PRIST
DEEMED TO BE
UNIVERSITY
NAAC ACCREDITED
THANJAVUR – 613 403 - TAMIL NADU

SCHOOL OF ARTS OF SCIENCE

DEPARTMENT OF CHEMISTRY

B.Sc CHEMISTRY CURRICULUM

REGULATION 2020

SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF CHEMISTRY

B.Sc CURRICULUM – REGULATION 2020

B.Sc. Graduate Attributes

- Domain knowledge
- Critical thinking
- Effective Communication
- Reflective learning
- Critical thinking

B.Sc Programme Educational Objectives – PEO

- PE01- Acquired the knowledge with facts and figures related to various subjects in pure sciences .
- PE02- Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life.
- PE03- Acquired the skills in handling scientific instruments, planning and performing in laboratory experiments.
- PE04- The skills of observations and drawing logical inferences from the scientific experiments.
- PE05- Analyzed the given scientific data critically and systematically and the ability to draw the objective conclusions.
- PE06- Been able to think creatively (divergently and convergent) to propose novel ideas in explaining facts and figures or providing new solution to the problems.
- PE07-Realized how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.
- PE08- Developed scientific outlook not only with respect to science subjects but also in all aspects related to life.
- PE09- Realized that knowledge of subjects in other faculties such as humanities, performing arts, social sciences etc.
- PE10- Can have greatly and effectively influence which inspires in evolving new scientific theories and inventions.
- PE11- Imbibed ethical, moral and social values in personal and social life leading to highly cultured and civilized personality.
- PE12- Developed various communication skills such as reading, listening, speaking, etc., which we will help in expressing ideas and views clearly and effectively.
- PE13- Realized that pursuit of knowledge is a lifelong activity and in combination with untiring efforts and positive attitude and other necessary qualities leads towards a successful life.

B.Sc Programme Outcome – PO

- PO1- To understand basic facts and concepts in Chemistry while retaining the exciting aspects of Chemistry so as to develop interest in the study of chemistry as a discipline.
- PO2- To develop the ability to apply the principles of Chemistry.
- PO3- To appreciate the achievements in Chemistry and to know the role of Chemistry in nature and in society. To develop problem solving skills.
- PO4- To be familiarised with the emerging areas of Chemistry and their applications in various spheres of Chemical sciences and to apprise the students of its relevance in future studies.
- PO5- To develop skills in the proper handling of apparatus and chemicals.
- PO6- To be exposed to the different processes used in industries and their applications.

B.Sc. Course – C

- C1- General Chemistry – I
- C2- Volumetric Analysis Lab
- C3- Mathematics – I
- C4- Mathematics – II
- C5- General Chemistry – II
- C6- Organic Analysis Lab
- C7- Mathematics - III
- C8- Mathematics – IV
- C9- Research Led Seminar
- C10- General Chemistry – III
- C11- Physical Chemistry Lab – I
- C12- Physics - I & II
- C13- Physics Lab – I & II
- C14- Research Methodology
- C15- General Chemistry - IV
- C16- Physical Chemistry Lab – II
- C17- Inorganic Chemistry – I
- C18- Organic Chemistry – I
- C19- Physical Chemistry – I
- C20- Inorganic Qualitative Analysis Lab
- C21- Gravimetric Analysis Lab
- C22-Participation in Bounded Research
- C23- Inorganic Chemistry – II
- C24- Organic Chemistry – II
- C25- Physical Chemistry – II
- C26- Project Work
- C27- Package Lab I to VI
- C28- Communication Lab I to VI

B.Sc Curriculum Mapping

Programme Educational Objectives Vs Programme Outcome

Programme Outcome-PO Programme Educational Outcome - PEO	PO1	PO2	PO3	PO4	PO5	PO6
PE01	✓					
PE02						
PE03		✓				
PE04			✓			
PE05						
PE06					✓	
PE07				✓		
PE08						✓
PE09	✓			✓		
PE10		✓	✓			
PE11						
PE12				✓		
PE13	✓		✓		✓	

B.Sc Curriculum Mapping

Programme Outcome vs Courses Outcome

Programme Outcome-PO Courses Outcome-CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1			*	*		*
CO2		*		*	*	*
CO3	*	*			*	
CO4			*	*		*
CO5			*	*		*
CO6		*		*	*	*
CO7	*	*			*	
CO8		*	*		*	
CO9	*	*			*	*
CO10		*	*	*		*
CO11		*		*	*	
CO12	*	*		*	*	
CO13		*	*	*	*	
CO14		*	*	*	*	*
CO15	*		*		*	
CO16		*		*		*
CO17	*		*		*	
CO18		*		*	*	
CO19	*	*		*		*
CO20			*	*	*	
CO21	*		*	*		*
CO22	*	*		*		*
CO23			*	*	*	
CO24	*	*	*		*	*
CO25	*	*		*		*
CO26	*	*		*	*	
CO27		*	*	*		
CO28	*	*			*	

PRIST
DEEMED TO BE
UNIVERSITY
NAAC ACCREDITED
THANJAVUR – 613 403 - TAMIL NADU

SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF CHEMISTRY

B.Sc CHEMISTRY – REGULATION 2020

COURSE STRUCTURE

COURSE CODE	COURSE TITLE	L	T	P	C
	SEMESTER – I				
20110AEC11/ 20111AEC11/ 20132AEC11/ 20135AEC11	Tamil – I / Advanced English – I / Hindi – I / French-I	4	0	0	2
20111AEC12	English – I	4	0	0	2
20114AEC13	General Chemistry – I	6	0	0	4
20114AEC14L	Volumetric Analysis Lab	0	0	3	2
20112AEC15A (OR)	Calculus and Fourier Series	5	0	0	4
20114AEC17	General and Applied Botany –I	6	0	0	6
20112AEC16A (OR)	Algebra and Trigonometry	4	0	0	3
20114AEC18L	General Botany Lab –I	0	0	3	2
201INDCONS	Indian Constitution	0	0	0	0
201LSCUV	Universal Human Values	-	-	-	2
	Total	**29**	**0**	**06**	**19**
	SEMESTER – II				
20110AEC21/ 20111AEC21/ 20131AEC21/ 20135AEC21	Tamil – II / Advanced English – I I / Hindi – II / French-II	4	0	0	2
20111AEC22	English – II	4	0	0	2
20114AEC23	General Chemistry – II	6	0	0	4
20114AEC24L	Organic Analysis Lab	0	0	3	2
20112AEC25A (OR)	ODE, PDE and Laplace Transform	5	0	0	4
20114AEC29A	General and Applied Botany –II	6	0	0	6
20112AEC26A	Analytical Geometry in Vector Calculus	4	0	0	3
20114AEC20L	General Botany Lab –II	0	0	3	2
20114RLC27	Research Led Seminar	_	_	_	1
20LSCCS	Communication Skills	-	-	-	2
201SSCBE	Basic Behavioral Etiquette	-	-	-	2
	Total	**29**	**0**	**06**	**22**
	SEMESTER – III				
20110AEC31/ 20111AEC31/ 20131AEC31/ 20135AEC31	Tamil – III / Advanced English – II I / Hindi – III / French-III	4	0	0	2
20111AEC32	English – III	4	0	0	2
20114AEC33	General Chemistry – III	5	0	0	4
20114AEC34L	Physical Chemistry – Non – Electrical Practical	0	0	3	2

20113AEC35	Physics – I	6	0	0	5
20113AEC36L	Physics Lab – I	0	0	3	2
20114RMC37	Research Methodology	2	0	0	2
201ACLSOAN	Office automation	-	-	-	2
	Total	**21**	**0**	**06**	**21**
SEMESTER – IV					
20110AEC41/ 20111AEC41/ 20131AEC41/ 20135AEC41	Tamil – IV / Advanced English – IV / Hindi – IV / French-IV	4	0	0	2
20111AEC42	English-IV	4	0	0	2
20114AEC43	General Chemistry – IV	5	0	0	4
20114AEC44L	Physical Chemistry – Electrical Practical	0	0	3	2
20113AEC45	Physics – II	6	0	0	5
20113AEC46L	Physics Lab – II	0	0	3	2
201ENVTSTU	Environmental Studies	2	-	-	2
201LSCLS	Leadership and Management Skills	-	-	-	2
201SSCAQ	General Aptitude and Quantitative Ability	-	-	-	2
	Total	**21**	**0**	**06**	**23**
SEMESTER – V					
20114AEC51	Inorganic Chemistry – I	5	0	0	4
20114AEC52	Organic Chemistry – I	4	1	0	3
20114AEC53	Physical Chemistry	4	1	0	4
20114AEC54L	Inorganic Qualitative Analysis Lab	0	0	3	2
20114AEC55L	Gravimetric Analysis Lab	0	0	3	2
20114DSC56_	Discipline Specific Elective –I	5	0	0	3
20114BRC57	Participation in Bounded Research	-	-	-	1
201ACLSPSL	Professional Skills	-	-	-	2
	Total	**18**	**02**	**06**	**21**
SEMESTER – VI					
20114AEC61	Inorganic Chemistry – II	4	1	0	4
20114AEC62	Organic Chemistry – II	5	0	0	5
20114AEC63L	Industrial Chemistry Practical	0	0	3	2
20114AEC64L	Domestic Products Preparation - Practical	0	0	3	2
20114DSC65_	Discipline Specific Elective – II	5	0	0	3
201_ _OEC66_	Open Elective	4	0	0	2
20114PRW67	Project Work	0	0	0	4
201LSCCE	Community Engagement	-	-	-	1
201SSCIM	Interview Skills Training and Mock Test	-	-	-	2
20114PEE	Programme Exit Examination	0	0	0	1
	Total	**18**	**01**	**06**	**26**
Total Credits of the Program					**132**

DISCIPLINE SPECIFIC ELECTIVE COURSES – I & II

Semester	Elective No.	Course Code	Course Title
V	I	20114DSC56A 20114DSC56B	A) Pharmaceutical Chemistry B) Agricultural Chemistry
VI	II	20114DSC65A 20114DSC65B	A) Polymer Chemistry B) Nano Science

OPEN ELECTIVE COURSES

Semester	Course code	Course Title
VI	20110OEC	Tamil Ilakkiya Varalaru
	20111OEC	Journalism
	20112OEC	Development of Mathematical Skills
	20113OEC	Instrumentation
	20116OEC	Wildlife Conservation
	20120OEC	E-Learning
	20120OEC	Web Technology
	20161OEC	Banking Service

RESEARCH BASED COURSES

Semester	Course Code	Course Title
II	20114RLC27	Research Led Seminar
III	20114RMC37	Research Methodology
IV	20114BRC57	Participation in Bounded Research

AUDIT COURSES

Semester	Course Code	Course Title
I	201LSCUV	Universal Human Values
II	20LSCCS	Communication Skills
II	201SSCBE	Basic Behavioral Etiquette
III	201ACLSOAN	Office automation
IV	201LSCLS	Leadership and Management Skills
IV	201SSCAQ	General Aptitude and Quantitative Ability
V	201ACLSPSL	Professional Skills
VI	201SSCIM	Interview Skills Training and Mock Test
VI	201LSCCE	Community Engagement

CREDIT DISTRIBUTION

SEMESTER	AEC	DSC	OEC	RESEARCH	OTHERS	TOTAL
I	17	-	-	-	02	**19**
II	17	-	-	01	04	**22**
III	17	-	-	02	02	**21**
IV	17	-	-	-	06	**23**
V	15	03	-	01	04	**23**
VI	13	03	02	04	02	**24**
TOTAL	**96**	**06**	**02**	**08**	**20**	**132**

SEMESTER – I

COURSE CODE	COURSE TITLE	L	T	P	C
20110AEC11	Tamil – I	4	0	0	2

தமிழ் -1

பாடத்திட்டம்

இளங்கலை: பருவம் 1 - பிரிவு -1 முதல் பருவம் - தாள் - 1

இக்கால இலக்கியம், செய்யுள், சிறுகதை, இலக்கணம், இலக்கிய வரலாறு மனப்பாடப்பகுதி

அலகு - 1

பாரதியார் தேசபக்திப் பாடல்கள் சுதந்திரப் பெருமை சுதந்திரப் பயிர் சுதந்திர தேவியின் துதி தொண்டு செய்யும் அடிமை பாரதிதாசன் வீரத்தாய்

அலகு - 2

சுரதா - நல்ல தீர்ப்பு கண்ணதாசன் - கந்தல் துணியின் கதை பட்டுக்கோட்டை கல்யாணசுந்தரம் - நண்டு செய்த தொண்டு - காலம் சரியில்லே மு.மேத்தா - வாழையடி வாழை வாலி - தாய்

அலகு - 3

சிறுகதை - இளவேனிற் குறிப்புகள் - திருவையாறு பாலகுமார்

அலகு - 4

இலக்கணம் எழுத்து மனப்பாடப்பகுதி

அலகு - 5

இலக்கிய வரலாறு சிறுகதை, புதினம், நாடகம், உரைநடை, கவிதை,புதுக்கவிதை

தாள் - 1

ஒப்படைவு - மதிப்பெண் 40

பாடத்தொடர்புடைய கட்டுரை - 20 மதிப்பெண்

ஆத்திச்சூடி - 20 மதிப்பெண்

அறம் செய விரும்பு, ஆறுவது சினம், இயல்வது கரவேல், ஈவது விலக்கேல், உடையது விளம்பேல், ஊக்கமது கைவிடேல், எண் எழுத்து இகழேல்,ஏற்பது இகழ்ச்சி, ஐயம் இட்டு உண், ஒப்புரவு ஒழுகு, ஓதுவது ஒழியேல்,ஔவியம் பேசேல், கண்டு ஒன்று சொல்லேல், ஞயம்பட உரை, இடம்பட வீடு எடேல், இணக்கம் அறிந்து இணங்கு, தந்தை தாய்ப்பேன்,நன்றி மறவேல்,பருவத்தே பயிர்செய், இயல்பு அலாதன செயேல்,வஞ்சகம் பேசேல்,இளமையில் கல்,அனந்தல்ஆடேல்,கடிவது மற,கீழ்மை அகற்று,குணமது கைவிடேல்,கெடுப்பது ஒழி, கேள்வி முயல்,சான்றோர் இனத்து இரு, சோம்பித்திரியேல்.

(மேற்;கண்ட தலைப்புகளில் ஏதேனும் ஒன்றனுக்கு கவிதை(மரபு அல்லது புதுக்கவிதை) கதை,கட்டுரை,நாடகம் எழுதி வரச் செய்து சரிப்பார்த்து மதிப்பெண் வழங்கிடவும்)

COURSE CODE	COURSE TITLE	L	T	P	C
20111AEC11	Advanced English-I	4	0	0	2

Aim:

- To improve the knowledge of English

Objective:

- To familiarize with the glossary terms, figures of speech
- To improve vocabulary

- To learn how to edit and proof read
- To know the comparison and contrast and cause and effect forms
- To understand the impact of the speeches of famous people

Outcome:

- Develop vocabulary
- Read and comprehend literature

UNIT –I
Glossary of grammar terms
Figures of speech

UNIT – II
Foreign words and phrases
British and American Vocabulary

UNIT – III
Speeches of famous people:
Mahatma Gandhi-Abraham Lincoln-Swami Vivekananda-John F. Kennedy

UNIT – IV
Editing
Proof reading

UNIT – V
Comparison and contrast
Cause and effect

References:

English Grammar -Wren and Martin
English Grammar and Composition -Radhakrishna Pillai
Essentials of Business Communication -Rajendra Pal &J.S Korlahalli Sultan Chand & Sons
English for writers and translators -Robin Macpherson
Technical Communication -Meenakshi Sharma & Sangeetha Sharma
The World's Great Speeches - Sudhir Kumar Sharma Galaxy Publishers
English Work Book-I&II -Jewelcy Jawahar

COURSE CODE	COURSE TITLE	L	T	P	C
20111AEC12	English-I	4	0	0	2

Aim:

- To acquaint students with learning English through literature

Objective:

- To improve English delightfully through simple poems, essays
- To throw light on fiction

- To read and comprehend literature

Outcome:

- Read and comprehend literature

UNIT –I

The Art of Reading - Lin Yutang

An Eco-Feminist Vision -Aruna Gnanadason

UNIT – II

The Merchant of Death -Nanda Kishore Mishra & John Kennet

She Spoke for all Nature -Young world 'The Hindu'

UNIT –III

Because I could not Stop for Death -Emily Dickinson

Stopping by Woods on a Snowy Evening -Robert Frost

UNIT –IV

Enterprise -Nissim Ezekiel

Love poem for a wife -A.K Ramanujam

UNIT –V

Oliver Twist -Charles Dickens

References:-

The Art of Reading/ Experiencing Poetry, S.Murugesan and Dr.K.Chellappan, Emerald Publishers

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC13	General Chemistry – I	6	0	0	4

Aim:

- To study about the theoretical and molecular models of chemical compounds.

Objective:

- To provide a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective.
- To expose the students to a breadth of experimental techniques using modern instrumentation.

Outcome:

- The student will learn the laboratory skills needed to design, safely conduct and interpret **chemical** research.
- The student will acquire a foundation of **chemistry** of sufficient breadth and depth to enable them to understand and critically interpret the primary **chemical** literature.

UNIT – I

Basic concepts in organic chemistry -Electron displacement effects – Inductive, electrometric and mesmeric effects, resonance, hyperconjugation and steric effects. Homolytic and heterolytic fission of carbon - carbon bonds. Reaction intermediates: - free radicals, carbocations, carbocations, carbones, nitrenes and arynes - their stability.

UNIT II

Standard solution - primary and secondary standards solution, Types of titrimetric reactions - redox and precipitation titrimetric reactions. Indicators - effect of change in pH- neutralization – mixed and fluorescent indicators. Halogen family comparative study of halogens and their compounds- unique nature of fluorides and Oxides and oxyacids of halogens - preparation and properties

UNIT III

Nomenclature of organic compounds - IUPAC naming of simple and substituted
Aliphatic, aromatic and alicylic compounds_Alkanes : Mechanism of free radical substitution in alkanes. Petroleum-thermal and catalytic process of cracking Synthetic petrol - Fischer, Tropsch and Bergtus processes, flash point, fire point, smoke point, knocking, octane number

UNIT IV

Liquid State: Liquid crystals classification, structures Properties and applications. Colloidal State: Size of colloidal particles-gold number- peptisation, stability of colloids, coagulation and protection. Reverse Osmosis and desalination of sea water. Electrophoresis and endosmosis.

UNIT V

Solid state: Nature of the solid state - seven crystal systems - Bravais lattice unit cell, law of rational indices (Weiss indices), Miller indices, symmetry) elements in crystals (for cubic system) X-Ray diffraction by crystals — derivation of Bragg's equation – Bragg method -
Crystal structure of NaCI, KCI, ZnS, CsCl determination of Avogadro number

References:

1. R.D. Madan, J.S.Tiwari and G.L.Mudhara, A Text book of First Year B.Sc.Chemistry, S.Chand&Co.
2. G.S.Manku, Theoretical Principles of Inorganic Chemistry, Tata McGraw Hill, New Delhi.
3. Paula Yaukanis Bruice- Organic Chemistry, Prentice Hall.
4. J.D.Lee,Concise Inorganic Chemistry, 5th Edition, Blackwell Science Ltd, Oxford, 2002.
5. B.S.Bahl and Arun Bahl, Advanced Organic Chemistry, S.Chand and Co., New Delhi.

6. B.R.Puri and Sharma, Principles of Physical Chemistry.

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC14L	Volumetric Analysis Lab	0	0	3	2

1. Strong acid vs strong base.
2. Weak acid vs strong base.
3. Estimation of ferrous sulphate.
4. Estimation of oxalic acid.
5. Estimation of copper.
6. Estimation of potassium dichromate.
7. Estimation of potassium permanganate.
8. Estimation of Ca by EDTA.

COURSE CODE	COURSE TITLE	L	T	P	C
20112AEC15A	Calculus and Fourier Series	5	0	0	4

Aim:

- To equip the students with basic differentiation, integration and Fourier se**ries.**

Objectives:

- This course is designed to give students, basic elementary calculus to allow them to tackle to solve Fourier series problems.

Outcomes:

- By the end of this course, the student should solve the differentiation, integration and Fourier series.

Unit – I

Leibnitz theorem (Proof not needed) and its applications – curvature and radius of curvature in Cartesian only (Proof not needed) – total differential coefficient (Proof not needed) – Jacobians of two & three variables – Simple problems in all these.

Unit – II

Reduction formula (when n is a +ve integer) for (i)

i. $\int_a^b e^{ax} x^n dx$
ii. $\int_a \ sin^n x \ dx$
iii. $\int_a \ cos^n x \ dx$
iv. $\int_0^x e^{ax} x^n dx$
v. $\int_0 \ sin^n x \ dx$
vi. without proof $\int_0 \ sin^n x \, cos^n x \ dx$ and illustrations

Unit – III

Beta and Gamma functions

Unit – IV

Evaluation of double and tripe integrals in simple cases – changing the order and evaluating of the double integration (Cartesian only)

Unit – V

Definition of Fourier series – Finding fourier coefficients for a given periodic function with period 2π and with period 2l – use of odd and even functions in evaluating fourier coefficients – half range sine and cosine series.

Reference:

1. Calculus – T.K.M. Pillai
2. Trigonometry & Fourier series – T.K.M. Pillai.

COURSE CODE	COURSE TITLE	L	T	P	C
20112AEC16A	Algebra and Trigonometry	4	0	0	4

Aim:

- To study Algebra and Trigonometry to solve various applications in chemistry.

Objectives:

- This course is designed to give students, the student should know the algebra and trigonometry.

Outcomes:

- By the end of this course, the student should solve the algebra and Trigonometry concepts to solve the problems.

Unit – I

Binomial, Exponential & Logarithmic series (Formulae only) – Summation

Unit – II

Nonsingular, symmetric, skew symmetric, orthogonal, Hermitian, skew Hermitian and unitary matrices – Characteristics equation, eigen values, eigen vector – Cayley Hamilton's theorem (proof not needed) Simple application only.

Unit – III

Expansion of sinnθ, cosnθ, tann(n being a positive integer) – Expansion of $sin^n\theta, cos^n\theta, sin^n\theta\ cos^m\theta$ in a series of sines and cosines of multiples of θ (θ – given in radius) Expansion of sinθ, cosθ and tanθ in terms of powers of θ (only problems in all the above)

Unit – IV

Euler's formula for $e^{i\theta}$ – definition of hyperbolic functions – formulae involving hyperbolic functions – relation between hyperbolic and circular function – expansion of sinhx, coshx, tanhx in power of x.

Unit – V

Expansion of inverse hyperbolic function – sinh-1x, cosh-1x and tanh-1x - Separation of real and imaginary parts of sin(x+iy), cos(x+iy), tan(x+iy), sinh(x+iy), cosh(x+iy), tanh(x+iy)

References:

1. T.K.M. Pillai, T.Natarajan, K.S. Ganapathi, Algebra, Vol I. S.Viswanathan Pvt.Ltd., Chennai – 2004

2. S.Narayanan, T.K.M.Pillai, S.Viswanathan Pvt.Ltd. & Vijay Nicole imprint Pvt. Ltd. 2004.

COURSE CODE	COURSE TITLE	L	T	P	C
201INDCONS	Indian Constitution	0	0	0	0

Objectives:

1. To make the students understand about the democratic rule and parliamentarian administration
2. To appreciate the salient features of the Indian constitution

3. To know the fundamental rights and constitutional remedies
4. To make familiar with powers and positions of the union executive ,union parliament and the supreme court .
5. To exercise the adult franchise of voting and appreciate the electoral system of Indian democracy.

Learning Outcomes:
1. Democratic values and citizenship training are gained
2. Awareness on fundamental rights are established
3. The function of union government and state government are learnt
4. The power and functions of the judiciary are learnt thoroughly
5. Appreaciation of democratic parliamentary rule is learnt

Unit I:The making of Indian constitution
The constitution assembly organization –character -work salient features of the constitution- written and detailed constitution -socialism –secularism-democracy and republic.

Unit II: Fundamental rights and fundamental duties of the citizens
Right of equality -right of freedom- right against exploitation -right to freedom of religion- cultural and educational rights -right to constitutional remedies -fundamental duties .

Unit III: Directive principles of state policy
Socialistic principles-Gandhi an principles-liberal and general principles -differences between fundamental rights and directive principles

Unit IV: The union executive, union parliament and Supreme Court
Powers and positions of the president -qualification _method of election of president and vice president -prime minister -Rajya Sabah -Lok Sabah .the supreme court -high court -functions and position of supreme court and high court

Unit V: State council -election system and parliamentary democracy in India.
State council of ministers -chief minister -election system in India-main features election commission-features of Indian democracy.

References:
1) Palekar.s.a. Indian constitution government and politics, ABD publications, India
2) Aiyer, alladi krishnaswami, Constitution and fundamental rights 1955.
3) Markandan. k.c.directive Principles in the Indian constitution 1966.
4) Kashyap. Subash c, Our parliament ,National book trust , New Delhi 1989

COURSE CODE	COURSE TITLE	L	T	P	C
201LSCUV	Universal Human Values	-	-	-	2

Objectives :

The present course deals with meaning, purpose, and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realise one's potentials.

Learning outcomes :
By the end of the course the learners will be able to:

Know about universal human values and understand the importance of values in individual, social circles, career path, and national life.
Learn from case studies of lives of great and successful people who followed and practised human values and achieved self-actualisation.
Become conscious practitioners of human values.
Realise their potential as human beings and conduct themselves properly in the ways of the world.

Unit – I Love & Compassion

Introduction: What is love? Forms of love—for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living

Love and compassion and inter-relatedness
Love, compassion, empathy, sympathy and non-violence
Individuals who are remembered in history for practicing compassion and love.
Narratives and anecdotes from history, literature including local folklore
Practicing love and compassion: What will learners learn gain if they practice love and compassion? What will learners lose if they don't practice love and compassion?
Sharing learner's individual and/or group experience(s)
Simulated Situations
Case studies

Unit - 2: Truth

Introduction: What is truth? Universal truth, truth as value, truth as fact (veracity,sincerity, honesty among others)

Individuals who are remembered in history for practicing this value

Narratives and anecdotes from history, literature including local folklore

Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?

Learners' individual and/or group experience(s)

Simulated situations

Case studies

Unit - 3: Non-Violence

Introduction: What is non-violence? Its need. Love, compassion, empathy sympathy for others as pre-requisites for non-violence
Ahimsa as non-violence and non-killing
Individuals and organisations that are known for their commitment to non-violence
Narratives and anecdotes about non-violence from history, and literature includinglocal folklore
Practicing non-violence:
What will learners learn/gain if they practice non- violence? What will learners lose if they don't practice it?
Sharing learner's individual and/or group experience(s) about non-violence
Simulated situations
Case studies

Unit - 4: Righteousness

Introduction: What is righteousness?

Righteousness and *dharma*, Righteousness and Propriety
Individuals who are remembered in history for practicing righteousness
Narratives and anecdotes from history, literature including local folklore
Practicing righteousness: What will learners learn/gain if they practice righteousness? What will learners lose if they don't practice it?
Sharing learners' individual and/or group experience(s)

Simulated situations
Case studies

Unit- 5: Peace

Introduction: What is peace? Its need, relation with harmony and balance

Individuals and organisations that are known for their commitment to peace

Narratives and Anecdotes about peace from history, and literature including localFolklore.

Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?

Sharing learner's individual and/or group experience(s) about peace

Simulated situations

Case studies

Unit - 6: Service

Introduction: What is service? Forms of service, for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster.

Individuals who are remembered in history for practicing this value.

Narratives and anecdotes dealing with instances of service from history, literatureincluding local folklore

Practicing service: What will learners learn/gain gain if they practice service? What will learners lose if they don't practice it?

Sharing learners' individual and/or group experience(s) regarding service

Simulated situations

Case studies

Unit - 7: Renunciation (Sacrifice)

Introduction: What is renunciation? Renunciation and sacrifice. Self-restrain and

Ways of overcoming greed. Renunciation with action as true renunciation.

Individuals who are remembered in history for practicing this value.

Narratives and anecdotes from history and literature, including local folklore about individuals who are remembered for their sacrifice and renunciation.

Practicing renunciation and sacrifice: What will learners learn/gain if they practice Renunciation and sacrifice? What will learners lose if they don't practice it?

Sharing learners' individual and/or group experience(s)

Simulated situations

Case studies

SEMESTER – II

COURSE CODE	COURSE TITLE	L	T	P	C
20110AEC21	Tamil – II	4	0	0	2

தமிழ் பாடத்திட்டம் இளங்கலை : பருவம் -2

தாள் - 2

செய்யுள் - பக்தி இலக்கியம், சிற்றிலக்கியம், இலக்கணம், இலக்கிய வரலாறு.மனப்பாடப்பகுதி

அலகு-1

திருஞானசம்பந்தர் தேவாரம் -இடரினும் தளரினும் – பதிகம் திருநாவுக்கரசர் தேவாரம் - அன்னம் பாலிக்கும் தில்லை – பதிகம் திருவாசகம் - கோயிற் திருப்பதிகம்

திருமந்திரம் - 25, 85, 139,238,250,252,270,724,2104,2716 திருஅருட்பா – தெய்வமணி மாலை 1,8,9

அலகு-2

நம்மாழ்வார் - 1 பாசுரம்- திருவாய்மொழி –எம்பெருமானுக்கு ஆட்படுதல் இன்பமே

பெரியாழ்வார் - 1 பாசுரம் - திருப்பல்லாண்டு – தாலப்பருவம் நாச்சியார் திருமொழி -10 பாடல்கள்- ஆறாம் திருமொழி

அலகு-3

சிற்றிலக்கியம் , முக்கூடற்பள்ளு- வளமை, செழுமை மதுரை மீனாட்சியம்மை பிள்ளைத்தமிழ்- தாலப்பருவம்-ஐந்துபாடல்கள்

அலகு-4

இலக்கணம் சொல் மனப்பாடப்பகுதி

அலகு-5

இலக்கிய வரலாறு சைவ, வைணவ இலக்கியங்கள் சிற்றிலக்கியம்.பள்ளு பிள்ளைத்தமிழ் பரணி

தாள் -2

ஒப்படைவு – மதிப்பெண் 40

பாடத்தொடர்புடைய கட்டுரை 20 மதிப்பெண்

கொன்றை வேந்தன் 20 மதிப்பெண்

அன்னையும் பிதாவும் முன்னறி தெய்வம், இல்லறம் அல்லது நல்லறம் அன்று, ஊருடன் பகைக்கின் வேருடன் கெடும்,ஏவா மக்கள் மூவா மருந்து,ஒளவியம் பேசுதல் ஆக்கத்திற்கு அழிவு, அஃகமும் காசும் சிக்கனத்தோடு,கற்பெனப்படுவது சொல்திறம்பாமை,கிட்டாதாயின் வெட்டென மற,கீழோர் ஆயினும் தாழ உரை,குற்றம் பார்க்கின் சுற்;றம் இல்லை, கூர் அம்பு ஆயினும் வீரீயம் பேசேல், கெடுவது செய்யின் விடுவது கருமம், கைப்பொருள் தன்னின்,மெய்ப்பொருள் கல்வி,சீரைத்தேடின் ஏரைத்தேடு, சுற்றத்திற்கு அழகு சூழ இருத்தல்,சூதும் வாதும் வேதனை செய்யும்,சேமம்புகினும் யாமத்து உறங்கு, சோம்பர்

என்பவர் தேம்பித்திரிவர், தந்தை சொல்மிக்க மந்திரம் இல்லை, தாயிற் சிறந்தது ஒரு கோவிலும் இல்லை, திரைகடல் ஓடியும் திரவியம் தேடு, தீராக் கோபம் போராய் முடியும், தோழனோடும் ஏழமை பேசேல்,நாடெங்கும் வாழக் கேடொன்றும் இல்லை,நீரகம் பொருந்திய ஊரகத்து இரு, பாலோடு ஆயினும் காலம் அறிந்து உண், பையச் சென்றால் வையம் தாங்கும், மருந்தே ஆயினும் விருந்தோடு உண், முற்பகல் செய்யின் பிற்பகல் விளையும், மேழிச் செல்வம் கோழைபடாது.

(மேற்;கண்ட தலைப்புகளில் ஏதேனும் ஒன்றனுக்கு கவிதை(மரபு அல்லது புதுக்கவிதை) கதை,கட்டுரை,நாடகம் எழுதி வரச் செய்து சரிப்பார்த்து மதிப்பெண் வழங்கிடவும்)

COURSE CODE	COURSE TITLE	L	T	P	C
20111AEC21	Advanced English-II	4	0	0	2

Aim:

- To improve the knowledge of English

Objective:

- To understand the format of e-mail, fax and memos
- To write itinerary, checklist, invitation, circular, instruction, recommendations
- To understand the impact of the biographies of famous people

Outcome:

- Develop writing skill
- Read and comprehend literature

UNIT –I

E-mail, Fax, Memos

UNIT – II

Itinerary, Checklist

UNIT – III

Invitation, Circular

UNIT – IV

Instruction, Recommendations

UNIT – V

Biographies of famous people:

Mother Teresa-Madam Curie-Charles Chaplin-Vikram Sarabhai

References:

English Grammar -Wren and Martin

English Grammar and Composition -Radhakrishna Pillai

Technical Communication -Meenakshi Sharma & Sangeetha Sharma

Inspiring Lives -Maruthi Publishers

English Work Book-I&II -Jewelcy Jawahar

COURSE CODE	COURSE TITLE	L	T	P	C
20111AEC22	English-II	4	0	0	2

Aim:

- To acquaint learners with different trends of writing

Objective:

- To empower students to acquire language skills through literature
- To enable the students to appreciate literature

- To develop the conversational skills through one act plays

Outcome:

- Read and comprehend literature.

UNIT – I

Ecology -A.K. Ramanujan
Gift -Alice Walker
The First Meeting -Sujata Bhatt

UNIT –II

Fueled -Marcie Hans
Asleep -Ernst Jandl
Buying and selling -Khalil Gibran

UNIT –III

The End of living and The Beginning of Survival - Chief Seattle
My Wood - E.M.Forster
The Meeting of Races - Rabindranath Tagore

UNIT – IV

The Refugee -K.A. Abbas
I Have a Dream -Martin Luther king
Those People Next Door -A.G. Gardiner

UNIT – V

Marriage is a private Affair -Chinua Achebe
The Fortune Teller -Karel Capek
Proposal -Anton Chekov

References:-

Gathered Wisdom -GowriSivaraman EmeraldPublishers

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC23	General Chemistry -II	6	1	0	5

Aim:

- Develop an appreciation of chemistry and its application in daily life.

Objective:

- To teach students to analyze data from experiments or from other sources.
- To acquire students a readiness in becoming responsible citizens in a changing world.

Outcome:

- Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
- Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.

UNIT I

Alkynes: Acidity of acetylene, formation of acetylides, addition of water with $HgSO_4$ catalyst, addition of hydrogen halides and halogens, oxidation, ozonolysis and hydroboration (mechanisms).
Cycloalkanes: Preparation using Wurtz's reaction, Dieckmann's ring closure and reductions of aromatic hydrocarbons. Substitution and ring opening reactions. Baeyer's strain theory and theory of stainless rings.

UNIT II

Quantum numbers - principal, Azimuthal, magnetic and spin quantum numbers and their significance - Pauli exclusion principle - Hund's rule - Aufbau principle, (n+1) rule, stability of half-filled and fully filled orbitals - inert pair effect.

UNIT III

Quantum theory: Bohr's model of atoms. Bohr's theory of hydrogen and spectral lines. Limitations of Bohr model. Somerfield's extinction. Photoelectric effect and Compton Effect. Debroglie's equation and verification (Davisson and Germer expt)

UNIT IV

Chemical Kinetics: Rate of reactions, rate laws, rate constant, order and molecularity of reactions. Rate equations for zero, first, second and third order reactions. Derviation of rate constant for Zero, first and second order reactions. Fractional order reactions. Examples- Half-life period, Pseudo first order reactions.

UNIT V

Polymerization: Types- free radical, cationic and anionic polymerizations with mechanisms.
Preparation of polymers - addition polymers (PE, PVC, Teflon and PS)-Condensation polymers (Nylon6.6, tereylene) - synthetic rubbers (Buna, Butyl rubber, SBR, neoprene) - natural rubber.

References:

1. S.S.Dara — A Text Book of Environmental Chemistry and Pollution Control- S.Chand and Co.
2. D.N.Bajpai — Advanced Physical Chemistry — S.Chand and Co.
3. Bruce H.Mahan, University Chemistry, Narosa Publishers, New Delhi, 1989.
4. R.T.Morrison and R.N.Boyd, Organic Chemistry, 6^{th} Edition.

5. I.L.Finar Organic Chemistry , Volume I
6. R.D.Madan, Advanced Inorganic Chemistry.
7. Puri and Sharma, Text Book of Physical Chemistry.

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC24L	Organic Analysis Lab	0	0	3	2

A study of the reactions of the following organic compounds,:

a. Carbohydrate,
b. Amide,
c. Aldehyde,
d. Ketone,
e. Acid,
f. Phenol.

The students may be trained to perform the specific reactions like tests for elements (nitrogen only) aliphatic or aromatic saturated or unsaturated and functional group present and record their observations.

Preparation (Single stage) involving

a. Nitration,
b. Hydrolysis
c. Bromination.

COURSE CODE	COURSE TITLE	L	T	P	C
20112AEC25A	ODE, PDE and Laplace Transform	5	0	0	4

Aim:

- To study the Ordinary Differential Equations, Partial Differential Equations and Laplace Transformy to solve mathematical applications in chemistry..

Objectives:

- This course is designed to give students, the student should know the Differential Equations and Laplace Transform.

Outcomes:

- By the end of this course, the student should solve the ODE, PDE and LAPLACE TRANSFORM concepts to solve the problems.

UNIT I:

Ordinary differential equations of first order but of higher degree- Equations solvable for x and y – solvable for dy/dx, clairaut's form (simple case only)- homogeneous linear differential equation(Variable coefficients), variation of parameter.

UNIT II:

Formation of partial differential equation by eliminating constants and by eliminating of arbitrary functions- definition of general, particular and complete solution – singular integral(Geometrical meaning not required) solution of first order equations in the slandered forms f(p,q=0, f(x,p,q)=0, f(z,p,q)=0 f1(x,p=f_2(y,p) z=(x,p+yq=f(p,q).

UNIT III:

Lagrange's method for solving $P_p + Q_q = R$ where p,q,r functions of X, Y, Z- (geometrical meaning is not needed)- (only problem in all the above- No proof needed for any formula) Cherpit's method The four standard forms.

UNIT IV:

Laplace Trnsforms- Definitions-

L(e^{at}) L(cosat), L(sinat), L(t^n) where n is a positive integer – Basic theorem inlaplace (transform only) L (e^{-st} cosbt), L(e^{-st} sinbt), L[e^{-st} f(t)]-L[F(t), L[f(t)], L[f'(t)]

UNIT V:

Inverse Laplace transform related to the above standard forms- solving second order ODE with constant coefficients using laplace transforms and simultaneous equation, variable coeffiecients. Fourier series: Periodic functions — Dirichlet conditions (Without Proof) Odd and Even functions change of interval — Half range series.

References:

1. S. Narayanan – differential equations
2. T.K.M Pillai & S.Naranyanan- calculus
3. M.L.Khanna- differential calculus

COURSE CODE	COURSE TITLE	L	T	P	C
20112AEC26A	Analytical Geometry in Vector Calculus	4	0	0	3

Aim:

- To study analytical geometry in vector calculus for the application in Chemistry.

Objectives:

- This course is designed to give students; the student should know and solve the analytical geometry in vector calculus.

Outcomes:

- By the end of this course, the student should solve problems of analytical Geometry in vector calculus.

UNIT – I

Vector differentiation – velocity & acceleration vectors- Gradient of a vector directional derivative - Init normal vector- tragent plane

Unit- II

Divergence- Curl – Solenoidal & Irrotational vector- Double operators – Properties connecting grad, div & curl of a vector.

Unit –III

Vector integration –Line integrals – Conservative force field – Scalar field- Scalar potential- work done by d Force- Surface integrals – Volume integrals.

Unit –IV

Gauss divergence theorem , Stoke's theorem (statement, application & verification only)

Unit –V

Equation of sphere – Target plane – plane section of a sphere – Finding the centre & radius of the circle of integration – sphere through the circle of integration (only problem in all above)

Reference:

T.K. Manickavasagem Pillai, Analytical Geometry (3D) & Vector calculus, Neq Gamma Publishing House, 1991

COURSE CODE	COURSE TITLE	L	T	P	C
20LSCCS	Communication Skills	-	-	-	2

Objectives :

This course has been developed with the following objectives:
Identify common communication problems that may be holding learners back
Identify what their non-verbal messages are communicating to others
Understand role of communication in teaching-learningprocess

Learning to communicate through the digital media
Understand the importance of empathetic listening
Explore communication beyond language.

Expected Outcome :
By the end of this program participants should have a clear understanding of what good communication skills are and what they can do to improve their abilities.

Unit - 1: Listening Techniques of effective listening

Listening and comprehensin
Probing questions
Barriers to listening

Unit - 2: Speaking Pronunciation

Enunciation
Vocabulary
Fluency
Common Errors

Unit - 3: Reading *Techniques of effective reading*

Gathering ideas and information from a given text
Identify the main claim of the text
Identify the purpose of the text
Identify the context of the text
Identify the concepts mentioned
Evaluating these ideas and information
Identify the arguments employed in the text
Identify the theories employed or assumed in the text
Interpret the text
To understand what a text says
To understand what a text does
To understand what a text means

Unit - 4: Writing and different modes of writing Clearly state the claims

Avoid ambiguity, vagueness, unwanted generalisations and oversimplification of Issues.
Provide background information
Effectively argue the claim
Provide evidence for the claims
Use examples to explain concepts
Follow convention
Be properly sequenced
Use proper signposting techniques
Be well structured
Well-knit logical sequence
Narrative sequence
Category groupings
Different modes of Writing -E-mails

i. Proposal writing for Higher Studies
ii. Recording the proceedings of meetings
iii. Any other mode of writing relevant for learners

Unit - 5 : Digital Literacy Role of Digital literacy in professional life

- Trends and opportunities in using digital technology in workplace
- Internet Basics
- Introduction to MS Office tools

i. Paint

ii. Office
iii. Excel
iv. Powerpoint
v.

Unit - 6 : Effective use of Social Media Introduction to social media websites

- Advantages of social media
- Ethics and etiquettes of social media
- How to use Google search better
- Effective ways of using Social Media
- Introduction to Digital Marketing
-

Unit - 7: Non-verbal communication Meaning of non-verbal communication

- Introduction to modes of non-verbal communication
- Breaking the misbeliefs
- Open and Closed Body language
- Eye Contact and Facial Expression
- Hand Gestures
- Do's and Don'ts
- Learning from experts
- Activities-Based Learning

References:

1. Sen Madhucchanda (2010), *An Introduction to Critical Thinking*, Pearson, Delhi

2. Silvia P. J. (2007), *How to Read a Lot*, American Psychological Association, Washington DC

COURSE CODE	COURSE TITLE	L	T	P	C
201SSCBE	Basic Behavioral Etiquette	-	-	-	2

Objectives:

Etiquette seems like an obsolete term in our modern world, however, more than ever, it is important to learn how to have solid social graces and just plain old good manners.

Learning outcomes:

Demonstrate how to properly introduce yourself to other people..
Describe appropriate etiquette in conversations and describe how to be a good listener.
Identify appropriate etiquette for public places.

Course Topics

Lesson 1 : Introduction to Modern Etiquette

Lesson 2 : Meetings and Introductions

Lesson 3 : Conversation and Listening Skills

Lesson 4 : Telephone/Cell Phone, Texting, Emailing and Internet Etiquette

Lesson 5 : Etiquette in Public Places

Lesson 6 : Employment/Volunteer Etiquette

Lesson 7 : Dining Etiquette

Lesson 8 : Social Gathering Etiquette (Guest and Host/Hostess)

Lesson 9 : School Etiquette

Lesson 10 : Confidence Without Arrogance

SEMESTER – III

COURSE CODE	COURSE TITLE	L	T	P	C
20110AEC31	Tamil –III	4	0	0	2

தமிழ்

பாடத்திட்டம்

இளங்கலை : பருவம் மூன்று-

தாள் - 3 செய்யுள் - காப்பியங்கள், இலக்கணம்,இலக்கிய வரலாறு, மனப்பாடப்பகுதி

அலகு-1

சிலப்பதிகாரம்-வழக்குரை காதை மணிமேகலை-ஆதிரை பிச்சையிட்ட காதை சீவகசிந்தாமணி-நாட்டுவளம் 10 பாடல்கள்

அலகு-2

பெரியபுராணம்- மெய்ப்பொருள் நாயனார் புராணம் கம்பராமாயணம்-வாலி வதைப்படலம்

அலகு-3

சீறாப்புராணம் - கரம் பொருத்து படலம் இயேசுகாவியம் - மழைப்பொழிவு

அலகு-4

இலக்கணம் யாப்பு மனப்பாடப்பகுதி

அலகு-5

இலக்கிய வரலாறு காப்பியங்கள் ஐஞ்சிறுகாப்பியங்கள் புராணங்கள், இதிகாசங்கள்

தாள் - 3

ஓப்படைவு - மதிப்பெண் 40

பாடத்தொடர்புடையக் கட்டுரை 20 மதிப்பெண்
வெற்றி வேற்கை 20 மதிப்பெண்
எழுத்து அறிவித்தவன் இறைவன் ஆகும், கவ்விக்கு அழகு கசடற மொழிதல், செல்வர்க்கு அழகு செழுங்கிளை தாங்குதல், மன்னவர்க்கு அழகு செங்கோல் முறைமை, வைசியர்க்கு அழகு வளர் பொருள் ஈட்டல், உழவர்க்கு அழகு உழுது ஊண் விரும்பல், மந்திரிக்கு அழகு வரும் பொருள் உரைத்தல், தந்திரிக்கு அழகு தறுகண் ஆண்மை, உண்டிக்கு அழகு விருந்தோடு உண்டல், பெண்டிர்க்;கு அழகு எதிர் பேசாதிருத்தல்,அறிஞர்க்கு அழகு கற்றுணர்ந்து அடங்கல், வறிஞர்க்கு அழகு வறுமையில் செம்மை, பெரியோர் எல்லாம் பெரியோரும் அல்லர்.சிறியோர் எல்லாம் சிறியரும் அல்லர்,அடினும் ஆவின் பால் தன் சுவை குன்றாது, சுடினும் செம்பொன் தன்னொளி கெடாது, அறைக்கினும் சந்தனம் தன் மனம் மாறாது பெருமையும் சிறுமையும் தான் தர வருமே, அறிவுடை ஒருவனை அரசும் விரும்பு, யானைக்கு இல்லை தானமும், தருமமும்,பூனைக்கு இல்லை தவமும் தயையும், ஞானிக்கு இல்லை இன்பமும் துன்பமும் , அச்சமும் நாணமும் அறிவிலோருக்கு இலலை, நாளும் கிழமையும் நலிந்தோருக்கு இல்லை, கேளும் கிளையும் கெட்டோருக்கு இல்லை,உடைமையும் வறுமையும் ஒரு வழி நில்லா,இரந்தோர்க்கு ஈவதும் உடையோர் கடனே,பழியா வருவது மொழியாது ஒழிவது, சுழியா வருபுனல் இழியாது ஒழிவது, துணையோடு அல்லது நெடுவழி போகேல்.

(மேற்;கண்ட தலைப்புகளில் ஏதேனும் ஒன்றனுக்கு கவிதை(மரபு அல்லது புதுக்கவிதை) கதை,கட்டுரை,நாடகம் எழுதி வரச் செய்து சரிப்பார்த்து மதிப்பெண் வழங்கிடவும்)

COURSE CODE	COURSE TITLE	L	T	P	C
20111AEC31	Advanced English-III	4	0	0	2

Aim:

- To improve the knowledge of English

Objective:

- To familiarize with the organs of speech and the description and classification of speech sounds
- To understand consonant cluster, syllable, word accent and intonation.
- To know how to interpret graphics
- To write slogans and advertisements

Outcome:

- Understand Phonetics
- Develop writing skill

UNIT –I

The organs of speech, Classification of speech sounds , Vowels and Diphthongs

UNIT –II

Consonants, Consonant cluster

UNIT – III

Syllable, Word accent, Intonation

UNIT – IV

Idiom, Interpretation of graphics

UNIT – V

Slogan writing, Writing advertisement

References:

English Grammar -Wren and Martin
English Grammar and Composition -Radhakrishna Pillai
Technical Communication -Meenakshi Sharma & Sangeetha Sharma
A text book of Phonetics for Indian Students -T.B. Balasubramaniyan

COURSE CODE	COURSE TITLE	L	T	P	C
20111AEC32	English – III	4	0	0	2

Aim:

- To acquaint students with learning English through literature

Objective:

- To sensitize students to language use through prescribed text
- To develop the conversational skills through one act plays

Outcome:

- Read and comprehend literature

UNIT – 1

The Doctor's World - R.K. Narayan

The Postmaster - Rabindranath Tagore

Princess September - E.Somerest Maugham

UNIT – II

The Price of Flowers -Prabhat Kumar Mukhopadhyay

The Open Window -Saki

The Model Millionaire -Oscar Wilde

UNIT –III

My Brother My Brother - Norah Burke

Uneasy Home Coming - Will F. Jenkins

Resignation - Premchand

UNIT –IV

The Referee -W.H. Andrews & Geoffrey Dreamer

The Case of the Stolen Diamonds -Farrell Mitchell

UNIT – V

The Dear Departed -Stanley Houghton

The Princess and the Wood Cutter -Alan Alexander Milne

References:-

Nine Short Stories -Steuart H.King Blackie Books

One-Act plays of Today -T.Prabhakar Emerald Publishers

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC33	General Chemistry – III	5	0	0	4

Aim:

- To acquaint with the knowledge of nature of metals and its characters.

Objective:

- The student will acquire a foundation of **chemistry** of sufficient breadth and depth to enable them to understand and critically interpret the primary **chemical** literature.
- The student will learn the laboratory skills needed to design, safely conduct and interpret **chemical** research.

Outcome:

- Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
- Students will be able to clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large.

UNIT I

Alkali and alkaline earth metals:

Comparative study of alkali and alkaline metal compounds (oxides, halides, hydroxides, carbonates, sulphates). Diagonal relationship between lithium and magnesium, lithium aluminium hydride and sodium borohydride — preparation, properties and uses. **Coinage metals:** Comparative study of coinage metals. **Zinc Group metals:** Comparative study of Zinc group metals. Galvanization, existence of mercurous ion and Hg^{2+} principles of qualitative analysis -solubility product, principles of elimination of interfering radicals, common effect, reactions including spot tests in qualitative analysis.

UNIT II

Inner transition elements:

Lanthanides—occurrence—electronic configuration — oxidation sates, magnetic properties, complexation behaviour. Actinides —occurrence — electronic configuration — oxidation states, magnetic properties and complexation behavior. Lanthanide contraction. Chemistry of thorium and uranium — occurrence, extraction and uses. Mineral wealth of India —minerals found in India. Steel and alloy steels — Heat treatment of steel.

UNIT III

Aromatic hydrocarbons and Aromaticity:

Structure and stability of benzene ring — resonance in benzene — delocalized π electron cloud in benzene. Aromaticity — Huckel's Rule — examples — benzene, naphthalene, anthracene, furan, pyrrole, thiophene and ferrocene. Electrophilic substitution reactions in aromatic compounds. General mechanism of electrophilic substitution reactions — Nitration, sulphonation , halogenation, Friedel-Crafts alkylation and acylation reactions — nuclear and side chain halogenations.

UNIT IV

Polynuclear hydrocarbons-

Napthalene and anthracene — isolation, properties, structure and uses. Aromatic nucleophilic substitution — Benzyne mechanism and intermediate complex formation mechanism — effect of substituents on reactivity.

UNIT V

Magnetic properties of matter- magnetic flux- magnetic permeability —magnetic susceptibility. diamagnetism, paramagnetism, ferro and anti-ferro magnetism — Curie temperature. Determination of magnetic susceptibility —Buoy's method — number of unpaired electrons. Application to structural problems $K_3Fe(CN)_6$, $K_4Fe(CN)_6$ and $Ni(Co)_4$.

References:

1. P.L.Soni & Mohankatyal, Text Book of Inorganic Chemistry 20th Revised edn., Sultan Chand 1992.
2. R.B.Puri & L.R.Sharma, "Principles of Inorganic Chemistry," Sultan Chand, 1989.
3. P.L.Soni & H.M.Chawla "Text book of Organic Chemistry' Sultan Chand & Sons 1994, Delhi.
4. K.S.Tewari, S.N.Mehrotra and N.K.Vishnoi, "A Text book of Organic Chemistry".
5. M.K.JAIN," Organic Chemistry", Shoban Lal Nagin Chand and Co.

6. B.R.Puri,L.R.Sharma and Madan S.Pathania, "Principles of Physical Chemistry" Shoban Lal Nagin Chand and Co., Delhi.
7. Vogel's "Text Book of Quantitative Chemical Analysis" E.L.B.S.
8. R.D.Madan, "Modern Inorganic Chemistry". 1987, S.Chand & Company Ltd.
9. P.L.Soni,"Text book of Organic Chemistry, Sultan Chand & Co., New Delhi.

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC34L	Physical Chemistry – Non – Electrical Practical	0	0	3	2

1. Kinetics – Acid hydrolysis of Easter – (Methyl acetate)
   – (IN HCL & 0.5N HCL)
2. Kinetics – Acid hydrolysis of Easter – (Ethyl acetate))
   – (IN HCL & 0.5N HCL)
3. Determination of molecular weight of substance by Rast method
4. Determination of (CST) of phenol – water system
5. Effect of impurities on CST
6. Determination of molecular weight of substances by Transition Temperature method.

COURSE CODE	COURSE TITLE	L	T	P	C
20113AEC35	Physics – I	6	0	0	5

Aim:

- The course presents an introduction to the physics of the objects whose sizes span from atomic dimensions to macroscopic, human scale dimensions, and beyond: atoms, molecules, gases, liquids, and solids.
- The aim is to show how the properties of macroscopic bodies can be derived from the knowledge that matter is made up from atoms.

Objectives:

- Recognize the difference between physical and chemical properties
- Distinguish between extensive and intensive properties

Outcomes:

- On completion successful students will be able to demonstrate an understanding of:
- 1. The relationships between physics on the atomic scale and the properties of matter.
- 2. The roles played by microscopic states of system, their numbers and their accessibility.
- 3. Techniques for finding appropriate averages to predict macroscopic behavior.

Unit I: Mechanics

Center of gravity of a solid hemisphere – Hollow hemisphere – Solid cone. Stability of floating bodies – Meta center – Determination of Meta centic height of a ship.

Unit II: Sound

Simple harmonic motion – comparison of two simple harmonic motion – A long straight line – At right andle to each other Lissa Hou's figures and their application – Acoustics of buildings reverberation – reverberation fire Sabines formula – conditions for good acoustics.
Deciber – phon – Intensity measurements by hotwire microscope method.

Unit III: Properties of matter

Diffussion: Fick's law – Coefficients of diffusion – experimental determination of coefficient of diffusion – application.
Osmosis: Laws of osmic pressure Berkely and Hartly method of determining osmotic pressure – elimination of boiling and depression of freezing point – application.

Unit IV

Thermal Physics: Newton's law of cooling – Verification – specific heat capacity of liquid by cooling – bomb calorie meter.
Conduction: Coefficeint of thermal conductivity – good and bad conductor – Stefan's law of radiation - Solar constant – Angstorm's phyro heliometers – temperature of the sun.

Unit V

Optics: Electro magnetic spectrum – spectral response of human eye – UV and IR spectroscopy
Raman effect – experimental arrangement – application of Raman effect.
Fiber optic communication: Introduction – optic fiber – numerical aperture – coherent bundle – fiber optic communication system and its advantage – multimode optic sensors.

Reference:

1. Sound , Saigal, S-Chand & co.
2. Properties of matter, D.S.Matur.
3. Heat and Thermodynamics, Brijal Subramaniyam.
4. Optics, Brijal Subramaniyam.
5. Static, Hydrostatics and Hydrodynamics, Nrayanamoorty & Nagarathinam.

COURSE CODE	COURSE TITLE	L	T	P	C
20113AEC36L	Physics Lab – I	0	0	3	2

List of Experiments

1. Semi-conductor diode characteristics
2. Surface tension – Drop weight method
3. Meter Bridge – Determinations of resistance
4. Post office Box – Resistance
5. Non-uniform Bending – Young's modulus
6. Potentiometer – Voltmeter calibration
7. Sonometer – Verification of laws
8. Spectrometer – Determinations of refractive index

9. Bridge Rectifier
10. Basic Logic Gates – Discrete components

COURSE CODE	COURSE TITLE	L	T	P	C
20114RMC37	Research Methodology	2	0	0	2

AIM:

To create a basic appreciation towards research process and awareness of various research publication

OBJECTIVES:

- To understand the steps in research process and the suitable methods.
- To identify various research communications and their salient features
- To carry out basic literature survey using the common data-bases
- To give exposure to standard laboratory precautions and best practices for experimental work
- To provide orientation for basic mathematical computation useful in basic research

OUTCOME:

Ability to carry out independent literature survey corresponding to the specific publication type and assess basic experimental as well as conceptual set up.

PREREQUISITES:

Basic mathematical and experimental skills and exposure to window-based computer operation system.

UNIT I: Introduction to Research Methodology

Meaning of research – Objectives of research – Types of research – Significance of research – Research approaches

UNIT II: Research Methods

Research methods versus methodology – Research and scientific method – Criteria of good research – Problems encountered by researchers in India.

UNIT III: Literature Survey

Articles – Thesis – Journals – Patents – Primary sources of journals and patents – Secondary sources – Listing of titles – Abstracts – Reviews – General treatises – Monographs.

UNIT IV: Database Survey

Database search – NIST – MSDS – PubMed – Scopus – Science citation index – Information about a specific search.

UNIT V: Laboratory Safety

General guidelines. Hygiene – Eye, foot, skin and hand protection – Safety rules Equipment protection – Respiratory protective equipment – safety equipment – Leaking compressed gas cylinders – electrical safety. Fire – fire extinguishers.

References:

1. C. R. Kothari, Research Methodology, New Age International Publishers. New Delhi, 2004.
2. R.A Day and A.L. Underwood, Quantitative analysis, Prentice Hall, 1999.
3. D.G Peters, J.M. Hayes and G.M. Hefige, A brief introduction to Modern chemical analysis.
4. R. Gopalan, Thesis writing, Vijay Nicole Imprints Private Ltd., 2005.
5. R. Gopalan, P. S. Subramanian and K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand and Sons, New Delhi, 2005.

COURSE CODE	COURSE TITLE	L	T	P	C
201ACLSOAN	Office automation	-	-	-	2

Course Objective:

To provide an in-depth training in use of office automation, internet and internet tools. The course also helps the candidates to get acquainted with IT.

Learning Outcomes:

After completion of the course, students would be able to documents, spreadsheets, make small presentations and would be acquainted with internet.

Course Modules:

Module 1

Knowing the basics of Computers

Module 2

Word Processing (MS word)

Module 3
Spread Sheet (MS XL)
Module 4
Presentation (MS Power Point)
Module 5
Communicating with Internet

Suggested reading and reference books:

1. Fundamentals of computers - V.Rajaraman - Prentice- Hall of india
2. Microsoft Office 2007 Bible - John Walkenbach,Herb Tyson,Faithe Wempen,cary N.Prague,Michael R.groh,Peter G.Aitken, and Lisa a.Bucki -Wiley India pvt.ltd.
3. Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.
4. Computer Fundamentals - P. K. Sinha Publisher: BPB Publications
5. https://en.wikipedia.org
6. https://wiki.openoffice.org/wiki/Documentation
7. http://windows.microsoft.com/en-in/windows/windows-basics-all-topics

SEMESTER – IV

COURSE CODE	COURSE TITLE	L	T	P	C
20110AEC41	Tamil–IV	4	0	0	2

பாடத்திட்டம்

இளங்கலை : பருவம் -4

தாள் - 4

செய்யுள்- சங்க இலக்கியம், இலக்கணம்,இலக்கிய வரலாறு-மனப்பாடப் பகுதி

அலகு-1

எட்டுத்தொகை நற்றினை – குறிஞ்சி 356,முல்லை-242, பாலை-397 குறுந்தொகை-2,18,25,58,67,69,135,167,283,373 ஐங்குறுநூறு- சிறுவெண் காக்கைப் பத்து

அலகு-2

கலித்தொகை-பாலை 34,குறிஞ்சி-51,நெய்தல்-133 அகநானூறு - 36,147,332

புறநானூறு- 34,173,189,235,279

அலகு-3

முல்லைப்பாட்டு திருக்குறள்-ஐந்து அதிகாரம்- அறம் 2,பொருள் 2,இன்பம் -1 வான்சிறப்பு,அழுக்காறாமை,இறைமாட்சி,கூடாநட்பு,காதற்சிறப்புரைத்தல்

அலகு-4

இலக்கணம் அணி மனப்பாடப்பகுதி

அலகு-5

இலக்கிய வரலாறு எட்டுத்தொகை பத்துப்பாட்டு அறஇலக்கியங்கள்

ஒப்படைவு மதிப்பெண்-40

பாடத்தொடர்புடைய கட்டுரை 20 மதிப்பெண் பாரதியார், பாரதிதாசன் புதிய ஆத்திச்சூடி 20 மதிப்பெண்

பாரதியார்

அச்சம் தவிர்,ஆண்மை தவறேல்,இளைத்தல் இகழ்ச்சி,உடலினை உறுதி செய்,எண்ணுவது உயர்வு,ஏறுபோல் நட,ஐம்பொறி ஆட்சி கொள்,ஒற்றுமை வலிமையாம்,காலம் அழியேல்,கீழோருக்கு அஞ்சேல்,குன்றென நிமிர்ந்து நில்,கொடுமையை எதிர்த்து நில், சிதையா நெஞ்சு கொள்,செய்வது துணிந்து செய், தீயோருக்கு அஞ்சேல்,பெரிதினும் பெரிது கேள்,வையத்தலைமை கொள்,யாரையும் மதித்து வாழ்

பாரதிதாசன்

காற்றினைத் தூய்மை செய்,குற்ற நினைவு தீர்,தளையினைக் களைந்து வாழ் தூய நீராடு, தெருவெல்லாம் மரம் வளர்,தைக்க இனிதுரை,தொன்மை மாற்று,நிiiவினில் தெளிவு கொள், நீனிலம் உன் இல்லம்,போர்த் தொழில் பழகு,மாறுவது இயற்கை, வையம் வாழ வாழ்.

(மேற்;கண்ட தலைப்புகளில் ஏதேனும் ஒன்றனுக்கு கவிதை(மரபு அல்லது புதுக்கவிதை) கதை,கட்டுரை,நாடகம் எழுதி வரச் செய்து சரிப்பார்த்து மதிப்பெண் வழங்கிடவும்)

COURSE CODE	COURSE TITLE	L	T	P	C
20111AEC41	Advanced English-IV	4	0	0	2

Aim: To improve the knowledge of English

Objective:

- To familiarize with the objectives and types of interview
- To know the types of questions and answering techniques
- To prepare reviews and proposals
- To learn the grammatical forms
- To understand the meaning of a poem and write the content
- To write for and against a topic
- To draw a flowchart
- To write definitions

Outcome:

- Develop communicative skill
- Read and comprehend literature

UNIT –I
Interviews
Objectives, types, ten success factors, ten failure factors - Planning and preparation –Presentation– Type of questions – Answering techniques.

UNIT – II
Flowchart
Proposals

UNIT – III
Discourse markers
Review

UNIT IV
Grammatical forms
Paraphrasing

UNIT –V
Definition
Writing for and against a topic.

References:

English Grammar -Wren and Martin
English Grammar and Composition -Radhakrishna Pillai
Essentials of Business Communication -Rajendra Pal &J.S Korlahalli Sultan Chand & Sons
Technical Communication -Meenakshi Sharma & Sangeetha Sharma
English for writers and translators -Robin Macpherson
English Work Book-I&II -Jewelcy Jawahar

COURSE CODE	COURSE TITLE	L	T	P	C
20111AEC42	English-IV	4	0	0	2

Aim:

- To acquaint students with learning English through literature

Objective:

- To introduce learners to the standard literary texts
- To impart wisdom through morally sound poems and essays
- To introduce Shakespeare to non-literature students

Outcome:

- Read and comprehend literature

UNIT –I

How to be a Doctor -Stephen Leacock

My Visions for India -A.P.J. Abdul Kalam

Woman, not the weaker sex -M.K. Gandhi

UNIT –II

My Last Duchess -Robert Browning

The Toys -Coventry Patmore

I, too -Langston Hughes

UNIT –III

The Best Investment I ever made-A.J.Cronin

The Verger -W.S Maugham

A Willing Slave -R.K.Narayan

UNIT –IV

Macbeth, As You Like It

UNIT –V

Henry IV, Tempest

References:-

English for Enrichment -.Devaraj Emerald Publishers
Selected Scenes from Shakespeare Book I &II -EmeraldPublishers

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC43	General Chemistry – IV	5	0	0	4

Aim:

- To acquaint with the knowledge of nature of metals and its characters.

Objective:

- The student will acquire a foundation of **chemistry** of sufficient breadth and depth to enable them to understand and critically interpret the primary **chemical** literature.
- The student will learn the laboratory skills needed to design, safely conduct and interpret **chemical** research.

Outcome:

- Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
- Students will be able to clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large.

UNIT I

TRANSITION METALS AND THEIR COMPOUNDS - Group study of Titanium, Vanadium, Chromium, Manganese and Iron. Metallurgy and uses of V, W and Mo. Comparison of lanthanides and actinides and their position in the periodic table. Elements with atomic number 104 and 105; preparation and their position in the periodic table. Chemistry of Thorium and Uranium — occurrence, ores, extraction and uses.

UNIT II

BIOLOGICALLY IMPORTANT COORDINATION COMPOUNDS — Chlorophyll, Hemoglobin, Vitamin B 12 — their structure, application (Structure elucidation is not required). Metal carbonyls — Mono and poly nuclear carbonyls of Ni, Fe, Cr, Co and Mn — synthesis, reactions, structure and uses. Nitrosyl compounds — classification, preparation, properties and structure of nitrosyl chloride and sodium nitroprusside.

UNIT III

ALIPHATIC NUCLEOPHILIC SUBSTITUTIONS — mechanism of S_N^1, S_N^2, and S_N^{ii} reactions, effect of solvents, leaving groups, nucleophiles and structure of substrates.
Elimination reactions — Hoffmann and Saytzeff s eliminations — cis, trans eliminations. Mechanism of El and E2 reactions. Relative reactivity of ethyl, vinyl, allyl and benzyl halides.

UNIT IV

POLYHYDRIC ALCOHOLS: Ethylene glycol, glycerol - properties including oxidation using periodic acid and LTA.
Unsaturated alcohols: Thioalcohols — preparation, properties and uses of ethyl mercaptan. Ethers- Methods of preparation of aliphatic and aromatic ethers — reactions of ethers — 1,4-dioxane — preparation and uses — Epoxides — Preparation and reactions. Thioethers — Preparation and uses.

UNIT V

Thermodynamics: system and surrounding — isolated, closed and open systems — homogeneous & heterogeneous systems, State of the system, intensive and extensive variables. Thermodynamic process — cyclic processes, reversible and irreversible, isothermal and adiabatic processes — state and path functions, concept of heat and work. First law of thermodynamics — statements, definition of internal energy (U), enthalpy (H), heat capacity. Relation between C_p and C_v;

References:

1. R.D.Madan, G.D.Tuli and S.M. Malik , Selected Topic in Inorganic Chemistry , S.Chand & Co., New Delhi
2. J.D.Lee , Concise Inorganic Chemistry , E.L.B.S., 4th Edn.
3. R.B. Puri & L.R.Sharma , Principles of Inorganic Cheipistry ,Sultan Chand.
4. I.L. Finar , Organic Chemistry , Volume I , E.L.B.S. London.
5. V.S.Parmar & Chawla , Principles of Reaction Mechanisms in Organic Chemistry.
6. P.L.Soni , Text Book of Organic Chemistry.
7. Gurdeep Raj , Advanced Physical Chemistry.
8. Rajaram and Kuriacose , Thermodynamics for Students ofChemistry.
9. Puri and Sharma , Principles of Physical Chemistry.
10. Samuel Glasstone , Thermodynamics

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC44L	Physical Chemistry – Electrical Practical	0	0	3	2

Conductometeric Experiments

1. Cell constant
2. Equivalent conductance
3. Verification of on- Sager equation
4. Acid- base titrations
5. Precipitation titrations

Potentiometric Experiments:

1. FAS vs $KMnO_4$
2. KI Vs KMN_{O4}
3. FAS VS $K_2Cr_2O_7$
4. KI Vs $K_2Cr_20_7$
5. Determination of solubility of silver salts.

COURSE CODE	COURSE TITLE	L	T	P	C
20113AEC45	Physics – II	6	0	0	5

Aim:

- To develop a basic understanding of electric and magnetic fields in free space using the
- Integral forms of Maxwell's laws.

Objectives:

- Describe the electric field and potential and related concepts, for stationary charges.

- Calculate electrostatic properties of simple charge distributions using Coulomb's law,
- Gauss's law and electric potential.

Outcomes:

- Describe the magnetic field for steady currents and moving charges.
- Calculate magnetic properties of simple current distributions using Biot-Savart and Ampere's Laws.
- Describe electromagnetic induction and related concepts, and make calculations using Faraday and Lenz's laws.
- Describe the basic physical content of Maxwell's laws in integral form.

Unit I: Electrostatics

Coulomb's law-Gauss theorem, its application Field due to an infinite long plane, Sphere and Cylinder- Mechanical force on the surface of a charged conductor – Electrostatics energy in The Medium – Capacitors – Principles of a capacitor – Capacity of a capacitor – Capacity of an Isolated sphere and cylinder – Energy of a charged capacitor – Sharing charges and loss of energy.

Unit II: Electricity

Kirchoff's law's and their applications to Wheatstone's network – condition for bridge balance – Carey Forster's bridge – Laws of electromagnetic Induction – Expression for induced EMF – Self and Mutual Induction – Self Inductance of a Solenoid – Mutual inductance of a solenoid Inductor – Coefficient of coupling – Determination of coefficient of self induction by Raleigh's method

Unit III: Atomic Physics

Atom models – Summerfield's and Vector atom Models – Pauli's exclusion principle – various quantum numbers and quantization of orbits.
X-rays – Continuous and Characteristic X-ray – Mosle's Law and its importance Bragg's Law – Miller indices – Determination of Crystal structure by Laue's Powder photograph method.

Unit IV: Nuclear Physics

Nucleus – Nuclear size – charge – Mass and spin – Liquid drop and Shell models.
Nuclear Radiations and their properties, particle accelatior – Betatron and Proton Synchrotron, Particle Detectors – Cloud Chamber and Bubble Chambers. Four types of reactions – Elementary particles and their classifications

Unit V: Digital Electronics

Decimal – Binary – Octal and Hexa Decimal number systems and their Mutual conversions – 's and 2's complement of a Binary number and Binary arithmetic (Addition, Subraction, Multiplication and Division) – Binary subtraction by 1's and 2's complement methods – Basic logic gates – AND, OR,

NOT, NOR, NAND and EXOR gates – NAND & NOR as universal building gates – Boolean algebra – Laws of Boolean algebra – De-Morgan's Theorems – Their verifications using truth tables .

Reference:

1. Magnetism and Electricity – Khare and Srivastave – AtmaRam and sons – New Delhi
2. Modern Physics – Murughesan – S.Chand and co
3. Digital principles and their applications – Malvino and Leach – Tata McGraw Hill
4. Hand Book of Electronics – Gupta and Kumar – Pragati Prakasan
5. Ancillary Physics II – A Sundaraveluswami

COURSE CODE	COURSE TITLE	L	T	P	C
20113AEC46L	Physics Lab – II	0	0	3	2

List of Experiments

1. Figure of merits of Galvanometer
2. Potentiometer – Ammeter calibration
3. Carey Forster Bridge
4. Viscosity of Liquid – Poiseulle's flow method
5. Lee's Disc – Thermal conductivity
6. Specific capacity of a liquid
7. Spectrometer – Wavelength determination using Grating
8. Meter Bridge verification of serial and parallel connections of resistance wires
9. Logic Gates – IC Version
10. Zener Diode characteristics

COURSE CODE	COURSE TITLE	L	T	P	C
201ENVTSTU	Environmental Studies	2	-	-	2

Aim:

- To study about the awareness of environmental pollution and its issues.

Objectives:

- Creating the awareness about environmental problems among people.
- Imparting basic knowledge about the environment and its Ancillary problems.
- Developing an attitude of concern for the environment.
- Motivating public to participate in environment protection and environment improvement.
- Acquiring skills to help the concerned individuals in identifying and solving environmental problems.
- Striving to attain harmony with Nature.

Learning Outcomes:

Students who graduate with a major in environmental science will be able to:

- Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale;
- Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment;
- Demonstrate ecology knowledge of a complex relationship between predators, prey, and the plant community;
- Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues; and
- Understand how politics and management have ecological consequences.

1. **Nature of Environmental Studies**

   Definition, scope and importance.
   Multidisciplinary nature of environmental studies
   Need for public awareness.

2. **Natural Resources and Associated Problems.**

   a) Forest resources: Use and over — exploitation, deforestation, dams and their effects on forests and tribal people.
   b) Water resources: Use and over — utilization Of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
   c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources.
   d) Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer — pesticide problems.
   e) Energy resources: Growing energy needs, renewable and non — renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy.
   f) Land resources: Solar energy, Biomass energy, Nuclear energy, Land as a resource, land degradation, man induced landslides, soil erosion and desertification,

3. **Ecosystems**

   Concept of an ecosystem.
   Structure and function of an ecosystem.
   Producers, consumers and decomposers.
   Energy flow in the ecosystem.

Ecological succession.
Food chains, food webs and ecological pyramids.
Introduction, types, characteristics features, structure and function of the following ecosystem:
a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem,
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

4. Biodiversity and its conservation

Introduction — Definition: genetic, species and ecosystem diversity.

Bio — geographical classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.

India as a mega — diversity nation.

Western Ghat as a biodiversity region.

Hot— spot of biodiversity.

Threats to biodiversity habitat loss, poaching of wildlife, man — wildlife conflicts.

Endangered and endemic species of India.

Conservation of biodiversity: In — situ and Ex — situ conservation of biodiversity.

5. Environmental Pollution

Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.
Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of a individual in prevention of pollution.

6. Social Issues and the Environment

Disaster management: floods, earthquake, cyclone, tsunami and landslides.
Urban problems related to energy Water conservation, rain water harvesting, watershed management
Resettlement and rehabilitation of people; its problems and concerns.
Environmental ethics: Issue and possible solutions.
Global wanTling, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation.
Consumerism and waste products.

7. Environmental Protection

From Unsustainable to Sustainable development.
Environmental Protection Act.
Air (Prevention and Control of Pollution) Act.
Water (Prevention and control of Pollution) Act.
Wildlife Protection Act.
Forest Conservation Act.
Population Growth and Human Health, Human Rights.

8. Field Work

Visit to a local area to document environmental assets — River / Forest / Grassland / Hill / Mountain.
or
Visit to a local polluted site — Urban / Rural *I* lad Listrial / Agricultural.
or
Study of common plants, insects, birds.
or
Study of simple ecosystems -— ponds, river, hill slopes, etc.

References:

1) Agarwal, K.C,200l, Environmental Biology, Nidi Pub. Ltd., Bikaner.

2) Bharucha Erach, The l3iodiversity of India, Mapin Publishing Pvt, Ltd., Ahmedabad 380013, India, Email: rn4pin@icenet.net (R)

3) Brunner R.C., 1989, 1-lazardous Waste Incineration, McGraw Hill Inc. 480p

4) Clank R.S., Marine Pollution, Clanderson Press Oxford (TB)

5) Cunningham, W.P. Cooper, T.H. Gorhani, E. & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Pub. Mumbai, Il96p

6) De A.K., Environmental Chemistry, Wiley Wastern Ltd.

7) Down to Earth, Centre for Science and Environment, New Delhi. (R)

8) Gleick, H., 1993, Water in crisis, Pacific Institute for studies in Dcv., Environment & Security. Stockholm Env Institute. Oxford Univ. Press 473p

9) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bompay (R)

10) Heywood, V.K. & Watson, R.T.1995, Global Biodiversity Assessment, Crnbridge Univ. Press 1140 p.

COURSE CODE	COURSE TITLE	L	T	P	C
201LSCLS	Leadership and Management Skills	-	-	-	2

Objectives :

The Module is designed to**:**

- Help students to develop essential skills to influence and motivate others
- Inculcate emotional and social intelligence and integrative thinking for effective leadership
- Create and maintain an effective and motivated team to work for the society
- Nurture a creative and entrepreneurial mindset
- Make students understand the personal values and apply ethical principles in professional and social contexts.

Expected Outcomes :

Upon completion of the course students will be able to:

1. Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision
2. Learn and demonstrate a set of practical skills such as time management, self management, handling conflicts, team leadership, etc.
3. Understand the basics of entrepreneurship and develop business plans
4. Apply the design thinking approach for leadership
5. Appreciate the importance of ethics and moral values for making of a balanced personality.

Unit - 1- Leadership Skills

a. Understanding Leadership and its Importance

What is leadership?
Why Leadership required?
Whom do you consider as an ideal leader?

b.Traits and Models of Leadership

Are leaders born or made?
Key characteristics of an effective leader
Leadership styles
Perspectives of different leaders

C. Basic Leadership Skills

Motivation
Team work
Negotiation
Networking

Unit - 2 - Managerial Skills

Basic Managerial Skills

- Planning for effective management
- How to organise teams?
- Recruiting and retaining talent
- Delegation of tasks
- Learn to coordinate
- Conflict management

b. Self Management Skills

- Understanding self concept
- Developing self-awareness
- Self-examination
- Self-regulation

Unit - 3 - Entrepreneurial Skills

a. Basics of Entrepreneurship

- Meaning of entrepreneurship
- Classification and types of entrepreneurship
- Traits and competencies of entrepreneur

b. Creating Business Plan

- Problem identification and idea generation
- Idea validation
- Pitch making

Unit - 4 - Innovative Leadership and Design Thinking

a. Innovative Leadership

- Concept of emotional and social intelligence
- Synthesis of human and artificial intelligence
- Why does culture matter for today's global leaders

b. Design Thinking

- What is design thinking?
- Key elements of design thinking:
  - Discovery
  - Interpretation
  - Ideation
  - Experimentation
  - Evolution.
- How to transform challenges into opportunities?
- How to develop human-centric solutions for creating social good?

Unit - 5- Ethics and Integrity

a.Learning through Biographies

- What makes an individual great?
- Understanding the persona of a leader for deriving holistic inspiration
- Drawing insights for leadership
- How leaders sail through difficult situations?

b. Ethics and Conduct

- Importance of ethics
- Ethical decision making
- Personal and professional moral codes of conduct
- Creating a harmonious life

References:

1. Ashokan, M. S. (2015). *Karmayogi: A Bbiography of E. Sreedharan*. Penguin, UK.
2. Brown, T. (2012). *Change by Design.* Harper Business
3. Elkington, J., & Hartigan, P. (2008). *The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World.* Harvard Business Press.
4. Goleman D. (1995). *Emotional Intelligence*. Bloomsbury Publishing India Private Limited
5. Kalam A. A. (2003). *Ignited Minds: Unleashing the Power within India*. Penguin Books India
6. Kelly T., Kelly D. (2014). *Creative Confidence: Unleashing the Creative Potential Within Us All.* William Collins
7. Kurien V., & Salve G. (2012). *I Too Had a Dream*. Roli Books Private Limited

COURSE CODE	COURSE TITLE	L	T	P	C
201SSCAQ	General Aptitude and Quantitative Ability	-	-	-	2

Focus on basics

- Pick a topic and start solving various questions until you are clear
- Practice each concept one by one and gradually move to difficult questions or topics

Prepare time table

- Go through the syllabus and exam pattern of CAT quantitative aptitude 2020
- Identify the topics which are uncovered
- Assess the time to be needed to cover each topic

Take mock tests

- Familiarize with the type of questions asked in the exam by solving mock tests/ previous year question papers
- Helps you give exam environment and prepare you for D-day
- Analyse your performance and weak and strong areas.

Practice as per sectional time limit

- Sectional time limit of quantitative aptitude is 60 minutes, follow the time pattern while solving mock test
- Assign time for each question. Don't waste time over a question

Focus on weak areas

- After giving mock tests of CAT, analyse the weak areas
- Overcome that mistake by practicing various questions on the particular topic from recommended books.

S

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC51	Inorganic Chemistry – I	5	0	0	4

Aim:

- To know about the details of co-ordination compounds and natute of metals.

Objective:

- To know about ligand types and their different methods of coordination
- To know about isomerism in transition metal complexes.
- To know some basic Chemistry of first row transition metal ions.

Outcome:

- Able to tell the name of orbitals by recognizing shapes of orbitals.
- Able to calculate bond order of different molecules.
- The bonding models, structures, reactivities, and applications of coordination complexes, boron hydrides, metal carbonyls, and organometallics

UNIT – I

Coordination Compounds: Types of ligands. IUPAC nomenclature. Theories of coordination compounds — Werner, Sidgwick, valence bond, crystal field, molecular orbital and ligand field theories.

UNIT- II

Isomerism — stability of complexes — factors affecting the stability of complexes. Unimolecular and bimolecular nucleophilic substitution reactions in octahedral and square planar complexes — Trans effect. Application of coordination compounds - Detection of potassium ions, separation of copper and cadmium ions. Estimation of nickel using DMG and aluminium using oxime. Structure of EDTA and its complexes. Complexometric titrations — principles and applications.

UNIT — III

Metallic state: Packing of atoms in metal (BCP,CCP(FCC),HCP).Theories of metallic bonding — electron gas, Pauling and band theories. Structure of alloys — substitutional and interestitial solid solutions — HUME Rothery ratios. Ionic Bond, crystal structure and advanced covalent bonding: Radius ratio rules — Calculation of some limiting radius ratio values for C.N.3(planar triangle), C.N.4 (tetrahedral) & C.N.6 (octahedral).

UNIT — IV

Binary compounds — hydrides, borides, carbides and nitrides —classification, preparation, properties and uses. Organometallic compounds of alkenes and cyclopentadienes.

UNIT - V

Group Theory and it's Applications: Symmetry elements —symmetry operations — mathematical group of multiplication tables, point group of simple molecules (H_2, HCl, CO_2, H_2O, BF_3 and NH_3).

References:

1. P.L.Soni, Text Book of Inorganic Chemistry, S.Chand & Co., New Delhi.
2. B.R.Poori &L.R. Sharma, Principles of Inorganic Chemistry, Shoban Lal, Nagin Chand & Co., New Delhi.
3. R.D.Madan, G.D.Tuli and S.M.Malik, Selected Topics in Inorganic Chemistry, S. Chand & Co., New Delhi
4. J.D.Lee, Concise Inorganic Chemistry, E.L.B.S., 4^{th} Edn.

5. Jeffery et al., Vogel Text Book of Inorganic Quantitative Analysis, Longman.
6. Cotton and Wilkinson, Advanced Inorganic Chemistry, 5th edn

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC52	Organic Chemistry – I	4	1	0	3

Aim:

- To know about the organic molecules and its reactivity.

Objective:

- To know about isomerism types and their different reactivity.
- To detail about carbonyl compounds and its reactions.
- To know some basic acids and its derivatives .

Outcome:

- Describe bonding models and appreciate how these impact on the properties of a simple molecule.
- Understand the importance of stereo isomerism and carbonyl compounds on a molecule structure and reactivity.

UNIT – I: STEREOISOMERISM - I

Stereoisomerisms — definition — optical and geometrical isomerism —classification of optical isomerism — optical activity — observed and specific rotation — conditions for optical activity in solid, liquid and gaseous phases —criteria for optical activity. Asymmetric center chirality's — achiral molecule — meaning of + and — and D and L notations — elements of symmetry —racemisation — methods of racemisation (by substitution and tautomerism) —resolution — methods of resolution (mechanical separation, seeding, biochemical and conversion to diasteroisomers) — asymmetric synthesis partial and absolute asymmetric synthesis — Walden inversion, Vant Hoff rule of superposition —m Freudenberg's rule of shift. Notations for optical isomers — Cahn — Ingold — Prelog rules — R.S.Notations for optical isomer with one asymmetric carbon — erythro and threo representions. Fischer projections, Sawhorse, Newman projections - representation of molecules with two asymmetric carbon atoms.

UNIT- II: STEREOISOMERISM - II

Optical activity in compounds containing no asymmetric cabons -biphenyls, allenes and spiranes. Optical activity on symmetric system (lactic acid, dissymmetric system (1,2- trans cyclopropane dicarboxylic acid). Geometrical isomerism — cis, —trans, syn and anti and E — Z notations-geometrical isomerism in maleic and fumaric acids and in unsymmetrical ketoximes — methods of distinguishing geometrical isomers (dipole moment, dehydration, heat of hydrogenation, cyclisation , melting points) — methods of determining the configuration of geometrical isomers no details required).Geometrical and optical isomerism in three member rings.

UNIT III: REACTIONS OF CABONYL COMPOUNDS

Carbonyl polarization - reactivity of carbonyl group — acidity of α-hydrogen. Mecanisms of aldol, Perkin, Knovenagal and benzoin condensations. Mechanisms of Clasien, Reformatsky, Wittig and Cannizaro reactions. Mechanisms of reduction (sodium borohydride, $LiA1H_4$,Wolff — Kishner and MPV reductions) — mechanisms of haloform rection and Michael addition and Oppenauer oxidation. Photochemistry of carbonyl compounds — Norrish I and II Types. Problem's and conversion wherever applicable.

UNIT IV: ACIDS AND ACID DERIVATIVES

Ionization of carboxylic acids — acidity constant- comparison of acid strengths of substituted halo acids — acid strengths of substited benzoic acids Hammmet equation. Hell — Volhard — Zeliniski reaction. Dicarboxylic acids — preparation and properties of oxalic, malonic, succinic, glutaric and adipic acids, unsaturated acids and hydroxy acids. malonic acid, acetoacetic esters — characteristics of reactivities of methylene group — synthetics uses of malonic and acetoacetic esters. Tautomerism — definition — keto-enol tautomerism (identification, acid and bases catalysed interconversion mechanisms. Preparations - amido — imido and — acnitro tautomerisms). Nucleophillic acyl substitutions, acid — base hydrolysis of ester, hydrolysis of amides and trans esterification.

UNIT V: HETEROCYCLIC COMPOUNDS

Aromatic characteristics of heterocyclic compounds. Preparation, properties and uses of furan, pyrrole, & thiophene. Synthesis and reactions of pyridine and piperidine — comparative basic characters of pyrrole, pyridine and piperidine with amines. Synthesis and reactions of Quinoline , isoquinoline and indole with reference to Skraup, Bischer Napieralski and Fischer indole synthesis . Structural elucidation of pyridine, quinoline and isoquinolines.

References:

1. B. S. Bahl and Arun Bahl, Advanced Organic Chemistry, S.Chand & Co, New Delhi. (1998)
2. P.L Soni And H. M Chawala, Text book of Organic Chemistry — 28th edition (1999)- Sultan Chand, New Delhi.
3. Ravi Bhushan, Stereoisomerism of Carbon Compounds — CBS —Publishers, Delhi ‗ Revised Edn.
4. P.S. Kalsi, Stereochemistry- Conformation and Mechanism, Willey Eastern Ltd., New Delhi
5. O.P.Agarwal Chemistry of Natural Products, Volume I & II.
6. D. Nasipuri, Stereochemistry of Organic Compounds, Wiley Eastern Ltd., New Delhi
7. I.L. finar Organic Chemistry, Vol. I, E.L.B.S, London
8. R.K.Bansal, Organic Reaction Mechanisms, Tata Mc-Graw Hill, 1975
9. P.S.Kalsi , Organic Reactions and Their Mechanisms, New Age International Publishers.

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC53	Physical Chemistry	4	1	0	4

Aim:

- To know about the physical properties of molecules and its reactivity.

Objective:

- To understand different properties of molecular structure.
- To understand the basic features of spectroscopy.
- To know some basic acids and its derivatives .
- To knowledge about thermodynamics and its applications.

Outcome:

- Able to recognize different regions for thermodynamics.
- Able to explain the concept of thermochemistry.
- Able to explain the concept and applications of surface chemistry.

UNIT- I THERMOCHEMISTRY:

Internal energy and enthalpy changes in chemical reactions. Relation between E and H. Relation between enthalpy of reaction at constant volume (q_v) and at constant pressure(q_p). Thermochemical equations, laws of thermochemistry — Hess's law and its applications. Standard states — standard enthalpy of formation, enthalpy of combustion, enthalpy of neutralization, integral and differential heats of solution and dilution. Bond dissociation energy — its calculation from thermobhemical data, temperature dependence of H - Kirchoff s equation.

UNIT - II SECOND LAW OF THERMODYNAMICS:

Need for the law, different statements of the law- concept of entropy. Entropy as a state function —entropy as a function of P,V and T. Entropy changes in phase changes —entropy of mixing. Gibbs and Helmholtz functions. Gibbs function (G) and Helomholtz function (A) as thermodynamic quantities- A and G as criteria for thermodynamic equilibrium and spontaneity — variation of A and G with P,V, T- Gibbs- Helmholtz equation and their applications —Maxwell's relations.

UNIT - III APPLICATIONS OF II LAW OF THERMODYNAMICS:

Equilibrium constants and free energy change. Thermodynamic derivation of law of mass action. Equilibrium constants in terms of pressure and concentration —NH_3, $PC1_5$, $CaCO_3$. Thermodynamic interpretation of LeChatlier's principle. (concentration, temperature, pressure and addition of inert gases). Equilibrium between different phases — system of variable composition —partial molar quantities — chemical potential of component in an ideal mixture — Gibbs - Duhem equation — variation of chemical potential with T,P,S and X(mole fraction). Reaction isotherm — vant Hoff's equation — vant Hoff's isochore - Clapeyron equation and Clausius Clapeyron equation —Applications.

UNIT – IV THIRD LAW OF THERMODYNAMICS:

Need for the law. Nernst heat theorem, third law of thermodynamics — statement and concept of residual entropy. Evaluation of absolute entropy from heat capacity data. Exception to third law.(ortho & para hydrogen, CO_2,N_20 and ice). Thermodynamic properties of real gases — fugacity — definition, calculation (real gases) and variation of fugacity with temperature, pressure and composition (Duhem-Margules equation).

UNIT – V SURFACE PHENOMENA:

Adsorption and free energy reaction relation at interphase — physisorption and chemisomtion — potential energy diagram- Lannord-Jones plot— Langmuir, BET isotherm — surface area determination-heats of adsorption, determination — adsorption from solutions — Gibbs adsorption isotherm. Activity and activity co-efficient—definitions. experimental determination of activity and activity coefficients of non-electrolytes — activities in electrolytic solutions — determination of activity coefficient of electrolytes by freezing points.

Reference:

1. B.R.Puri & Sharma, Principles of Physical Chemistry.
2. P.L.Soni, Textbook of Physical Chemistry.
3. Gurdeep Raj, Advanced Physical Chemistry.
4. B.S.Bahl, G.D.Tuli & Arun Bahl, Essentials of Physical Chemistry, S.Chand & Co., New Delhi.(1999).
5. Samuel Glasstone, Thermodynamics for Chemists.
6. R.L.Madan, G.D.Tuli, Simplified Course in Physical Chemistr, S.Chand & Co., New Delhi(1999).
7. Rajaram and Kuriacose, Thermodynamics for Students of Chemistry.
8. P.W.Atkins, Physical Chemistry, ELBS, Oxford Univ. Press, 1998.

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC54L	Inorganic Qualitative Analysis Lab	0	0	3	2

Analysis of a mixture containing two cations and two anions of which one will be an interfering ion.

Semimicro methods using the conventional scheme with hydrogen sulphide may be adopted.

Cations: Pb, Co, Cd, Fe, Al, Zn, Cu, Ni, Sr, Mg and Sb.

Anions: Sulphide, bromide, chromate, arsenate, fluoride, oxalate, chloride, carbonate and sulphate.

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC55L	Gravimetric Analysis Lab	0	0	3	2

Estimation of:

1. Barium as barium chromate
2. Nickel as nickel dimethylglyoxime complex.
3. Lead as lead chromate.
4. Calcium as calcium oxalate.
5. Lead as lead sulphate.

COURSE CODE	COURSE TITLE	L	T	P	C

20114DSC56A	Discipline Specific Elective: I Pharmaceutical Chemistry	5	0	0	4

Aim:

To develop pharmaceutical knowledge to the learners.

Objectives:

- Imparting basic knowledge about the drugs.
- Developing knowledge about pharmacy.

Learning Outcomes:

Students who graduate with a major in Pharmaceutical Chemistry will be able to:

- Understand the principles of Pharmaceutical Chemistry.
- To know the knowledge about antiseptic and anaesthetics.
- To have employability.

UNIT I

ALKALOIDS — general methods of extraction from a plant source, colour reaction and detection — morphine and quinine with special refrence to structure relationship (SAR) and uses. Chemistry of sulphonamides — sulphapyridine phthalyl sulphathiazole — sulpha furazole and protosil —preparation and uses — vitamins — classification of vitamins — vitamin A,B 1 and B2, ascorbic acid — their synthesis, estimation and uses.

UNIT II

ENZYMES — characteristics — classification — composition and biological functions — composition of blood and blood plasma — analysis of serum proteins — functions of plasma proteins — osmotic regulation — functions of hemoglobin, transport of oxygen and maintenance of pH of blood — analysis of hemoglobin in blood — Rh factor — blood pressure — normal, high and low and to control — diagnostic test for sugar, salt and cholesterol in serum —medically important compounds of Al, P, As and Fe — their preparation and applications.

UNIT III

SYNTHESIS OF HETEROCYCLICS - drugs derived from — pyridine derivatives — triphenyl amine and mepyramine — quinoline derivatives — chloroquine and primaquine — pyrimidines — urides and barbiturates. Antibiotics — pharmacological action — structural elucidation — synthesis and rises of chloramphenicol and penidillin.

UNIT IV

ORGANIC DIAGNOSTIC AGENTS — x-ray contrast media (radiopaques) sodium diatrizolate,— evan's blue — indigocarmine — methylene blue — histamine — pentagastrin — xylose and sodium benzoate — clinical estimation of proteins, glucose, urea, blood, cholesterol and hemoglobin — analgesic — classification — narcotic analgesics — morphine and derivatives — totally synthetic analgesic — pethidine and methadones — antipyretic analgesics — salicylic acid derivatives, indolyl derivatives and p-aminophenol derivatives —synthetic — action and uses.

UNIT V

ANAESTHETICS— preparation and uses of general and local gaseous anaesthetics —ether, vinylether, methoxy flourane, halogenated hydrocarbons like choloroform, halothane, tricholoethylene, ethyl chloride, cyclopropane, nitrous oxide. Thiopentane sodium, methohexitone and propanoid- local anahetics- cocaine and its derivatives. Antiseptic and disinfectants- phenols and related compounds, organic mercurials- dyes, cationic surface active agents, chloramine-T, chlorhexidine, diqualinium chloride. Preservatives, antioxidants, coloring, flavoring and sweetening agents, emulsifying agents-and suspending agents- ointment bases- disintegrating agents.

References:

(1) H.S1ingh and Kapoor K.V. Vallabh Prakashan, Organic Pharmaceutical Chemistry, New Delhi.
(2) Bently and Drivers, Pharmaceutical Chemistry.
(3) Allion Chidambaram, Pharmaceutical Chemistry.
(4) Chatwal, Organic Pharmaceutical Chemistry.
(5) S. Jayshree Ghosh, Pharmaceutical Chemistry, Chand & Co.
(6) Chatwal, Inorganic Pharmaceutical Chemistry.

COURSE CODE	COURSE TITLE	L	T	P	C
20114DSC56B	Discipline Specific Elective: I Agricultural Chemistry	5	0	0	4

Aim:

To develop agricultural knowledge to the learners.

Objectives:

- Imparting basic knowledge about the soil nature.
- Developing knowledge about fertilizers and pesticides.

Learning Outcomes:

Students who graduate with a major in Agricultural Chemistry will be able to:

- Understand the principles of Agricultural Chemistry.
- To know the knowledge about nutrients and its importance.
- To have employability.

UNIT-I

DEFINITION OF SOIL-SOIL COMPOSITION.Soil Physical properties-soil separates and particle size distribution-soil texture and structure —Bulk density, particle density, pore space, soil air, soil temperature, soil water , soil consistence-significance of physical properties to plant growth.Soil chemical properties — soil colloids —Inorganic colloids — clay minerals — amorphous — Ion exchange reactions —organic colloids — soil organic matter-Decomposition-Humus formation —significance on soil fertility, soil reaction —Biological properties of soil — nutrient availability.

UNIT-II

FERTILIZER — definition-fertilizer recommendation based on soil testing-Nitrogenous fertilizers — Effect of Nitrogen on plant growth and development .Phosphate fertilizers — Effect of phosphorous on plant growth and development.-super phosphate & Bone meal .Potassium fertilizers — function of Potassium on plant growth. Secondary and micronutrient fertilizers — complex and mixed fertilizer- sources. Manufacture, properties and reactions in soils. Biofertilizersnitrogen fixing biofertilizer- rhizobium, azospirillum- Phosphate Mobilizing.

UNIT-III

ORGANIC MANURES —Agricultural, industrial and urban Wastes — prepartion of enriched farm yard manures — Zinc enriched organics. Green manures-green leaf manure-bulky organic and concentrated organic manures -compost — enriched farm yard manures, oil cakes, bone meal, fish meal, guano poultry manures- Fertilizer use efficiency —integrated nutrient management. Preparation of slow release fertilizer-compatability of fertilizers —fertilizers Blending- preparation of different fertilizer mixtures — fertilizer prescription for different soils and crops.

UNIT - IV

PEST MANAGEMENT AND CONTROL .PESTICIDES — formulations — emulsifiable concentrate, water miscible liquids, wettable powders, dusts, granules , classification of pesticides — mode of action — characteristics — uses — fate of pesticides in soil and plants — impact of pesticides on environment — safety measures in the analysis of pesticides.

Insecticides — plant products — Nicotine, pyrethrum, rotenone, petroleum oils. In organic pesticides — Arsenical fluorides, borates. Organic pesticides — organo chlorine compounds — D.D.T , B.H.C, methoxychlor, chloredane, endousulfon.

UNIT - V

FUNGICIDES-inorgnic-sulphur compounds-copper compounds- Mercuic compounds-organic-dithio carbamates – dithane M.boredeaux mixture Herbicidies: Inorganic herbidea- Arsenical compounds Boron compound- cyanamide- cyanides and thiocyanates, chlorates and sulphamates. Organic herbicides & Nitro – compounds- chlorinated compound – urea herbicides, Alachlor.

REFERENCES:

1.N.C Brady , the Nature and properties of soils Eurasia pudishinghouse,(P)Ltd 9th Ed.1984

2. Biswas,T.D.and Mukeherjee S.K.1987 Text book of soil science.

3.A.J.Daji(1970) A Text book of soil science-Asia publishing house,Madras.

4.Donahue,R.LMiller,R.W.and shuckluna,J.C.1987.soils-An introduction to soils and plant Growth —Prentice Hall of India (p) Ltd, NewDelhi.

5. Colling,G.H.1955,Commercial Fertilizers-McGraw Hill Publishing Co., New york.

COURSE CODE	COURSE TITLE	L	T	P	C
201ACLSPSL	Professional Skills	-	-	-	2

Objectives :

The Objectives of the course are to help students/candidates:

Acquire career skills and fully pursue to partake in a successful career path
Prepare good resume, prepare for interviews and group discussions
Explore desired career opportunities in the employment market in consideration of an individual SWOT.

Expected Outcomes :

At the end of this course the students will be able to:

1. Prepare their resume in an appropriate template without grammatical and other errors and using proper syntax
2. Participate in a simulated interview
3. Actively participate in group discussions towards gainful employment
4. Capture a self - interview simulation video regarding the job role concerned
5. Enlist the common errors generally made by candidates in an interview
6. Perform appropriately and effectively in group discussions
7. Explore sources (online/offline) of career opportunities
8. Identify career opportunities in consideration of their own potential and aspirations
9. Use the necessary components required to prepare for a career in an identified occupation (as a case study).

Unit - 1: Resume Skills

Resume Skills : Preparation and Presentation

Introduction of resume and its importance
Difference between a CV, Resume and Bio data
Essential components of a good resume

Resume skills : common errors

Common errors people generally make in preparing their resume
Prepare a good resume of her/his considering all essential components

Unit - 2: Interview Skills

Interview Skills : Preparation and Presentation

- Meaning and types of interview (F2F, telephonic, video, etc.)
- Dress Code, Background Research, Do's and Don'ts
- Situation, Task, Approach and Response (STAR Approach) for facing an interview
- Interview procedure (opening, listening skills, closure, etc.)
- Important questions generally asked in a job interview (open and closed ended questions)

ii. Interview Skills : Simulation

Observation of exemplary interviews
Comment critically on simulated interviews

iii. Interview Skills : Common Errors

Discuss the common errors generally candidates make in interview
Demonstrate an ideal interview

Unit - 3: Group Discussion Skills

Meaning and methods of Group Discussion

Procedure of Group Discussion
Group Discussion- Simulation
Group Discussion - Common Errors

Unit - 4: Exploring Career Opportunities

Knowing yourself – personal characteristics

Knowledge about the world of work, requirements of jobs including self-employment.
Sources of career information
Preparing for a career based on their potentials and availability of opportunities

References:

Foundation Skills In IT (FSIT) - Refer the websites like https://www.sscnasscom.com/ssc-projects/capacity-building-and-development/training/fsit/ and

Global Business Foundation Skills (GBFS) – Refer websites like https://www.sscnasscom.com/ssc-projects/capacity-building-and-development/training/gbfs/

SEMESTER – VI

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC61	Inorganic Chemistry – II	4	1	0	4

Aim:

- To develop knowledge about inorganic metals and its characteristics.

Objective:

- To know the differences between transition elements and main group elements.
- To know about ligand types and their different methods of coordination.
- To know about isomerism in transition metal complexes

Outcome:

- Able to write electronic configuration of given atomic number.
- Able to tell the name of orbitals by recognizing shapes of orbitals.
- Able to calculate bond order of different molecules.

UNIT I

NUCLEAR CHEMISTRY: Introduction—composition of nucleus and nuclear forces, nuclear stability — o/p ratio, mass defect, binding energy, packing fraction and magic numbers, shell and drop models. Isotopes —detection and separation. Isotopic constitution of elements and whole number rule-deviation of atomic weights from whole numbers-isobars, isotones and isomers.

UNIT — II

RADIOACTIVITY: Discovery, detection and measurements (Wilson cloud chamber). Radioactive emanations-disintegration theory — decay — group displacement law — rate of disintegration — half-life and average life —Radioactive series. Nuclear transformations — uses of projectiles, nuclear reactors. Applications of radio isotopes — carbon dating — radioactive waste disposal - radiolysis of water and hydrated electron.

UNIT — III

X-RAY CRYSTALLOGRAPHY: Solid state-difference between point groups and space groups — screw axis — glide planes. Crystal symmetry elements-crystal classes-crystal systems-unit cell, Bravais lattices, Asymmetric unit space group-equivalent positions — relations between molecular symmetry and crystallographic symmetry — basic concepts. The concept of reciprocal lattice and its application. X-ray diffraction by single crystal — structure factor — systematic absences. Determination of pace group — heavy atom method. Neutron diffraction — elementary treatment. Comparison of X-ray diffraction, electron diffraction — basic principles.

UNIT — IV

SOME SPECIAL CLASSES OF COMPOUNDS: Clathrates-examples and structures. Interstitial compounds and non-stoichiometric compounds. Silicones-composition, raw materials, manufacture, structures, properties and uses. Metal alkyls, co-ordination polymers and phosphonitrilic polymers. Silicates — classification into discrete anions, one, two and three dimensional structures with typical examples. Composition, properties and uses of beryl, asbestos, talc, mica, zeolites and ultramarines.

UNIT-V

FOSSIL FUELS:- Varieties of coal and petroleum- petroleum refineries in India. Gaseous fuels-natural, gobar, coal, water, semiwater and producer gases, liquefied petroleum gas (LPG). Safety matches, fire-works and explosives, paints and varnishes. Effluents and their treatment (dye, cement, tannery, distillery units).

Reference:

1. P.L. Soni, Mohan Katyal, Text Book of Inorganic Chemistry, 20th Revised Edn., Sultan Chand.
2. Esmarch S.Gilreath, Fundamental Concepts of Inorgaic Chemistry, International Edn., Mc-Graw-Hill Kogakusha, Ltd.,
3. Gurdeep Chatwal and M.S.Yadu, Co-ordination Chemistry, First Edn., Himalaya Publishing House.
4. B.R.Puri and L.R.Sharma, Principles of Inorganic Chemistry, ShobanLal Nagin Chand and Co.,
5. Cotton and Wilkinson, Advanced Inorganic Chemistry, 5th Edn.,
6. R.D.Madan, Modern Inorganic Chemistry,
7. S.Glasstone, Source Book on Atomic Energy, 3rd Edn., East West Press.

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC62	Organic Chemistry – II	5	0	0	5

Aim: To study about the organic and bioorganic molecules and its characteristics.

Objective:

- Structural theory, Lewis structures, isomers, basic resonance theory.
- Atomic, molecular, and hybrid orbitals, covalent bonding, shapes of molecules.
- Polarity of molecules and bonds.

Outcome:

- Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Organic Chemistry.
- Able to study of biomolecules and its activity.

UNIT — I

NITROCOMPOUNDS AND AMINES : Conversion of nitrobenzene to ortho-, para- and meta- dinitrobenzenes. TNT - aromatic nitro compounds —reduction in neutral, acidic and alkaline media. Relative basic characters of aliphatic and aromatic amines. Ring substitution in aromatic amines, diazotisation and its mechanism. Synthetic applications of diazonium salts, diazomethane and diazoacetic ester — preparation, structure and their synthetic uses. Phenylene diamines, sulphanilic acid, sulphanailamide, saccharin, chloromine-T, diamide — preparation, properties and uses of urea and thiourea.

UNIT — II

AMINOACIDS AND PROTEINS: Classification of aminoacids. Essential and non- essential amino acids. Preparation of L — amino acids, properties and reactions. Zwitter ions, isoelectric points, peptide synthesis. Structure determinations of polypeptides - end group analysis. Proteins-classification based on physical and chemical properties based on physiological functions. Primary and secondary structures of proteins. Helical and sheet structures (elementary treatment only) - denaturation of proteins. Nucleic acid-structures of nucleobases — adenine, guanine, thiamine, uracil and cytosine-nucleosides- nucleotides- polynucleotides - types of nucleic acids — DNA and RNA — biological functions.

UNIT—III

CARBOHYDRATES: Classification, constitution of glucose and fructose. Reactions of glucose and fructose - oxazone formation, mutarotation, and its mechanism, cyclic structure, pyranose and furanose forms. Determination of ring size, formulas, configuration of monosaccharide. Epimerisation, chain lengthening and chain shortening

UNIT—IV

MOLECULAR REARRANGEMENTS: Classification (anionotrophics, cationotrophic) Intermolecular and intramolecular. Pinacol- Pinacolone rearrangement (Mechanism, Evidences for carbonium ion intermediate formation — Migratory aptitude)Beckmann, Benzidine, Hofmann, Curtius, Benzilic acid rearrangements (mechanisms only) Clasien Rearrangement(sigmatrophic rearrangement) — Evidence for intamolecular nature and allylic carbon attachment paraclasien rearangernnent, cope and oxycope rearrangements , Fries rearrangement (Two mechanisms).

UNIT — V

NATURAL PRODUCTS: Terpenes, gerenial, nerol, menthol, and α - terpinol Alkaloids — geneeral and methods of isolation and general methods of structural determination of conine, piperine and nicotine. Vitamins — thiamine, riboflavin, pyrodxine and ascorbic acid occurrence and biological importance. Structural elucidations of pyridoxine and ascorbic acid.

REFFERENCES:

1. P.L. Soni and H.M. Chawla, Text Book of Organic Chemistry',27th Edn., Sultan Chand 1997.
2. V.S.Parrnar and H.M.Chawla, Principles of Reaction Mechanisms in Organic Chemistry, 27th Edn., Sultan Chand 1998.
3. Subash. Chandra Rastogi, Satis Kumar, Agarwala Ashok Kumar 'Sharma , Chemistry of Natural Products, Vol.I & II., 1St Edn.1974-75.
4. Ernest L Elliel, Stereochemistry of Cabon Compounds, Tata Mc-Grave Hill Publishing company Ltd., 19th Edn., 1995
5. M.K.Jain, Organic Chemistry, Shoban Lal Nagin Chand and Co., 12 th Edn.

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC63L	Industrial Chemistry Practical	0	0	3	2

1. Estimation of glucose in food samples.
2. Determination of dissolved oxygen in water.
3. Determination of Chemical Oxygen Demand (COD)
4. Determination of Biological Oxygen Demand (BOD)
5. Estimation of phosphoric acid in superphosphate fertilizer.
6. Determination of alkali content in antacid tablet using Hcl.
7. Estimation of Calcium in Calcium ammonium nitrate fertilizer.
8. Testing of turmeric powder, milk and mustard oil for adulterants.
9. Determination of total permanent and temporary hardness of water using EDTA.
10. Measurement of chloride, sulphate and salinity of water samples by simple titration method. ($AgNO_3$ and potassium chromate)

Suggested Readings

1. E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
2. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
3. B. K. Sharma: Engineering Chemistry, Goel Publishing House, Meerut
4. A. K. De, Environmental Chemistry: New Age International Pvt, Ltd, New Delhi.
5. S. M. Khopkar, Environmental Pollution Analysis: Wiley Eastern Ltd, New Delhi.
6. S. C. Bhatia: Chemical Process Industries, Vol. I & II, CBS Publishers, New Delhi.
7. J. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
8. S. S. Dara: A Textbook of Engineering Chemistry, S. Chand & Company Ltd. New Delhi.
9. O. P. Vermani, A. K. Narula: Industrial Chemistry, Galgotia Publications Pvt. Ltd., New Delhi.
10. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.
11. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: Introduction to Ceramics, Wiley Publishers, New Delhi.
12. R.M. Felder, R.W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.

COURSE CODE	COURSE TITLE	L	T	P	C
20114AEC64L	Domestic Products Preparation - Practical	0	0	3	2

1. Preparation of enamels.
2. Preparation of shampoo.
3. Preparation of face cream.
4. Preparation of hair remover.
5. Preparation of talcum powder.
6. Preparation of Aspirin and its analysis.
7. Preparation of Magnesium bisilicate (Antacid).
8. Preparation of nail polish and nail polish remover.
9. Preparation of simple organophosphates, phosphonates and thiophosphates
10. To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications.

Suggested Readings

1. R. Cremlyn: Pesticides, John Wiley.
2. E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK.
3. B.K. Sharma: Industrial Chemistry, Goel Publishing House, Meerut.
4. P.C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
5. G.L. Patrick: Introduction to Medicinal Chemistry, Oxford University Press, UK.
6. Hakishan, V.K. Kapoor: Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan, New Delhi.
7. William O. Foye, Thomas L., Lemke , David A. William: Principles of Medicinal Chemistry, B.I. Waverly Pvt Ltd. New Delhi.

COURSE CODE	COURSE TITLE	L	T	P	C
20114DSC65A	Discipline Specific Elective:II Nano Science	5	0	0	3

Aim: To study about the importance and applications of Nano science.

Objective:

- To foundational knowledge of the Nanoscience and related fields.
- To make the students acquire an understanding the Nanoscience and Applications.
- To help them understand in broad outline of Nanoscience.

Outcome:

- Learn about the background on Nanoscience
- Understand the synthesis of nanomaterials and their application and the impact of nanomaterials on environment
- Apply their learned knowledge to develop Nanomaterial's.

UNIT I:

INTRODUCTION AND HISTORY

Background to nanotechnology - scientific revolutions –atomic structure-atomic size – bottom up/top down nanotechnology-chemical reactivity-Incremental nanotechnology-Evolutionary nanotechnology-Radical nanotechnology-Emergence of nanotechnology-Challenging in nanotechnology-Misnomers and misconception of Nanotechnology.

UNIT II:

EVOLUTION AND GROWTH OF NANOSYSTEM

Basic problems and limitations - opportunities of nano scale -evolution of band structures and Fermi surface. Nanoparticles through homogeneous and heterogeneous nucleation-Growth controlled by surface and diffusion process- Oswald ripening process - influence of reducing agents-solid state phase segregation- grain growth and sintering precipitation in solid solutionhume rothery rule.

UNIT III:

NANOMATERIALS AND CLASSIFICATIONS

Carbon Nanotubes (CNT) - Metals (Au, Ag, Pd, Cu) - Metal oxides (TiO_2, CeO_2, ZnO, MgO) - Semiconductors (Si, Ge, CdS, ZnSe). Classifications of nanomaterials-zero dimensional-onedimensional-two dimensional-three dimensional nanostructures- Quantum dots-Quantum wireQuantum well-semiconductors and ceramics.

UNIT IV: SPECIAL NANOMATERIALS

Carbon fullerenes-fullerene derived crystals- carbon nanotubes. Micro and Mesoporous materialOrdered mesoporous materials-Random mesoporous materials-crystalline microporous materials.Core/Shell structures-Metal oxide structures-Metal polymer structures-Intercalation compounds-nanograined materials.

UNIT V: MATERIALS STRUCTURE AND PROPERTIES

Space lattice and unit cells, crystal system, Symmetry operation, Structures of common metallic, Semiconductor ceramic and superconductor materials, Miller Indices, Packing fractions, Formation of dangling bonds-atom like behavior of nanomaterials-physicochemical properties. Optical properties of nanomaterials-semiconductor-metal nanoparticles-Electrical and electronic propertiesThermal properties-Ferro electric properties-mechanical and magnetic properties.

Reference:

1.Introduction to Nan science, By Gabor L. Hornyak, Joydeep Dutta, H.F. Tibbals, Anil Rao

2. Introduction to Nanoscience and Nanotechnology, By Chris Binns

3. Foundations of Nanotechnology, Volume Two: Nanoelements Formation and ., By Sabu Thomas, Saeedeh Rafiei, Shima Maghsoodlou, Arezo Afzali

4. Nanocomposite structures and dispersions, By Ignac Capek

5. Morphology Control of Materials and Nanoparticles: Advanced Materials ..., edited by Yoshio Waseda, Atsushi Muramatsu

6. Nanomaterials: Synthesis, Properties and Applications, Second Edition, edited by A.S Edelstein, R.C Cammaratra

7. Nanomaterials: New Research, By B. M. Caruta.

COURSE CODE	COURSE TITLE	L	T	P	C
20114DSC65B	Discipline Specific Elective:II Polymer Chemistry	5	0	0	3

Aim: To develop knowledge about polymers to the learners.

Objectives:

- Imparting basic knowledge about the different types of polymers.
- Developing knowledge about production and advantages of polymers.

Learning Outcomes: Students who graduate with a major in Polymer Chemistry will be able to:

- Understand the principles of Polymer Chemistry.
- To know the knowledge about various techniques of polymers and its importance.
- To have employability.

UNIT — I

Basic concepts- an introduction of polymers and macromolecules. Natural and synthetic polymers. Molecular forces and chemical bonding polymers. Classification of polymers-addition and condensation polymers. General methods of preparation of polymers. Polymerisation through functional groups, multiple bonds and ring opening. Polymerisation techniques- bulk, solution, suspension and emulsion polymerization.

UNIT—II

Copolymerisation- homo and copolymers. Block copolymers and graft copolymers. Kinetics of free radical and cationic polymerization reactions. Mean kinetic chain length, degree of polymerization. Inhibition and retardation.

UNIT — III

Thermoplastic and thermosetting resins. Constituents of plastics, fillers, dyes, pigments, plasticizers, lubricants and catalysts. Acrylics, polyvinyl and cellulose derivatives of thermoplastic resins. Silicone resins, epoxy resins, phenolic resins and alkyl resins of thermosetting resins.

UNIT — IV

Nylon 66, terylene, viscose rayon, polyesters —definition and polymer requirement. Polymers of acrylic acid, methacrylic acid and poly acrylates.

UNIT — V

Polymer structure- linear, branched and cross-linked polymers- isotactic, sydiotactic and atactic. Properties- melting point, glassy state, glass tranisition temperature. Thermal analysis of polymers, thermal high energy radiation, oxidative and hydrolytic polymer degradation.

REFERENCES:

1. Introduction to Polymers by R. J. Young and P. A. Lovell.
2. Polymer Chemistry: An Introduction" by Malcolm P. Stevens.
3. Polymer Chemistry" by B.K. Sharma.
4. Introductory Polymer Chemistry " by G.S. Misra.
5. Textbook of polymer Science-FW Billmeyer
6. Introduction of Polymer Chemistry, R.P. Seymour Mc-Graw Hill, New York,
7. Polymer Science, V.R. Gowrikar, N. V. Viswanathan,Wiley Eastern Ltd.

COURSE CODE	COURSE TITLE	L	T	P	C
201LSCCE	Community Engagement	-	-	-	1

a) Objectives:

- To develop an appreciation of rural culture, life-style and wisdom amongststudents
- To learn about the status of various agricultural and rural development programmes
- To understand causes for rural distress and poverty and explore solutions for the same
- To apply classroom knowledge of courses to field realities and thereby improve quality of learning

b) Learning outcomes:

After completing this course, student will be able to

- Gain an understanding of rural life, culture and socialrealities
- Develop a sense of empathy and bonds of mutuality with local community
- Appreciate significant contributions of local communities to Indian society and economy
- Learn to value the local knowledge and wisdom of the community
- Identify opportunities for contributing to community's socio-economic improvements

c) Contents

Divided into four Modules, field immersion is part of each Unit

S. No.	Module Title	Module Content	Assignment	Teaching/ Learning Methodology	No. of Classes
1	**Appreciation of Rural Society**	Rurallifestyle, rural society, caste and gender relations, rural values with respect to community, nature and resources, elaboration of "soul of India lies in villages' (Gandhi), rural infrastructure	Prepare a map (physical, visual or digital) of the village you visited and write an essay about inter-family relations in that village.	- Classroom discussions - Field visit** - Assignment Map	2 4 2
2	***Understanding rural economy & livelihood***	Agriculture, farming, landownership, water management, animal husbandry, non-farm livelihoods and artisans, rural entrepreneurs, rural markets	Describe your analysis of rural household economy, its challenges and possible pathways to address them	- Field visit** - Group discussions in class - Assignment	3 4 1

3	***Rural Institutions***	Traditional rural organisations, Self-help Groups, Panchayati raj institutions (Gram Sabha, Gram Panchayat, Standing Committees), local civil society, local administration	How effectively are Panchayati raj institutions functioning in the village? What would you suggest to improve their effectiveness? Present a case study (written or audio-visual)	- Classroom - Field visit** - Group presentation of assignment	2 4 2
4	***Rural Development Programmes***	History of rural development in India, current national programmes: Sarva Shiksha Abhiyan, Beti Bachao, Beti Padhao, Ayushman Bharat, Swatchh Bharat, PM AwaasYojana, Skill India, Gram Panchayat Decentralised Planning, NRLM, MNREGA, etc.	Describe the benefits received and challenges faced in the delivery of one of these programmes in the rural community; give suggestions about improving implementation of the programme for the rural poor.	- Classroom - Each student selects one program for field visit** - Written assignment	2 4 2

COURSE CODE	COURSE TITLE	L	T	P	C
201SSCIM	Interview Skills Training and Mock Test	-	-	-	2

Objectives:

Preparing for your job interview could very well be one of the most important moments of your career.

Learning Outcomes:

Prepare for the interview.

Know common interview questions and questions to ask your future employer.

Describe body language and its impact on the interview.

Course Goals

Lesson One: Interview Preparation

Lesson Two: Common Interview Questions

Lesson Three: What Employers Want

Lesson Four: Attitude and Effort

Lesson Five: Body Language

Lesson Six: Research

Lesson Seven: The Mock Interview

Lesson Eight: Phone Interviews

Lesson Nine: Behavioral Interviews

Lesson Ten: Closing the Interview

Lesson Eleven: Thank You Notes

COURSE CODE	COURSE TITLE	L	T	P	C
20114PEE	Programme Exit Examination	0	0	0	1

UNIT - I

General Reasoning: Analytical Reasoning, Syllogisms, Analogies, Directions, Coding-Decoding, Classification Alphabet Series, Symbols and Notations, Similarities and Differences, Number Series, Blood Relationships Arrangements, Statements, Data Sufficiency, Non-verbal Reasoning, Visual Ability, Graphical Analysis Data Analysis

General Aptitude: Simplifications, Number System, Average, Algebra, PercentageTime & Work

Simple & Compound Interest, Time & Speed, HCF, LCM Problems, Area, Profit & Loss, Bar Graph, Pictorial Graph, Pie Chart Ratio & Proportion, Permutation & Combination

UNIT - II Inorganic Chemistry

General Chemistry: periodic trends, electronic structure, acid-base theory and reactions, balancing equations, stoichiometry, oxidation states and nuclear chemistry.

Structure and bonding: Lewis diagrams, molecular geometries and VSEPR concept, valence bond description and hybridization, bond energies, van der Waals radii of the elements, molecular orbitals and intermolecular forces

Metallic and ionic substances: lattice structure, lattice energies, theory of metallic bonding, conductors, semiconductors, superconductors and liquid crystals.

Chemistry of the main group elements: physical and chemical properties of the elements and their compounds, and occurrences and recovery.

Chemistry of the transition elements: electronic structures, physical and chemical properties of the elements and their compounds, occurrences and recovery, coordination chemistry, including ligands, stereochemistry, nomenclature, bonding, spectroscopy, thermodynamic and kinetic aspects.

Special topics: bioinorganic chemistry, catalysis, environmental chemistry, organometallic chemistry, including effective atomic number rule, bonding and reactions

Unit - III Organic Chemistry

Molecular structure: bonding, Lewis structures, orbital hybridization, resonance, aromaticity, stereochemistry, conformational analysis, acid base properties, IUPAC nomenclature, IR, NMR, UV/visible spectroscopy and mass spectrometry.

Functional groups: preparation and reactions of alkanes, alkenes, alkynes, dienes, alkyl halides, alcohols, thiols, ethers, sulfides, epoxides, aromatic compounds, aldehydes, ketones, amines, carboxylic acids and their derivatives.

Reaction mechanisms: electrophilic substitutions and eliminations, nucleophilic substitutions and additions, nucleophilic addition-eliminations, cycloadditions, and radical reactions, catalysis, reaction coordinate diagrams, thermodynamic and kinetic control, stereochemistry of reactions, relative

reactivities, relative stabilities and reactive intermediates (carbocations, carbanions, radicals, carbenes, enols, enolates, etc.)

Biochemistry: carbohydrates, amino acids, peptides, proteins, lipids, alkaloids, pharmaceuticals, nucleotides and nucleic acids, glycoproteins, polysaccharides, terpenes and steroids

Special topics: catalysis, organometallic chemistry, polymers and rearrangements

Unit - IV Physical Chemistry

Thermodynamics: first, second and third laws; equilibrium constants; spontaneity; LeChatelier's principle; thermochemistry; mixing; phase equilibria; colligative properties; electrochemistry and statistical thermodynamics

Kinetics: kinetic theory of gases, ideal and real gas equations and properties, rate laws, rate constants, half-life, reaction mechanisms, enzyme kinetics, activated complex theory, collision theory, photochemistry and solution dynamics.

Quantum chemistry and applications: classical experiments, principles of quantum mechanics, atomic and molecular structure, molecular spectroscopy

Unit -V Analytical Chemistry

Experimental design and data acquisition: accuracy and precision, random and systematic error, standard deviation, confidence limits, calibration, detection limits, sensitivity and significant figures

Homogeneous equilibria: acid-base equilibria and titrations, redox reactions and titrations, electrochemical cells and complexometric titrations

Heterogeneous equilibria: gravimetric analysis, solubility and chemical separations

Solutions: concentration terms, ionic strength and activity, standardizations and primary standards

Instrumental methods: Beer's law, spectroscopic methods, chromatographic methods, radiochemical methods, electrolysis, potentiometry and lasers

Open Electives