2. Cours	se Name	APPLIED ELECTRONICS				L		٦	Г		Р	
3. Cours	se Code	PY305				3		1	L		0	
4. Type	of Course (use tick	mark)				Core ( v	)	DE	()		FC (	)
E Drou	roquisito (if any)	10+2 with physics	6	Froquency (use tick marks)	Even (v/)	) bb0	<u>`</u>	Fithor	Som (	) E		, m ( )
3. FIE-	Number of Losture	Tutoriala Prosticala	0.	Frequency (use tick marks)	Lven(v)	Ouu (	/	LIUIEI	Seni (	/	Tery Ser	II( )
7. TOLdi	Number of Lecture											
	Lectu	ares = 30		l utorials = 10	I			Practic	al = Nil			
8. COUF	RSE OBJECTIVES: Th	e purpose of this undergradu	ate co	ourse is to impart basic and key	/ knowledge o	f electronics a	nd its a	oplicatio	ns. By ι	using th	e princi	iples of
modern p	physics and mathen	natics to obtain quantitative re	elatior	ns which are very important for	r higher studie	s. After succes	stully c	ompleti	on of co	ourse, ti	ne stud	ent will
able expl	ore subject into the	ir respective dimensions.										
9. COUR	SE OUTCOMES (CO)	):										
After the	successful course c	ompletion, learners will devel	op fol	lowing attributes:								
COURS	SE OUTCOME (CO)			AT	TRIBUTES							
	CO1	Students will gain an understa	nding	of modern physics and character	erization of se	miconductor b	ased ele	ectronic	devices.			
	CO2	Students will be able to realize	e the i	mportant concepts of advance of	electronics rela	ated to bipolar	junctio	n transis	tors.			
	CO3	Students will gain an unders	tandir	ng of advanced concepts of tra	ansistors and	related to bias	sing ciro	cuits for	small a	and lar	ge scale	e signal
		Conditioning, power amplifica		and effect of external factors in			r dociar	ing nou		lies for	induct	rial and
	CO4	commercial applications.	nign s		es like fets di	IU IVIOSFETS IU	r desigr	ing pow	ier supp	mes for	maustr	iai anu
	CO5	Students will learn about the	Power	electronic devices like the UJT	, TRIAC, etc. ar	nd designing In	tegrate	d Circuit	s for fal	oricatio	n of hig	gh yield
10 11-1												
10. Uni	t wise detailed con						-					
Unit-1		Number of lectures = 08	Tit	le of the unit: SEMICONDUCTO	R AND P-N JU	NCTION DIODE						
Diffusion	of minority carrier	s in semiconductor, work fun	ction	in metals and semiconductors	Junctions bet	ween metal a	nd sem	iconduct	tors, Se	micond	uctor a	nd p.n.
Junction,	Depletion layer, Ju	nction Potential Width of dep	letior	a layer, Field and Capacitance of	of depletion la	yer, Forward	A.C. and	d D.C. re	sistance	e of jur	iction, F	{everse
Breakdov	vn, Zener and Avala	nche diodes, Tunnel diodes, P	oint c	ontact diode, their importance	at High freque	encies, LED ph	otodiod	es, Effeo	t of ten	nperatu	ire on Ji	unction
diode The	ermistors.											
Unit-2		Number of lectures =08	Titl	e of the unit: TRANSISTOR – I								
Transisto	r parameters, base	width modulation, transit time	e and	life-time of minority carriers, B	ase- Emitter re	esistance Colle	ctor cor	nductan	ce, Base	spread	ling resi	istance,
Diffusion	capacitance, Reve	rse feedback ratio, Equivalen	t circ	uit for transistors, Basic mode	el, hybrid mod	lel and Y para	meter	equivale	ent circu	uit, Inp	ut and	output
impedan	ces.					•		•		<i>,</i> ,		•
Unit-3		Number of lectures = 08	Titl	e of the unit: TRANSISTOR – II								
Current a	and Voltage gain B	jasing formulae for transistor	s Ras	e bias emitter bias and mixed	type hias an	d mixed type	hiasing	for sma	ll and la	arge sig	mal one	eration
Transisto	r circuit application	at law frequencies their AC ar	nd DC	equivalent for three different n	nodes of opera	tion Large sig	nal one	ration of	trancia	tors Tr	ancistor	Power
amplifier	Class A and B one	ration Maximum power output		ct of temperature heat sinks t	thermal resista	nce Distortion	in amn	lifiors c	scading	n of sta	ansistor and Ero	
response	Negative and nosit	ive feedback in transistor amn	lifiers	ter of temperature, near sinks, t			mump	iiiici 3, ci	Jocuum	5 OF Stag	505,110	quency
Init_4	, Negative and posit	Number of loctures = 08	Titl	o of the unity FIFI D FFFFCT TRA	NEISTORS AN							
	at the second state of a second st					D POWER SUP	PLIES					
	ect transistors and t	neir characteristics, blasing of	FE1, l	aters Silicon Controlled restified	na their simple	e uses. Electro	nically r	egulated	a low ar	ia nign	voitage	power
supplies,	inverters for batter	y operated equipments. Photo	transi	stors, shicon controlled rectille	15.							
Unit-5		Number of lectures = 08	Titl	e of the unit: POWER ELECTRO	NICS AND INTI	GRATED CIRC	UITS					
Triac Con	struction, Operatio	n and Characteristics, Unijunct	tion T	ransistors (UJT), its characterist	tics, IC-classific	ation, Making	monoli	thic ICs,	IC-fabri	cation (	of comp	onents
on mono	lithic IC, IC packings	, IC symbols.										
11. CO-P	O mapping											
00			A++rib	utor		DO1	DO3	DO2	DO4	DOF	DOG	DO7
0.03	Charles III and a	· · · · · · · · · · · · · · · · · · ·	Attrib	vies		PUI	P02	PU3	PU4	PUS	PU0	PU7
CO1	Students will gain	an understanding of model	n pn	ysics and characterization of	semiconducto	r based 3	2	1	2	1	1	3
	electronic devices.							-		<sup> </sup>		
CO2	Students will be al transistors	ble to realize the important c	oncep	ts of advance electronics relate	ed to bipolar j	unction 3	2	1		2	1	3
	Students will gain	an understanding of advanced	l conc	epts of transistors and related	to biasing cire	cuits for	1	1				
	small and large sc	ale signal conditioning nower	amnl	lifications and effect of externa	al factors in tr	ansistor 3	2	1		2	1	3
CO3	onorations	ale signal conditioning, power	ampi	incations and effect of externa			2	1		~	*	3
	operations.			lusting devices like FFTs and N	AOCEETa fan d	!		-			┟────┦	
CO4		about the high switching sen		succing devices like FETS and N	NOSFETS for u	<sup>251gning</sup> 3	2	1		1	1	3
	power supplies for	Industrial and commercial app	licatio	ons.				-		<sup>_</sup>	┢────┦	
CO5	Students will learn	about the Power electronic	aevice	es like the UJT, TRIAC, etc. and	a designing int	egrated 3	2		2	2	1	3
05	Circuits for fabricat	ion of high yield monolithic IC	s.									I
	3 S	trong contribution, 2 Average	contr	ibution , 1 Low contribution								
12. Brie	f description of sel	f-learning / E-learning compor	nent									
1.	https://nptel.ac.ir	n/courses/117/107/117107095	5/									
2.	https://nptel.ac.ir	/courses/108/101/108101091	Ĺ/									
3.	https://nptel.ac.ir	1/courses/117/103/11710306	3/									
13. Book	s recommended:											
1	B G Strootman <sup>(</sup>	Solid State Electronic Dovises"	י און י	dition (Prentice Hall of India N	ew Dolhi 1094	5)						
1. 2	W/ D Stanlow "FI	octropic Dovices Circuits and		ations" (Prontice Hall Now Lore	OV 116A 1000	<i>,</i> ,.						
2.		ropics Eurodomontols and April	100+ic	auons (Frenuce-Hall, New Jers	Ey, USA. 1988) Findia Nove De	Nhi 1095)						
3.	J. D. Kyder; Elect	Crobole "Mission of a state of a	icatio	is into Edition (Prentice-Hall O	k Comments	2002).						
4.	i. iviiiiman and A.	Grabel; Wilcroelectronics", Int	ernat	ional. Edition (IVICGraw-Hill Boo	к company, Ne	ew YOFK, 1988)	•					

1. Name	e of the Departmen	t: CHEMISTRY								-		
2. Cours	se Name	SPECTROSCOPIC TECHNIQU	ES			L L		1	<u>г</u>		Р	
3. Cours	se Code	СН308				3			1	T	0	
4. Type	of Course (use tick	mark)				Core (	/)	DF	()	1	FC (	)
5 Pro-r	equisite (if any)	10+2 with Chemistry	6	Frequency (use tick marks)	Even (V)	bb0	)	Fither	Sem (	E	Jery Sei	, m()
7. Total	Number of Losture	Tutoriala Prosticala	0.	Frequency (use tick marks)	Lven(v)	Ouu	)	Littlei	Seni (		Very Ser	
7. Total	Number of Lecture	es, Tutoriais, Practicais										
	Lectu	ires = 30		Tutorials = 10				Practic	al = Nil			
8. COUR Nuclear N	<b>SE OBJECTIVES:</b> Stu Magnetic Resonance	udents able to understand the espectroscopy and mass spect	e inter romet	action of electromagnetic radia ry.	ation with the	materials, s	pectrosc	opic tech	iniques l	ike Ult	raviole	t, FT-IR,
9. COUR	SE OUTCOMES (CO)	):										
After the	successful course c	ompletion, learners will devel	op fol	owing attributes:								
COURS	SE OUTCOME (CO)			AT	TRIBUTES							
	CO1	Understanding Wave-like pr Woodward – Fieser rules for c	opaga alcula	tion of light, electronic trans tion of wave length.	sitions, instru	mentation,	conjugat	ed syste	ms and	transi	tion ei	nergies,
	CO2	Comprehension of absorption vibrational frequencies, chara	in the cterist	infrared region, theory of infra	red spectrosco es of compour	opy, instrum nds.	entation,	molecul	ar vibrat	ions, fa	ictors a	ffecting
	CO3	To create basics of NMR spect	trosco	py, instrumentation, chemical s	shift, equivaler	nt and noned	uivalent	protons,	spin-sp	in splitt	ing and	d vicinal
	CO4	Able to evaluate the NMR spe of NMR spectroscopy.	ectra c	f some representative compou	inds: Hydrocar	bons, Aldeh	des, Ket	ones, Ac	ids and <i>i</i>	Alcohol	s, Appl	ications
	CO5	Analyze the theory, instrume	ntatio	n, important useful terms in n s (alkanes, alkenes, alkynes, alc	nass spectrom ohols, ketones	etry; molecu aldehydes)	lar ion p Mclaffe	oeak, me rty rearra	tastable	peak, nts.	fragme	ntation
10. Unit	t wise detailed cont	ent	0	- (	,	,,,						
Linit-1	t thise detailed torin	Number of lectures = 08	Tit	e of the unit: UV SPECTROSCO	PV							
Mayo like	propagation of light	t absorption of electromagne	tic rad	liation by organic molecules all	 owod and forb	iddon transit	ions ins	trumonta	tion co	niugato	od syste	mc and
transition	energies, Woodwa	rd – Fieser rules; unsaturated	carbo	nyl compounds, conjugated dier	nes and polyer	nes.	10115, 1115	trumenta	111011, CO	ijugate	u syste	ins and
Unit-2		Number of lectures =08	Title	of the unit: IR SPECTROSCOP	(							
Introduct	ion, absorption in	the infrared region, theory	of inf	rared spectroscopy, instrumer	ntation, moleo	cular vibratio	ons, fact	ors affeo	ting vib	rationa	al frequ	uencies,
character	istic absorptions in	common classes of compound	s, cha	racteristic vibrational frequenci	es of some org	ganic compou	ınds.					
Unit-3		Number of lectures = 08	Title	e of the unit: NMR SPECTROSC	ΟΡΥ							
Introduct	ion. theory of NMR	spectroscopy, instrumentatio	n. che	mical shift, equivalent and non	equivalent pro	otons. spin-s	oin splitt	ing. vicin	al coupl	ing., In	terpreta	ation of
NMR spe	ctra of some repres	entative compounds.	.,			,						
Linit_4		Number of lectures = 08	Titl	of the unit: MASS SPECTROS								
Unit-4	ion hasiathaani in	Number of lectures - 08	fultor	of the unit. WASS SPECINOSC	OPT	orne of vorio	is functi	anal gray	una (allea			llamos
Introduct	ion, basic theory, in	strumentation, important use	tui ter	ms in mass spectrometry, fragn	nentation patt	erns of vario	us tuncti	onal grou	ips (aika	nes, all	kenes, a	aikynes,
alconois,	ether, phenois and	amines, ketones, aldenydes, e	sters,	acids, annydrides), molecular id	n peak, metas	table peak, r		y rearran	gements	s, mitro	gen rui	e.
Unit-5		Number of lectures = 08	liti	e of the unit: ATOMIC ABSORP	TION SPECIRC	PHOTOMET	RY	6				
Introduct	ion, Principle, Instru	imentation, Sample preparation	on, Int	ernal standard and standard ad	dition, calibrat	ion and appl	cations	of AAS.				
11. CO-P(	O mapping											
COs			Attrib	utes		PO	1 PO2	PO3	PO4	PO5	PO6	PO7
	Understanding Wa	ve-like propagation of light	lectro	nic transitions instrumentation		systems						
CO1	and transition ener	gies, Woodward – Fieser rules	for ca	Iculation of wave length.	i, conjugatea	3	1	2		2	1	2
CO2	Comprehension of molecular vibratior of compounds.	absorption in the infrared r ns, factors affecting vibrational	region I frequ	encies, characteristic absorptic	opy, instrume ons in commor	ntation, i classes <b>3</b>	1	2		2	1	2
CO3	To create basics of protons, spin-spin s	of NMR spectroscopy, instrum splitting and vicinal coupling.	menta	tion, chemical shift, equivaler	nt and noneq	uivalent 3	1	2		2	1	3
CO4	Able to evaluate th	e NMR spectra of some repre	esenta	tive compounds: Hydrocarbons	s, Aldehydes, k	Ketones, 3	1	1		2	1	3
	Acias and Alcohols,	Applications of NIVIR spectros	copy.	l terms in mass spectrometry	molecular in	n neak	_	-				
	motostable neak f	ragmontation patterns of vari	ious fu	in terms in mass spectrometry	, molecular io	licobols <b>2</b>	1	1		2	1	2
CO5	ketones aldebudos	Mclafferty rearrangements	ous it	aireannaí groups (aireanes, direi	ics, aikylics, d	aconois, <b>3</b>	1	-		-	1	5
	a conces, and engues	trong contribution 2 Average	CO Pt-	hution 1 low contribution				1	II		[	
12 D.	5 5	Long contribution, 2 Average	contr	Sution , I LOW CONTIDUTION			_		_			
IZ. Brie	i description of sen	-learning / E-learning compor	ient									
1.	https://www.you	tube.com/watch?v=2Y8pSoS00	dig					. //	25 6 6 6			
2.	http://www.infoc	obuild.com/education/audio-v	/ideo-	courses/cnemistry/ApplicationC	JTSpectroscopi	civietnods-II	-iviadras	s/lecture	-25.ntmi			
3.	https://scrippslab	s.com/summary-of-spectrosco	pic-te									
4.	nttps://nptel.ac.ir	i/content/storage2/courses/10	02103	044/pat/mod2.pdf							_	
13. BOOK	s recommended:											
1.	Introduction to sp	ectroscopy: Pavia, Lampman &	s Kriz,	3rd Ed, Books/cole.								
2.	spectroscopic me	thods in organic chemistry: H.	willia	ms and Ian fleminig, V Edition T	ata Mc Grawh	IIIS						
3.	Organic spectrosc	opy: William Kemp, 3rd Editio	n, Palg	rave publications.								
4.	Fundamentals of	Analytical chemistry, Douglas A	A. Sko	bg, Donald M. West, F. James H	oller, 7th editio	on, Harcourt	college p	oublicatio	ons.			
5.	Principles and pra	ctice of analytical chemistry, F	. W. F	field, D. Kealey, 5th edition, Bla	ickwell publica	tion.						
6.	Analytical chemis	try, Gary D. Christian, 6th editi	on, W	ley and sons publication.								
7.	Spectrometric ide	ntification of organic compour	nds, R.	M. Silverstein, 6th edition, Joh	n Wiley and so	ns.						
8.	Basic concepts of	analytical chemistry, S. M. Kop	oper, N	Iew Age International Publisher	s.							

#### **SEMESTER – VI (Physics, Chemistry)**

1. Name	1. Name of the Department: PHYSICS											
2. Cours	se Name	MATHEMATICAL METHODS	IN PHYSICS			L		1	•		Р	
3. Cours	se Code	PY307				3		1			0	
4. Type	of Course (use tick	mark)				Core ( )		DE	√)		FC (	)
5. Pre-r	equisite (if any)	10+2 with physics	6. Fred	quency (use tick marks)	Even ( v )	Odd ()		Either S	Sem (	) E <sup>,</sup>	very Sei	n( )
7. Total	Number of Lecture	es, Tutorials, Practicals										
	Lectu	ures = 30		Tutorials = 10				Practica	al = Nil			
8. COUR	SE OBJECTIVES:											
9. COUR	SE OUTCOMES (CO)	):										
After the	SUCCESSFUL COURSE C	ompletion, learners will devel I	op following	g attributes:	TRIBUTEC							
COOKS				AI	TRIBUTES							
	CO1											
	CO2											
	603											
	COS											
	CO4											
	CO5											
10. Unit	wise detailed cont	tent										
Unit-1		Number of lectures = 08	Title of t	he unit:								
Unit-2		Number of lectures =08	Title of th	ne unit:								
			I									
Unit-3		Number of lectures = 08	Title of th	ne unit:								
Unit 4		Number of lectures = 09	Title of th									
Unit-4		Number of fectures - 08	The of th	ie unit.								
Unit-5		Number of lectures = 08	Title of th	he unit:								
11. CO-PC	D mapping											
COs			Attributes			PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1												
CO2												
CO3												
CO4												
CO5												ı
12 Drie	3 Si f decorintion of cold	trong contribution, 2 Average	contributio	n , 1 Low contribution								
IZ. BILE	r description of sel	-learning / E-learning compor	lent									
13. Book	s recommended:											
1												

1. Nam	e of the Departmen	t: PHYSICS						-		
2. Cour	se Name	ADVANCED SOLID STATE PH	L		1	Г		Р		
3. Cour	se Code	PY308		3		1	L		0	
4. Type	of Course (use tick	mark)		Core ( )		DE	(√)		FC (	)
5. Pre-	requisite (if any)	10+2 with physics	6. Frequency (use tick marks) Even ( √ )	Odd (		Either	Sem ( )	E١	very Se	m()
7. Tota	Number of Lecture	es, Tutorials, Practicals								
	Lectu	ures = 30	Tutorials = 10			Practic	al = Nil			
8. COUR	RSE OBJECTIVES: Thi	s course aims to extend the m	aterial covered in the basic courses in Solid State Phy	sics, Electron	c Mater	ials and	Device I	Physics	and pr	ovide a
broader	and deeper unders	standing of the physics of to	day's semiconductor devices. This includes discuss	sions on the	materia	ls prop	erties an	nd opt	ical pro	operties
underlyin	ig fundamental devi	ces.								
9. COUR After the	SE OUTCOWES (CO)	): ompletion, learners will devel	op following attributes:							
COUR	SE OUTCOMF (CO)									
	CO1	Students will gain an unders vibrational dynamics.	tanding of the vibrations involved in Lattice whic	h help them	to unde	erstand	the con	cept o	f phon	on and
	CO2	Students will gain knowledge	of semiconductor and their benefits over conductors	and trying to	improve	e upon t	hese qua	alities.		
	CO3	Students will gain an unders understanding about Capacito	tanding of dielectric material, their properties an	nd use of die	ectric n	naterial cuit.	in capa	citor.	It will	help ir
	CO4	Students will gain an understa	nding of different kinds of magnetic material and it u	uses.						
	CO5	Students will be able to evalua	te the optical properties of the material and will cre	ate own unde	rstandin	ig appro	aches to	the fi	nding tl	nem.
10. Uni	t wise detailed cont	tent		<b>6</b>						
Unit-1		Number of lectures = 08	Inte of the unit: ELEMENTARY LATTICE DYNAMI	CS	taal of		Qualitati	ي ال الم		- <b>6</b> - 1
Elementa	ary Lattice Dynamic	s: Lattice vibrations and phon	ons. Linear monoatomic and diatomic chains, Acou	istical and op	ucal pho	onons, (	Jualitativ	ve des	criptior	i of the
priorion s	pectrum in solias, D	buiong and Petit's law, Einstein	and Debye theories of specific neat of solids, I haw.							
Unit-2		Number of lectures =08	Ittle of the unit: SEMICONDUCTOR PHYSICS	dalara d			h			
Classifyin semicond	g materials as semi ductors, Carrier conc	conductors, Chemical bonds in centration and Fermi level for i	semiconductors, Mechanism of current flow, Forbid ntrinsic semiconductor, Carrier concentration, Fermi	i level and con	and con ductivity	duction y of exti	i bands, l rinsic sen	nicond	c and e uctor.	extrinsio
Unit-3		Number of lectures = 08	Title of the unit: DIELECTRIC PROPERTIES OF MAT	TERIALS						
Polarizati	on, Depolarization	field, Electric susceptibility, P	olarizability, Sources of polarizability (electronic, i	onic, dipolar	& orient	tational	), Classic	al the	ory of	electric
polarizab	ility, Frequency dep	pendence of ionic polarizabili	ty, Local electric field at an atom, Clausius-Mosott	ti equation, L	angevin-	Debye	equatior	n, Com	plex di	electri
constant	and loss.									
Unit-4		Number of lectures = 08	Title of the unit: MAGNETIC PROPERTIES OF MAT	ERIALS						
Magnetic of param	properties of matte agnetism, Curie law	er: dia, para, terri and ferroma , Weiss's theory of ferromagne	gnetic materials, Classical Langevin theory of dia and stic domains, Discussion of B-H Curve, hysteresis and	d paramagnet energy loss.	ic mater	rials, Qu	antum n	nechar	ical tre	atment
Unit-5		Number of lectures = 08	Title of the unit: OPTICAL PROPERTIES OF MATER	RIALS						
Classical Colour ce	Model-Drude mode entres, Excitons, Lun	el, ionic conduction, Optical re ninescence, LED, Photo detecto	efractive index and relative dielectric constant, Opt or, Photomultiplier.	ical absorptio	n in me	tals, se	micondu	ctors a	and ins	ulators
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Students will gain a	an understanding of the vibrat	ions involved in Lattice which help them to understa	and the					-	
CO1	concept of phonon	and vibrational dynamics.	P	3		1		1	2	
	Students will gain	knowledge of semiconductor	and their benefits over conductors and trying to ir	mprove		2		3	2	2
CO2	upon these qualitie	es.		3		2		3	2	2
CO3	Students will gain a capacitor. It will he in any electronic cu	an understanding of dielectric lp in understanding about Cap rcuit.	material, their properties and use of dielectric mat acitors, as it is one of the most basic electrical comp	erial in onents <b>3</b>		2		3	2	2
CO4	Students will gain a	in understanding of different k	inds of magnetic material and it uses.	3		1		2	2	2
CO5	Students will be all approaches to the	ole to evaluate the optical pro finding them.	perties of the material and will create own underst	anding 3		2		3	2	2
	3 S	trong contribution, 2 Average	contribution , 1 Low contribution							
12. Brie	of description of self	f-learning / E-learning compor	nent							
13. Book	s recommended.									
1	Introduction to Sc	lid State Physics by Charles Kit	tel (Willey Publication).							
2. <b>3.</b>	Elements of Solid- Solid State Physics	-State Physics by Puri and Babb s by S. O. Pillai (New Age Interr	ar (S. Chand). national).							
		· •								

# SEMESTER – VI (Physics, Chemistry)

2. Cour	rse Name	CHEMICAL PROCESS INDUSTR	RY	L		1			Р	
3. Cour	rse Code	СН309		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 ()		Either S	Sem (	) Ev	very Se	m()
7. Tota	al Number of Lecture	s. Tutorials. Practicals						,		. ,
	lecti	res = 30	Tutorials = 10			Practic	al = Nil			
8. COU	RSE OBJECTIVES: Th	e main objective of this course	is to study the composition preparation properties	s and uses of	ammor	nia nitri	ic acid	nhosnh	orus ch	nemical
glass, ce	ment, ceramics and	refractories and their related to	xic hazards on the health of consumer.	5 010 0505 01	ammor	na, men	ic acia,	priospri		ienneui,
		•								
Δfter the	e successful course c	n Ampletion learners will develop	n following attributes:							
COUR	RSF OUTCOMF (CO)									
		Evaluate different preparation r	processes for the manufacture of ammonia nitric ac	cid ammoniu	m nitrat	to and a	mmoni	um culr	hata a	nd their
	CO1	related quality control, hazards	safety and effluent management.					uni suip	mate a	na trici
	603									
	02	Evaluate different manufacturir	ng methods of caustic soda and phosphorus chemica	als and their p	ropertie	es and u	ses.			
	CO3	Understand the composition of	glass and their types, properties and uses.							
		Analyza the composition types	proportion and proportion of compart and its cottin	a tima						
-	CO4	Analyze the composition, types	, properties and preparation of cement and its settin	ig time.						
	CO5	Understand the classification, p	roperties and uses of ceramics and refractoriness an	nd their respe	ctive ch	aracteri	stics.			
10. Un	it wise detailed con	rent								
Unit-1		Number of lectures = 08	Title of the unit: SYNTHETIC NITROGEN PRODUCT	s						
Ammoni	ia nitricacid ammo	nium nitrate and ammonium su	Inhate their manufacture with reference to: consum	ntion Pattern	Raw m	naterial	Produ	ction n	rocess	Quality
control.	Hazards and safety a	nd Effluent management.			,	laterial	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ectori p	1000033,	Quanty
Unit-2		Number of lectures =08	Title of the unit: CHLOR-ALKALLINDUSTRIAL PROD							
Caustic	soda Chlorine Phos	phorus chemicals: Phosphorus	phosphoric acid ammonium phosphate superph	hosphate trir		arnhosn	hato I	ime m	nsum	Silicon
calcium	carhide				ne supe	i priosp	mate. E	inic, 6)	,psum,	Sincon,
Linit-3		Number of lectures = 08	Title of the unit: GLASS							
Introduc	tion Classification a	nd General Properties of Glass	Characteristics raw Materials Chemical Reactions	Methods of M	lanufac	turo an				
minouue		in deneral roperties of diass,	enaracteristics, raw waterials, enemical reactions, r		anarac		. 0303.			
Linit 4		Number of lectures = 09	Title of the unity CEMENT							
Unit-4	tion Classification a	A Constal Droportion of Class	Characteristics, row Materials, Chamical Departients, N	Mathada of M	lanufan					
Introduc	LION, Classification a	nu General Properties of Glass,	Characteristics, raw Materials, Chernical Reactions, r	iviethous of iv	lanulac	lure and	J USES.			
Unit-5		-								
Onit-5		Number of lectures = 08	Title of the unit: CERAMICS AND REFRACTORIES							
Introduc	ction, Types of ceran	Number of lectures = 08 hics materials, properties and a	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories	es, characteri	stics of	refract	ories m	aterials	, prope	erties of
Introduc refractor	ction, Types of ceran ries. Neutral refracto	Number of lectures = 08 nics materials, properties and a ries; Silicon carbide. Acid refract	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractorie tories; High Alumina refractories.	es, characteri	stics of	refract	ories m	aterials	, prope	erties of
Introduc refractor 11. CO-P	ction, Types of ceran ries. Neutral refracto PO mapping	Number of lectures = 08 nics materials, properties and a ries; Silicon carbide. Acid refract	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractorie tories; High Alumina refractories.	es, characteri	stics of	refract	ories m	aterials	, prope	erties of
Introduc refractor 11. CO-P COs	ction, Types of ceran ries. Neutral refracto P <b>O mapping</b>	Number of lectures = 08 nics materials, properties and a ries; Silicon carbide. Acid refract	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractorie tories; High Alumina refractories. ttributes	es, characteri	stics of PO2	refract	ories ma	aterials PO5	, prope PO6	erties of
Introduc refractor 11. CO-P COs	ction, Types of ceran ries. Neutral refracto PO mapping Evaluate different	Number of lectures = 08 nics materials, properties and a ries; Silicon carbide. Acid refract A preparation processes for the r	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories. ttributes nanufacture of ammonia, nitric acid, ammonium n	es, characteri PO1 nitrate	stics of PO2	refractor	ories ma	aterials PO5	, prope <b>PO6</b>	erties of
Introduc refractor 11. CO-P COs	ction, Types of ceran ries. Neutral refracto PO mapping Evaluate different and ammonium su	Number of lectures = 08 nics materials, properties and a ries; Silicon carbide. Acid refract A preparation processes for the r phate and their related quality of	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories. ttributes nanufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management.	es, characteri PO1 nitrate 3	stics of PO2 2	refractor PO3 3	ories ma PO4 3	aterials PO5 2	, prope PO6 3	PO7
Introduc refractor 11. CO-P COs	tion, Types of ceran ries. Neutral refracto <b>PO mapping</b> Evaluate different and ammonium su Evaluate different	Number of lectures = 08         nics materials, properties and a ries; Silicon carbide. Acid refract         A         preparation processes for the r         phate and their related quality of manufacturing methods of caus	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories. ttributes nanufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop	es, characteri PO1 hitrate 3 perties	stics of PO2 2	refractor PO3 3	PO4 3	PO5 2	, prope PO6 3	PO7 2
Introduc refractor 11. CO-P COs CO1 CO2	tion, Types of ceran ries. Neutral refracto <b>PO mapping</b> Evaluate different and ammonium su Evaluate different and uses.	Number of lectures = 08         nics materials, properties and a ries; Silicon carbide. Acid refract         A         preparation processes for the r         phate and their related quality of manufacturing methods of cause	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories. ttributes nanufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop	es, characteri PO1 <sup>hitrate</sup> 3 perties 3	stics of PO2 2 2	refractor PO3 3 3	PO4 3 3	aterials PO5 2 1	, prope PO6 3 3	PO7 2 2
Introduc refractor 11. CO-P COs CO1 CO2	tion, Types of ceran ries. Neutral refracto <b>PO mapping</b> Evaluate different and ammonium su Evaluate different and uses. Understand the co	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract A preparation processes for the r phate and their related quality of manufacturing methods of caus proposition of glass and their type	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories. ttributes nanufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop	es, characteri PO1 hitrate 3 perties 3 3	stics of PO2 2 2 2	PO3 3 3 3	PO4 3 3 3	PO5 2 1	, prope PO6 3 3 3	PO7 2 2 2
Introduc refractor 11. CO-P COs CO1 CO2 CO3	tion, Types of ceran ries. Neutral refracto O mapping Evaluate different and ammonium su Evaluate different and uses. Understand the co	Number of lectures = 08         nics materials, properties and a ries; Silicon carbide. Acid refract         A         preparation processes for the r         phate and their related quality of manufacturing methods of cause         mposition of glass and their type	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories. ttributes nanufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses.	es, characteri PO1 hitrate 3 perties 3 3	stics of PO2 2 2 2 2	PO3 3 3 3 3	PO4 3 3 3	PO5 2 1 1	, prope PO6 3 3 3	PO7 2 2 2 2 2
Introduc refractor 11. CO-P COs CO1 CO2 CO3 CO3	tion, Types of ceran ries. Neutral refracto O mapping Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo	Number of lectures = 08         nics materials, properties and a ries; Silicon carbide. Acid refract         A         preparation processes for the r         phate and their related quality of manufacturing methods of cause         mposition of glass and their type         sition, types, properties and pre-	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories. ttributes nanufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses. eparation of cement and its setting time.	es, characteri PO1 hitrate 3 perties 3 3 3 3	stics of PO2 2 2 2 2 2 2	PO3 3 3 3 3 3	PO4 3 3 3 3 3	PO5 2 1 1 1	, prope PO6 3 3 3 3 3	PO7 2 2 2 2 2 2
CO1 CO2 CO3 CO4	tion, Types of ceran ries. Neutral refracto O mapping Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the cl	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract A preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories. ttributes nanufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses. eparation of cement and its setting time. es of ceramics and refractoriness and their respe	es, characteri PO1 hitrate 3 perties 3 3 a ective 2	stics of PO2 2 2 2 2 2 2 2	PO3 3 3 3 3 3	PO4 3 3 3 3 3	PO5 2 1 1 1	, prope PO6 3 3 3 3 3	PO7 2 2 2 2 2 2
Introduc refractor 11. CO-P COs CO1 CO2 CO3 CO4 CO5	tion, Types of ceran ries. Neutral refractor Omapping Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the cl characteristics.	Number of lectures = 08         nics materials, properties and a ries; Silicon carbide. Acid refract         A         preparation processes for the r         phate and their related quality of manufacturing methods of caus         mposition of glass and their type sition, types, properties and us         sition, properties and us	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories. <b>ttributes</b> manufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses. eparation of cement and its setting time. es of ceramics and refractoriness and their respon	es, characteri hitrate 3 perties 3 3 ective 3	stics of PO2 2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 3 3	PO4 3 3 3 3 3 3 3 3	PO5 2 1 1 1 1 1	, prope PO6 3 3 3 3 3 3	PO7 2 2 2 2 2 2 2 2 2 2
CO1 CO2 CO3 CO4 CO5	tion, Types of ceran ries. Neutral refractor O mapping Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the ci characteristics.	Number of lectures = 08         nics materials, properties and a ries; Silicon carbide. Acid refract         A         preparation processes for the r         phate and their related quality of manufacturing methods of cause         mposition of glass and their type sition, types, properties and use	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories. ttributes manufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses. eparation of cement and its setting time. es of ceramics and refractoriness and their responentiation , 1 Low contribution	es, characteri hitrate 3 perties 3 3 ective 3	stics of PO2 2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 3 3	PO4         3           3         3           3         3           3         3           3         3           3         3	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3 3	PO7 2 2 2 2 2 2 2 2 2 2
Introduc refractor 11. CO-P COs CO1 CO2 CO3 CO4 CO5	tion, Types of ceran ries. Neutral refractor O mapping Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the ci characteristics. 3 S ief description of sel	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract A preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average c F-learning / E-learning compone	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories.  ttributes manufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses. eparation of cement and its setting time. es of ceramics and refractoriness and their responentibution , 1 Low contribution ent	es, characteri hitrate 3 perties 3 3 ective 3	stics of PO2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 3	PO4 3 3 3 3 3 3 3	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3 3	PO7 2 2 2 2 2 2 2 2 2 2
Introduc refractor 11. CO-P COs CO1 CO2 CO3 CO4 CO5 12. Brit 1.	tion, Types of ceran ries. Neutral refractor O mapping Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the cl characteristics. 3 S ief description of sel https://encyclope	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average c F-learning / E-learning componential dia2.thefreedictionary.com/che	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories.  ttributes manufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses. eparation of cement and its setting time. es of ceramics and refractoriness and their respo ontribution , 1 Low contribution ent emical+process+industry	es, characteri hitrate 3 perties 3 3 a ective 3	stics of PO2 2 2 2 2 2 2 2 2	refractor PO3 3 3 3 3 3 3	PO4         3           3         3           3         3           3         3           3         3	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3 3	PO7 2 2 2 2 2 2 2 2 2
Introduc refractor 11. CO-P COs CO1 CO2 CO3 CO4 CO5 12. Brit 1. 2.	tion, Types of ceran ries. Neutral refractor O mapping Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the cl characteristics. 3 S ief description of sel https://encyclope https://www.you	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average c F-learning / E-learning component dia2.thefreedictionary.com/che tube.com/watch?v=RjZJjneJ5fk	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories.  ttributes manufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses. eparation of cement and its setting time. es of ceramics and refractoriness and their respontribution , 1 Low contribution ent emical+process+industry	es, characteri hitrate 3 perties 3 3 ective 3 ective 3	stics of PO2 2 2 2 2 2 2 2	refractor PO3 3 3 3 3 3 3	PO4         3           3         3           3         3           3         3           3         3	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3	PO7 2 2 2 2 2 2 2 2
COL           Introduc           refractor           11. CO-P           COs           CO1           CO2           CO3           CO4           CO5           11. CO-P           Introduction           Introduction           CO3           CO4           Introduction           Introt           Introt </td <td>tion, Types of ceran ries. Neutral refractor O mapping Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the ci characteristics. 3 S ief description of sel https://encyclope https://www.you https://www.che</td> <td>Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average c F-learning / E-learning component dia2.thefreedictionary.com/che tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/</td> <td>Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories.  ttributes manufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses. eparation of cement and its setting time. es of ceramics and refractoriness and their responentibution , 1 Low contribution ent emical+process+industry</td> <td>es, characteri hitrate 3 perties 3 3 a ective 3</td> <td>stics of PO2 2 2 2 2 2 2 2</td> <td>refractor PO3 3 3 3 3 3 3</td> <td>PO4         3           3         3           3         3           3         3           3         3</td> <td>PO5 2 1 1 1 1</td> <td>, prope <b>PO6</b> 3 3 3 3 3</td> <td>PO7 2 2 2 2 2 2 2</td>	tion, Types of ceran ries. Neutral refractor O mapping Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the ci characteristics. 3 S ief description of sel https://encyclope https://www.you https://www.che	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average c F-learning / E-learning component dia2.thefreedictionary.com/che tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories.  ttributes manufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses. eparation of cement and its setting time. es of ceramics and refractoriness and their responentibution , 1 Low contribution ent emical+process+industry	es, characteri hitrate 3 perties 3 3 a ective 3	stics of PO2 2 2 2 2 2 2 2	refractor PO3 3 3 3 3 3 3	PO4         3           3         3           3         3           3         3           3         3	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3	PO7 2 2 2 2 2 2 2
COL           Introduc           refractor           11. CO-P           CO3           CO4           CO5           12. Brie           1.           2.           3.           4.	tion, Types of ceran ries. Neutral refractor O mapping Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the co characteristics. 3 S ief description of sel https://encyclope https://www.you https://www.brit	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average of Flearning / E-learning component dia2.thefreedictionary.com/che tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphorus	Title of the unit: CERAMICS AND REFRACTORIES         pplications. Refractories, classification of refractories         tories; High Alumina refractories.         ttributes         manufacture of ammonia, nitric acid, ammonium n         control, hazards, safety and effluent management.         stic soda and phosphorus chemicals and their prop         es, properties and uses.         eparation of cement and its setting time.         es of ceramics and refractoriness and their respontribution , 1 Low contribution         emical+process+industry         s-chemical-element	es, characteri PO1 hitrate 3 perties 3 3 a ective 3	stics of PO2 2 2 2 2 2 2 2	refractor PO3 3 3 3 3 3 3	PO4         3           3         3           3         3           3         3           3         3	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3	PO7 2 2 2 2 2 2 2
COL           Introduc           refractor           11. CO-P           COs           CO1           CO2           CO3           CO4           CO5           12. Brie           1.           2.           3.           4.           13. Boo	tion, Types of ceran ries. Neutral refractor O mapping Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the co characteristics. 3 S ief description of sel https://encyclope https://www.you https://www.brit	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average of Flearning / E-learning component dia2.thefreedictionary.com/che tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphorus	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories.  ttributes manufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses. eparation of cement and its setting time. es of ceramics and refractoriness and their responentibution , 1 Low contribution ent emical+process+industry s-chemical-element	es, characteri PO1 hitrate 3 perties 3 3 a ective 3	stics of PO2 2 2 2 2 2 2 2	refractor PO3 3 3 3 3 3 3	PO4         3           3         3           3         3           3         3           3         3	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3	PO7 2 2 2 2 2 2 2
COL           Introduc           refractor           11. CO-P           COs           CO1           CO2           CO3           CO4           CO5           12. Brie           1.           2.           3.           4.           13. Boo           1.	tion, Types of ceran ries. Neutral refractor <b>PO mapping</b> Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the co characteristics. <b>3 S</b> <b>ief description of sel</b> https://encyclope https://www.you https://www.you https://www.brit	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average of Flearning / E-learning component dia2.thefreedictionary.com/che tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphorus J.A., Chemical Process Industrie	Title of the unit: CERAMICS AND REFRACTORIES pplications. Refractories, classification of refractories tories; High Alumina refractories.  ttributes manufacture of ammonia, nitric acid, ammonium n control, hazards, safety and effluent management. stic soda and phosphorus chemicals and their prop es, properties and uses. eparation of cement and its setting time. es of ceramics and refractoriness and their responentiation of contribution ent emical+process+industry s-chemical-element es, International student edition, Pubs: McGraw Hill E	es, characteri PO1 hitrate 3 perties 3 3 a ective 3 Book Co. New	stics of PO2 2 2 2 2 2 2 2	refract. PO3 3 3 3 3 3 960.	PO4         3           3         3           3         3           3         3           3         3	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3	PO7 2 2 2 2 2 2 2
COL           Introduc           refractor           11. CO-P           COs           CO1           CO2           CO3           CO4           CO5           12. Brie           1.           2.           3.           4.           13. Boo           1.           2.	tion, Types of ceran ries. Neutral refracto <b>PO mapping</b> Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the co characteristics. <b>3 S</b> <b>16f description of sel</b> https://encyclope https://www.you https://www.brit bts recommended: Shreve R.N. Brink Groggins P.M., Ur	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average of Flearning / E-learning component dia2.thefreedictionary.com/che tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphorus J.A., Chemical Process Industrie hit Process in Organic Synthesis,	Title of the unit: CERAMICS AND REFRACTORIES         pplications. Refractories, classification of refractories         tories; High Alumina refractories.         ttributes         manufacture of ammonia, nitric acid, ammonium n         control, hazards, safety and effluent management.         stic soda and phosphorus chemicals and their prop         es, properties and uses.         eparation of cement and its setting time.         es of ceramics and refractoriness and their respontribution , 1 Low contribution         entitle         entitle         es, International student edition, Pubs: McGraw Hill E         5th edition, International student edition, Pubs: McGraw Hill E	es, characteri PO1 hitrate 3 perties 3 3 ective 3 Book Co. New Graw-Hill Boo	stics of PO2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 960. ew Yorl	PO4 3 3 3 3 3 3 4 8 4 4 4 998.	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3	PO7 2 2 2 2 2 2 2
COL           Introduc           refractor           11. CO-P           CO3           CO1           CO2           CO3           CO4           CO5           12. Brie           1.           2.           3.           4.           13. Boo           1.           2.           3.	tion, Types of ceran ries. Neutral refracto <b>PO mapping</b> Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the co characteristics. <b>3 S</b> <b>16f description of sel</b> https://encyclope https://www.you https://www.brit bks recommended: Shreve R.N. Brink Groggins P.M., Ur Dryden's outlines	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average of Flearning / E-learning component dia2.thefreedictionary.com/che tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphorus J.A., Chemical Process Industrie hit Process in Organic Synthesis, of Chemical Technology, edited	Title of the unit: CERAMICS AND REFRACTORIES         pplications. Refractories, classification of refractories         tories; High Alumina refractories.         ttributes         manufacture of ammonia, nitric acid, ammonium n         control, hazards, safety and effluent management.         stic soda and phosphorus chemicals and their prop         es, properties and uses.         eparation of cement and its setting time.         es of ceramics and refractoriness and their responentiation of community and the setting time.         entities         entities         entities         entities         entities         entities         es of ceramics and refractoriness and their responentiation of cement and its setting time.         es of ceramics and refractoriness and their responentiation of cement and its setting time.         entities         entities         entities         entities         entities         entities         entities         entities         es of ceramical student edition, Pubs: McGraw Hill E         entities         es, International student edition, Pubs: McGraw Hill E         5th edition, International student edition, Pubs: McGraw Hill E         and revised by Gopala Rao M. and M	es, characteri PO1 nitrate 3 perties 3 3 ective 3 Book Co. New Graw-Hill Boo : East-West Pr	stics of PO2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 3 960. lew Yorl w Delhi	PO4 3 3 3 3 3 3 4 8 4 , 1998. , 2004.	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3	PO7 2 2 2 2 2 2 2
COL           Introduc           refractor           11. CO-P           CO3           CO1           CO2           CO3           CO4           CO5           12. Brie           1.           2.           3.           4.           13. Boo           1.           2.           3.           4.	tion, Types of ceran ries. Neutral refracto <b>PO mapping</b> Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the co Characteristics. <b>3 S</b> <b>16f description of sel</b> https://encyclope https://www.you https://www.brit bks recommended: Shreve R.N. Brink Groggins P.M., Ur Dryden's outlines Industrial Chemis	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average of Hearning / E-learning component dia2.thefreedictionary.com/che tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphorus J.A., Chemical Process Industrie hit Process in Organic Synthesis, of Chemical Technology, edited try B.K.Sharma, goel publishing I	Title of the unit: CERAMICS AND REFRACTORIES         pplications. Refractories, classification of refractories         tories; High Alumina refractories.         ttributes         manufacture of ammonia, nitric acid, ammonium n         control, hazards, safety and effluent management.         stic soda and phosphorus chemicals and their prop         es, properties and uses.         eparation of cement and its setting time.         es of ceramics and refractoriness and their responentiation of community and the setting time.         entities         entities         entities         entities         entities         entities         es of ceramics and refractoriness and their responentiation of cement and its setting time.         es of ceramics and refractoriness and their responentiation of cement and its setting time.         entities         entis         entities </td <td>es, characteri PO1 nitrate 3 perties 3 3 ective 3 Book Co. New Graw-Hill Boo : East-West Pr</td> <td>stics of PO2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2</td> <td>PO3 3 3 3 3 3 3 3 960. lew Yorl w Delhi</td> <td>PO4 3 3 3 3 3 3 4 8 4 4 5 5 6 7 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7</td> <td>PO5 2 1 1 1 1</td> <td>, prope <b>PO6</b> 3 3 3 3 3</td> <td>PO7 2 2 2 2 2 2</td>	es, characteri PO1 nitrate 3 perties 3 3 ective 3 Book Co. New Graw-Hill Boo : East-West Pr	stics of PO2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 3 960. lew Yorl w Delhi	PO4 3 3 3 3 3 3 4 8 4 4 5 5 6 7 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3	PO7 2 2 2 2 2 2
COL           Introduc           refractor           11. CO-P           CO3           CO1           CO2           CO3           CO4           CO5           12. Brie           1.           2.           3.           4.           13. Boo           1.           2.           3.           4.           5.	tion, Types of ceran ries. Neutral refracto <b>PO mapping</b> Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the co Characteristics. <b>3 S</b> <b>16f description of sel</b> https://encyclope https://www.you https://www.you https://www.brit <b>15ks recommended:</b> Shreve R.N. Brink Groggins P.M., Ur Dryden's outlines Industrial Chemis Chemical process	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average of Flearning / E-learning component dia2.thefreedictionary.com/che tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphorus J.A., Chemical Process Industrie hit Process in Organic Synthesis, of Chemical Technology, edited try B.K.Sharma, goel publishing I industries N.R Nerris shreve.	Title of the unit: CERAMICS AND REFRACTORIES         pplications. Refractories, classification of refractories         tories; High Alumina refractories.         ttributes         manufacture of ammonia, nitric acid, ammonium n         control, hazards, safety and effluent management.         stic soda and phosphorus chemicals and their prop         es, properties and uses.         eparation of cement and its setting time.         es of ceramics and refractoriness and their responentiation of community and the setting time.         entities         entities         entities         entities         entities         entities         es of ceramics and refractoriness and their responentiation of cement and its setting time.         es of ceramics and refractoriness and their responentiation of cement and its setting time.         entities         entities         entities         entities         entities         entities         entities         entities         es of ceramical student edition, Pubs: McGraw Hill Es         Schemical-element         es, International student edition, Pubs: McGraw Hill Es         Sth edition, International student edition, Pubs: McGraw Hill Es         house.	es, characteri PO1 nitrate 3 perties 3 3 ective 3 Book Co. New Graw-Hill Boo : East-West Pr	stics of PO2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 3 960. lew Yorl w Delhi	PO4 3 3 3 3 3 3 4 8 4, 1998. , 2004.	PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3 3	PO7 2 2 2 2 2 2
Control         Control           Introduc         refractor           11. CO-P         COs           CO1         CO2           CO3         CO4           CO5         Introduction           12. Brin         Introduction           13. Boo         Introduction           14. Co5         Introduction           15. Good         Introduction           16. Co5         Introduction           17. Co5         Introduction           18. Boo         Introduction           19. Co5         Introduction           11. Co5         Introduction           12. Brin         Introduction           13. Boo         Introduction           14. Co5         Introduction           15. Co5         Introduction           16. Co5         Introduction	tion, Types of ceran ries. Neutral refracto <b>PO mapping</b> Evaluate different and ammonium su Evaluate different and uses. Understand the co Analyze the compo Understand the co characteristics. <b>3 S</b> <b>16f description of sel</b> https://encyclope https://www.you https://www.you https://www.brit <b>bks recommended:</b> Shreve R.N. Brink Groggins P.M., Ur Dryden's outlines Industrial Chemis Chemical process	Number of lectures = 08 hics materials, properties and a ries; Silicon carbide. Acid refract preparation processes for the r phate and their related quality of manufacturing methods of caus mposition of glass and their type sition, types, properties and pre assification, properties and us trong contribution, 2 Average of Hearning / E-learning component dia2.thefreedictionary.com/che tube.com/watch?v=RjZJjneJ5fk micalprocessing.com/ annica.com/science/phosphorus J.A., Chemical Process Industrie it Process in Organic Synthesis, of Chemical Technology, edited try B.K.Sharma, goel publishing I industries N.R Nerris shreve. principales: part 1 & II – O.A / H	Title of the unit: CERAMICS AND REFRACTORIES         pplications. Refractories, classification of refractories         tories; High Alumina refractories.         ttributes         manufacture of ammonia, nitric acid, ammonium n         control, hazards, safety and effluent management.         stic soda and phosphorus chemicals and their prop         es, properties and uses.         eparation of cement and its setting time.         es of ceramics and refractoriness and their responentiation of cement and its setting time.         entities         entities         entities         entities         entities         entities         es of ceramics and refractoriness and their responentiation of cement and its setting time.         es of ceramics and refractoriness and their responentiation of cement and its setting time.         estimical+process+industry         s-chemical-element         est, International student edition, Pubs: McGraw Hill E Sth edition, International student edition, Pubs: McGraw Hill E Sth edition, International student edition, Pubs: McGraw Hill E Sth edition, Matson RA Ragatz (CBS)	es, characteri PO1 nitrate 3 perties 3 3 ective 3 Book Co. New Graw-Hill Boo : East-West Pr	stics of PO2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PO3 3 3 3 3 3 3 3 960. lew Yorl w Delhi	PO4 3 3 3 3 3 3 4 8 4, 1998. , 2004.	aterials PO5 2 1 1 1 1	, prope <b>PO6</b> 3 3 3 3 3	PO7 2 2 2 2 2 2

7. Shrev's Chemical process Industries: 5th edition – George T. Austin, Mc Graw Hill.

# SEMESTER – VI (Physics, Chemistry)

1. Nam	le of the Departmen							-		
2. Cour	rse Name	CHEMISTRY OF POLYMERS		L		Т			Р	
3. Cou	rse Code	CH317		3		1		_	0	
4. Туре	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 ()		Either S	Sem (	Ev	very Ser	m()
7. Tota	I Number of Lecture	es, Tutorials, Practicals								
	Lectu	ires = 30	Tutorials = 10			Practica	al = Nil			
8. COU	IRSE OBJECTIVES: T	he main objective of this co	urse is to study the mechanism of polymer prepa	aration, their	proce:	ssing te	chniqu	es, con	nmercia	al uses,
			orymers, polyamides, polyesters, synthetic rubbers, ce	enulose and c	орогут	erresin	5.			
9. COUR	e successful course c	: ompletion. learners will develo	op following attributes:							
COUR	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Student will be able to evaluat	e the different mechanisms of polymer preparation ar	nd their class	ificatior					
	CO2	Student will be able explain va	rious polymer reactions such as hydrolysis, acidolysis,	crosslinking	etc.					
	CO3	Understand the colligative pro	perties of Polymers and evaluate the identification teo	chniques such	n as NM	R and F	TIR of P	olymer	s.	
	CO4	Understand the degradation a	nd its types.							
	CO5	Understand the preparation p	ocess of vinyl polymers, polyamide, polyesters and ru	bbers.						
10. Un	it wise detailed cont	ent								
Unit-1		Number of lectures = 08	Title of the unit: INTRODUCTION							
Basic cor Free radi	ncepts of polymer so ical addition polyme	cience, Classification of polyme	ers, Average molecular weight and Molecular weight ization. Coordination polymerization. Step growth po	distribution.	Polyme	rization	: Mecha	anism a	and kine	etics of:
Ilnit-2		Number of lectures =08	Title of the unit: POLYMER REACTIONS	, menzationi						
Introduc	tion: types- hydroly	sis, acidolysis, addition, substit	ution, halogenation, hydrogenation, crosslinking, curi	ng. (brief me	chanisr	n and u	sefulne	ss of ea	ach read	ction to
be highli	ghted with examples	5).			ename	and d	oerume			
Unit-3		Number of lectures = 08	Title of the unit: STRUCTURE AND PROPERTIES							
Thermal	transitions, Crystalli	nity, Molecular weight charact	erization, Nuclear Magnetic Resonance (NMR) and Fou	urier Transfor	m Infra	red (FTI	R) tech	niques.		
Unit-4		Number of lectures = 08	Title of the unit: POLYMER DEGRADATION							
Introduc radiatior	tion, Types of degra	adation- thermal degradation,	mechanical degradation, degradation by ultrasonic and biodegradation.	waves, phot	o degra	dation,	degrad	ation Ł	by high	-energy
Unit-5	.,	Number of lectures = 08	Title of the unit: SYNTHESIS, PROPERTIES AND APE	PLICAIONS						
Polystyre	ene, Polyacrylonitril	e, Polymethacrylate, Polyme	thylmethacrylate, Polyethene, Polybutadiene, Poly	vinylidene, F	olycarb	onates,	Polye	sters,	Polyure	thanes,
Phenolic	polyesters, Polyami	des, Polysulphones.			,	,	,		,	
11. CO-P	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	P07
<b>CO1</b>	Student will be able	e to evaluate the different med	hanisms of polymer preparation and their classificatio	n. 1	2	2	2	3	1	2
(0)	Student will be able	e explain various polymer react	ions such as hydrolysis, acidolysis, crosslinking etc.	1	2	2	2	3	1	2
02	Understand the co	lligative properties of Polymer	s and evaluate the identification techniques such as	NMR						
CO3	and FTIR of Polyme	rs.	s and evaluate the identification techniques such as	1	2	2	2	3	1	2
CO4	Understand the de	gradation and its types.		1	1	2	2	3	1	2
CO5	Understand the pre	eparation process of vinyl polyr	ners, polyamide, polyesters and rubbers.	1	1	2	2	3	1	2
	3 5	trong contribution, 2 Average	contribution , 1 Low contribution							
12. Bri	ef description of self	-learning / E-learning compon								
L L	https://www.vou	tube.com/watch?v=klVlHYNuvk	()2()&list=PLBAcrca()2t/dHmbDEvn()A6/YLIPhE5sMe							
5.	https://www.vou	tubo com/watch?v=Gzin6mP_t	IM& list-DI IV 2iIICC87ChD7Mp/oP_VT09VT10Vool							
5. 6. 7	https://www.you	tube.com/watch?v=Gzin6mP-t	JM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ /E							
6. 7. 8.	https://www.you https://www.you https://www.you	tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8	JJM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ /E /							
6. 7. 8. <b>13. Boo</b>	https://www.yout https://www.yout https://www.yout ks recommended:	tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8	JM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ vE v							
6. 7. 8. <b>13. Boo</b> 6.	https://www.your https://www.your https://www.your ks recommended: Principles of poly	tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8 mer chemistry: A Ravve, 2nd E	JM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ /E / dition, Kluwer Academic publications							
6. 7. 8. <b>13. Boo</b> 6. 7.	https://www.your https://www.your https://www.your ks recommended: Principles of poly Polymer Science a	tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8 mer chemistry: A Ravve, 2nd E and technology: Joll. R. Fried, P	JM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ // dition, Kluwer Academic publications rentice – Hall.							
6. 7. 8. <b>13. Boo</b> 6. 7. 8.	https://www.your https://www.your https://www.your ks recommended: Principles of poly Polymer Science a Principles of polyr	tube.com/watch?v=Gzin6mP-t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8 mer chemistry: A Ravve, 2nd E and technology: Joll. R. Fried, P ner systems: F. Rodriguez, Clau	JM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ /E / dition, Kluwer Academic publications rentice – Hall. de Cohen, C.K. Ober, L.A. Archer, Vth Edition, Taylor &	& Francis						
6. 7. 8. <b>13. Boo</b> 6. 7. 8. 9.	https://www.you https://www.you https://www.you ks recommended: Principles of poly Polymer Science a Principles of polyr Introduction to po	tube.com/watch?v=Gzin6mP,t tube.com/watch?v=68fF7Tnl0v tube.com/watch?v=YZf5q-ICf8 mer chemistry: A Ravve, 2nd E ind technology: Joll. R. Fried, P mer systems: F. Rodriguez, Clau blymers: R.J. Young and P.A. Lo	JM&list=PLLy_2iUCG87CbDZMn4eP_XT09XTJOVooJ /E / dition, Kluwer Academic publications rentice – Hall. /de Cohen, C.K. Ober, L.A. Archer, Vth Edition, Taylor & /ell, 2nd Edition, Netron Thornes publications	& Francis						

1. Name	e of the Departmer	nt: CHEMISTRY								
2. Cours	se Name	FUNDAMENTALS OF FOOD O	CHEMISTRY	L		т			Р	
3. Cours	se Code	CH310		3		1			0	
4. Type	of Course (use tick	mark)		Core (√)		DE	()		FC (	)
5. Pre-r	equisite (if any)	10+2 with Chemistry	6. Frequency (use tick marks) Even ( √ )	Odd ()		Either S	iem (	) E'	very Se	m()
7. Total	Number of Lecture	es, Tutorials, Practicals						<u> </u>		
	Lectu	ures = 30	Tutorials = 10			Practica	al = Nil			
8. COUR	SE OBJECTIVES: Th	e course focuses on providing	knowledge of food constituents, food additives and	food process	ing tec	hniques	. The st	udy of	food la	aws and
standards	appraise students	about quality and safety assura	nce and food related hazards.							
9. COUR	SE OUTCOMES (CO	):								
After the	successful course c	ompletion, learners will develo	op following attributes:							
COURS	SE OUTCOME (CO)		ATTRIBUTES							
	CO1	Understanding of Indian food I	aw and food standards, value of quality assurance and	d safety assur	ance.					
	CO2	Comprehension of chemical s	structure, properties and argue importance of food	l component	s, inclu	iding ca	irbohyd	rates,	protein	ı, lipids,
	CO3	Describe the principles in for	ood processing techniques and differentiate food	preservation	metho	ds like	heat p	reserva	ation a	nd cold
	CO4	Able to explain different types	of food additives with examples and judge its value in	real life.						
	CO5	Analyze the importance of foo	d safety and food related physical, chemical and biolo	gical hazards.						
10. Unit	t wise detailed con	tent								
Unit-1		Number of lectures = 08	Title of the unit: GOVERNMENTAL REGULATIONS							
Introduct BIS.	ion, Food laws and	standards: Indian food safety l	aws and standards; Quality and safety assurance in fo	od industry;	BIS Lab	oratory	Service	s and (	Certifica	ation by
Unit-2		Number of lectures =08	Title of the unit: CONSTITUENTS OF FOOD AND THE		E ASPE	стѕ				
Carbohvd	rates. Proteins. Fat	s and oils. Vitamins and Minera	ls.							
,-										
Unit-3		Number of lectures = 08	Title of the unit: FOOD PROCESSING TECHIQUES							
Common concentra	unit operations, ation & food packag	Food deterioration and their ging.	control; Heat preservation and processing, Cold	preservation	and p	orocessi	ng Foo	d dehy	/dratio	n, Food
Unit-4		Number of lectures = 08	Title of the unit: FOOD ADDITIVES							
Preservat	ives, Antioxidants,	Chelating agents, Surface active	e agents, Stabilizing and Thickening agents, Buffering	agents, Colou	iring ag	gents, Sv	veeteni	ng agei	nts & F	lavoring
agents.										
Unit-5		Number of lectures = 08	Title of the unit: FOOD SAFETY, RISKS AND HAZARD	DS						
Food rela	ited Hazards, Micro	obiological Considerations in f	ood safety, Effects of processing and storage on mi	crobial safety	, Chen	nical ha	zards a	ssociat	ed with	n foods,
Preventio	n methods from fo	od born disease.								
11. CO-PO	O mapping									
COs			Attributes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	Understanding of I	ndian food law and food standa	ards, value of quality assurance and safety assurance.	3	2	3	2	3	3	3
CO2	Comprehension of	chemical structure, propertie	es and argue importance of food components, inclu-	uding 3	2	2	3	3	3	3
CO3	Describe the prin	ciples in food processing tech	niques and differentiate food preservation method	s like <b>3</b>	2	2	2	3	3	3
CO4	Able to explain diff	erent types of food additives w	ith examples and judge its value in real life.	3	2	2	2	3	3	3
CO5	Analyze the import	ance of food safety and food re	elated physical, chemical and biological hazards.	3	2	3	3	3	3	3
	3 5	trong contribution, 2 Average	contribution , 1 Low contribution							1
12. Brie	f description of sel	f-learning / E-learning compon	ent							
1.	http://www.basic	knowledge101.com/pdf/Food	620chemistry.pdf							
2.	https://courses.fc	odcrumbles.com/courses/food	I-chemistry-basics/							
3.	https://www.cab	direct.org/cabdirect/abstract/1	9710406009							
13. Book	s recommended:									
1.	Food Chemistry, E	Belitz and Gosch, Springer – Ver	lag Bertin Heiderberg, 2nd Edition, 1999							
2.	Principles of Hum	an Nutrition, Martin Eastwood,	, Chapman and Hall, London, I Edition, 1997.							
3.	Food – The Chem	istry of its Components, T.P. Co	bultate, Royal Soc. Chemistry, 4th Edition, 2002.			20				
4. E	Food additives, Bi	ranan, Alfred Larry, Davidson P.	IVIICIDAE, FOOD SCIENCE AND LECHNOLOGY SERIES (35), MC	orcel Dekker,	inc, 199	90.				
э. 6	Nutrition Science	and application Lori Smolin L/	Leanning, U.S.A, Leunion, 2003. A Saunders College Publishing 3rd Edition							
0. 7.	Human Nutrition	and dietetics. J.S. Barrow. W.P.	T James, Churchill Livingstone, 9th Edition, 1993.							

1. Nam	e of the Departmen	IT: PHYSICS				-				-		
2. Cour	se Name		L		1	г		Р				
3. Cour	se Code	PY306		3		1	L		0			
4. Type	of Course (use tick	mark)				Core ( √ )		DE	()		FC (	)
5. Pre-	requisite (if any)	10+2 with physics	6.	Frequency (use tick marks)	Even (√)	Odd ( )		Either	Sem ()	E	very Sei	m ( )
7. Tota	Number of Lecture	es, Tutorials, Practicals										
	Lectu	ıres = 30		Tutorials = 10				Practic	al = Nil			
8. COUR	RSE OBJECTIVES: Th	ne purpose of this undergradu	iate co	ourse is to impart basic and ke	ey knowledge	of materials. By	using	the bas	ic knowl	edge o	of mate	erials to
obtain qu	antitative relations	which are very important for f	urther	research. After successfully co	mpletion of co	ourse, the stude	nt will l	be able t	to explor	re subj	ect into	1
their resp	pective dimensions.											
9. COUR	SE OUTCOMES (CO	): omnletion learners will double	on fall	owing attributes:								
COUP	SE OUTCOME (CO)	ompletion, learners will devel	op joli		TRIBUTES							
coon	CO1	To learn about crystal structur	re and	its fractures	TRIBUTES							
	CO2	To introduce crystal imperfect	ion an	d elastic properties of crystals.								
	CO3	To introduce the structure of r	metals	, alloys, ceramics and glasses a	nd their proces	ssing.						
	CO4	To Introduce the Nanomateria	als and	nanotechnology								
	CO5	To learn various characterizati	ion tec	hniques of nanoparticles or na	nomaterials							
10. Uni	t wise detailed con	tent										
Unit-1		Number of lectures = 08	Titl	e of the unit: INTRODUCTION								
Introduc	tion: Atomic basis o	f structure – ionic bonding, Co	valent	bonding, Metallic bonding, Se	condary bondi	ng, Crystalline a	and nor	n-crysta	line stat	es, cry	stal syn	nmetry,
silica and	silicates, polymers,	fullerenes.	_									
Fracture:	Ductile fracture, Br	Ittle fracture, Fracture toughne	ess, Du	ictile-brittle transition, Protecti	ion against frac	cture, Fatigue fr	acture.	_				
Unit-2	an out out is man. Date t	Number of lectures =08	litle	e of the unit: CKYSTAL IMPERFI	ections AND	ELASTIC PROPE	KIIES	on otall'	no m=+-	rialc		
Elastic Pr	operties: Elastic bel	havior and its atomic model, Ri	ubber	like elasticity, anelastic behavio	or, relaxation p	rocesses, viscoe	elastic k	crystalli pehavioi	r, plastic	deforn	nation	
Unit-3		Number of lectures = 08	Title	e of the unit: STRUCTURE AND	PROCESSING	OF MATERIALS						
Structure alloys, ce	of metals and alloy ramic and glasses.	ys, structure of ceramics and g	lasses	, structure of polymers, structu	ire of composi	tes (qualitative)	). Brief	introdu	ction of	proces	sing of	metals,
Unit-4		Number of lectures = 08	Title	e of the unit: INTRODUCTION T	O NANOMATI	ERIALS						
Brief intr	oduction of nanoma	iterials, properties of Nanomat	terials.	Methods to produce nanomat	erials: Sol-Gel	synthesis metho	od. App	lication	s of nand	omater	ials.	
Carbon N	lanomaterials: class	ification and properties, Nanov	wires: o	classification, properties and ap	oplications. Na	nocomputers.						
Unit-5		Number of lectures = 08	Title	e of the unit: TOOLS AND TECH	INIQUES							
Crystallo	graphy: Particle size	e determination, Electron Mi	crosco	py: Scanning Electron Microso	copy (SEM), T	unneling Electr	on Mic	roscopy	/ (TEM)	(qualit	ative),	sample
preparati	on for an electron r	nicroscope, Difference betwee	n TEM	and SEM, Disadvantages of ele	ectron microsc	ope, Atomic for	ce micr	oscope	(AFM) (c	qualitat	ive).	•
11. CO-P	O mapping											
COs	-		Attrib	utes		PO1	PO2	PO3	PO4	PO5	PO6	P07
<b>CO1</b>	To learn about crys	tal structure and its fractures				3	1	1		2	1	1
(0)	To introduce crysta	I imperfection and elastic prop	perties	of crystals.		3	1	2		2	1	1
	To introduce the st	ructure of motals allows corre-	nice ar	d alassos and their processing			1	2		2	1	1
CO3	To Introduce the N	anomaterials and nanotechnol	ogv	ים הומספים מווע נוופון מוטנפאטווע.		3	1	<u> </u>		2	1	1
C04	To learn various ch	aracterization techniques of na	anopar	ticles or nanomaterials		3	1			2	1	
	20	trong contribution 2 Average	contri	bution 1 low contribution		-	I	I				I
12 Brie	of description of self	f-learning / F-learning compor	rent									
12. 016	a description of ser		ient									
13. Bool	s recommended:											
1.	Introduction to So	blid State Physics: C. Kittel (Wild	ey, VII	ed.)								
2.	Solid State Physics	Silus: L.V. Azarott (Tata McGrav	v Hill).									
э. 4	Fssentials of Mate	arials Science: A G Guy (McGra	w Hill	).								
5.	Materials Science	and Engineering: V. Raghvan (	Prenti	,. ce Hall).								
6.	Elements of Mate	rials Science and Engineering:	L.H. Va	an Vlack (Addison-Wesley).								
7.	Introduction to Na	anotechnology: Charles P. Pool	le Jr, F	rank J. Owens.								
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1. Nam	e of the Departmer	t: CHEMISTRY										
2. Cour	se Name	UG CHEMISTRY PROJECT				L		٦	-		Р	
3. Cour	se Code	CH318				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 S	Sem (	) E	very Sei	m()
7. Tota	Number of Lecture	es, Tutorials, Practicals										
Lectures = 30 Tutorials = 10 Practical = Nil												
8. COUR	SE OBJECTIVES: The	e main objective is to enhance	the tee	chnical skills and to provide stue	dents industria	al exposure.						
9. COUR	SE OUTCOMES (CO)	):										
After the	successful course c	ompletion, learners will develo	op foll	owing attributes:								
COUR	SE OUTCOME (CO)			AT	TRIBUTES							
	CO1	Hands on training										
	CO2	Integrate class room theory wi	th lab	oratory scale practice.								
	CO3	Understanding professional et	hics of	industry and code of conduct.								
10. CO-	PO mapping											
COs		1	Attribu	utes		PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	Hands on training					3	2	3	2	3	3	3
CO2	Integrate class roor	m theory with laboratory scale	practio	ce.		3	2	2	3	3	3	3
CO3	CO3Understanding professional ethics of industry and code of conduct.322233											
	3 S	trong contribution, 2 Average	contri	bution , 1 Low contribution								