Dr. N.G.P. ARTS AND SCIENCE COLLEGE (Autonomous)

REGULATIONS 2024-25 for Post Graduate Programme (Outcome Based Education model with Choice Based Credit System)

M.Sc. Degree

(For the students admitted during the academic year 2024-25 and onwards)

Programme: M.Sc. Chemistry

Eligibility

A pass in B.Sc. Chemistry as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent there to by the Academic Council subject to such conditions as may be prescribed there to are permitted to appear and qualify for the **Master of Science (CHEMISTRY)** Degree Examination of this College after a course study of two academic years.

Programme Educational Objectives

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

- 1. To build the firm foundation in the fundamentals and correlate the application with the current developments in chemistry.
- 2. To get sufficient expertise in the operational knowledge and laboratory skills in all major fields of chemistry.
- 3. To emphasize on integrating various disciplines of Science and encourage for interdisciplinary approach.
- 4. To acquire problem solving capacity, interpretation of results with the use of sophisticated instruments and devises new preparation techniques.
- 5. To motivate the students to prepare for competitive examinations, job carriers and get trained for industrial entrepreneurship.

PROGRAMME OUTCOMES:

On the successful completion of the program, the following are the expected outcomes.

PO	PO Statement
Number	Jakiswan too 25-4500 seed in skype of proper behavior a drabish of
PO1	Make use of knowledge in the major fields of Chemistry which would make them to analyze the significant role played in the field of energy, materials, health sector and environment.
PO2	Select the appropriate modern scientific instruments, to plan and execute in laboratory.
PO3	Interpret the Knowledge and skills to develop independent writing reports and to execute the ideas.
PO4	Take part in research- based knowledge in interdisciplinary approach including design of experiments, analysis and interpretation of data for provide better solution in emerging issues.
PO5	Utilize the knowledge for social, economic, and environmental challenges globally and formulate for life-long learning in the broadest context of technological change.

PG CURRICULUM PROGRAMME NAME – M. Sc Chemistry A.Y: 2024-25

Course	Course	Course Name				Instru Ho	iction urs	Exam (h)	Max Marks			
Code	Category	1 000 000000 stee	L	Т	P	Week	Total	2000 T	CIA	ESE	Total	Credits
First Semes	ter											
24CEP1CA	Core -I	Organic Reaction Mechanism	4	1	-	5	60	3	25	75	100	4
24CEP1CB	Core -II	Coordination Chemistry	4	1	. -	5	60	3	25	75	100	4
24CEP1CC	Core -III	Thermodynamics and Kinetics	4	1	-	5	60	3	25	75	100	4
24CEP1CD	Core -IV	Analytical Chemistry	4	1	-	5	60	3	25	<i>7</i> 5	100	4
24CEP1CP	Core Practical -I	Organic Chemistry	-	1	6	6	72	6	40	60	100	3
24CEP1DA 24CEP1DB 24CEP1DC	DSE-I	Polymer Chemistry Industrial Chemistry Green Chemistry	4	1	-	4	48	3	25	75	100	4
		Total	20	4	6	30	360				600	23

Course Code	Course Category	Course Name	L	Т	P	Instru Hot		Exam (h)	М	ax Mar	ks	Credits
	Cutegory					Week	Total		CIA	ESE	Total	
Second Ser	Second Semester											
24CEP2CA	Core -V	Stereochemistry and Pericyclic Reactions	4	1	-	5	60	3	25	<i>7</i> 5	100	4
24CEP2CB	Core -VI	Bio-Inorganic Chemistry	4	-	-	4	48	3	25	75	100	4
24CEP2CC	Core -VII	Molecular Spectroscopy	4	1	,	5	60	3	25	75	100	4
24CEP2CP	Core Practical -II	Inorganic Chemistry	-	-	8	8	96	3	40	60	100	4
24BCP2EA	EDC	Drug Biochemistry	4	-		4	48	3	25	7 5	100	4
24CEP2DA		Cosmetic Chemistry										1
24CEP2DB	DSE - II	Electrochemistry	4	-	-	4	48	3	25	75	100	4
24CEF2DC		Organic Reactions and Reagents										
		Total	20	2	8	30	360				600	24

Course Code	Course Category	Course Name	L	Т	P	Instru Ho		Exam (h)	N	Iax Ma	rks	Credits
						Week	Total	-	CIA	ESE	Total	
Third Sem	hird Semester									· ·		
24CEP3CA	Core -VIII	Chemistry of Natural Products	4	1	-	5	60	3	25	75	100	4
24CEP3CB	Core -IX	Inorganic Chemistry	4	1	-	5	60	3	25	75	100	4
24CEP3CC	Core -X	Quantum Chemistry and Group Theory	4	1	-	5	60	3	25	7 5	100	4
24CEP3CD	Core -XI	Analytical Spectroscopy	4	1	-	5	60	3	25	75	100	4
24CEP3CP	Core Practical –	Physical Chemistry	-	1	6	6	72	3	40	60	100	3
24CEP3CT	IT	Internship							40	60	100	2
24CEP3DA		Dye and Textile Chemistry									-	
24CEP3DB	DSE - III	Nanomaterials and Nanotechnology	4	-	_	48	48	3	25	<i>7</i> 5	100	4
24CEP3DC		Bio-Organic Chemistry							•			
	Tot	al	20	4	6	30	360				700	25

Course Code	Course Course Name L T P			uction ours	Exam Max M		Лах Ма	rks	Credits			
						Week	Total		CIA	ESE	Total	
Fourth Semester												
24CEP4CA	Core-XII	Synthetic Organic Chemistry	4	1	-	5	60	3	25	75	100	4
24CEP4CB	Core-XIII	Statistical Thermodynamics and Computational Chemistry	4	1	-	5	60	3	25	75	100	4
24CEP4CV	Core-XIV	Project and Viva voce	-	-	-	16	192	-	80	120	200	8
24CEP4DA		Environmental Chemistry										
24CEP4DB	DSE - IV	Catalysis	4	-	-	4	48		25	<i>7</i> 5	100	4
24CEP4DC		Medicinal Chemistry		.				2 0.000	J T			
		Total	12	2	16	30	360		1 3		500	20
			*G	rand	l Tota	al	1	.f.			2400	92

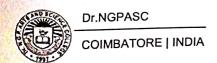
Theory : CIA 25: ESE 75
Practical/IT : CIA 40: ESE 60
Project : CIA 80: ESE 120

BoS Chairman/HoD Department of Chemistry Dr. N. G. P. Arts and Science College,

Coimbatore - 641 048

	Dr.N.G.P. Arts and S	Science College					
APPROVED							
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^{*}Total Credits does not exceed 92 credits

DISCIPLINE SPECIFIC ELECTIVE

Students shall select the desired course of their choice in the listed elective course during Semesters I-IV

Semester I (Elective I)

List of Elective Courses

S.No.	Course Code	Name of the Course
1	24CEP1DA	Polymer Chemistry
2	24CEP1DB	Industrial Chemistry
3	24CEP1DC	Green Chemistry

Semester II (Elective II)

List of Elective Courses

S.No.	Course Code	Name of the Course
1	24CEP2DA	Cosmetic chemistry
2	24CEP2DB	Electrochemistry
3	24CEP2DC	Organic Reactions and Reagents

Semester III (Elective III)

List of Elective Courses

S.No.	Course Code	Name of the Course
1	24CEP3DA	Dye and Textile Chemistry
2	24CEP3DB	Nanomaterials and Nanotechnology
3	24CEP3DC	Bio-Organic Chemistry

Semester IV (Elective IV)

List of Elective Courses

S.No.	Course Code	Name of the Course
1	24CEP4DA	Environmental Chemistry
2	24CEP4DB	Catalysis
3	24CEP4DC	Medicinal Chemistry

EXTRA CREDIT COURSES

The following are the courses offered under self-study to earn extra credits:

Semester III

S.No.	Course Code	Course Name
1	24CEPSSA	Research Methodology
2	24CEPSSB	Forensic Chemistry and Crime Investigation

Semester - I CORE I: ORGANIC REACTION MECHANISM

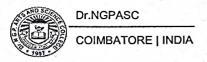
Semester	Course Code	Course Name	Category	L	T	P	Credits
I	24CEP1CA	ORGANIC REACTION MECHANISM	CORE	48	12	-	4

Preamble	This course has been designed for students to learn and understand					
	The basic principles of acids and bases, electronic effects and aromaticity of					
	organic compounds	organic compounds				
	• The mechanism involving in the various aliphatic, a	romatic electrophilic and				
	nucleophilic substitution reactions					
	The basic knowledge about addition, elimination	n reactions involved in				
	multiple bonds	multiple bonds				
Prerequisi	te Knowledge on Organic Chemistry	e to received ;				
Course Ou	tcomes (COs)					
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level				
CO1	Apply the electronic effects in organic chemistry, stability of organic compounds	К3				
CO2	Utilize various methods to determine the reaction mechanisms	K3				
CO3	Summarize reaction mechanisms of nucleophilic substitution reactions	К3				
CO4	Illustrate the reaction mechanisms of electrophilic substitution reactions	K4				
CO5	Compare the addition and elimination reactions	K4				

Mapping with Program Outcomes:							
COs / POs	PO1	PO2	PO3	PO4	PO5		
CO1	✓	Mount I ages		√	✓		
CO2		✓	✓	reacus estadoras	60		
CO3	✓	1	aratag38 makaa	✓	A L		
CO4	- 31 mag	ntoning supra by dones - saw	1				
CO5	1	√		1	√		

24CEP1CA - ORGANIC REACTION MECHANISM Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Electronic Effects and Aromaticity Electron displacement — Inductive and field effect — Delocalized bonds — Rules of resonance - Steric inhibition of resonance — Steric enhancement of resonance — Hyper conjugation — Hydrogen bonding. Aromaticity: Aromatic systems with 2,6 and 10 electrons — Alternant and non- alternant hydrocarbons, systems of more than 10 electrons — Annulenes — Azulenes — Ferrocene and Syndones — Concept of homo aromaticity	12	Text Book
11	Methods of Determining Reaction Mechanism Thermodynamic and kinetic requirements of reactions: Types of mechanism - Thermodynamic and kinetic control - Methods of determination of reaction mechanism - Product analysis - Determination of the presence of intermediate - Isolation - Detection - Trapping - Cross over experiments - Isotopic labeling - Isotopic effect - Kinetic evidence. Kinetic methods of determination of reaction mechanism - Curtin-Hammett principle - Hammett equation - Significance of substitution and reaction constant - Hammond postulates - Limitations and deviations - Taft equation	12	Reference Book
Ш	Aliphatic & Aromatic Nucleophilic Substitution Reactions SN ₁ , SN ₂ , SN _i and neighboring group participation - Kinetics - Effect of structure, solvent, leaving and entering group and Stereochemistry. Claisen and Dieckmann condensation - Williamson reactions. Mechanism of aromatic nucleophilic substitution - SNAr and Benzyne mechanism - Chichibabin reaction - Cine substitution - Diazonium group as leaving group	12	Text Book
IV	Aliphatic & Aromatic Electrophilic Substitution Reactions SE ₁ and SE ₂ reactions - Mechanisms and reactivity - Ketoenol tautomerism - Halogenation of carbonyl compounds - Stork enamine reaction - Aromatic electrophilic substitution - Orientation and mechanism - Nitration - Halogenation and sulphonation - Friedel-Crafts alkylation - Friedel Crafts acylation and Scholl reaction - Vilsmeyer- Haack reaction - Gattermann reaction - Bischler Napieralski reaction	12	NPTEL
V	Addition and Elimination Reaction Addition to C-C and C-O multiple bonds — Electrophilic - Nucleophilic and free- radical additions - Birch reduction - Michael addition - Diels-Alder reaction - Meerwein - Pondorf reduction - Stobbe condensation. Elimination reactions - E ₁		You Tube Videos



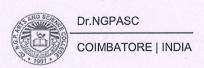
	and E ₂ mechanism - Orientation - Hofmann and Saytzeff rules - Elimination versus substitution - Chugaev reaction - Hofmann degradation and Cope elimination - Mechanism and orientation in pyrolytic elimination	# TF/01	
23500	Total	60	O. Mineral

Text Book	1	Michael B. Smith, 2015, "March's Advanced Organic Chemistry: Reactions,
	1.	Mechanisms and Structure", 7 th edition, Willey & USA.
Reference	1	Morrison R.N. Boyd R.N. and Bhattacharjee, 2010, "Organic Chemistry", 7th edition,
Books	1.	Pearson Education &UK.
	3	Bansal R.K., 2012, "Organic Chemistry Reaction mechanisms." 7th edition, New Age
	4.	International Private Ltd & New Delhi.
	2	Lowry and Richardson, 1997, "Mechanism and theory in organic chemistry", 3rd
	3.	edition. Pearson Publishers & UK
	4	Clayden J, Greeves N and Warren S, 2014, "Organic Chemistry" 2 nd edition, Oxford
	4.	University Press & UK.

Journal and Magazines	https://www.sciencedirect.com/topics/chemistry/michael-addition
E-Resources and Website	https://archive.nptel.ac.in/courses/104/101/104101115/

Learning Method	Chalk and Talk/Assignment/Seminar

Focus of the Course	Skill Development/Employability
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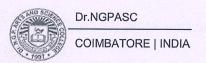


Semester - I
CORE II: COORDINATION CHEMISTRY

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	24CEP1CB	COORDINATION CHEMISTRY	CORE	48	12	-	4

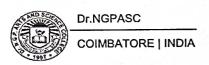
Preamble	This course has been designed for students to learn and under	erstand	
	The characteristics of different types of matrices		
	The basic concept of sequence and series		
	The rule for finding the limit		
Prerequisi	te Knowledge on Coordination Chemistry		
Course Ou	itcomes (COs)		
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level	
CO1	Interpret the various theories of coordination compounds, MO diagrams of complexes	К3	
CO2	Outline the various types of reaction mechanism of coordination complexes	K3	
CO3	Compare the various symmetries and geometries of coordination complexes	К3	
CO4	Examine the structure and bonding of metal carbonyls	K4	
CO5	Analyze the importance of electronic spectroscopy	K4	

Mapping with Program Outcomes:						
COs / POs	PO1	PO2	PO3	PO4	PO5	
CO1	1				✓	
CO2		✓	√			
CO3	1	✓		1	✓	
CO4			1		✓	
CO5	✓	1		1	✓	



24CEP1CB - COORDINATION CHEMISTRY Syllabus

Unit	Content	Hours	E-Contents / Resources
Ι	Theories of coordination compounds Valence bond and Crystal field theory - Splitting of d orbitals in ligand field and different symmetries - Crystal Field Stabilization Energy - Factors affecting the magnitude of 10 Dq - Evidence for crystal field stabilization - Spectrochemical series - Site selection in spinels - Tetragonal distortion from octahedral symmetry - Jahn-Teller distortion - Nephelauxetic effect - Molecular orbital theory - Octahedral - Tetrahedral and square planar complexes - pi bonding and molecular orbital theory	12	Text Book
Ш	Reaction mechanism in coordination complexes Theories of trans effect - The rate law for nucleophilic substitution reaction and mechanism of square planar complexes - Kinetics and substitution reaction mechanism of octahedral complexes. Ligand field effects and reaction rates - Reaction rates influenced by acid and bases - Racemization and isomerization - Mechanism of redox reaction - Outer sphere mechanism - Excited state outer sphere electron transfer reactions - Inner sphere mechanism	12	Reference Book
ш	Structure of coordination complexes Complexes with coordination number two, three, four, five six, seven and eight - Site preference in trigonal bipyramidal and square pyramidal complexes - Isomerism in five coordinate complexes - Distortion from perfect octahedral symmetry - Trigonal prism - Geometrical isomerism in octahedral complexes	12	Text Book
IV	Structure and bonding in metal carbonyls Metal carbonyl complexes - Classification- synthesis - Structure and properties - 18 electron and EAN rule - Nature of M-CO bonding - Binding mode of CO and IR spectra of metal carbonyls - Metal carbonyl hydrides -Metal nitrosyl complexes	12	NPTEL
V	Electronic spectra and magnetism Microstates, terms and energy levels for d ¹ - d ⁹ ions in cubic and square fields - Selection rules - Band intensities and band widths - Energy level diagrams of Orgel and Tanabe - Sugano - spectra of V ³⁺ , Ni ²⁺ , Cr ³⁺ , Co ²⁺ and Fe ²⁺ - Calculation of 10Dq and magnetic moment for V ³⁺ (oct) and Ni ²⁺ (oct) complexes - Charge transfer spectra - Change in magnetic properties of complexes in terms of spin orbit coupling - Temperature independent paramagnetism		You Tube Videos



Total	60	

Text Book	1.	Huheey. J.E, Keiter. E.A and Keiter. R.L, 2006, "Inorganic Chemistry, Principles of
	1.	Structure and Reactivity", 4th edition, Pearson Education & UK.
Reference		Cotton. F.A, Wilkinson. G, Murillo. C.A and Bochmann. M, 1999, "Advanced
Books	1.	Inorganic Chemistry", 6th edition, A Wiley - Interscience Publications, John Wiley and
		Sons & USA.
2000	2	Gopalan. R, Ramalingam. V, 2001, "Concise Coordination Chemistry", 3rd edition,
	4.	Vikas Publishing house pvt. Ltd & New Dehli.
	2	Gurdeep Raj, 2014, "Advanced Inorganic Chemistry", 12th edition, Geol Publishing
	٥.	House & New Delhi
	4.	Shriver. D. F, Weller. M.T, Overton. T, Rourke. J and Armstrong. F.A, 2014,
	4.	"Inorganic Chemistry", 6th Edition, New York, W.H. Freeman and Company & USA.

Journal and Magazines	https://www.tandfonline.com/journals/gcoo20
E-Resources and Website	https://www.dalalinstitute.com/wp-content/uploads/Books/A-Textbook-of-Inorganic-Chemistry-Volume-1/ATOICV1-8-3-Orgel-and-Tanabe-Sugano-Diagrams-for-Transition-Metal-Complexes-d1-d9-States.pdf

Learning Method Chalk and Talk/Assignment/Seminar	
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Focus of the	Skill Development/Employability
Course	to maintaine describer - meigraphic Total describer to

Semester - I
CORE III: THERMODYNAMICS AND KINETICS

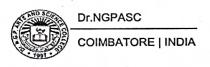
Semester	Course Code	Course Name	Category	L	Т	P	Credits
I	24CEP1CC	THERMODYNAMICS AND KINETICS	CORE	48	12	-	4

Preamble	This course has been designed for students to learn and under	This course has been designed for students to learn and understand				
	 The Fundamentals of equilibrium and non- equilibrium thermodynamics 					
	The chemical equilibrium and catalysis					
	The application-oriented knowledge about electroche	The application-oriented knowledge about electrochemistry				
Prerequisit	ke Knowledge on Basic of Thermodynamics	Productive model				
Course Ou	tcomes (COs)					
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level				
CO1	Analyze the concepts of equilibrium thermodynamics	K4				
CO2	Understand the concepts of non-equilibrium thermodynamics K3					
CO3	Analyze the concepts and functions of electrochemical reactions	K4				
CO4	Interpret the knowledge about chemical kinetics in molecular reactions K4					
CO5	Apply concept involved in catalysis and adsorption K3					

Sapping with P	rogram Outcon	nes:	aning - say p	SAUCYL (a sumo	raci (
COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	1	✓	✓	1	1
CO2		✓		zalizniki izolim	
CO3	√	ing sangle from	Manager - 10-	√	14.1
CO4	Tarig 144	Se vaposiloi -	✓	property and	
CO5	√	√	Riggodie – davi	✓	1

24CEP1CC - THERMODYNAMICS AND KINETICS Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Equilibrium thermodynamics Gibbs - Helmholtz equation - Maxwell relations - Third law and its limitations - Thermodynamics of systems of variable compositions - Partial molar quantities and their determination - Chemical potential - Gibbs-Duhem equation - Gibbs-Duhem-Margules equation - Fugacity - Determination of fugacity of gases by graphical method and from equations of state - Variation of fugacity with temperature - Fugacity (or activity) coefficient	12	Text Book
II.	Non-equilibrium thermodynamics Phenomenological laws and Onsager Reciprocal relations - Conservation of mass and energy in closed and open system- Entropy production in heat flow and chemical reactions - Entropy production and entropy flow in open systems - Principles of microscopic reversibility - Onsager's theory - Validity and its verification	12	Reference Book
ш	Electrochemistry Activity - Mean ion activity and mean activity coefficient of electrolytes in solution - Debye-Huckel theory and limiting law - Debye-Hückel-Onsager equation verification and limitations. The electrical double layer - Structure and models (Helmholtz, Guoy-Chapman and Stern) - Kinetics of electrode processes - Current-potential curve - Butler Volmer relation and its approximations - Tafel equation - Charge transfer resistance	12	Text Book
IV	Chemical Kinetics - I Theories of reaction rates — Collision - transition State - Lindemann - Hinshelwood - Rice — Ramsperger — Kassel theory (RRK), Rice—Ramsperger — Kassel—Marcus (RRKM) theory - Slater treatments - Fast reaction kinetics - Stopped flow method - Chemical relaxation method	12	NPTEL
V	Chemical Kinetics - II Homogenous catalysis - Hammett acid-base catalysis - Acidity function - Enzyme catalysis - Michaelis - Menton kinetics - Lineweaver Burk plot - Influence of PH and temperature on enzyme catalysis Heterogeneous catalysts - Adsorption and free energy relation at interfaces - Gibbs adsorption isotherm - Adsorption isotherms (Langmuir and BET) - Measurement of surface area - Kinetics of heterogeneous catalysis (Langmuir	12	You Tube Videos



Hinshelwood mechanism and Eley-Rideal mechanism)		
Total	60	

Text Book	1	Atkins. P and Julio de Paula, 2014, "Physical Chemistry" 10th edition, Oxford
	1.	University Press & UK.
Reference	1	Glasstone. S, 2008, "Thermodynamics for Chemists", 11th edition, Ewp Publishers &
Books	1.	USA.
	2	Grow. D.R, 1994, "Principles and applications of electrochemistry", 4th edition, CRC
	4.	Press publishers & UK.
	2	Laidler. K.J, 2003, "Chemical Kinetics", 3rd edition. Pearson Education Publishers &
	3.	India.
1. 1	4	Bockris. J.O.M and Reddy A. K. N, 1998, "Modern Electrochemistry",4th edition,
Leadingtone	4.	Plenum Press & USA.

Journal and Magazines	https://link.springer.com/journal/10800
E-Resources and Website	https://archive.nptel.ac.in/courses/104/101/104101128/

Focus of the Course	Skill Development/Employability	Called and applicable this basic
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Semester - I
CORE IV: ANALYTICAL CHEMISTRY

Semester	Course Code	Course Name	Category	L	Т	P	Credits
I	24CEP1CD	ANALYTICAL CHEMISTRY	CORE	48	12	-	4

Preamble	Preamble This course has been designed for students to learn and understand				
	The nature of errors and their types				
	 Various techniques involved in chromatography 				
	The thermo analytical, Radiochemical, Fluorescent	ace and electroanalytical			
	techniques				
Prerequisi	te Knowledge on Analytical Chemistry				
Course Ou	tcomes (COs)				
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level			
CO1					
COI	Identify the nature of errors and their analysis	K3			
CO2	Apply the various methods of chromatographic techniques	K3			

Mapping with Program Outcomes:						
COs / POs	PO1	PO2	PO3	PO4	PO5	
CO1	1	✓	✓	1	✓ ·	
CO2		✓			✓	
CO3	✓				✓	
CO4		✓	√	1		
CO5	✓		√	✓	✓	

Analyze the various electroanalytical techniques

CO5

K4

24CEP1CD - ANALYTICAL CHEMISTRY Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Data and error analysis Types of errors (accuracy, precision, significant figures) – Frequency distributions (Binomial, Poisson and normal). Describing data - Population and sample - Mean - Variance and standard deviation. Way of quoting uncertainty - Robust estimators - Repeatability and reproducibility of measurements. Hypothesis testing - Levels of confidence and significance - Analysis of residuals	12	Text Book
II	Chromatography Principles, instrumentation and uses of ion exchange - Paper - Thin-layer and column chromatography — HPTLC (High Performance Thin Layer Chromatography) - HPLC (High Performance Liquid Chromatography) — GC-MS (Gas Chromatography and Mass Spectroscopy) - GC-FID (Gas Chromatography and Field Ionization Detector), GC-ECD (Gas Chromatography and Electron Capture Detector) and GC-PFPD (Gas Chromatography and Pulsed Flame Photometric Detector	12	Reference Book
Ш	Spectrophotometry, XRD and fluorescence spectroscopy Principles, instrumentation and applications of Atomic Absorption Spectrophotometry (AAS) - Flame Emission Spectroscopy (FES) and Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES) - Single crystal and powder XRD (X-ray diffraction) - Fluorescence spectroscopy	12	Text Book
IV	Thermal methods of analysis Principles - Instrumentations and applications of thermogravimetry analysis (TGA) - Differential Thermal Analysis (DTA) - TGA and DTA of CaC2O4.H2O (Calcium oxalate monohydrate), CaCO3 (Calcium carbonate) - Differential Scanning Calorimetry (DSC) - PLA (poly lactic acid)	12	NPTEL
v	Electroanalytical techniques Electrochemical sensors - Ion-sensitive electrodes - Glass membrane - Solid - liquid membrane - Gas sensor. Principles and instrumentations of polarography - Cyclic voltammetry - Amperometric titrations	12	You Tube Videos
	Total	60	

		Skoog and West, 2014, "Instrumental methods of analysis" 6th edition, Cengage
Text Book	1	Skoog and West, 2014, "Instrumental methods of differences of the state of the stat
Reference		Publishers & USA. Sharma B.K, 2011, "Instrumental methods of chemical analysis", 1 st edition, Krishna
	1.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Books	-	Prakashan Media pvt. Ltd & New Demi Willard H.W, Merrit. L.I, Dean. J.J.A and Settle. F.A, 2004, "Instrumental methods of
	2	Willard H. W. Meirit. L.I. Dean. S. J. Land South
	2.	analysis". 7 th edition, CBS Publishers & New Delhi
		analysis". 7th edition, CBS Publishers & New Behn Srivastava.V.K and Srivastava. K.K, 1985, "Introduction to Chromatography," 2nd
	3.	Tr 11 D - 0- Norre Vork
100000000000000000000000000000000000000		Hibbert. D.B and Gooding. J.J, 2006, "Data Analysis for Chemistry", 1 st edition,
	4.	Oxford University Press & UK.
		Oxford University Fless & O.K.

Magazines	https://www.jscimedcentral.com/journal-info/JSM-Spectroscopy-and-Chromatography
E-Resources and Website	http://www.issp.ac.ru/ebooks/books/open/X-Ray_Spectroscopy.pdf

The State of		
Learning Method	Chalk and Talk/Assignment/Seminar	
Lanning Menoa		

Focus of the Course	Skill Development/Employability	

24CEP1CP

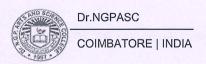
ORGANIC CHEMISTRY

SEMESTER I

Total Credits: 3
Total Instructions Hours: 72 h

S.No	Contents
1	Analysis of two component mixtures-separation and characterization of the components-I
2	Analysis of two component mixtures-separation and characterization of the components-II
3	Analysis of two component mixtures-separation and characterization of the components-III
4	Analysis of two component mixtures-separation and characterization of the components-IV
5	Analysis of two component mixtures-separation and characterization of the components-V
6	Estimation of Phenol
7	Estimation of Aniline
8	Estimation of Glucose
9	Preparation of Acetylsalicylic acid from methyl salicylate
10	Preparation of Benzilic acid from benzoin (rearrangement)
11	Preparation of Benzanilide from benzophenone (rearrangement)
12	Preparation of p-Bromoacetanilide from aniline

Note: Any 10 Experiment



- N.S.Gnanaprakasam and Ramamurthy.G,1998, "Organic Chemistry-Lab Manual",S.Viswanathan Co.Pvt.Ltd & Chennai
- B.S.Furniss, Brain.S, Hannaford A.J, and Antony.J, 2016, "Vogel's Text book of Practical Organic Chemistry", 5th Edition, ELBS/Longman & UK
- 3 F.G.Mann, Saunders, 2011, "Practical Organic Chemistry", 4th Edition, Pearson & India
- V.K.Aluwalia, Bhagat.P and Agarwal.R, 2005, "Laboratory Techniques in Organic Chemistry",", 4th Edition I.K.International Publishing House Pvt. Ltd & New Delhi

Semester - I
DSE I: POLYMER CHEMISTRY

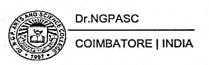
Semester	Course Code	Course Name	Category	L	Т	P	Credits
I	24CEP1DA	POLYMER CHEMISTRY	DSE	48	_	-	4

Preamble	This course has been designed for students to learn and understand • The significance of polymers					
	 Polymer structure, properties and characteristics 	Polymer structure, properties and characteristics				
	 Polymer processing techniques and its applications 					
Prerequisi	te Knowledge on Polymer Chemistry	18513-3447932333333 S. T.				
Course Ou	itcomes (COs)					
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level				
CO1	Summarize the mechanism of polymerization process	K3				
CO2	Categorize the different polymerization techniques	K4				
CO3	Analyze the various characteristics of polymers	K4				
CO4	Examine the structure, properties and fabrication techniques	K4				
CO5	Summarize the functionalities of commercial polymers	K3				

Mapping with	Program Outcom	ies:			
COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	1 34,51734	✓	✓	✓	√
CO2		√	entritainin tarenia Timita urioa	i Salahan an ilah	
CO3	✓	√	alo la regid —	✓	
CO4		ie – warrybag te	✓		
CO5	✓	√		√	1

24CEP1DA - POLYMER CHEMISTRY Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Chemistry of polymers Addition and Condensation polymers - Mechanism (free radical, ionic, Zeigler-Natta polymerization) - Kinetics of polymerization - Kinetic chain length -Factors affecting chain polymerization - Inhibition and retardation - Carother's equation. Difference between polymers and plastics-Compounding of plastics - Fillers, plasticizers, colourants, auto oxidants, fire retardants and thermal stabilizers	10	Text Book
II	Polymerization techniques and types Polymerization Techniques (bulk, solution, suspension, emulsion, melt, interfacial solid-gas phase condensation). Types of copolymerization — Free radical — Ionic — Polycondensation — Copolymer equation — Significance — Monomer and radical reactivity — Q-e scheme - Determination of monomer reactivity ratio — Mayo-Lewis and Fineman Ross methods — Block and graft copolymerization — Methods of preparation and mechanism	08	Reference Book
ш	Polymer characteristics and characterization Types of degradation – Thermal- Mechanical – Photodegradations - The concept of number average and weight average molecular weight methods. Separation of polymers – Precipitation and analytical methods – Determination of molecular weights – Osmotic pressure - Viscosity - Ultra centrifugation. Analysis and testing of polymers - Spectroscopic methods, x-ray diffraction study		Text Book
IV	Polymer properties and fabrication Morphology and order in crystalline polymers – Configuration of polymer chain – Tacticity (Mono and disubstitute polyethylene, polypropylene, polybutadiene). Significance of stereoregularity - Polymer structure and physical properties – Crystalline melting point (Tm) – Melting points of homogeneous series – Effect of chain flexibility and heat of fusion - The glass transition temperature (Tg) Relationship between Tm and Tg - Fabrications of polymers – Moulding, casting and spinning	10	NPTEL
V	Commercial polymers and applications Preparation, properties and applications of polyethylene - Polyvinyl chloride - Polyamides - Polyesters - Polymethylmethacrylate - Polystyrene - Polycarbonates - Phenolic resins and epoxy resins. Types and applications of dendrimers and conducting polymers. Liquid crystalline		You Tube Videos



polymers		
Total	48	

Text Book	4	Gowariker, V.R and Viswanathan N.V. 2019 "Polymer science" 3rd Edition Nov.
	1.	Gowariker. V.R and Viswanathan. N.V, 2019, "Polymer science", 3 rd Edition, New Age International Publishers & New Delhi
Reference Books	1.	Billmeyer. F.W, 2007, "Text book of Polymer science", 3 rd Edition, Wiley India Pvt. Ltd & New Delhi.
	2.	Manas Chanda, 2013, "Introduction to Polymer Science and Chemistry", 2 nd Edition, CRC Press & USA.
	3.	Goel R. Fried, 2003, "Polymer science and technology", 2 nd Edition, Prentice Hall & New Jersey
	4.	George Odian,2007, "Principles of polymerization", 4 th Edition, Wiley India Pvt. Ltd & New Delhi.

Journal and Magazines	https://onlinelibrary.wiley.com/journal/26424169
E-Resources and Website	https://nitsri.ac.in/Department/Chemical%20Engineering/M3Polymer_Technology.pdf

Learning Method	Chalk and Talk/Assignment/Seminar	ony entovare
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Focus of the Course	Skill Development/Employability
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K3

Semester - I DSE I: INDUSTRIAL CHEMISTRY

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	24CEP1DB	INDUSTRIAL CHEMISTRY	DSE	48	-	-	4

Preamble	This course has been designed for students to learn and under	erstand	
	The properties and manufacture of glass products		
	The coating techniques		
	The classification and properties of alloys		
Prerequisit	Knowledge on industrial chemistry	Targett (
Course Ou	tcomes (COs)		
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level	
CO1	Summarize the properties and preparation of glass products	K3	
CO2	Utilize the coating process of paint and pigments	К3	
CO3	Illustrate the various types and properties of alloying materials	K3	
CO4	Analyze the types and manufacturing process of fertilizer	K4	

Mapping with F	Program Outcom	nes:	likterokjes var-	mode utiliza	97.97.79
COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓		√	✓	√
CO2		✓	✓		
CO3	✓	✓		✓	√
CO4			✓		
CO5	✓	✓		1	√

manufacturing process of

Develop the various types and

cement and ceramics

CO5

24CEP1DB - INDUSTRIAL CHEMISTRY

Syllabus

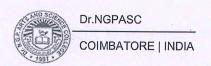
Unit	Content	Hours	E-Contents / Resources
1	Silicon industries Glass: Glassy state and its properties, classification (silicate and non-silicate glasses). Manufacture and processing of glass - Composition and properties of the glasses - Soda lime - Lead - Armoured - Safety - Borosilicate - Fluorosilicate - Coloured - Photosensitive. Chemistry of refractories and Abrasives	10	Text Book
II	Surface coatings Objective of coating surfaces - Preliminary treatment of surface - Classification of surface coatings - Paints and pigments - Formulation and composition of Oil paint, Vehicle, Pigments, toners and lakes pigments, Fillers, Thinners, Enamels, emulsifying agents - Special paints (Heat retardant, Fire retardant, Eco-friendly paint, Plastic paint). Wax polishing-Water and Oil paints - Metallic coatings (electrolytic and electroless). Metal spraying and anodizing	10	Reference Book
Ш	Alloys Classification of alloys (ferrous and non-ferrous) -Specific properties of elements in alloys. Manufacture of Steel (removal of silicon decarbonization, demanganization, desulphurization and dephosphorization, Surface treatment, argon treatment, heat treatment, nitriding, carburizing). Composition and properties of different types of steels	10	Text Book
IV	Fertilizer Different types of fertilizers. Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates, polyphosphate, superphosphate, and triple super phosphate. Compound and mixed fertilizers - Potassium chloride - Potassium sulphate.	10	NPTEL
V	Ceramics and cements Ceramics: clays and feldspar-Manufacture of ceramics and their types - High technology ceramics and their applications - Superconducting and semiconducting oxides - Fullerenes - Carbon nanotubes and carbon fibre. Cements: Classification of cement - Ingredients and their role - Manufacture of cement and the setting process- Quick setting cements	8	You Tube Videos
	Total	48	

Text Book	1	Jain and Jain, 2017," Engineering Chemistry", 17th edition, Dhanpat Rai &
	1.	Sons&New Delhi
Reference	1	Sharma.B .K , 2003 ,"Industrial Chemistry", 22 nd edition , Goel Publishing House &
Books	1.	Meerut.
	2	White. H.L, 1986, "Introduction to Industrial Chemistry", 1st edition, A Wiley
Dard as	4.	Interscience Publication & USA.
	2	Pawar. R.A, Gugale. G.S, Nagawade. A.V, Gadave. K.M, 2017, "A Book of Industrial
	٥.	Chemistry",1 st edition, NiraliPrakashan Publishers & Pune.
	1	Alan Heaton, 1996, "An Introduction to Industrial chemistry", 3 rd edition, Chapman &
	4.	Hall Publishers & UK.

Journal and Magazines	https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SCH1604.pdf
E-Resources and Website	https://www.scribd.com/document/491788610/Metal-and-Metal-Alloys-Notes#

Learning Method	Chalk and Talk/Assignment/Seminar
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Focus of the Course	Skill Development/Employability	
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Semester - I DSE I : GREEN CHEMISTRY

Semester	Course Code	Course Name	Category	L	T	P	Credits
			Tekatyen assa			e q	
I	24CEP1DC	GREEN CHEMISTRY	DSE	48	_	_	4

Preamble	This course has been designed for students to learn and un-	This course has been designed for students to learn and understand				
	The basics of Green chemistry					
	The advantages of green synthetic methods of orga	nic compounds				
B	• The reactions and applications of green chemistry					
Prerequisi	ite Knowledge on Green Chemistry					
Course Or	itcomes (COs)	(Constant Bang)				
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level				
CO1	Gain knowledge on green chemistry principles	K3				
CO2	Understand various methods of Green synthetic routes	K3				
CO3	Develop the basic knowledge of the various green reactions	K3				
CO4	Compare Aqueous phase, Solid state and PTC reactions	K4				
CO5	Analyze the Photochemical, Microwave, Sonication and Ionic liquid reactions	К3				

Mapping with 1	Program Outco	mes:	T. BUS. C. ASSOCIATION.	Cook of Cook	Had I
COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	State been and	Politice System	1	✓
CO2		1	√	63.000	
CO3	✓	✓	t or amplies a	✓	
CO4	✓	Made die	√	ol eurocen	√
CO5	√	√	Citor de regione d	√ management	✓

24CEP1DC - GREEN CHEMISTRY Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Principles of green chemistry Twelve principles of green chemistry - Explanation. Planning a green synthesis - Percentage atom utilization - Evaluating type of reaction involved - Selection of appropriate solvent - Reagent - Protecting groups - Use of catalyst - Energy requirement	10	Text Book
II	Green synthesis Adipic acid - Catechol - Disodiumiminodiacetate - Hoffmann elimination - Benzoic acid from methyl benzoate - Toluene - Diels-Alder reaction- Decarboxylation - Safe marine antifoulant	10	Reference Book
m	Green reactions Mechanism and application of Acyloin condensation - Aldol condensation - Arndt-Eistert-synthesis - Baeyer-Villiger oxidation - Baker Venkatraman Rearrangement -Barbier reaction - Barton reaction - Baylis-Hillman Reaction - Backmann rearrangement - Benzil-Benzilic rearrangement - Biginelli reaction	10	Text Book
IV	Aqueous phase, solid state and PTC reactions Aqueous phase reaction - Hydrolysis of methyl salicylate - Chalcone - p-ethoxy acetanilide- p-acetamido phenol - Vanillidene acetone. SFE (Super Critical Fluid Extraction) - Liquid CO ₂ in green synthesis. Solid state - Diphenyl carbinol - Phenyl benzoate - Azomethines. PTC (Phase Transfer Catalyst) reaction - Phenylisocyanide- Diphenyl-7-Hydroxy- coumarin	10	NPTEL
V	Photochemical, microwave, sonication and ionic liquid reactions Photochemical reactions - Benzopinacol, trans Azobenzene to cis-azobenzene, trans stilbene to cis-stilbene. Microwave reactions-3-methyl-1-phenyl-5-pyrazolone, copper phthalocyanine. Sonication reaction - Butyraldehyde, 2-chloro-N-Aryl anthranilic acid. Ionic liquid reactions-1-Acetyl naphthalene - Ethyl-4-methyl-3Cyclohexenecarboxylate	8	You Tube Videos
	Total	48	

Text Book	1.	Ahluwalia. V. K. 2011, "Green Chemistry-Greener Alternatives to synthetic alternatives to synthetic organic transformations", 1 st edition, Narora Publishing House & New Delhi.
Reference Books	1.	Ahluwalia V. K, 2019, "Green Chemistry", 3 rd edition, Ane Books India & NewDelhi.
	2.	Asim. K. Das and Madhua. Das, 2012, "Environmental Chemistry with Green Chemistry", Books and Allied Pvt. Ltd &New Delhi.
	3.	Rashmi S, Srivastava M.M, 2009. "Green Chemistry" 4 th edition, NarosaPublishing House & New Delhi.
	4.	Indu Tucker Sidhwani, Rakesh K. Sharma, 2020," An Introductory Text on Green Chemistry: For Undergraduate Students", 1 st edition, Wiley & Sons & Germany

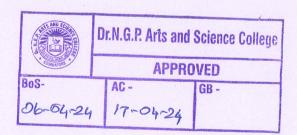
Journal and Magazines	https://simons.hec.utah.edu/papers/BOOK2_C7.PDF
E-Resources and Website	https://www.uou.ac.in/sites/default/files/slm/MSCCH-604.pdf

Learning Method	Chalk and Talk/Assignment/Seminar	
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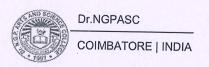
Focus of the Course	Skill Development/Employability			
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Bos Chairman/HoD

Department of Chemistry
Dr. N. G. P. Arts and Science College
Coimbatore – 641 048







Semester - II
CORE : STEREOCHEMISTRY AND PERICYCLIC REACTIONS

Semester	Course Code	Course Name	Category	L	T	P	Credits
п	24CEP2CA	STEREOCHEMISTRY AND PERICYCLIC REACTIONS	CORE	48	12	_	4

Preamble	This course has been designed for students to learn and unde	erstand			
	The basic principles of stereochemistry and conformation compounds	tional analysis of organic			
	 About photochemistry and pericyclic reaction mechanisms The basic knowledge about various molecular rearrangement reactions 				
Prerequisi	te Knowledge in organic chemistry, stereochemistry and reacti	on mechanisms			
Course Ou	itcomes (COs)				
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level			
CO1	Outline the stereochemistry of organic molecules in 3-D arrangements	К3			
CO2	Interpret the various methods of conformational analysis of organic molecules	K3			
CO3	Categorize the various light induced photo reactions and their rearrangements	K4			
CO4	Examine the basic principles involved in the pericyclic reactions	К3			
CO5	Analyze the reaction mechanism of various molecular rearrangement reactions	K4			

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	2011112	✓	✓	
CO2		✓			✓
CO3	✓	✓	200, 5 - 34 - 1	√	✓
CO4	√	✓	1	✓	✓
CO5	√	✓	✓		✓

24CEP2CA

CORE: STEREOCHEMISTRY AND PERICYCLIC REACTIONS

Syllabus

Unit	Content	Hours	E-Contents Resources
	Stereochemistry		
I	Stereoisomerism – Symmetry – Enantiomers and diastereomers – R and S / E and Z nomenclature. Topicity – Homotopic, heterotopic, enantiotopic and diastereotopic systems. Stereochemistry of biphenyls, allenes, spiranes, ansa compounds and helical structures. Asymmetry synthesis – Cram's and Prelog's rules	12	Text Book
	Conformational Analysis		Marine 14, 77
п	Conformational analysis of acyclic system: Conformations of ethane, butane and halogenoalkanes - Effect of conformation on reactivity - Addition and elimination reaction of acyclic systems. Conformational analysis of cyclic compounds: Cyclohexane -	12	Reference Book
	Mono and disubstituted cyclohexane. Conformation and reactivity of cyclohexane derivatives. Conformation of decalins		
	Organic Photochemistry		
ш	Fundamental concepts – Energy transfer – Characteristics of photoreactions – Photoreduction, photooxidation and photosensitization. Photoreactions of ketones and enones – Norrish type I and II reactions – Paterno-Buchi reaction – Photo-Fries rearrangement – Photochemistry of alkenes, dienes and aromatic compounds – di- π-methane rearrangement – Barton reaction		Text Book
11 23	Pericyclic Reactions		- 19.4
IV	Concerted reactions: Conservation of orbital symmetry – Woodward-Hoffman rules. Electrocyclic reactions – 1,3-dienes and 1,3,5-trienes. Analysis of reaction using orbital correlation diagram and FMO methods. Cycloadditions [2+2] and [4+2] – Analysis using correlation diagram and FMO methods. Sigmatropic rearrangements – Cope and Claisen rearrangements	12	NPTEL
	Molecular Rearrangements		
V	Classification – Mechanism and applications of Wagner - Meerwein, Neber, Baeyer–Villiger, Dienone phenol, Favorski, Benzidine, Stevens, Schmidt, Lossen and Wallach rearrangements	12	You Tube Videos
	Total	60	

Text Book		Nasipuri D, 2018, "Stereochemistry of Organic Compounds: Principles and			
TOAT DOOR	Applications", 3 rd Edition, New Age International Publishers & New Delhi				
Reference	1.	Sanyal S. N, 2019, "Reactions, Rearrangements and Reagents", 4th Edition, Bharati			
Books	1.	Bhawan Publishers & Distributors & New Delhi			
	2	Michael B Smith B, 2015, "March's Advanced Organic Chemistry: Reactions			
	2.	Mechanisms and Structure", 7th Edition, Wiley & New Delhi			
	2	Kalsi P. S, 2022, "Stereochemistry: Conformation and Mechanism", 11th Edition, New			
	3.	Age International Private Limited & New Delhi			
		DePuy C. H, 1972, "Molecular Reactions and Photochemistry", 1st Edition, Prentice			
	4.	Hall & New Delhi			

Journal and Magazines	Chatwal G. R, 2010, "Organic Photochemistry", 1st Edition, Himalaya Publications house & New Delhi
E-Resources and Website	https://www.alchemyst.co.uk/pdf/Organic/pericyclics.pdf

		16.0 T 18 V 19.0
Learning Method	Chalk and Talk/Assignment/Seminar	

Focus of the	Skill Development/Employability	
Course	the first of what are below the	

Semester - II
CORE: BIO-INORGANIC CHEMISTRY

Semester	Course Code	Course Name	Category	L	Т	P	Credits
п	24CEP2CB	BIO-INORGANIC CHEMISTRY	CORE	48	-	-	4

Preamble	This course has been designed for students to learn and und	erstand
	 The structure and bonding of Cobalamines, I Hemoglobin The structure and reactions of Metal alkylide complexes The importance of trace elements in biological applications of bioinorganic compounds 	ene, alkene and alkyne
Prerequis		
	utcomes (COs)	All Carter Madelle
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Explore the broad idea about the Cobalamines, Heme and Non-Proteins Hemoglobin	K4
CO2	Analyze the synthesis and reactivity of Metal alkylidene, alkene and alkyne complexes	K4
CO3	Examine the synthesis and applications of metallocene compounds	К3
CO4	Interpret toxic and non-toxic metal ions to the biological systems	K4
CO5	Survey the role of inorganic complexes in medicinal applications	K4

Mapping with P	rogram Outcome	es:			
COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	√			✓	1
CO2		✓	√		
CO3	✓	✓		✓	
CO4			✓		
CO5	✓	✓		✓	✓ ```

24CEP2CB

CORE: BIO-INORGANIC CHEMISTRY

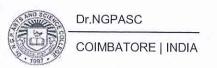
Syllabus

Unit	Content	Hours	E-Contents / Resources
>	Cobalamines, Heme and Non-Proteins Hemoglobin		
I	Reactions of the alkyl cobalamins – One-electron Reduction and Oxidation – Co-C Bond Cleavage – Coenzyme B12 – Alkylation reactions of methyl cobalamin. Hemoglobin and Myoglobin – Oxygen transport and storage – Electron transfer and Oxygen activation. Cytochromes, Ferredoxins and Rubredoxins – Model systems, mononuclear non-heme iron enzymes	10	Text Book
п	Metal ions in biological system Classification of elements according to their action in biological systems, Na & K ion transport, Na / K pump. Consequences of excess and deficiency of trace metals. Toxicity of metal ions (Hg, Pb, Cd and As) - Reasons for toxicity. Use of chelating agents in medicine - Cis platin mode of action	09	Reference Book
ш	Nitrogen fixation and Photosynthesis Nitrogenase enzyme: Introduction, types of nitrogen fixing microorganisms, metal clusters in nitrogenase. Nitrogen fixation pathway. Biological redox reactions. Chlorophyll - Light and dark phase reactions of photosynthesis		Text Book
IV	Metal-alkylidene/alkene/alkyne complexes Synthesis of alkylidene complexes in low oxidation states and in high oxidation states. Alkene complexes - Synthesis - Bonding - Reactivity - Ligand substitution - Reactions with nucleophiles. Alkyne complexes - Synthesis by reduction method. Insertion reactions - Cobalt catalyzed alkyne cycloaddition with nitrile, alkene and alkyne	10	NPTEL
V	Metallocenes Cyclopentadienyl complexes - Metallocenes - Synthesis of metallocenes - Reactions of metallocenes - Bonding, redox and substitution reactions of ferrocene - Application of ferrocenes - Blood glucose sensors - Synthesis of bent metallocene complexes - Reactivity of bent metallocenes - Substitution, bonding and structure of arene complexes	09	You Tube Videos
162	Total	48	

Text Book	1.	Asim K Das, 2013, "Bioinorganic chemistry", 5th Edition, Books & Allied Pvt Ltd &
Reference Books	1.	Kolkatta Stephen J Lippard, 2005, "Principles of Bioinorganic Chemistry", 2 nd Edition, Panima publishing corporation & New Delhi
Dooks	2.	Rosette M Roat-Malone, 2007, "Bioinorganic chemistry" - A short course, 2 nd Edition, A John Wiley & Sons Inc. Publication & US
	3.	Dieter Rehder, 2014, "Bioinorganic chemistry", 1st Edition, Oxford University Press & New Delhi
	4.	Dharam Prakash, 2018, "Bioinorganic chemistry", 1 st Edition, Arjun Publishing House & New Delhi

Journal and Magazines	https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000005CH/P000670/M0139 91/ET/1455878224CHE_P15_M5_e-Text.pdf
E-Resources and Website	https://books.google.co.in/books/about/Metallocenes_An_Introduction_to_Sandwich.html?id=pwppQgAACAAJ&redir_esc=y

Learning Method	Chalk and Talk/Assignment/Seminar	C. Parker	
Focus of the	Skill Development/Employability		



Course

Semester - II
CORE: MOLECULAR SPECTROSCOPY

Semester	Course Code	Course Name	Category	L	Т	P	Credits
II	24CEP2CC	MOLECULAR SPECTROSCOPY	CORE	48	12	_	4

Preamble	This course has been designed for students to learn and understand		
	• The principle and application of different types of molecular spectroscopy		
	 The basic knowledge on influence of electromagnetic radiation and associated physical events 		
	The use of spectroscopic techniques for structural investigation		
Prerequisite	Knowledge on application of electromagnetic spectrum		

Course Outcomes (COs)

CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level	
CO1	Outline the fundamental concepts of microwave spectroscopy	K3	
CO2	Apply intense knowledge on the principles and instrumentation of IR and electronic spectroscopy	K4	
CO3	Develop the basic principles of NMR spectroscopy	K5	
CO4	Analyze the 2D techniques involved in NMR spectroscopy	K4	
CO5	Utilize the basic principles involved in ESR spectroscopy to understand the structural features of complexes	K4	

Tapping with Pr	rogram Outcom	es:			
COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓		1	✓
CO2	· v in the many	✓	✓	geria - unicionis	✓
CO3	√	✓		✓	✓
CO4			✓		
CO5	√	✓	air, i ^t ajar ji saddij l	/	✓

24CEP2CC

CORE: MOLECULAR SPECTROSCOPY

Unit	Content	Hours	E-Contents Resources
	Microwave Spectroscopy		
radiation with molecules - Types of Factors affecting line width and ir ratio and resolving power. Microwave Spectroscopy - Rotation spectra of rigid rotator - Intensities of isotopic substitution - Rotation rotator - Linear & symmetric top Applications of microwave spectroscopy.		12	Text Book
	Microwave Spectroscopy - Rotation of molecules - Rotational spectra of rigid rotator - Intensities of rotational lines - Effect of isotopic substitution - Rotational spectrum of non-rigid rotator - Linear & symmetric top molecules - Stark effect. Applications of microwave spectroscopy - Determination of bond length-Bond angle -Dipole moment -Atomic mass	12	Text Book
	Infrared and Electronic spectroscopy		
	Electronic Spectra of diatomic molecules - Frank Condon principle - Vertical transitions - Selection rules - Parity, symmetry and spin selection rules - Polarization of transitions - Russell Sanders coupling - Different types of electronic transitions -Instrumentation of UV-Visible spectroscopy		Reference
П	Infrared Spectroscopy: Vibration of diatomic molecule - Harmonic and anharmonic oscillators — Fermi resonance - Selection rules - Vibrations of polyatomic molecules - Molecular vibrations - Types of molecular vibrations - Rotational vibrational spectra of linear and symmetric top molecules — Factors influencing vibrational frequencies - Fourier transformation in IR spectroscopy - Instrumentation	12	Book
	Nuclear Magnetic Resonance (NMR) Spectroscopy-I		
ш	Chemical shift - Factors affecting chemical shift - Nuclear spin states and NMR active nuclei - Nuclear magnetic moments - Mechanism of resonance absorption - Population of nuclear spin states. Multiplicity - Coupling constant - First order and second order proton - Dependence of J on dihedral angle - Vicinal and geminal coupling constants - Karplus equation - Long range coupling constants - Factors influencing coupling constant - Splitting of NMR signals - AB, AX and AMX types - Influence of stereochemical factors on chemical shift of protons	12	Text Book
IV	Nuclear Magnetic Resonance (NMR) Spectroscopy-II 13C nucleus - Chemical shift - Spin -spin splitting - Double resonance techniques - Homonuclear and hetero nuclear	12	NPTEL

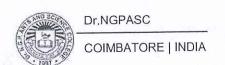
	Total	60	
V	Theory - Electron spin - Zeeman effect — Presentation of the spectrum - EPR spectrum of hydrogen and methyl radicals (first order treatment) - g factor - Hyperfine splitting - Nuclear spin interaction with electron spin - Hyperfine coupling constants - EPR spectra of organic radicals (AA and AB type). Theory of EPR spectroscopy — Spin densities and McConnell relationship — Factors affecting the magnitude of g and A-Tensors in metal species — Zero-field splitting- Kramer's degeneracy - Applications of EPR	12	You Tube Videos
	Electron Spin Resonance (ESR) Spectroscopy		
	FT and 2D NMR spectroscopy: FID-DEPT-J-resolved-H-H-COSY-C-H-COSY-NOESY		
	decoupling - Broad band decoupling - Off resonance decoupling - ¹³ C relaxation mechanism - Overhauser effect		

Text Book	1.	Pavia. D. L, 2011, "Spectroscopy", 5th Edition, Brooks/Cole Publications & UK
Reference Books	1.	William Kemp, 2008, "Organic Spectroscopy", 3rd Edition, Palgrave Publications & US
	2.	Banwell, C. N, 2017, "Fundamentals of molecular spectroscopy", 4 th Edition, Mc Graw Hill Book Company & London
Exited.	3.	Kalsi P. S, 2014, "Spectroscopy of Organic Compounds", 6 th Edition, New Age International (P) Ltd & New Delhi
	4.	Silverstein R. M, 2009, "Spectrometric Identification of Organic compounds, 6 th Edition, John Wiley Publications & Germany

Journal and Magazines	Sharma Y. R, 2013, "Elementary Organic Spectroscopy", 5 th Edition, S. Chand and Company Pvt Ltd & New Delhi
E-Resources and Website	https://ccsuniversity.ac.in/bridge-library/pdf/Msc-chemistry-psct-unit-3.pdf

Learning Method	Chalk and Talk/Assignment/Seminar	

Farms of the	Skill Development/Employability	
Focus of the	Skill Developmend Employability	
Course		



1	COI	Semester – II RE PRACTICAL: INORGANIC	CHEMIST	RY			
Semester	Corse Code	Course Name	Category	L	T	P	Credits
п	24CEP2CP	INORGANIC CHEMISTRY	CORE	_	-	96	4

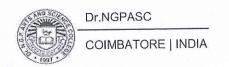
	This course has been designed for students to learn and understand
Preamble	 The method of analysis to identify common and rare cations The practice to estimate metal ions present in the mixture
	• The procedure to perform complexometric and colorimetric estimations
Prerequisite	Knowledge on classification of metals in to groups

CO CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Evaluate cations present in the inorganic mixtures	K4
CO2	Analyze common and rare cations present in the inorganic mixtures	K4
CO3	Estimate gravimetrically the metals present in the mixture	K3
CO4	Interpret the complexometric titration of metals	K4
CO5	Identify metal concentration using colorimeter	K3

Cos / POs	PO1	PO2	PO3	PO4	PO5
CO1		✓	1	√	/
CO2	✓	✓			✓
CO3	✓		✓	√	✓
CO4	✓	✓		✓	✓
CO5	V	√	√	√	

24CEP2CP | CORE PRACTICAL: INORGANIC CHEMISTRY

S.No	Contents
1	Analysis of Inorganic Mixture - I
2	Analysis of Inorganic Mixture - II
3	Analysis of Inorganic Mixture - III
4	Analysis of Inorganic Mixture - IV
5	Volumetric and gravimetric estimations of Cu and Ni
6	Volumetric and gravimetric estimations of Zn and Cu
7	Volumetric and gravimetric estimations of Fe and Zn
8	Estimation of Calcium
9	Estimation of Magnesium
10	Estimation of Zinc
11	Estimation of Iron
12	Estimation of Copper
Manuals	 Venkateswaran V, Veeraswamy R and Kulandaivelu A. R, 2017, "Principles of Practical Chemistry", 1st Edition, Sultan Chand & Sons & New Delhi Ramanujam V. V, 1988, "Inorganic Semimicro Qualitative Analysis", 3rd Edition, National Pubs & London
Learnin	g Method Hands on Experiments
Focus of t	the Course Skill Development



Semester - II EDC: DRUG BIOCHEMISTRY

Semester	Course Code	Course Name	Category	L	Т	P	Credits
II	24BCP2EA	DRUG BIOCHEMISTRY	EDC	48	-	_	4

Preamble	 This course has been designed for students to learn and understand The drug types, characteristics, and action of drugs on the body The basic knowledge on mechanism of action, therapeutic uses, kinetics and adverse effects of drugs used for various clinical conditions The principles of chemotherapy, treatment strategies for cancer
Prerequisite	Basic knowledge on drug Biochemistry

Course Outcomes (COs)

CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Illustrate the concepts of pharmacokinetics	K3
CO2	Explain the key principles of pharmacodynamics	K3
CO3	Analyze the mechanism of drugs acting on Central Nervous system	K4
CO4	Examine the mechanism of action of drugs for peptic ulcer, inflammation, thyroid disorders and diabetes	K4
CO5	Illustrate the mechanism of anticancer drugs and basic concepts in patenting of drugs	K3

Mapping with Program Outcomes:						
COs / POs	PO1	PO2	PO3	PO4	PO5	
CO1	✓	✓		✓	✓	
CO2		✓	✓ .	✓		
CO3	✓	✓	√	✓	✓	
CO4		✓	✓	√	✓	
CO5	✓	✓	~	✓	✓	

24BCP2EA

EDC: DRUG BIOCHEMISTRY

Unit	Content	Hours	E-Contents / Resources
Ι	Pharmacology and Pharmacokinetics Pharmacology: Classification of drugs, sources, Routes of drug administration: sublingual, buccal, oral, rectal, intravenous, intramuscular, subcutaneous, transdermal, inhalational and topical administration. Pharmacokinetics: drug absorption, drug distribution, drug biotransformation (role, formation, and phases), drug excretion: quantitative pharmacokinetics, bioavailability, drug clearance.	10	Text Book, Reference book, NPTEL and E-Resources
п	Pharmacodynamics Drug receptors: Types, classification, drug-receptor interaction, Agonist, antagonist, Inverse agonist, partial agonist. Dose-response relationships (graded and quantal). Adverse effects of drugs. Factors affecting drug safety and efficacy.	8	Text Book, Reference book, NPTEL and E-Resources
m	Antidepressant drugs and neurodegenerative diseases Antidepressant drugs: Mechanism of action and therapeutic uses of tricyclic antidepressants and monoamine oxidase inhibitors. Treatment of neurodegenerative diseases: Parkinson's Diseases - Introduction, Monoamine oxidase inhibitors. Alzheimer diseases- Mode of action Galantamine, rivastigmine. Hypnotic drug – zolpidem or zaleplon.	10	Text Book, Reference book, NPTEL and E-Resource
IV	Drugs for peptic ulcer, inflammation, thyroid disorders and Diabetes Anti-peptic ulcer drugs: H2 receptor antagonists and inhibitors of H+K+ ATP-ase pump. Anti-inflammatory drugs: Mechanism of action, therapeutic uses, pharmacokinetics, and adverse effects of Anti-inflammatory drugs -aspirin and colchicine. Antimicrobial drugs — Sulfonamides trimethoprim, penicillin, aminoglycosides, and bacterial resistance. Thyroid and anti- thyroid drugs, Insulin, and oral anti-diabetic drugs	10	Text Book, Reference book, NPTEL and E-Resource
V	Anticancer drugs	10	Text Book Reference

Total	48	
Anticancer drugs: Mode of action and its mechanism - Cyclophosphamide & methotrexate. Antibiotics (Dactinomycin & Bleomycin), microtubule inhibitor (Vincristine & Vinblastine). Patenting of Drug, Marketing, and Computer aided drug design.		book, NPTEL and E-Resources

Text Book	1.	D George M. Brunner, Craig W. Stevans, 2011,"Pharmacology",Third Edition, Saunders, an imprint of Elsevier Inc, United States.
	2.	Tripathi, K.D., 2019, "Essentials of Medical Pharmacology", Seventh Edition, Jaypee Brothers, Medical Publishers, New Delhi.
Reference Books	1.	Satoskar, R. S, Nirmala N, Reje, Bhandarkar S. D, 2011, "Pharmacology and Pharmacotherapeutics", Twenty second Edition, Popular Prakashan Pvt. Ltd, India
	2.	Laurence L. Brunton, Bjorn C. Knollmann, 2023, "Goodman & Gilmans The Pharmacological Basis of Therapeutics", Fourteenth Edition, McGraw Hill / Medical., India.
ر ساست	3. Sangeeta Sharma and Dinesh K. Badyal, 2022, "LIR Pharmacology", Secon Wolters India Pvt. Ltd., Haryana.	
	4.	Bertram G Katzung, Susan B Masters, Anthony J Trevor, 2012, "Basic & Clinical Pharmacology", Twelfth Edition, McGraw Hill Medical., Newyork.

Journal and Magazines	https://www.scimagojr.com/journalsearch.php?q=20063&tip=sid https://www.sciencedirect.com/journal/biochemical-pharmacology https://www.longdom.org/biochemistry-pharmacology-open-access.html	
E-Resources and Website	https://dth.ac.in/medical/courses/pharmacology/1/8/index.php https://www.coursera.org/courses?query=pharmacology	

Learning Methods	Chalk and Talk/Assignment/Seminar		
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Focus of the	Skill Development/Employability	
Course		

Semester - II DSE: COSMETIC CHEMISTRY

Semester	Course Code	Course Name	Category	L	T	P	Credits
П	24CEP2DA	COSMETIC CHEMISTRY	DSE	48	-	-	4

Preamble	This course has been designed for students to learn and understand			
	 The basic principles of Skin creams and Humec 	tants		
	 About the methods of Mask and Aroma therapy The knowledge about the various methods of Oils extraction 			
Prerequisi				
	itcomes (COs)			
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level		
CO1	Understand basics of Skin Creams and Humectants	K3		
CO2	Analyze the Bath and Oils	K3		
CO3	Summarize the methods of Mask and aroma therapy	K3		
CO4	Illustrate the separation of Essential and Flower oils	К3		
CO5	Analyze the various methods of oils	K4		

apping with	Program Outcom	ies:			Contract
COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2		✓		✓	✓
CO3	✓	✓	1	✓	✓
CO4	✓				
CO5	✓	✓	✓		✓

24CEP2DA

DSE: COSMETIC CHEMISTRY

Unit	Content	Hours	E-Contents Resources
	Skin Creams and Humectants		
I	Skin Creams - Introduction, classification of skin creams, cleansing creams, night and massage creams, moisturizing, vanishing and foundation creams, pigmented foundation creams, hand creams, hand and body cream. Humectants — Introduction, drying out, types, hygroscopicity, stability, safety and applications. Antioxidants and application of antioxidants	10	Text Book
п	Bath and Oils Bath Preparation: Foam baths, Introduction, formulation and foam baths, types of products, product assessment, bath salts, ingredient and formulations. Bath Oils: Introduction floating and spreading oils, dispersible or blooming oils soluble oils, foaming oils	10	Reference Book
ш	Mask and Aroma therapy Setting masks - Peel off masks - Thermal types - Paraffin wax masks - Non-setting masks - Hot oil masks. Aroma therapy - Methods of extraction of essential oils. Blending & precautions, properties of essential oils and carrier oils. Patch testing, safety & precautions - Different aroma therapy formulations for skin and hair care	10	Text Book
IV	Essential and Flower oils Essential oils – Methodology of production, steam and water distillation. Treatment of condensate water after distillation - Flower oils – Extraction with cold fat and hot fat, alcoholic extracts, absolute of enfleurages and chassis. Extraction with volatile solvents, selection of solvent and extraction apparatus	10	NPTEL
V	Isolation of Oils Isolates — Methods of Isolation, properties and uses of following- Eugenol, pinene, linalool, citral and geraniol. Flavours — Sources and properties of vanilla, rose, pineapple, peppermint, mango, raspberry, orange and lemon	8	You Tube Videos
	Total	48	

Text Book	1	Poucher W. A. 2012, "Perfumes, Cosmetics and Soaps: Volume II The Production,
	I.	Manufacture and Application of Perfumes", 9th Edition, Springer, USA & New York
Reference		Vimaladevi M, 2019, "Text book of herbal cosmetics", 10th Edition, Satguru
Books	I.	Publications, India & New Delhi
	2.	Deore S. V, Gaikwad, S. D, Gaikwad D. D and Gugale G. S. 2022, "Chemistry of
	2.	Cosmetics and Perfumes", 1st Edition Nirali Prakashan, India & New Delhi
- 11-00-10-10		Butler H. 2010, Poucher's "Perfumes, Cosmetics and Soaps", 10th Edition
	3.	Springer, USA & New York
		Asha Ram, 1997, "Herbal Indian Perfumes and Cosmetics", 4th Edition Sri Satguru
	4.	Publications, India & New Delhi

Journal and Magazines	https://agritech.tnau.ac.in/horticulture/extraction_methods_natural_essential_oil.pdf
E-Resources and Website	https://www.hsrd.research.va.gov/publications/esp/aromatherapy.pdf

Learning Method	Chalk and Talk/Assignment/Seminar

Focus of the	Skill Development/Employability	
Course		

Semester - II DSE: ELECTROCHEMISTRY

Semester	Course Code	Course Name	Category	L	T	P	Credits
II	24CEP2DB	ELECTROCHEMISTRY	DSE	48	-	-	4

Preamble	This course has been designed for students to learn and under	erstand					
	 The efficiency of battery and discharge cycle The different types of fuel cells and other storage devices 						
	The technology behind battery electric and hybrid ve	The technology behind battery electric and hybrid vehicles					
Prerequisi	te Basic knowledge on electrochemical concepts applied to en	ergy storage devices					
Course Ou	tcomes (COs)						
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level					
CO1	Understand the basic concept of electrochemistry related to battery	К3					
CO2	Explain the concept of primary and secondary batteries and to explore their operations K4						
CO3	Compare the different batteries used in electric and hybrid vehicles	К3					
CO4	Analyze the operations of batteries in hydrogen and other types of fuel cells K4						
CO5	Identify the other energy storage devices such as ultra- capacitors, flywheels and compressed air	K4					

Mapping with P			Marie 1		
COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	√	✓	*	✓
CO2		✓		✓	√
CO3	✓	✓	✓	√	✓
CO4	✓				
CO5	√	✓	1		/

24CEP2DB

DSE: ELECTROCHEMISTRY

Unit	Content	Hours	E-Contents / Resources
	Electrochemistry		
I	The reaction quotient (Q), for a chemical reaction - The potential (E), for non-standard conditions using the Nernst Equation - Rate of reaction and types of over-voltages in galvanic and electrolytic cells and the Tafel Equation - Efficiency of chemical energy conversion: batteries versus heat engines	10	Text Book
W 11-1	Batteries	44-	
п	Primary batteries - Secondary batteries - Battery charging and discharging curves for secondary batteries - Specific power and specific energy, Ragone plot - Energy efficiency of batteries, energy out during discharge - Energy in during charge - Energy efficiency of batteries versus heat engines for converting chemical energy into work	10	Reference Book
	Batteries for Electric and Hybrid Vehicles		
ш	Battery packs, voltage and state of charge, coulomb counting - Energy in a battery (kWh) and charge in a battery (Ah); C- Rate of charging and discharging, Peukert equation - Coulombic efficiency of batteries and battery lifetime - Button type battery - Difference between cells and batteries	10	Text Book
	Fuel Cells		
IV	Fuel cells - Description - Working principle - Anodic, cathodic and cell reactions. Fabrication of electrodes and other components. Applications, advantages, disadvantages and environmental aspects of the following types of fuel cells: Proton Exchange Membrane Fuel Cells - Alkaline fuel cells - Phosphoric acid - Solid oxide, Molten carbonate and direct methanol fuel cells	10	NPTEL
	Additional energy storage devices and Renewable energy		
V	Hydrogen fueling system and hydrogen storage aboard vehicles - Comparison of fuel cells and batteries for powering electric vehicles. Capacitors - Super capacitor storing charge - Flywheels: storing kinetic energy - Compressed air: storing potential energy - Renewable energy and synergy with electric vehicles.	8	You Tube Videos
24	Total	48	

Text Book	1.	Aubrecht G, 2005, "Energy: Physical, Environmental, and Social Impact" 3 rd Edition, CA: Pearson Addison-Wesley & San Francisco
Reference Books	1.	Barbir F, 2012, "PEM Fuel Cells: Theory and Practice", 2 rd Edition, Elsevier & USA
	2.	Sharma, B. K, 2014, "Industrial Chemistry", 17 th Edition, Krishna Prakashan Media P. Ltd & Meerut
	3.	Stochi E, 1990, "Industrial chemistry", 1st Edition, Ellis Horwood Ltd & UK
	4.	Jain P.C, Jain M, 2015, "Engineering chemistry", 17 th Edition, Dhanpat Rai & sons & New Delhi

Journal and Magazines	https://www.sciencedirect.com/journal/electrochemistry-communications
E- Resources and Website	https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/NS%20316%20UNIT%20III% 20and%20IV%20Supporting%20PPT.pdf

Learning Method	Chalk and Talk/Assignment/Seminar		
Focus of the	Skill Development/Employability		

Semester - II
DSE: ORGANIC REACTIONS AND REAGENTS

Semester	Course Code	Course Name	Category	L	T	P	Credits
II	24CEP2DC	ORGANIC REACTIONS AND REAGENTS	DSE	48	-	-	4

Preamble	This course has been designed for students to learn and under	erstand
	 The basic principle and applications of oxidative involved in organic synthesis About mechanism and applications of various i reactions The Reaction and reagents involved in functional groups 	mportant organic name
Prerequisi	te Knowledge on application of reagents	alls .
Course Ou	tcomes (COs)	
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Outline the mechanism and applications of various oxidation reagents	K3
CO2	Interpret the mechanism and applications of reducing reagents involved in organic synthesis	К3
CO3	Analyze the reaction and reagents functional group transformations	К3
CO4	Analyze the various metal mediated and multicomponent name reactions and their applications	К3
CO5	Examine the basic principles and applications involved in name reaction on substitution	K3

Iapping with P	rogram Outcon	nes:			
COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	√		✓	✓	✓
CO2		/		✓	✓
CO3	✓	✓	✓	✓ /	
CO4		✓		✓	1
CO5	✓ .	✓	1		✓

24CEP2DC

DSE: ORGANIC REACTIONS AND REAGENTS

Unit	Content	Hours	E-Contents / Resources
	Reagents in Oxidation Reactions	= -	
I	Chromium oxidant - Pyridinium chlorochromate (PCC), pyridinium dichromate (PDC), Chromium trioxide (CrO ₃), Chromic acid, Jones reagent, Manganese oxidant - KMnO ₄ , MnO ₂ - Peracids - Alkenes, ketones and heterocycles, singlet oxygen, ozone, OsO ₄ , HIO ₄ , Ag ₂ O, Bio-oxidations of Bacterium aceti - Invertase - Pseudomonas putida - Micrococcus luteus - Gibberella fujikorai - Streptomyces albus	10	Text Book
	Reagents in Reduction Reactions		
II	Nickel/Palladium/Platinum based heterogeneous catalysts for hydrogenation, Wilkinson's catalyst, Noyori asymmetric hydrogenation - Reductions using Lithium/Sodium/Calcium in liquid ammonia - Metal hydrides - LiAlH4, NaBH4, NaBH3CN - Alkoxy borates - Hydrazine - Tin in hydrochloric acid - NaHSO3 - NaSH - Luche reduction	10	Reference Book
	Reagents and their Applications		
ш	Preparation and synthetic application of Lipoteichoic acid (LTA) - Lithium diisopropylamide (LDA) - Dicyclohexyl carbodiimide (DCC) - 2,3-Dichloro-5,6-dicyano-1,4-benzoquinone (DDQ) - TMS-iodide - TMS-cyanide - TBDMS Chloride - 1,3-Dithiane - Merrifield resin - Baker's yeast	10	Text Book
	Name Reactions and their Applications - I	4 21 70	
IV	Jacobsen epoxidation - Shi epoxidation - Suzuki coupling - Heck reaction - Sonogashira coupling - Wacker process - Stille Coupling. Multicomponent reactions - Strecker synthesis - Hantszch pyridine synthesis - Biginelli synthesis - Passerini reaction - Ugi-4-component synthesis	10	NPTEL
	Name Reactions and their Applications - II	5.1	
v	Mechanism and applications of Robinson annulation - Ene reaction - Hofmann isonitrile synthesis - Doebner-Miller synthesis - Nef reaction - Eschweiler Clark reaction - Bucherer reaction - Leukart reaction - Willegerodt - Kindler reaction	8	You Tube Videos
	Total	48	

Text Book		Ahluwalia V. H and Parashar R. K, 2009, "Organic Reactions and Mechanisms", 4th
X 0.1.1 = 0.0	1.	Edition, Narosa Publishing House & New Delhi
Reference		Fieser L. S, Fieser M and Tse-Lok Ho, 2016, "Fieser and Fieser's Reagents for Organic
Books	1.	Synthesis", 1st Edition, Wiley-Balckwell & USA
		Chatwal G. R, 2015, "Reaction Mechanism and Reagents in Organic Chemistry", 4th
	2.	Edition, Himalaya Publisher House & Delhi
	3.	Sanyal S. N, 2019, "Reactions, Rearrangements and reagents" 4th Edition, Bharat. Bhawan Publishers & Bengaluru
	4.	Mundy B. P, Eller M. G and Favarolo F. G, 2015," Name Reactions and Reagents in Organic Synthesis", 2nd Edition. Wiley-Blackwell & USA

Journal and	Kalsi P. S, 2010, "Organic Reactions and their Mechanisms", 2nd Edition, New Age
Magazines	International Publishers & New Delhi
E-Resources and Website	https://www.masterorganicchemistry.com/reaction-guide/

Learning Method	Chalk and Talk/Assignment/Seminar	

Focus of the	Skill Development/Employability	
Course		

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