

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**B.Sc. CHEMISTRY- COURSE PATTERN**  
**(2017 – 2018)**

Sem ester	Part	Course	Title of the Course	Code	Hrs. /wk.	Credits	Marks
I	I	Language	Tamil paper I/ Hindi Paper I/ French Paper I	U15TL1TAM01/ U15HN1HIN01/ U15FR1FRE01	6	3	100
	II	English	English Paper I	U15EL1GEN01	6	3	100
	III	Major Core - 1	General Chemistry I	U15CH1MCT01	7	6	100
		Allied – 1 (Compulsory)	Allied Chemistry Paper I [For Botany and Zoology	U15CH1AOT01	4	4	100
		Allied – 2 (Compulsory)	Allied Chemistry Paper II [For Botany and Zoology	U15CH1AOP02	4	3	100
	IV	Environmental Studies	Environmental Studies	U15RE2EST01	2	2	100
		Value Education	Ethics-I/ Bible Studies-I/ Catechism-I	U15VE2LVE01 U15VE2LVB01 U15VE2LVC01	1	-	-
TOTAL					30	21	600
II	I	Language	Tami Paper II/ Hindi Paper II/ French Paper II	U15TL2TAM02/ U15HN2HIN02/ U15FR2FRE02	5	3	100
	II	English	English Paper II	U15EL2GEN02	6	3	100
	III	Major Core –2	General Chemistry II	U15CH2MCT02	7	6	100
		Major Core –3	Practical – 1: Semimicro Analysis	U15CH2MCP03	3	2	100
		Allied – 3	Allied Chemistry Paper III [For Botany and Zoology	U15CH2AOT03	4	3	100
	IV	Skill-based Elective – 1	Soft Skill Development	U15RE2SBT01	2	2	100
		Skill-based Elective – 2	Rural Enrichment and Sustainable Development	U15RE2SBT02	2	2	100
Value Education		Ethics I/ Bible Studies I/ Catechism I	U15VE2LVE01 U15VE2LVB01 U15VE2LVC01	1	1	100	

	Total				30	22	800
Semester	Part	Course	Title of the Course	Code	Hrs./wk	Credits	Marks
III	I	Language	Tamil Paper III/ Hindi Paper III/ French Paper III	U15TL3TAM03/ U15HN3HIN03/ U15FR3FRE03	6	3	100
	II	English	English Paper III	U15EL3GEN03	6	3	100
	III	Major Core – 4	General Chemistry – III	U15CH3MCT04	6	6	100
		Major Core – 5	Volumetric Analysis - Theory Cum Lab - I	U15CH3MCP05	4	4	100
		Allied – 4	Allied Optional Paper I (For Physics)	U15CH3AOT01	4	3	100
	IV	Skill-based Elective–3	Industrial Chemistry	U17CH3SBT03	2	2	100
			Experimental Chemistry For Life Science [For Botany]	U15CH3SBP03			
		Value Education	Ethics-II/ Bible Studies-II/ Catechism-II	U15VE4LVE02 U15VE4LVB02 U15VE4LVC02	1	-	
		Gender studies	Gender studies	U15WS3GST01	1	1	100
	Total					30	22
IV	I	Language	Tamil Paper IV/ Hindi Paper IV/ French Paper IV	U15TL4TAM04/ U15HN4HIN04/ U15FR4FRE04	5	3	100
	II	English	English Paper – IV	U15EL4GEN04	6	3	100
	III	Major Core – 6	General Chemistry – IV	U15CH4MCT06	5	5	100
		Major Elective - 1	Physical Chemistry - Theory Cum Lab – II (Separation Techniques and Virtual Lab Experiments)/ Physical Chemistry Theory Cum Lab – III(Verification of Colligative properties)	U17CH4MEP01/ U17CH4MEP02	5	5	100

		Allied – 5	Allied Optional Paper II (For Physics)	U15CH4AOT02	4	4	100
		Allied – 6	Allied Optional Paper III (For Physics)	U15CH4AOP03	4	3	100
	IV	Value Education	Ethics II/ Bible Studies II/ Catechism II	U15VE4LVE02/ U15VE4LVB02/ U15VE4LVC02	1	1	100
	VI	Extension Activity (180 hours) outside class hours from the Semester I -IV		Any 1 activity based on the student's choice (11 Activities)	-	1	--
Total					30	24	700
Semester	Part	Course	Title of the Course	Code	Hrs./wk.	Credits	Marks
V	III	Major Core – 7	Inorganic Chemistry	U15CH5MCT07	4	4	100
		Major Core – 8	Organic Chemistry	U15CH5MCT08	4	4	100
		Major Core – 9	Physical Chemistry – I [Electro Chemistry And Photochemistry]	U15CH5MCT09	4	4	100
		Major Core – 10	Practical II – Gravimetric, Organic analysis and Organic Preparation/ III – Physical Chemistry	U15CH5MCP10/ U15CH5MCP11	8	5	100
		Major Elective – 2	Dairy Chemistry / Polymer Chemistry/ Chemistry of Biomolecules Food Chemistry	U15CH5MET01 U15CH5MET02 U15CH5MET03 U17CH5MET03	5	4	100
	IV	NME – 1	Home Care/ Cosmetology	U15CH5NMT01/ U15CH5NMT02	2	2	100
		SBE – 4	Experimental Chemistry for Life Science [For Zoology]	U15CH5SBP04	2	2	100
			Value Education	Ethics -III/ Bible Studies-III / Catechism-III	U15VE6LVE03 U15VE6LVB03 U15VE6LVC03	1	-
Total					30	25	700
	III	Major Core – 11	Organic Chemistry	U15CH6MCT12	5	5	100
		Major Core – 12	Physical Chemistry– II [Spectroscopy]	U15CH6MCT13	5	5	100

VI		Major Core – 13	Practical III - Physical Chemistry/ II - Gravimetric, Organic analysis and Organic Preparation	U15CH6MCP11/10	8	5	100
		Major Elective – 3	Environmental Pollution / Dye Chemistry/ Health and Hygiene/ Analytical Chemistry	U15CH6MET01/ U15CH6MET02/ U15CH6MET03/ U15CH6MET04	5	5	100
	IV	NME – 2	Home Care/ Cosmetology	U15CH6NMT01/ U15CH6NMT02	2	2	100
		SBE – 5	Laboratory Techniques	U15CH6SBT05	2	2	100
		SBE – 6	Research Methodology	U15DS6SBT06	2	2	100
		Value Education	Ethics-III / Bible Studies-III / Catechism-III	U15VE6LVE03 U15VE6LVB03 U15VE6LVC03	1	-	-
			Total		30	26	700
	V	Extension Activity	RESCAPES -Impact study of project	U15RE6ETF01	-	1	100
Grand Total					180	141	4300

புனித சிலுவை தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி – 620 002.  
தமிழாய்வுத்துறை  
இளங்கலை / இளமறிவியல் / இளம்வணிகவியல் / பட்டவகுப்பு  
முதலாமாண்டு – முதற்பருவம் - நவம்பர் 2017  
தாள் - I

**Total Hours : 90**

**Hrs : 6Hrs /Wk**

**Credit : 3**

**Code : U15TL1TAM01**

**Marks : 100**

**நோக்கங்கள்:**

1. தாய்மொழியை வலுவோடும், பொலிவோடும் கையாளும் வழி முறைகளைக் கண்டறியச் செய்தல்.
2. தமிழ் இலக்கியப் பரப்பையும், பாரம்பரியத்தையும் அறிமுகப்படுத்துதல்.
3. படைப்பாற்றலை வளர்த்துக் கொள்ள ஊக்கம் அளித்தல்.
4. உயர்ந்த பண்பாடுகளின் அடிப்படையில் வாழ்க்கையை அமைத்துக் கொள்ளும் உள்ளார்ந்த விருப்பத்தைத் தோற்றுவித்தல்.
5. மனித உரிமைகளை வலியுறுத்தி மனித நேயத்தை வளர்த்தல்.
6. நாம் வாழும் நாட்டையும், உலகையும் பற்றிய விழிப்புணர்வை ஊட்டி சமய நல்லிணக்கத்தையும், சமூக நல்லுறவையும் பேணிக்காக்கத் துணைப்பூரிதல்.
7. ஆரோக்கியமான சிந்தனைகள் வளர ஆக்கம் அளித்தல்.

**பயன்கள்:**

1. தற்காலத் தமிழ் இலக்கிய வரலாற்றை வளர்க்க வழிகாட்டல்.
2. மாணவர்களின் தன்னம்பிக்கையை வளர்த்தல்
3. வாழ்வியல் நெறிகளை உணர்த்தல்.
4. பிழையின்றி எழுத பேச பயிற்சி அளித்தல்.

**பாடத்திட்டம்**

**அலகு:1 செய்யுள்**

1. பாரதியார் கவிதைகள் - தமிழ்  
கண்ணன் என் சேவகன்
2. பாரதிதாசன் கவிதைகள் - உலகம் உன்னுடையது

3. உமர்கய்யாம் - உமர்கய்யாம் பாடல்கள்
4. பட்டுக்கோட்டையார் - செய்யும் தொழிலே தெய்வம்
5. ந. பிச்சமுர்த்தி - ஒளியின் அழைப்பு
6. வைரமுத்து - ஐந்து பெரிது ஆறு சிறிது
7. சிற்பி - ஒரு கிராமத்து நதி

#### அலகு:2 செய்யுள்

8. கல்யாண்ஜி - பேசும்பார் என் கிளி
9. நிர்மலா சுரேஷ் - தைலச்சிமிழும் தச்சன் மகளும்
10. இரா. மீனாட்சி - ஒரு கோதை
11. விஜி - குரங்கு மனிதன்
12. பா. சத்தியமோகன் - எங்கெங்கு காணினும்
13. ஹைகூ கவிதைகள்

#### அலகு:3

தமிழ் இலக்கிய வரலாறு  
20-ஆம் நூற்றாண்டு (தற்காலம்)  
தமிழாய்வுத்துறை வெளியீடு

#### அலகு:4

படைப்பிலக்கியம் - சிறுகதைத் தொகுப்பு

#### அலகு:5

பொதுப்பகுதி - கலைச்சொற்கள்  
தமிழாய்வுத்துறை வெளியீடு

#### பாட நூல்கள்

செய்யுள்	- தமிழாய்வுத்துறை வெளியீடு
தமிழ் இலக்கிய வரலாறு	- தமிழாய்வுத்துறை வெளியீடு
சிறுகதைத் தொகுப்பு	- தமிழாய்வுத்துறை வெளியீடு
கலைச்சொற்கள்	- தமிழாய்வுத்துறை வெளியீடு

(for the candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002**  
**DEPARTMENT OF HINDI**  
**PART – I LANGUAGE HINDI FOR B.A, B.Sc & B.Com**  
**HINDI PAPER-I SHORT STORY, PROSE, GRAMMAR**  
**SEMESTER – I**

**HRS/WEEK : 6**

**CODE: U15HN1HIN01**

**CREDITS : 3**

**MARKS : 100**

**UNIT – I :** Purasakar, Sukamaya Jeevan, Ganga Singh, Machuye Ki Beti,  
Maharaj Ka Ilaj

**UNIT- II :** Maatru vandana, Chandini, Thitalii, Divali, Seekho.

**UNIT- III :** Sadak Ke Niyam, Bhagavan mahaveer, Prithvi Ka swarga, Mahan  
ganithagya Ramanujam, Birbal Ki Chathuraye.

**UNIT- IV :** General Grammar  
(Sanghya, Visheshan, ling, Vachan, Kriyavisheshan)

**UNIT- V :** Anuvad Abhyas – II

Books Prescribed :

- |                               |   |
|-------------------------------|---|
| 1. Galpa Sanchayan            | - D.B.H.P. Sabha Publishers, Chennai-17 |
| 2. Naveen Hindi Patamala – I  | - D.B.H.P. Sabha Publishers, Chennai-17 |
| 3. Naveen Hindi Patamala – II | - D.B.H.P. Sabha Publishers, Chennai-17 |
| 4. Sugam Hindi Vyakaran       | - D.B.H.P. Sabha Publishers, Chennai-17 |
| 5. Anuvad Abhyas – II         | - D.B.H.P. Sabha Publishers, Chennai-17 |

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2**

**DEPARTMENT OF FRENCH  
SEMESTER I**

**PART I – LANGUAGE - FRENCH PAPER I [GRAMMAR & CIVILISATION  
(ÉCHO A1 2<sup>e</sup> édition)]**

**(For candidates admitted 2016 onwards)**

**HRS/WEEK : 6**

**CREDIT : 3**

**CODE : U16FR1FRE01**

**MARKS : 100**

**Unit 1 Parcours d’initiation ; Vous comprenez**

La différence entre le prénom et le nom, les nationalités, les nombres, les professions

La présentation, le genre et le nombre d’un nom, l’interrogation et la négation – l’identité, les lieux de la ville, les mots du savoir-vivre – saluer, remercier – l’espace francophone.

**Unit 2 Au travail!**

La conjugaison des verbes du 1<sup>er</sup> groupe, des accords, les articles – l’état civil, des personnes et des objets caractéristiques d’un pays – exprimer ses goûts – première approche de la société française.

**Unit 3 On se détend!**

La conjugaison des verbes irréguliers, le future proche, les pronoms après une préposition – les loisirs – proposer, accepter, refuser, demander une explication – première approche de l’espace de France, repérages de quelques lieux de loisirs

**Unit 4 Racontez-moi ! ; Bon voyage !**

Le passé composé, la date et l’heure – les moments de la journée, de l’année, les événements liés au temps – dire ce qu’on a fait – les rythmes de vie en France, des personnalités du monde francophone.

La comparaison, les adjectifs démonstratifs et possessifs – les voyages et les transports – négocier une activité, faire les recommandations – les transports en France

**Unit 5 Bon appétit!**

L’emploi des articles, la forme possessive – la nourriture, les repas, la fête – les situations pratiques à l’hôtel et au restaurant – les habitudes alimentaires en France.

**TEXT BOOKS :**

**ECHO A1 – METHODE DE FRANÇAIS & CAHIER PERSONNEL D’APPRENTISSAGE**

Authors: J. Girardet and J. Pécheur Publication: CLÉ INTERNATIONAL, 2013.



(for candidates admitted from June 2017 onwards)  
**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2.**  
**I YEAR UG – SEMESTER I**  
**PART II – ENGLISH 1 - GENERAL ENGLISH I**

**HOURS : 6**  
**CREDIT : 3**

**CODE : U15EL1GEN01**  
**MARKS: 100**

**OBJECTIVES**

- Students learn to use LSRW skills and advanced communication skills in the context required in their daily life.
- The students learn to analyze and express their self and their concern and responsibilities to the world around.
- The students learn how English is used in literary writing so as to imbibe the spirit of using the standard language for communication.

**UNIT I - I, ME, MYSELF**

**Listening** for specific information in instructions and directions

**Speaking** about oneself, family and friends, likes, dislikes, strengths, weaknesses, profession, talents, emotions, feelings, incidents, reactions, opinions, views, aim, vision.

**Reading** for comprehension of routine work.

**Writing** -Paragraph guided

**Grammar**- Articles, Prepositions, Punctuation

**Vocabulary**-Meanings, Synonyms, Antonyms

**Composition** –Guided Creative writing

**TEXTS**

*This is the Photograph of me* by Margaret Atwood - Poem (**Internal Testing**)

1. *The Mayonnaise Jar*
2. *In Prison* by Jawaharlal Nehru (edited)
3. An extract from Shakespeare's *Othello* Act V Scene II

**UNIT II - MY FAMILY AND FRIENDS**

**Listening** to identify the persons/ places/ things from descriptions

**Speaking** -Describing incidents, favorite places, traits of a person, analyzing the nature of a person.

**Reading** to get specific information and to analyze characters

**Writing** -Letters (personal ),paragraphs-family profile and history

**Grammar** -adjectives and verbs

**Vocabulary**-synonyms and antonyms in context

**Composition** - Guided paragraph

**TEXTS**

*Night of the Scorpion* by Nissim Ezekiel - Poem (**Internal Testing**)

1. *The Old Folks at Home* by Alphonse Daudet (edited)
2. *Will you, Daddy?* (Story from Reader's Digest)
3. An extract from Shakespeare's *King Lear* Act I Scene I

**UNIT III - THE WORLD AROUND ME**

**Listening** To identify specific information

**Speaking** –Discussing and expressing opinions

**Reading** To infer meaning

**Writing** Descriptive and Diary writing

**Grammar** Uses of 'be' Verbs – subject verb concord

**Vocabulary** Coining new words with Prefix and suffix- converting one part of speech to another

**Composition - Essay writing**

### TEXTS

*Snake* by D.H. Lawrence – Poem (**Internal Testing**)

1. *Floating Fantasy* by Vinu Abraham (Prose)
2. *Discovery* by Herman Ould (Play)
3. *A Handful of Dates* by Tayeb Salih (Short story)

### UNIT IV - MY CONCERN AND RESPONSIBILITIES

**Listening** to short speeches and getting main concern- Global comprehension

**Speaking** Expressing opinions, concerns and responsibilities

**Reading** To detect one's perspective

**Writing** Debate and Dialogue

**Grammar** Sentence patterns (5 basic types)

**Vocabulary** Appropriate words in the context , coinage of new words , use of phrases

**Composition-Imaginative writing**

### TEXTS

*I have a Dream* by Martin Luther King Jr - (**Internal Testing**)

1. *What I have lived for?* by Bernard Russell
2. *Three days to see* by Helen Keller (edited)
3. An extract from Shakespeare's *The Merchant of Venice Act IV Scene I*

### UNIT V - MY PROFESSIONAL WORLD

**Listening to** short profile to get details –global comprehension

**Speaking** Discussion on secrets of success learnt from success stories

**Reading to infer meaning** – to trace the development and analyze the ratio of development

**Writing resume and E-mail writing**

**Grammar- Four** Types of sentences

**Vocabulary**-Idioms and phrases- meaning

**Composition** – Formal and imaginative writing

### TEXTS

Profile of a successful personality (**Internal Testing**)

1. Extract from a profile and an Interview of Indra Krishnamoorthy Nooyi
2. *The Verger* by Somerset Maugham
3. Profile of Bill Gates

### PRESCRIBED BOOK:

English for Communication –PoGo publication Trichy

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY SEMESTER I**  
**MAIN CORE PAPER – I : GENERAL CHEMISTRY – I**

**Theory: 7 hrs./wk**

**Credits: 6**

**Code: U15CH1MCT01**

**Course objectives:**

To make the students understand and learn about the properties of atoms, their discreteness, periodic table and variation in periodic properties, gaseous state, principles involved in qualitative analysis and fundamental concepts in organic chemistry.

**UNIT I :**

**Atomic structure**

- 1.1 Rutherford's nuclear model of atom. Planck's Quantum theory of radiation. photo electric effect and quantum theory.
- 1.2 Bohr's model of an atom. Bohr's theory and the origin of hydrogen spectrum. Somerfield's extension of Bohr's theory.
- 1.3 Particle and wave character. de Broglie's equation. Heisenberg's uncertainty principle.
- 1.4 Compton effect. Postulates of Quantum mechanics. Schrodinger wave equation. Significance of  $\psi$  and  $\psi^2$ . Quantum Numbers – wave picture of electron. Concept of atomic orbitals – shapes of s, p & d orbitals, nodal planes and nodal points in atomic orbitals.

**UNIT II :**

**Periodic table and Periodic properties:**

- 2.1 Modern periodic table- cause of periodicity, division of elements into s,p,d & f block elements.
- 2.2 Slater's rule. Filling up of atomic orbitals- Pauli's exclusion principle, Hund's rule of maximum multiplicity, Aufbau principle. electronic configuration.
- 2.3 Periodic variation of properties of elements – Size of atoms and ions, Atomic volume, Ionization potential, Electron affinity, Electro negativity, Metallic character.

**UNIT III:**

**The Gaseous State:**

- 3.1 Gases – Boyle's law. Charle's law. Avogadro's law. ideal gas equation. deviation from ideal behavior.
- 3.2 Maxwell's distribution of molecular speeds and molecular energies. effect of temperature in distribution of molecular velocities.
- 3.3 Types of molecular velocities – most probable, average and root mean square velocity, Collision number, Collision diameter, Collision frequency, Mean free path. Transport phenomena in gases. vanderwaal's equation of state – derivation.

**UNIT IV:**

**Qualitative Analysis**

- 4.1 Basic principles of Chemical analysis - Solubility product, Common ion effect, Complexation, oxidation and reduction.
- 4.2 Reactions involved in identification of anions and cations.

- 4.3 Interfering acid radicals and their removal – oxalate, fluoride, phosphate and arsenate. Separation of cations into groups.
- 4.4 Semimicro analysis of simple salts- **Practicals.**

#### **UNIT V:**

#### **Fundamental concepts in Organic Chemistry**

- 5.1 IUPAC system of Nomenclature – Longest chain rule, lowest number rule, arrangement prefixes, lowest number for functional group, writing names for compounds containing more than one functional group. Writing the structural formula from given IUPAC name.
- 5.2 Types of covalent bonds –  $\sigma, \pi$  bond, Polarity of covalent bonds, Homolytic and heterolytic fission of bonds.
- 5.3 Types of reactions of organic compounds – substitution reaction, Addition reactions, Elimination reactions, Rearrangement reactions and polymerization reactions.
- 5.4 Free radicals – Formation, detection, properties, stability. Carbocations, carbanion, carbenes – Formation, stability and reactions.

#### **BOOKS FOR STUDY:**

1. Soni P.L. and Chawla H.M.(2014). *Text Book of Organic Chemistry*( 26<sup>th</sup> edn). New Delhi: Sultan Chand and sons.
2. Puri B.R., Sharma L.R. and Madan S. Pathania, (2013). *Principles of Physical Chemistry* (35<sup>th</sup> edn). New Delhi: Shoban Lal Nagin chand and Co.
3. Puri B.R., Sharma L.R. and Madan S. Pathania, (2013). *Principles of Inorganic Chemistry* (35<sup>th</sup> edn). New Delhi: Shoban Lal Nagin chand and Co.

#### **BOOKS FOR REFERENCE:**

1. Gopalan R., Subramanian P.S. and Rengarajan K, (2013) *Elements of Analytical Chemistry*. (3<sup>rd</sup> Edition) New Delhi: Sultan Chand and sons.
2. Bahl B.S, Arun Bahl and Tuli G.D. (2012), *Essentials of Physical Chemistry*, New Delhi: Sultan Chand and sons.
3. Bahl B.S, Arun Bahl, (2010). *A Textbook of Organic Chemistry*. New Delhi: Sultan Chand and sons.
4. Soni P.L. and Mohankatyal (2013) ‘Text book of Inorganic Chemistry’ 20<sup>th</sup> revised edition, sultan chand.
5. Robert Thornton Morrison, Robert Neilson Boyd, Saibal Kanti Bhattacharjee, (2011), *Organic Chemistry*( 7<sup>th</sup> Edition), Pearson Education India, Chennai.
6. Raj K. Bansal, (2007) “A Text Book of Organic Chemistry”, 5<sup>th</sup> edition, New Age International Limited.

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER I**  
**ALLIED – 1: ALLIED CHEMISTRY PAPER I**  
**[For Botany and Zoology]**

**HOURS: 4Hrs./Wk.**

**CODE: U15CH1AOT01**

**Credit: 4**

**Course objectives:**

To make the students to understand the basic concepts in organic chemistry, carbohydrates and heterocyclic compounds, periodic properties, quantum numbers, chemical equilibrium and kinetics, chromatography and osmosis.

**UNIT I:**

**Fundamental Concepts of Organic Chemistry:**

- 1.1 Types of organic reactions - substitution, addition, elimination, rearrangement and polymerization reactions and reagents. Common electrophiles, nucleophiles and free radicals.
- 1.2 Inductive, resonance, hyper conjugation and steric effects – an elementary idea. States of hybridization of carbon.
- 1.3 Isomerism – structural isomerism, types definition and example.

**UNIT II:**

**Carbohydrates and Heterocyclic compounds:**

- 2.1 Carbohydrates – classification, glucose, fructose and sucrose – Structure only, Properties, Mutarotation, Test to identify Carbohydrates- Elementary idea of Starch and Cellulose.
- 2.2 Aromatic Hydrocarbons-General methods of preparation of Benzene and its homologous. General properties of benzene and its homologous. Aromatic character – Huckel's rule.
- 2.3 Heterocyclic compounds: Furan, Pyrrole, Thiophene, Pyridine – Preparation, properties and uses.

**UNIT III:**

- 3.1 Quantum numbers:- Principal, Azimuthal, Magnetic and spin quantum numbers. Electronic configuration of elements – Aufbau principle, Hund's rule and Pauli's exclusion principle.
- 3.2 Long form of periodic table, division of elements into s, p, d and f blocks, cause of periodicity.
- 3.3 Periodic properties – atomic radius, ionic radius, Ionization energy, Electron affinity and Electronegativity – definition and variation along a group and a period.

**UNIT IV:**

**Chemical Kinetics and Catalysis:**

- 4.1 Rate of reactions, order, molecularity, kinetic equations for I and II order, order of reactions and their determination.

- 4.2 Catalysis – Positive and negative catalysis, auto catalysis, induced catalysis, enzyme catalysis, promoters, catalytic poisons with examples only, characteristics of catalysis.
- 4.3 Types of catalysis – Homogeneous catalysis – the intermediate compound formation theory. Heterogenous catalysis – the adsorption theory.

#### **UNIT V:**

##### **Chromatography and Osmosis:**

- 5.1 Chromatography – Column and Paper.
- 5.2 Thin layer chromatography, Electrophoresis.
- 5.3 Osmosis – Osmotic pressure and its determination, reverse osmosis- Desaliantion.

#### **BOOK FOR STUDY:**

1. Soni P.L. and Chawla H.M.(2014).*Text Book of Organic Chemistry*( 26<sup>th</sup> edn). New Delhi: Sultan Chand and sons.
2. Puri B.R., Sharma L.R. and Madan S. Pathania, (2013).*Principles of Physical Chemistry* (35<sup>th</sup> edn).New Delhi: Shoban Lal Nagin chand and Co.
3. Puri B.R., Sharma L.R. and Madan S. Pathania, (2013).*Principles of Inorganic Chemistry* (35<sup>th</sup> edn).New Delhi: Shoban Lal Nagin chand and Co.

#### **REFERENCE BOOKS:**

1. Jain M.K, Sharma S.C. ‘Modern Organic Chemistry’, (2007), Vishal Publishing Co
2. Soni P.L. and Mohankatyal (1992) ‘Text book of Inorganic Chemistry’ 20<sup>th</sup> revised edition, sultan chand.
3. . Bahl B.S, Arun Bahl and Tuli G.D. (2012), *Essentials of Physical Chemistry*, New Delhi: Sultan Chand and sons.

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER I**  
**ALLIED : 2 - ALLIED CHEMISTRY PRACTICAL PAPER II**  
**[FOR BOTANY AND ZOOLOGY]**

**Hours : 4Hrs./wk.**

**Credits : 3**

**Code: U15CH1AOP02**

**OBJECTIVES:**

To expose the students to the theory of volumetric analysis and also to develop practical skills by giving them certain experiments in volumetric analysis.

**VOLUMETRIC ANALYSIS: (10 hrs.)**

- 1.1 Definitions:- Titration, Back Titration, End point, Equivalence point, Indicator, Normality, Molality, Molarity, Mole Fraction, Equivalent weights of acid, base, salt, oxidizing and reducing agents.
- 1.2 Standard solution, requirements of a primary standard, preparation of standard solution, secondary standard, principle of volumetric analysis.
- 1.3 Acid-Base titrations – HCl with NaOH, CH<sub>3</sub>COOH against NaOH, Na<sub>2</sub>CO<sub>3</sub> with HCl. Acid-Base indicators – Ostwald's theory and quinonoid theory.
- 1.4 Redox titrations – Mohr salt against KMnO<sub>4</sub>, Oxalic acid with KMnO<sub>4</sub>, FeSO<sub>4</sub> against K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>. Redox indicator – Diphenyl amine, Iodometry - Estimation of copper sulphate

**VOLUMETRIC ANALYSIS (DOUBLE TITRATION WITH WEIGHING):**

(3 hrs. External)

**I Acidimetry and Alkalimetry:**

1. Estimation of sodium hydroxide.
2. Estimation of hydrochloric acid.

**II Permanganometry:**

3. Estimation of Mohr's Salt.
4. Estimation of Oxalic acid.

**III Iodometry:**

5. Estimation of copper sulphate

**IV Dichrometry:**

1. Estimation of iron (internal indicator)

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**  
**B.A /B.Sc./B.Com/B.R.SC/B.C.A/B.B.A DEGREE EXAMINATION**  
**SEMESTER I**  
**ENVIRONMENTAL STUDIES**

**Hrs – 2/Week**

**CODE: U15RE1EST01**  
**CREDITS:2**

**Unit I – Awareness and Natural Resources**

Awareness of Environmental issues and management strategies–need of the hour

Renewable and non-renewable resources–uses, present status and management of forest, water, land and energy resources.

**Unit II–Ecosystems and Biodiversity**

Ecosystem–concepts, structure and types–concept of food chains and food web–causes and effects of weakening food chains

Biodiversity–concept of genetic, species and ecological biodiversity–ecological and economic values–India, a mega diversity country, hotspots–threats to biodiversity and conservation measures.

**Unit III–Environmental Pollution**

Causes, effects and control of water, and air pollution – global warming–ozone depletion–Nuclear hazards.

**Unit IV–Human population and Environment**

Population growth at national and global level.

World food production–Effects of modern agriculture on land and Eco systems–GMOs and related issues

Environmental pollutions and diseases–malaria– chikungunya

**Unit V–Environment and Social Issues Rich– poor wide–at national and global levels**

Urbanization –slums

Changing value systems–AIDS Family welfare programs

**REFERENCES:**

1. Agarwal, K.C. (2001). Environmental Biology, Nidi Publication Ltd.
2. . Bikaner. Chairas, D.D. (1985). Environmental Science. The Benjamin Cummings Publishing company., Inc.
3. Clarke George, L. (1954). Elements of Ecology. Hohn Wiley and SONS, Inc.
4. Hodges, L. (1977). Environmental Pollution, II Edition. Holt, Rinehart and Winston, New York. Krebs, C.J



(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**

**B.A/B. Sc/B.Com /B.C.A-DEGREE COURSES**

**LIFE ORIENTED EDUCATION**

**ETHICS – I: RELIGIONS AND VALUE SYSTEMS**

**HRS / Wk :1**

**CREDITS : 1**

**CODE:U15VE2LVE01**

**MARKS : 100**

**OBJECTIVES:**

- To understand and appreciate other Religions and Culture
- To learn from other Religions and Culture
- To interact with all Religions and Culture to enhance my faith in my religion.
- To help the students to become aware of the negative forces of religions.

**UNIT – I: RELIGION**

God – Faith, Religion, Definition, Nature, Characteristics and Basic values of different religions. Impact of Globalization on religion – Importance of worship in holy places – celebration, Communion (come-union) – Socialization

**UNIT – II: DIFFERENT RELIGIONS**

Basic characteristics and basic thoughts of different religions: Buddhism, Christianity, Hinduism, Islam, Jainism and Sikhism

**UNIT – III: UNITY OF RELIGION**

Unity of Vision and Purpose- Respect for Other Religions, Inter Religious Co-operation, Religious Pluralism as a fact and Religious Pluralism as a value

**UNIT – IV: FUNDAMENTALISM, COMMUNALISM AND SECULARISM**

Meaning and impact of Fundamentalism, Communalism, Violence and Terrorism – Tolerance – Secularism – Individualism

**UNIT – V: VALUE SYSTEMS**

Value and Value Systems - Moral Values -Individuals and the need to stand for values in the context of Globalization – Consumerism - Will power to live up to your values - Healthy body for empowerment – Physical health and Mental hygiene, food and exercises

**REFERENCES:**

1. Social Analysis (a course for all first year UG students), 2001. Department of Foundation Courses, Loyola College, Chennai-34.
2. Special topics on Hindu Religion, 2001. Department of Foundation Courses, Loyola College, Chennai-34.
3. Religion: the living faiths of the world, 2001. Department of Foundation Courses, Loyola College, Chennai-34.
4. Sydney Am Meritt, 1997. Guided meditations for youth.
5. Marie Migon Mascarenhas, 1986. Family life education- Value Education, A text book for College students.

(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI -2**  
**B.A/B. Sc /B.Com/ B.C.A-DEGREE COURSES**  
**LIFE ORIENTED EDUCATION**  
**CATECHISM – I: GOD OF LIFE**

**HRS / Wk : 1**

**CREDIT : 1**

**CODE: U15VE2LVC01**

**MARKS : 100**

**OBJECTIVES:**

- To enable the students to know God and his Salvific acts through Holy Bible
- To enable the students to know about the Paschal Mystery

**UNIT – I: CREATION AND COVENANT**

Study from petty catechism - Genesis - God revealed himself in creation -God who preserves creation through covenants

(Pentateuch) -Our response to God's covenant -Reason for its success and failure -The relationship of God with Israel -Image of God in Old Testament-God and me

**UNIT – II: GOD OF THE PROPHETS**

God's care for the humanity through Prophets-Major (Isaiah, Jeremiah) Minor (Amos) and Women (Deborah) Prophets-Their life and mission - Theology of Prophets -Concept of sin and collective sins expressed by prophets and God's saving love.

**UNIT – III: GOD OF WISDOM**

God experience through wisdom Literature, its origin and growth

**UNIT – IV: SYNOPTIC GOSPELS**

Synoptic Gospels and John's Gospel – Author –historical background –Chief message of each Gospel and for whom it was written - A few passages for the study of parallelism in the Synoptic Gospels.

**UNIT – V: LUKE'S GOSPEL**

Study of Luke's Gospel in detail – speciality of the Gospel – main emphasis of the message – meaning and blessing of suffering and paschal joy in one's life - Passion – PaschalMystery

**REFERENCES:**

1. Catechism of the Catholic Church published by Theological Publications in India for the Catholic Hierarchy of India, 1994
2. The Holy Bible Revised Standard Version with Old and New Testaments Catholic Edition for India.
3. Vaazhvin Vazhiyil – St. John's Gospel- Fr. Eronimus
4. God's Word nourishes A catholic approach to the Scriptures Dr. Silvano Renu Rita, O.C.V. STD and Dr. Mascarenhas Fio S.J. D.mim. Catholic Bible I
5. Documents of Vatican II – St. Paul's Publications, Bombay 1966.

(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TRICHIRAPALLI-2.**

**B.A/B.Sc./B.Com /B.C.A-DEGREE COURSES**

**LIFE ORIENTED EDUCATION**

**BIBLE STUDIES – I: NEW TESTAMENT**

**HRS / WK : 1**

**CREDIT : 1**

**CODE: U15VE2LVB01**

**MARKS : 100**

**OBJECTIVE:**

- To enable the students to develop the passion for the Word of God – Jesus and inculcate the thirst of Missionaries being a disciple of Christ.

**UNIT – I: BIBLE – THE WORD OF GOD**

- Books of the Bible – Division into Old Testament and New Testament – History of the Bible-
- Messianic Prophecies (Isaiah 9:6,40:3,53:1-12,61:1-3,Micah 5:2)
- The Birth and Ministry of John the Baptist (Luke 1:1-80,Mat 3:1-17,14:1-12)
- The Birth, Passion, Death and Resurrection of Jesus (Luke 1:26-80,2:1-52,John 1 :18-21)

**UNIT – II: MINISTRY OF JESUS**

- Miracles (Mark 2:1-12,Luke 4:38-41,6:6-11,7:1-17,8:26-56,John 2:1-12)
- Parables (Luke 6:46-49,8:4-15,10:25-37,15:1-32)
- Preaching
  - Sermon on the mount (Mat 5-7)
  - Lord's Prayer (Luke 11: 1-13)
  - Kingdom of God (Mat 13: 24-50)
- Prayer life of Jesus (Luke 5:12-16,John 11:41-45,17:1-26,Mark 14:32-42)
- Rich and Poor (Luke 16: 19-31,21:1-4)
- Women Liberation (John 4:1-30,8:1-4)
- Women in the New Testament
- Martha & Maria (Luke 10: 38- 42, John 11: 1-46)

**UNIT – III: CHURCH – BIRTH AND GROWTH**

- Early Church
- Birth (Acts 2:1-41)
- Unity and sharing (Acts 2:42-47,4:1-37,5:1-11)
- Witnessing life (Acts 3:1-26,5:12-42,8:26-40, 16:20-34)
- Comparison between early Church and present Church.

#### **UNIT – IV: DISCIPLES AND APOSTLES**

- Mother Mary (Mother of Jesus) (Luke 1: 27-35, John 2: 1-12, 19:35, Acts 1: 13-14)
- St. Peter (Luke 22:1-7,Acts 2:1-41,12:1-17)
- St. Andrew (Mat 4:18-20,John 1:35-42,6:1-14)
- St. Stephen (Acts 6,7)
- St. Paul (Acts 8,9,14,17,26 and 28)
- St. Thomas (John 20:24-31)

#### **UNIT – V: ST. PAUL’S LETTERS AND THE MESSAGE**

- I & II Corinthians
- Galatians
- Ephesians
- Philippians
- I & II Timothy
- Titus

#### **REFERENCES:**

1. Holy Bible
2. John Stott, 1994, “**Men with a Message**”, Angus Hudson Ltd. London.

புனித சிலுவை தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி – 620 002.

தமிழாய்வுத்துறை

இளங்கலை / இளம் அறிவியல் / இளம் வணிகவியல் பட்ட வகுப்பு  
முதலாமாண்டு – இரண்டாம் பருவம் - ஏப்ரல் 2017 - 2018  
தாள் - II

**Total Hours : 75**

**Hrs : 5Hrs /Wk**

**Credit : 3**

**Code : U15TL2TAM02**

**Marks : 100**

**நோக்கங்கள்:**

1. இறைச் சிந்தனை வழி மாணவர்களை ஒருமுகப்படுத்துதல்.
2. தமிழ்ச் சான்றோர்களின் சிறப்புகளை அறிமுகப்படுத்துதல்.
3. மாணவர்களின் நல்லெண்ணங்களை மேம்படுத்துதல்.
4. நட்புணர்வை மாணவர்கள் மனதில் பதியவைத்தல்.

**பயன்கள்:**

1. இப்பாடம் மாணவர்களிடையே ஆன்மீக அறிவு அறிமுகமாகவும், வளரவும், ஆழப்படவும் துணைபுரிகின்றது. இது ஓர் இயற்கைப் பூங்கா.
2. தமிழை நேசித்து, தமிழ்ச் சான்றோர்களின் மீது மதிப்புக் கொள்ளவும், தானும் சான்றோர் ஆகவும் இது ஒரு பாலமாக பயன்படுகிறது.
3. ஊற்றுக்களாய் மாணவிகளிடையே மறைந்து கிடக்கும் நல்லெண்ணங்களை வெளிக்கொணரவும் நேர்மறைச் சிந்தனைகள் தோன்றவும் பயன்படுவதால் இது ஒரு நூலகமாகும்.
4. வாழ்க்கையில் நட்பின் தேவையை உணர வைக்கும் வழிகாட்டியாகத் திகழ்கிறது. இது வாழ்க்கைப் பெட்டகம்.

**பாடத்திட்டம்**

**அலகு:1 செய்யுள்**

1. தேவாரம்

- சுந்தரர் (திருமழப்பாடி)

- |                             |                                      |
|-----------------------------|--------------------------------------|
| 2. திருவாசகம்               | - மாணிக்கவாசகர் (குயில் பத்து)       |
| 3. திருமந்திரம்             | - திருமூலர்                          |
| 4. திருப்பாவை               | - ஆண்டாள்                            |
| 5. நாலாயிர திவ்வியபிரபந்தம் | - குலசேகராழ்வார் (பெருமாள் திருமொழி) |

**அலகு:2 செய்யுள்**

- |  |                           |
|--|---------------------------|
| 6. மீனாட்சியம்மை பிள்ளைத்தமிழ்                       | - குமரகுருபரர்            |
| 7. இரட்சணிய யாத்திரிகம்                              | - எச்.ஏ.கிருட்டிணப்பிள்ளை |
| 8. வேதநாயகம் சாஸ்திரியார் பாடல்கள்- வேதநாயகம் பிள்ளை |                           |
| 9. நபிகள் நாயக மான்மிய மஞ்சரி                        | - செய்கு தம்பிப் பாவலர்   |

**அலகு:3**

**தமிழ் இலக்கிய வரலாறு - தமிழாய்வுத்துறை வெளியீடு**  
 பல்லவர்காலம்  
 நாயக்கர்காலம்

**அலகு:4**

**படைப்பிலக்கியம் - புதினம்**  
 கல்கி - பார்த்திபன் கனவு

**அலகு:5**

**கடிதம் எழுதுதல்**

**பாட நூல்கள்**

செய்யுள்	- தமிழாய்வுத்துறை வெளியீடு
தமிழ் இலக்கிய வரலாறு	- தமிழாய்வுத்துறை வெளியீடு
கல்கி	- பார்த்திபன் கனவு
கடித இலக்கியம்	- பயிற்சி ஏடு.

(for the candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002**  
**DEPARTMENT OF HINDI**  
**PART – I LANGUAGE HINDI FOR B.A, B.Sc & B.Com**  
**HINDI PAPER-II PROSE, DRAMA, GRAMMAR-II, COMPREHENSION**  
**SEMESTER –II**

**HRS/WEEK : 5**  
**CREDITS : 3**

**CODE: U15HN2HIN02**  
**MARKS : 100**

**UNIT – I :** Bharat matha, Premchand, Taj mahal ki Aathma Kahani, Mahakavi Prasadh, Meri theertha yatra

**UNIT- II :** Sathyameva jayathe - Drama (chapter 1& 2)

**UNIT- III :** Sathyameva jayathe – Drama (chapter 3)

**UNIT- IV :** General Grammar (Sarvanaam, Kriya, Kaal, Karak, Ne Ka niyam)

**UNIT- V :** Comprehension – Prose passages

Books Prescribed :

1. Naveen Gadhya Chayanika – D.B.H.P. Sabha Publishers, Chennai-17
2. Sathyameva Jayathe – D.B.H.P. Sabha Publishers, Chennai-17
3. General Grammar – D.B.H.P. Sabha Publishers, Chennai-17

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2**

**DEPARTMENT OF FRENCH  
SEMESTER XVIII**

**PART I - LANGUAGE - FRENCH PAPER II [GRAMMAR, CIVILISATION &  
TRANSLATION (ÉCHO A1 2<sup>e</sup> édition)]  
(For candidates admitted 2016 onwards)**

**HRS/WEEK : 5**

**CODE : U16FR2FRE02**

**CREDIT : 3**

**MARKS : 100**

**Unit 1 Quelle journée !**

La conjugaison pronominale, l'impératif, l'expression de la quantité – les activités quotidiennes, les achats et l'argent – demander des nouvelles de quelqu'un – le comportement en matière d'achat et d'argent.

**Unit 2 Qu'on est bien ici !**

Les prépositions et les adverbes, les verbes exprimant un déplacement – le logement, la localisation, l'orientation, l'état physique, le temps qu'il fait – demander de l'aide, exprimer une interdiction – le climat en France, les cadres de vie (ville et campagne)

**Unit 3 Souvenez-vous ?**

Emplois du passé composé et de l'imparfait – les moments de la vie, la famille, les relations amicales, amoureuses, familiales – demander/donner des informations sur la biographie d'une personne – le couple et la famille.

**Unit 4 On s'appelle ?**

Les pronoms compléments directs et indirects – les moyens de la communication – aborder quelqu'un, exprimer une opinion sur la vérité d'un fait – les conseils de savoir-vivre en France.

**Unit 5 Un bon conseil ! ; Parlez-moi de vous !**

L'expression de déroulement de l'action, les phrases rapportées – le corps, la santé et la maladie – téléphoner, prendre rendez-vous, exposer un problème – les conseils pour faire face aux situations d'urgence.

La place de l'adjectif, la proposition relative, la formation des mots – la description physique et psychologique des personnes, les vêtements et les couleurs – demander/donner une explication – quelques styles comportementaux et vestimentaires en France.

**TEXT BOOKS :**

ECHO A1 – METHODE DE FRANÇAIS & CAHIER PERSONNEL D'APPRENTISSAGE  
Authors: J. Girardet and J. Pécheur Publication: CLÉ INTERNATIONAL, 2013.



(for candidates admitted from June 2017 onwards)  
**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2.**  
**I YEAR UG – SEMESTER II**  
**PART II – ENGLISH 2 - GENERAL ENGLISH II**

**HOURS : 6**  
**CREDIT : 3**

**CODE : U15EL2GEN02**  
**MARKS: 100**

**OBJECTIVES**

- Students learn to use LSRW skills and advanced communication skills in the context required in their daily life.
- The students learn to analyze and express their self and their concern and responsibilities to the world around.
- The students learn how English is used in literary writing so as to imbibe the spirit of the standard language for communication.

**UNIT I – SELF**

**Listening-** Specific information from demonstration and instructions, transfer of information.

**Speaking** - Sharing expressions, dreams and expressing opinions.

**Reading** -Skimming and Scanning for specific information, reading for local comprehension.

**Writing** - Story Writing

**Grammar** - Articles and Sentence Pattern

**Vocabulary** - Meanings, Synonyms, Antonyms

**Composition** - Transfer of information: Paragraph to Bar graph/pie chart

General Essay - Courage is the key to success

**TEXTS**

1. *The Far and the Near* by Thomas Wolfe (Short Story)
2. *The Owl who was a God* by James Thurber (Short Story)
3. *Wings of Fire – Chapter I* by Dr. A.P.J. Abdul Kalam (Prose)

**UNIT II – STRENGTHS**

**Listening** - Listening to a process

**Speaking** - Telephone Etiquette

**Reading** - Loud reading with pause, intonation and expression in dialogue form

**Writing** - Writing about oneself (strengths& weaknesses, Have's & Have not's)

**Grammar-** Subject verb agreement, Prepositions

**Vocabulary-** One word substitute in the context

**Composition-** Letter Writing - informal letters

General essay – A bird in hand is worth two in bush.

**TEXTS**

1. *The Robe of Peace* by O' Henry (Short Story)
2. An extract from *Androcles and the Lion* by George Bernard Shaw (Play)

**UNIT III - POSITIVE SHORTCOMINGS**

**Listening** - Listening to facts and opinions and trying to differentiate it

**Speaking** - Pair Work – about have's & have not's, understanding the strengths and overcoming the weaknesses

**Reading** - Reading newspapers, articles, magazines, anecdotes for global and specific in analytical thinking

**Writing** - Filing Complaints, Travelogues

**Grammar** - Tenses, Direct and Indirect Speech

**Vocabulary** - Compound words

**Composition** - Dialogue Writing

General essay – Adversity is the seed of success.

### TEXTS

1. *Six Thinking Hats* by Edward de Bono (Prose)
2. *A Cup of Tea* by Katherine Mansfield (Short Story)
3. An Extract from Shakespeare's *As You Like It* (Act II Scene I lines 12 -17)

### UNIT IV POTENTIALS

**Listening** - Listening to the description of personalities, historical places and monuments

**Speaking** - Group Discussion – Totally controlled, partially controlled, Free

**Reading** - Parallel Reading, reading for pleasure

**Writing** - Letter writing – formal letters

**Grammar** - Adjectives, Degrees of Comparisons

**Vocabulary** - Idioms and Phrases

**Composition** - Debates and Discussions

General essay – My potentials

### TEXTS

1. *Easy Ways to Avoid an Argument* by Sam Horn (Prose)
2. *Pygmalion* by George Bernard Shaw (Play)
3. *My Heart Leaps up when I behold* by William Wordsworth (Poem)
4. *The Flower* by Alfred Lord Tennyson (Poem)

### UNIT V ACHIEVEMENTS

**Listening** - Listening to comparisons and arguments

**Speaking** - Performance

**Reading** - In-depth reading

**Writing** - Script writing of story to play

**Grammar** - Question Tags

**Vocabulary** - Homophones

**Composition** - Essay Writing

General essay - The reward of hard work.

### TEXTS

1. *On Saying Please* by A.G. Gardiner (Prose)
2. *A Time of Green* by Anna Stillaman (Play)

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER II**  
**MAIN CORE PAPER – 2: GENERAL CHEMISTRY – II**

**Theory: 7 hrs./wk**

**Credits: 6**

**Code: U15CH2MCT02**

**Course objectives:**

To understand the fundamental concepts of ionic, covalent and hydrogen bonding. To predict the shapes of molecules from the valence shell electron pair repulsion model. To write the molecular orbital diagrams for homo nuclear and heteronuclear diatomic molecules. To understand the concepts of hybridization and various effects operating in organic compounds. To learn the reactions of alkanes, alkenes, dienes and alkynes. To understand the first law of thermodynamics, relate heat, work and energy and study the applications of first law to chemical reactions.

**UNIT I:**

**Aliphatic hydrocarbons - I**

- 1.1 Atomic orbitals involved in organic molecules. Quadrivalency of carbon. Hybridization – sp, sp<sup>2</sup>, sp<sup>3</sup>.
- 1.2 Effects operating in organic compounds – Inductive, Electromeric, Resonance, Hyperconjugation, Mesomeric and Steric effect.
- 1.3 Alkanes; Substitution reactions – Free radical substitution reaction (mechanism), thermal and Catalytic reactions – Oxidation and pyrolysis. Application of cracking. Octane number, Cetane number, Flash point – definitions. Anti-knocking properties. Petroleum as a source of aromatics.
- 1.4 Alkenes: Nomenclature. Addition reactions. Markownikoff's and Anti Markownikoff's rule – explanation. Problems related to alkenes. Reactions showing stereo specificity and non stereospecificity.

**UNIT II:**

**Aliphatic hydrocarbons –II & synthetic reagents**

- 2.1 Dienes – conjugated, isolated and cumulated dienes. Diels Alder reaction – endo rule. 1,2 and 1,4 addition. Kinetic and thermodynamic control. Stabilities of isolated and conjugated diene.
- 2.2 Elimination reactions: Dehydration of alcohols, dehalogenation of vicinal dihalides and dehydro halogenations. Mechanism of E1 and E2. Hofmann and Saytzeff's rule of elimination. Problems related to elimination reactions.
- 2.3 Alkynes – Acidity of acetylene. Properties - oxidation, ozonolysis. Problems related to alkynes.
- 2.4 Applications of reagents of synthetic importance – SeO<sub>2</sub>, Lead tetraacetate, OsO<sub>4</sub>, HIO<sub>4</sub>, DCC, Crown ethers and cyclodextrins.

### **UNIT III:**

#### **Thermodynamics – I**

- 3.1 Importance and Limitations of Thermodynamics. Terms and definitions – system, macroscopic properties, state variables, thermodynamic equilibrium, extensive and intensive properties, processes and their types, exact and inexact differentials, concept of heat and work.
- 3.2 First Law of Thermodynamics: Statement, the energy content, work, heat and energy changes, thermodynamic reversibility, work of expansion against constant external pressure, isothermal reversible work of expansion.
- 3.3 Heat changes at constant volume and constant pressure, heat content, definitions of  $C_p$  and  $C_v$ , relationship between  $C_p$  and  $C_v$ , reversible adiabatic expansion and compression, adiabatic relationships.

### **UNIT IV:**

#### **Thermochemistry:**

- 4.1 Joule-Thomson experiment, Joule-Thomson coefficient – derivation, sign and magnitude of Joule-Thomson coefficient, inversion temperature, derivation of inversion temperature in terms of Vanderwaal's constants.
- 4.2 Heat of reaction, relationship between heat of reaction at constant pressure and at constant volume, types of heat of reactions – heat of formation, combustion, neutralization and solution. Effect of temperature on heat of reaction – Kirchoff's equation.
- 4.3 Thermochemical laws – the Lavoisier and Laplace law, Hess's law of constant heat summation and its applications, Bond energies.

### **UNIT V:**

#### **Chemical Bonding:**

- 5.1 Ionic bonding – variable electrovalency. Lattice energy, Born-Habercycle. Covalent bonding – Covalent character in ionic bond. Fajan's rule, Effects of polarization. Percent ionic character of a polar covalent bond.
- 5.2 VSEPR theory – geometry of molecules containing only bonded pairs of electrons –  $\text{BeF}_2$ ,  $\text{BF}_3$ ,  $\text{PF}_5$ ,  $\text{SF}_6$ ,  $\text{IF}_7$ .
- 5.3 Geometry of molecules containing bonded pair and lone pairs of electrons –  $\text{SnCl}_2$ ,  $\text{NH}_3$ ,  $\text{H}_2\text{O}$ ,  $\text{SF}_4$ ,  $\text{ClF}_3$ ,  $\text{XeF}_4$ ,  $\text{XeF}_2$  and  $\text{IF}_5$ .
- 5.4 VBT – Principle of Hybridisation. Formation of  $\text{H}_2$  molecule,  $\text{BeCl}_2$ . MOT – Basic Principles of bonding and antibonding orbitals, MO configurations of simple molecules  $\text{H}_2$ ,  $\text{He}^+$ ,  $\text{He}_2$ ,  $\text{N}_2$ ,  $\text{O}_2$ ,  $\text{HF}$ ,  $\text{CO}$ .
- 5.5 Hydrogen bond – Types, Consequences and importance of Hydrogen bonding in sustaining life.

### **BOOKS FOR STUDY:**

1. Soni P.L. and Chawla H.M.(2014).*Text Book of Organic Chemistry*( 26<sup>th</sup> edn). New Delhi: Sultan Chand and sons.
2. Puri B.R., Sharma L.R. and Madan S. Pathania, (2013).*Principles of Physical Chemistry* (35<sup>th</sup> edn).New Delhi: Shoban Lal Nagin chand and Co.
3. Puri B.R., Sharma L.R. and Madan S. Pathania, (2013).*Principles of Inorganic Chemistry* (35<sup>th</sup> edn).New Delhi: Shoban Lal Nagin chand and Co.

### **BOOKS FOR REFERENCE:**

1. Samuel Glasstone,(1974). *Thermodynamics for Chemists* ( 3<sup>rd</sup> printing). East-West Edn.
2. Bahl B.S, Arun Bahl and Tuli G.D. (2012), *Essentials of Physical Chemistry*, New Delhi: Sultan Chand and sons.
3. Jain M.K. ( 2003), *Organic Chemistry*, ( 12<sup>th</sup> edition), New Delhi: Shoban Lal Nagin Chand and Co.
4. Bahl B.S, Arun Bahl and Tuli G.D. (2007), *Essentials of Physical Chemistry*, New Delhi: Sultan Chand and sons.
5. Robert Thornton Morrison, Robert Neilson Boyd , Saibal Kanti Bhattacharjee,(2011), *Organic Chemistry*( 7<sup>th</sup> Edition), Pearson Education India, Chennai.
6. Soni P.L. and Mohankatyal (2013) ‘Text book of Inorganic Chemistry’ 20<sup>th</sup> revised edition, sultan chand.
7. Raj K. Bansal, (2007) “A Text Book of Organic Chemistry”, 5<sup>th</sup> edition, New Age International Limited.

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-2**  
**B.SC. CHEMISTRY - SEMESTER II**  
**MAIN CORE – 3: PRACTICAL –I : SEMIMICRO ANALYSIS**

**Hours:3hrs./wk.**

**Credits: 2**

**Code: U15CH2MCP03**

Objectives: To impart in students the skill in the analysis of Inorganic salts.

1. Reactions of the following Radicals:

Lead, Copper, Bismuth, Cadmium, Iron, Aluminium, Zinc, Manganese, Cobalt, Nickel, Calcium, Strontium, Barium, Magnesium and Ammonium.

Sulphate, Carbonate, nitrate, Fluoride, Chloride, Bromide, Oxalate, Phosphate, Borate and Arsenite.

2. Analysis of Mixtures containing two cations and two anions of which one will be an interfering ion.

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY SEMESTER – II**  
**ALLIED - 3: ALLIED CHEMISTRY PAPER III**  
**[For Botany and Zoology]**

**Hours: 4Hrs./Wk.**  
**Credits: 3**

**Total Hours: 50**  
**Code:U15CH2AOT03**

**Course objectives:**

To make the students to learn about coordination chemistry, Amino acids and proteins, thermodynamics, electrochemistry and photochemistry.

**UNIT: I**

**Co-ordination Chemistry:**

- 1.1 Nomenclature of mono nuclear complexes, Theories of coordination compounds – Werner, Sidgwick and Pauling theories.
- 1.2 Chelation and its industrial importance with particular reference to EDTA. Biological role of haemoglobin and chlorophyll.

**UNIT: II**

**Amino acids and Proteins:**

- 2.1 Amino acids: Classifications, preparation and properties of  $\alpha$ - amino acids. Test for amino acids. Peptides – peptide linkage.
- 2.2 Proteins – definition, classification based on physical properties and biological function, primary and secondary structures (elementary treatment). Test for proteins, Elementary idea of RNA and DNA and their biological role.

**UNIT: III**

**Thermodynamics:**

- 3.1 Terminology – System, surroundings, state of a system, variables, extensive and intensive properties, isothermal and adiabatic, reversible and irreversible processes.
- 3.2 First law of thermodynamics – internal energy, work done in reversible isothermal and adiabatic processes, Enthalpy of a system.
- 3.3 Second law of thermodynamics – Carnot cycle, Carnot theorem – statement, entropy, free energy and work function (Basic concepts alone).

## UNIT: IV

### Electrochemistry:

- 4.1 Electrical conductance – Conductance, specific conductance, equivalent conductance and molar conductance, determination of conductance, variation of specific and equivalent conductances with dilution.
- 4.2 Kohlrausch's law and its application to determine  $\Lambda_0$  of a weak electrolyte, Conductometric titrations – HCl Vs NaOH, KCl Vs  $\text{AgNO}_3$ ,  $\text{CH}_3\text{COOH}$  Vs NaOH.
- 4.3 Determination of pH by conductivity method, buffer solution.

## UNIT: V

- 5.1 Photochemistry – Photochemical reactions – Lambert's law, Beer's law, Stark Einstein's law of photochemical equivalence.
- 5.2 Photochemical processes – fluorescence, phosphorescence and Chemiluminescence, Photosensitized reactions.

### BOOK FOR STUDY:

1. Soni P.L. and Chawla H.M.(2014).*Text Book of Organic Chemistry*( 26<sup>th</sup> edn). New Delhi: Sultan Chand and sons.
2. Puri B.R., Sharma L.R. and Madan S. Pathania, (2013).*Principles of Physical Chemistry* (35<sup>th</sup> edn).New Delhi: Shoban Lal Nagin chand and Co.
3. Puri B.R., Sharma L.R. and Madan S. Pathania, (2013).*Principles of Inorganic Chemistry* (35<sup>th</sup> edn).New Delhi: Shoban Lal Nagin chand and Co.

### REFERENCE BOOKS:

1. Jain M.K, Sharma S.C. 'Modern Organic Chemistry', (2007), Vishal Publishing Co
2. Soni P.L. and Mohankatyal (1992) 'Text book of Inorganic Chemistry' 20<sup>th</sup> revised edition, sultan chand.
3. . Bahl B.S, Arun Bahl and Tuli G.D. (2012), *Essentials of Physical Chemistry*, New Delhi: Sultan Chand and sons.



(For the candidates admitted from 2015 onwards)  
**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI**  
**B.A/B.Sc./B.Com/B.R.SC/B.C.A/B.B.A DEGREE EXAMINATION**

**SEMESTER-II**  
**SBE-1 SOFT SKILL DEVELOPMENT**

**Hrs – 2/Week**

**CODE: U15RE2SBT01**  
**CREDITS -2**

**General Objective:**

The student understands the need for the development of self esteem, team spirit and communicative skills to prepare themselves for self development.

**UNIT I:**

**Individual Capacity Building**

Self awareness – building self-esteem – importance of having a strong self-esteem – developing positive attitude - .Anchoring on principles: Universal principles and values– forming & inculcating values-Leadership skills.

**UNIT II :**

**Interpersonal skills**

Trust- worthiness-interpersonal communication–art of listening, reading and writing–art of writing–building relationship-empathy.

**UNIT III:**

**Corporate skills**

Vision, mission and goals: Concepts, vision setting, goal setting, Individual and Group goals, Concept of synergy, team building, group skills.

**UNIT IV:**

**Management skills**

Developing Body Language–Practicing etiquette and mannerism–Stress Management– Time Management Prioritization Importance and urgent activities-Time management to move towards life vision.

**UNIT V:**

**Self Development Plan**

Concept and Need for Self Development Plan–Preparing Self Development Plan. (Format is used to complete the self development Plan), Monitoring and Evaluation of self Development plan– Developing indicators for self development introduction to National Skill Development Mission.

**REFERENCES:**

Alex K.(2012)Soft Skills–Know Yourself & Know the World, S. Chand &Company Ltd., New Delhi Meena K.AyothiV. (2013). A Book on Development of Soft Skills (Soft Skills: A Road Map to Success), P.R. Publishers & Distributors, Trichy.

Francis Thamburaj S.J.(2009).Communications of skills for Professional Excellence,1<sup>st</sup>Ed., Grace Publishers,

Rathan Reddy B.(2005).Team Development and Leadership, Jaico Publishing House, Mumbai.

(For candidates admitted from 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI- 2**  
**B.A./B.Sc./B.Com./BCA& BBA, DEGREE EXAMINATION**

**SEMESTER II**  
**SBE- 2 RURAL ENRICHMENT AND SUSTAINABLE DEVELOPMENT**

Hrs – 2/Week

**CODE: U15RE2SBT02**  
**CREDITS -2**

**Course Objective:**

The students are able to understand practically the Environmental concerns of rural areas and develop an alternative thinking through various field based intervention.

**Unit-I**

Village-Public Administration- Survey of natural resources and resource mapping of villages, village level Participating Approach (VLPA) – Role of NGO'S and SHG'S, Department of Rural development(central and state):

**Unit-II**

Green Revolution and industrialization cost climatic changes and mismanagement of natural resources- Reduced economic returns from agriculture-resultant social issues- poverty and farmer suicide- introduction to WTO, GATT and LPG and its impact on green Revolution.

**Unit-III**

Sustainable Development-Concepts , Environmental , social and economic aspects of sustainable development, sustainable development as solution to address rural issue-successful case studies from India

**Unit-IV**

Elements in sustainable development-Comparison and Compliments of Traditional water shed and modern water shed management techniques-water shed management practices-rain water harvesting, managing existing rain water drainage canals, desilting, buns construction, check dams, micro irrigation, agro forestry and alternative agriculture models and agriculture implements – Afforestation- Honey Bee rearing-dairy farming.

**Unit-V**

Elements in sustainable development –addressing agriculture issues-traditional farming technology- organic farming-Zero budget farming-organic manures vermicompost-azolla cultivation panchakavya- amirtha karaisal, organic pesticides mulikaipuchiviratti-neem products-natural management in soil- precision farming soil fertility. Ecological sanitation-bio-diversity and natural resource-terrace farming- seed banking and kitchen garden.

**REFERENCES:**

2. Packages of organic practices from Tamil Nadu Center for Indian Knowledge System(CIKS)  
.2.www.fao.org.in

(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**

**B.A/B. Sc/B.Com /B.C.A-DEGREE COURSES**

**LIFE ORIENTED EDUCATION**

**ETHICS – I: RELIGIONS AND VALUE SYSTEMS**

**HRS / Wk :1**

**CREDITS : 1**

**CODE:U15VE2LVE01**

**MARKS : 100**

**OBJECTIVES:**

- To understand and appreciate other Religions and Culture
- To learn from other Religions and Culture
- To interact with all Religions and Culture to enhance my faith in my religion.
- To help the students to become aware of the negative forces of religions.

**UNIT – I: RELIGION**

God – Faith, Religion, Definition, Nature, Characteristics and Basic values of different religions. Impact of Globalization on religion – Importance of worship in holy places – celebration, Communion (come-union) – Socialization

**UNIT – II: DIFFERENT RELIGIONS**

Basic characteristics and basic thoughts of different religions: Buddhism, Christianity, Hinduism, Islam, Jainism and Sikhism

**UNIT – III: UNITY OF RELIGION**

Unity of Vision and Purpose- Respect for Other Religions, Inter Religious Co-operation, Religious Pluralism as a fact and Religious Pluralism as a value

**UNIT – IV: FUNDAMENTALISM, COMMUNALISM AND SECULARISM**

Meaning and impact of Fundamentalism, Communalism, Violence and Terrorism – Tolerance – Secularism – Individualism

**UNIT – V: VALUE SYSTEMS**

Value and Value Systems - Moral Values -Individuals and the need to stand for values in the context of Globalization – Consumerism - Will power to live up to your values - Healthy body for empowerment – Physical health and Mental hygiene, food and exercises

**REFERENCES:**

6. Social Analysis (a course for all first year UG students), 2001. Department of Foundation Courses, Loyola College, Chennai-34.
7. Special topics on Hindu Religion, 2001. Department of Foundation Courses, Loyola College, Chennai-34.
8. Religion: the living faiths of the world, 2001. Department of Foundation Courses, Loyola College, Chennai-34.
9. Sydney Am Meritt, 1997. Guided meditations for youth.
10. Marie Migon Mascarenhas, 1986. Family life education- Value Education, A text book for College students.

(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI -2**  
**B.A/B. Sc /B.Com/ B.C.A-DEGREE COURSES**  
**LIFE ORIENTED EDUCATION**  
**CATECHISM – I: GOD OF LIFE**

**HRS / Wk : 1**

**CREDIT : 1**

**CODE: U15VE2LVC01**

**MARKS : 100**

**OBJECTIVES:**

- To enable the students to know God and his Salvific acts through Holy Bible
- To enable the students to know about the Paschal Mystery

**UNIT – I: CREATION AND COVENANT**

Study from petty catechism - Genesis - God revealed himself in creation -God who preserves creation through covenants

(Pentateuch) -Our response to God's covenant -Reason for its success and failure -The relationship of God with Israel -Image of God in Old Testament-God and me

**UNIT – II: GOD OF THE PROPHETS**

God's care for the humanity through Prophets-Major (Isaiah, Jeremiah) Minor (Amos) and Women (Deborah) Prophets-Their life and mission - Theology of Prophets -Concept of sin and collective sins expressed by prophets and God's saving love.

**UNIT – III: GOD OF WISDOM**

God experience through wisdom Literature, its origin and growth

**UNIT – IV: SYNOPTIC GOSPELS**

Synoptic Gospels and John's Gospel – Author –historical background –Chief message of each Gospel and for whom it was written - A few passages for the study of parallelism in the Synoptic Gospels.

**UNIT – V: LUKE'S GOSPEL**

Study of Luke's Gospel in detail – speciality of the Gospel – main emphasis of the message – meaning and blessing of suffering and paschal joy in one's life - Passion – PaschalMystery

**REFERENCES:**

1. Catechism of the Catholic Church published by Theological Publications in India for the Catholic Hierarchy of India, 1994
2. The Holy Bible Revised Standard Version with Old and New Testaments Catholic Edition for India.
3. Vaazhvin Vazhiyil – St. John's Gospel- Fr. Eronimus
4. God's Word nourishes A catholic approach to the Scriptures Dr. Silvano Renu Rita, O.C.V. STD and Dr. Mascarenhas Fio S.J. D.mim. Catholic Bible I
5. Documents of Vatican II – St. Paul's Publications, Bombay 1966.

(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TRICHIRAPALLI-2.**

**B.A/B.Sc./B.Com /B.C.A-DEGREE COURSES**

**LIFE ORIENTED EDUCATION**

**BIBLE STUDIES – I: NEW TESTAMENT**

**HRS / WK : 1**

**CREDIT : 1**

**CODE: U15VE2LVBO1**

**MARKS : 100**

**OBJECTIVE:**

- To enable the students to develop the passion for the Word of God – Jesus and inculcate the thirst of Missionaries being a disciple of Christ.

**UNIT – I: BIBLE – THE WORD OF GOD**

- Books of the Bible – Division into Old Testament and New Testament – History of the Bible-
- Messianic Prophecies (Isaiah 9:6,40:3,53:1-12,61:1-3,Micah 5:2)
- The Birth and Ministry of John the Baptist (Luke 1:1-80,Mat 3:1-17,14:1-12)
- The Birth, Passion, Death and Resurrection of Jesus (Luke 1:26-80,2:1-52,John 1 :18-21)

**UNIT – II: MINISTRY OF JESUS**

- Miracles (Mark 2:1-12,Luke 4:38-41,6:6-11,7:1-17,8:26-56,John 2:1-12)
- Parables (Luke 6:46-49,8:4-15,10:25-37,15:1-32)
- Preaching
  - Sermon on the mount (Mat 5-7)
  - Lord's Prayer (Luke 11: 1-13)
  - Kingdom of God (Mat 13: 24-50)
- Prayer life of Jesus (Luke 5:12-16,John 11:41-45,17:1-26,Mark 14:32-42)
- Rich and Poor (Luke 16: 19-31,21:1-4)
- Women Liberation (John 4:1-30,8:1-4)
- Women in the New Testament
- Martha & Maria (Luke 10: 38- 42, John 11: 1-46)

**UNIT – III: CHURCH – BIRTH AND GROWTH**

- Early Church
- Birth (Acts 2:1-41)
- Unity and sharing (Acts 2:42-47,4:1-37,5:1-11)
- Witnessing life (Acts 3:1-26,5:12-42,8:26-40, 16:20-34)
- Comparison between early Church and present Church.

#### **UNIT – IV: DISCIPLES AND APOSTLES**

- Mother Mary (Mother of Jesus) (Luke 1: 27-35, John 2: 1-12, 19:35, Acts 1: 13-14)
- St. Peter (Luke 22:1-7,Acts 2:1-41,12:1-17)
- St. Andrew (Mat 4:18-20,John 1:35-42,6:1-14)
- St. Stephen (Acts 6,7)
- St. Paul (Acts 8,9,14,17,26 and 28)
- St. Thomas (John 20:24-31)

#### **UNIT – V: ST. PAUL’S LETTERS AND THE MESSAGE**

- I & II Corinthians
- Galatians
- Ephesians
- Philippians
- I & II Timothy
- Titus

#### **REFERENCES:**

3. Holy Bible
4. John Stott, 1994, “**Men with a Message**”, Angus Hudson Ltd. London.

புனித சிலுவை தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி – 620 002.  
தமிழாய்வுத்துறை  
இளம் வணிகவியல் / இளங்கலை / இளம் அறிவியல் பட்ட வகுப்பு  
இரண்டாம் ஆண்டு - மூன்றாம் பருவம் - நவம்பர் - 2017  
தாள் - III

**Total Hours : 90**

**Hrs : 6Hrs /Wk**

**Credit : 3**

**Code : U15TL3TAM03**

**Marks : 100**

**நோக்கங்கள்:**

1. வாழ்வியல் நெறிகளாகிய அறம், பொருள், இன்பம், வீடுபேறு ஆகியவற்றின் மேன்மையை எடுத்துரைத்தல்
2. சமூக வாழ்க்கைப் பற்றிய விழிப்புணர்வினைத் தோற்றுவித்தல்
3. ஆன்மீக உணர்வுகளை வலுப்படுத்துதல்

**பயன்கள்:**

1. காப்பியங்களைப் பயில்வதன் மூலமாக மாணவர்கள் அறக்கருத்துக்களை உணர்ந்து கொள்ளுதல்.
2. சமூக மாற்றங்களைக் கண்டறிந்து மேம்பாடுகளை உருவாக்கச் செய்தல்
3. கலைநுட்பங்களையும் பண்பாட்டுச் சிறப்புக்களையும் உணர்ந்து கொள்ளச் செய்தல்

**அலகு:1 செய்யுள்**

1. சிலப்பதிகாரம் - கடலாடு காதை
2. மணிமேகலை – உலகவறவி புக்க காதை
3. கம்பராமாயணம் - கங்கைப் படலம்

**அலகு:2 செய்யுள்**

4. இரட்சணிய யாத்திரிகம் - மரணப் படலம்
5. சீறாப்புராணம் - ஒட்டகை பேசிய படலம்

**அலகு:3**



தமிழ் இலக்கிய வரலாறு  
சோழர் காலம்

**அலகு:4**

நாடகம்

சத்திய வேள்வி – அய்க்கண்

**அலகு:5**

கோயிற்கலை - திட்டக்கட்டுரை, வினாடி வினா

**பாட நூல்கள்**

- |                         |                        |
|-------------------------|------------------------|
| 1. செய்யுள்             | - தமிழ்த்துறை வெளியீடு |
| 2. தமிழ் இலக்கிய வரலாறு | - தமிழ்த்துறை வெளியீடு |
| 3. நாடகம்<br>அய்க்கண்   | - சத்திய வேள்வி        |
| 4. கோயிற்கலை            | - தமிழ்த்துறை வெளியீடு |

(for the candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002**  
**DEPARTMENT OF HINDI**  
**PART – I LANGUAGE HINDI FOR B.A, B.Sc & B.Com**  
**HINDI PAPER-III POETRY, PREDICS, HISTORY OF HINDI LITERATURE**  
**SEMESTER – III**

**HRS/WEEK : 6**  
**CREDITS : 3**

**CODE: U15HN3HIN03**  
**MARKS : 100**

**UNIT – I :** Shubhagaman, Man, Tere ghar ked war bahuth hym  
Memory poem : - Kabir das Ke Dohe - 6 Thulasidas  
Ke Dohe - 6 Rahim Ke Dohe - 6

**UNIT- II :** History of Hindi Literature :  
Essay Type Questions : Veeragatha Kaal

**UNIT- III :** Bakthi Kaal

**UNIT- IV :** Poetics

- a. Ras : Shringar, karun, Hasya, Veer
- b. Alankar : Anupras, Yamak, Upama, Roopak
- c. Chand : Choupayee, Baravai

**UNIT- V :** Kavi Parichaya : Ayodiya singh upadyaya Harioudh, Maithili Sharan Gupth,  
Siyaram Sharan Gupth, Kabir, Thulasi das

Books Prescribed :

1. Naveen Padhya Rathnakar – D.B.H.P. Sabha Publishers, Chennai-17
2. Pracheen Padhya Sangrah – D.B.H.P. Sabha Publishers, Chennai-17
3. Hindi Sahitya Ka Sanshitpta Itihas – Rajnath Sharma, Agrwal Publication,  
Uttar Prakash
4. Kavya Pradeep – Ram Bahori Shukla, Hindi Bhavan, , Illahabad.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2**

**DEPARTMENT OF FRENCH  
SEMESTER XXXVII**

**PART I - LANGUAGE - FRENCH PAPER III [LANGUAGE & CIVILISATION  
(ÉCHO A2 2<sup>e</sup> édition)]**

**(For candidates admitted 2015 onwards)**

**HRS/WEEK : 6**

**CREDIT : 3**

**CODE : U16FR3FRE03**

**MARKS : 100**

**Unit 1 Vivement demain !**

Le futur, la comparaison des qualités, des quantités et des actions – la santé – le travail dans trente ans – la vie quotidienne - l'éducation et la formation (l'enseignement en France) – faire des projets.

**Unit 2 Tu as du boulot ?**

Le pronom « en » et « y » - exprimer une condition : si + présent, si + passé composé, exprimer des préférences – les emplois de demain - des idées pour créer une entreprise – l'économie en France - le travail en dix points

**Unit 3 Qu'en pensez-vous?**

L'emploi du subjonctif, l'expression de la quantité – revue de presse – entrée en politique – la naissance des départements – la région 'Poitou- Charentes' - la vie politique

**Unit 4 C'est tout un programme !**

Les propositions relatives, la formation des adverbes, la forme « en + participe présent » - parler de la télévision et de la radio - comment les Français s'informent (la télévision et la presse en France)

**Unit 5 On se retrouve**

L'emploi et la conjugaison de l'indicatif – parler de son apprentissage du français langue étrangère – les rencontres : modes et comportements – une vraie vie de quartier grâce à Internet – formules pour un premier contact par écrit.

**TEXT BOOKS :**

ECHO A2 – METHODE DE FRANÇAIS & CAHIER PERSONNEL D'APPRENTISSAGE

Authors: J. Girardet and J. Pécheur Publication: CLÉ INTERNATIONAL, 2013.

(for candidates admitted from June 2016 onwards)  
**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2.**  
**II YEAR UG – SEMESTER III**  
**PART II – ENGLISH 3 - GENERAL ENGLISH III**

**HOURS : 6**  
**CREDIT : 3**

**CODE : U15EL3GEN03**  
**MARKS: 100**

**GROWING WITH VALUES**

**Objectives:**

1. To acquaint students with fine pieces of literature thereby enhancing their communicative skills.
2. To develop both receptive (reading, listening) and productive (speaking, writing) skills through communicative classes
3. To create interest among students for self-learning
4. To create a general awareness among students regarding the importance of humanistic values in the modern world.
5. To acquire proficiency in oral and written language.

**UNIT I – Love, Faith and Hope**

**Listening** for comprehension and general significance

**Speaking** about one's fear and hope

**Reading** for specific and global comprehension.

**Writing** – creative writing

**Grammar** – reporting speeches

**Vocabulary** – shades of meaning, Idioms and phrases (10)

**Composition** – Writing Paragraphs

**TEXTS**

“Hope” by Emily Dickinson (**Internal Testing**)

1. An extract from the Nobel Lecture by Mother Teresa
2. Angels Never Say “Hello!” by Dottie Walters
3. The Treasure by Alice Grey (Taken from Plant the seed by Timothy Kendrick)

**UNIT II – Perseverance**

**Listening-** for distinguishing / convert / summarize/(interview)

**Speaking-** a role play on the theme of perseverance (enactment of fables/ folk tales based on the theme)

**Reading** – read the passage (from encyclopedia) and draw a flowchart / tree diagram [main idea]

**Writing-** parallel writing

**Grammar** – descriptive discourse – degrees of comparison (describing person, city, places, things, weather climate)

**Vocabulary** – antonyms, idioms and phrases (10)

**Composition** – Creative writing

**TEXTS**

Mother to Son by Langston Hughes (**Internal Testing**)

1. **The Perseverance of a Spider.**
2. Two Gentlemen of Verona by A.J Cronin

3. Faith of determination and perseverance (about Walt Disney)

### **UNIT III – Tolerance/Benevolence/Compassion**

**Listening-** for developing / relating (speech)

**Speaking-** simulate any personality related to humanity

**Reading** – scan the passage (life of ...) and write down key phrases to sum up [figurative languages]

**Writing-** case study / letter writing (personal)

**Grammar** –writing reports of events and processes (voices)

**Vocabulary** – Suffixes, idioms and phrases

**Composition** – imaginative writing

#### **TEXTS:**

Portrait of Gandhiji by Will Durant (1<sup>st</sup> Para) (**Internal Testing**)

1. Gitanjali (Poem No. 11) Leave this chanting – Rabindranath Tagore
2. The Selfish Giant – Oscar Wilde
3. The Price of a Miracle in *Rainbows follow rain* by Dan Clark

### **UNIT IV – Essential Life Skills/ Resilience**

**Listening-** for deducing/ illustrating / subdivide to make notes (newspaper article)

**Speaking-** interviewing (gap activity) / picture description

**Reading** – in-depth reading to classify/ categorize [point of view]

**Writing-** Situational writing

**Grammar** – analysis of sentences – simple, compound, complex

**Vocabulary** – compound words, idioms and phrases

**Composition** – essay writing (proverb as title)

#### **TEXTS:**

The story of Rosa Parks (**Internal Testing**)

1. Life of Nelson Mandela
2. It's cool to be kechi by Juliet Hindell
3. 'Home they brought Her warrior dead' by Alfred Lord Tennyson

### **UNIT V – The Art of Living**

**Listening-** for comparing and contrasting (personality/lives of two people)

**Speaking-** reporting from the magazine / newspaper

**Reading** - read the passage to draw inference / parallel reading [making connections]

**Writing-** creative writing

**Grammar** –'If' clause

**Vocabulary** – coinage, idioms and phrases

**Composition** – creative writing/imaginative writing

#### **TEXTS:**

"A Psalm of Life" by H.W. Longfellow (**Internal Testing**)

1. The Power of Limitless living - by Robin Sharma.
2. The Art of Understanding Other People by Clarence Hall
3. "Leisure" by William Henry Davies

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER III**  
**MAIN CORE PAPER – 2 : GENERAL CHEMISTRY – III**

**Total Hours: 90**  
**Theory: 6 hrs./wk**  
**Credits: 6**

**Code: U15CH3MCT04**

**General Objective:**

To understand the second, third law of thermodynamics and the concept of chemical potential, the general characteristics of s and p block elements and their compounds and the properties of aromatic hydrocarbons.

**Course Objectives:**

**The Learner will be able to**

1. understand second law of thermodynamics, analyse thermodynamic cycles, classifies entropy, interprets work function and free energy
2. interpret the concept of chemical potential and partial molar properties, apply the third law of thermodynamics and relate free energy and chemical reactions.
3. analyse the characteristics of s- block elements and compares the properties of alkali and alkaline earth metals
4. Outline the characteristics of p- block elements and find out the anomalous behaviour of Carbon, oxygen and fluorine.
5. Formulate the preparation, properties of mononuclear and polynuclear aromatic hydrocarbons and predict the products formation.

**UNIT 1 - SECOND LAW OF THERMODYNAMICS**

**18Hrs**

- 1.1 The second Law of thermodynamics: Need for the second law of thermodynamics, spontaneous or irreversible processes, Statements of the II law, Conversion of heat into work – the Carnot's theorem, the Carnot cycle, maximum efficiency of heat engine, refrigeration engine, the thermodynamic scale of temperature.
- 1.2 Entropy – definition, entropy changes in reversible and irreversible processes, entropy change and phase change, entropy changes of ideal gases, entropy of mixing, entropy and disorder.
- 1.3 Variation of entropy with temperature, Maxwell's relations, the thermodynamic equations of state.
- 1.4 Free energy and work function – definition, Work function and Free energy relationships. The Gibb's Helmholtz equation, conditions of equilibrium.

**Extra reading/Keywords:** *Thermodynamic cycles, Applications of Entropy*

**UNIT 2 - CHEMICAL POTENTIAL AND THIRD LAW OF THERMODYNAMICS**

**18Hrs**

- 2.1 Chemical potential – partial molar properties, physical significance of partial molar property, partial molar free energy – Gibb's Duhem equation, variation of chemical potential with temperature and pressure.
- 2.2 Chemical potential in a mixture of ideal gases, Clausius-Clapeyron equation.
- 2.3 The Third law of thermodynamics – Nernst heat theorem, the third law, determination of absolute entropies of solids liquids and gases, exceptions to III law, applications of III law of thermodynamics.
- 2.4 Free energy and chemical reactions – Vant-Hoff reaction isotherm, standard free energy of reaction, variation of equilibrium constant with temperature – The Vant-Hoff's equation.

**Extra reading/Keywords:** *Concept of fugacity and its relationship to chemical potential*

### UNIT 3- S – BLOCK ELEMENTS

18Hrs

- 3.1 General characteristics of s-block elements with respect to atomic and ionic radii, ionization energy, reducing properties, the electro positive character, hydration of ions, oxidation potentials, flame colouration, lattice energy and chemical properties.
- 3.2 Trends in physical and chemical properties of compounds of s-block elements: Comparison of Li with other elements of group I. Comparison of Be with other elements of group II. Diagonal relationship between Li and Mg, Al and Be. Biological functions of Na, K, Ca and Mg ions.
- 3.3 Compounds of s block elements:  $\text{LiAlH}_4$ ,  $\text{NaNH}_2$ ,  $\text{NaCN}$ , Beryllium acetate,  $\text{CaC}_2$ ,  $\text{CaCN}_2$ , Plaster of Paris, Epsom Salt - Preparation, properties and uses.

**Extra reading/Keywords:** *Isotopes of Hydrogen, Metallic Hydrides*

### UNIT 4- P- BLOCK ELEMENTS

18Hrs

- 4.1 General characteristics of p-block elements: Characteristics of p-block elements- atomic radii, ionization potential, electronegativity, electron affinity, metallic and non-metallic properties, oxidation states, inert pair effect, allotropy, catenation, flame colouration.
- 4.2 Boron compounds: Diborane – structure. Borax and borazole – preparation, properties and structure. Comparison of borazole with benzene. Carbon - Anomalous behavior of carbon, structure of graphite and diamond. Nitrogen – Liquid  $\text{NH}_3$  as non-aqueous solvent.
- 4.3 Oxygen compounds – Anomalous behaviour of oxygen, Classification of oxides based on their chemical behaviour – acidic oxides, basic oxides, amphoteric oxides and neutral oxides – examples.
- 4.4 Halogens: Unique character of fluorine, Pseudo halogens - Properties. Positive nature of iodine. Chloro fluoro carbons – applications and hazards. Biological functions and toxicity of iodine.

**Extra reading/Keywords:** *Industrially important compounds of p- block elements*

### UNIT 5- AROMATIC HYDROCARBONS

18Hrs

- 5.1 Aromatic hydrocarbons: Nomenclature. Structure of benzene. Stability of benzene ring. Molecular orbital picture of benzene. Aromaticity- Huckel's rule and its applications.
- 5.2 Effect of substituent groups - Activating and deactivating groups, directive influence, orientation. Hammett equation - Substituent effect.
- 5.3 Reactions of benzene ring. Electrophilic substitution reaction in aromatic compounds-general mechanism, mechanism for nitration, sulphonation, halogenations and Friedel Craft's reactions. Nucleophilic substitution reactions in benzene ring- Benzyne mechanism.
- 5.4 Aromatic poly nuclear hydrocarbons – Naphthalene, Anthracene and Phenanthrene – synthesis, properties and uses.

**Extra reading/Keywords:** *Aromaticity in annulenes*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

#### Course Outcomes:

1. Calculate the work function and free energy.
2. Derive Maxwell's relations.
3. Describe Nernst heat theorem.
4. Compare the periodic properties of alkali and alkaline earth metals.
5. Discuss the anomalous behavior of fluorine and oxygen.
6. Predict aromaticity using Huckel's rule.
7. Discuss the mechanism of aromatic electrophilic substitution reaction.
8. Predict the oxidation and reduction product of aromatic poly nuclear hydrocarbons.

**Text Books:**

1. Bahl B.S., Arun Bahl and Tuli, *Essentials of Physical Chemistry*, New Delhi, Sultan chand and sons, 2007.
2. Bahl B.S., Arun Bahl, *A Text Book of Organic Chemistry*, New Delhi, Sultan Chand & sons, 2010.
3. Puri B.R. and Sharma L.R., '*Principles of Inorganic Chemistry*', New Delhi, Sultan Chand, 1989.

**BOOKS FOR REFERENCE:**

1. Puri B.R., Sharma. L.R. and Madan S. Pathania, '*Principles of Physical Chemistry*', 35<sup>th</sup> edition, New Delhi, Shoban Lal Nagin Chand and Co., 2011.
2. Jain M.K. '*Organic Chemistry*, 12<sup>th</sup> Edition, New Delhi, Shoban Lal Nagin (35<sup>th</sup> Edition), New Delhi, Shoban Lal Nagin Chand and Co., 2003.
3. Lee, J.D. *A New Concise Inorganic Chemistry* (4th Ed.). London:ELBS, 1995.
4. Samuel Glasstone, *Thermodynamics for Chemists* (3<sup>rd</sup> printing). East-West Edn., 1974.
5. Clayden, Warren, Wothers, '*Organic chemistry*', 2<sup>nd</sup> Edition, Oxford University Press, 2012.
6. John Mc Murray, '*Organic chemistry*', 8<sup>th</sup> Edition, Internation Edition, 2012.
7. Paula Yurkanis Bruice, '*Organic chemistry*', 8<sup>th</sup> Edition, Pearson Education Ltd., 2016.
8. Robert Thornton Morrison, Robert Neilson Boyd , Saibal Kanti Bhattacharjee, *Organic Chemistry*, 7<sup>th</sup> Edition, Pearson Education India, Chennai, 2011.
9. Soni P.L. and Chawla H.M., "*Text Book of organic Chemistry*", 27<sup>th</sup> Edition, Sultan Chand and Sons, 1997.



(For (For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER III**  
**MAJOR CORE – 5: VOLUMETRIC ANALYSIS – Theory Cum Lab -I**

**TOTAL HOURS: 60**  
**HOURS: 4 HRS./WK**  
**CREDITS: 4**

**CODE: U15CH3MCP05**

**General Objective:**

To expose the students the various concepts in volumetric analysis and to gain skill in the preparation of standard solution and to find out the strength of unknown solutions in different types of volumetric analysis.

**Course Objective:**

**The Learner will be able to**

1. determine the strength of the given solution from different types of titrations like acid base, redox, precipitation and complexometric titration.

**UNIT: I - VOLUMETRIC ANALYSIS**

**12Hrs**

- 1.1 Terminology, Basic requirement of a titration, standard solution – primary standard, preservation of standard solution, expressing concentration of standard solution, simple correlation for quick and convenient volumetric calculation, p-functions.
- 1.2 Volumetric Titrations: Acid base titration – acid base titration and use of indicators, titration of a strong acid against a strong base, titration of a weak acid with a strong base, titration of a weak base with strong acid, titration of  $\text{Na}_2\text{CO}_3$  with HCl, the theory of acid base indicators, action of phenolphthalein and methyl orange.
- 1.3 Redox titration – theory – titration of Mohr salt against  $\text{KMnO}_4$ , oxalic acid against  $\text{KMnO}_4$ ,  $\text{FeSO}_4$  against  $\text{K}_2\text{Cr}_2\text{O}_7$ , internal indicator, external indicator, starch, iodimetry and iodometry. Precipitation titrations – conditions for precipitation titration and indicators.
- 1.4 Complexometric titration:-EDTA titrations, indicators of EDTA titrations, complexometric titration curves, EDTA – titration methods – masking of ions, precautions to avoid errors in titrimetric analysis, corrections for unavoidable errors.

**Extra reading/Keywords :** *Determine the total hardness present in the given water sample*

**VOLUMETRIC ANALYSIS:**

1. Acidimetry  
Estimation of Oxalic acid.
2. Permanganometry:
  - i. Estimation of  $\text{FeSO}_4$ .
  - ii. Estimation of Calcium. (Direct Method).
3. Iodimetry & Iodometry:
  - i. Estimation of copper.
  - ii. Estimation of Arsenious oxide.
4. Dichrometry:  
Estimation of Ferrous ion.

5. EDTA Titrations:
  - i. Estimation of Magnesium.
  - ii. Estimation of Zinc.

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Calculate the various concentration units.
2. Prepare the standard solution of different strength.
3. Explain the acid base, redox and complexometric titrations with examples.
4. Estimate the strength of the given unknown solution.

**TEXT BOOKS:**

1. Puri B.R. and Sharma L.R. *Principles of Inorganic Chemistry*. New Delhi: Shoban Lal Nagin Chand and Co., 2002.
2. Venkateswaran V., Veeraswamy R. and Kulandaivelu A.R. *Basic Principles of Practical Chemistry*. New Delhi: 2<sup>nd</sup> edn, Sultan Chand & Sons, 1997.

**BOOKS FOR REFERENCE:**

1. Svehla G. *Vogel's Qualitative Inorganic Analysis*. US: 7<sup>th</sup> Edition, Prentice Hall, 1996.
2. Mendham J., Denney R. C., Barnes J. D. and Thomas M. J. K. *Vogel's Prescribed Book of Qualitative Chemical Analysis*, US: 6<sup>th</sup> Edition, Prentice Hall, 2000.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER III**  
**ALLIED – 4: ALLIED CHEMISTRY PAPER I (FOR PHYSICS MAIN)**

**Total Hours: 60**  
**Hours: 4Hrs/Wk**  
**Credits: 3**

**Code: U15CH3AOT01**

**General Objective:**

To make the students to understand the basic concepts in organic reactions, quantum numbers, chemical bonding, electrical and magnetic properties, solutions, colligative properties and phase equilibria.

**Course Objectives:**

**The Learner will be able to**

1. illustrate the types of organic reactions and the influence of field effects.
2. recognizes the concept of grouping elements based on their properties in periodic table.
3. understand the basic concepts of ionic and covalent bonding.
4. identify polar and non-polar molecules and to draw the molecular structure of some molecules and understand the concept of magnetic properties.
5. differentiate ideal and non-ideal solutions and to draw the phase diagram of water and lead-silver system.

**UNIT 1 - FUNDAMENTAL CONCEPTS**

**12 Hrs**

- 1.1 Types of organic reactions and reagents, common electrophiles, nucleophiles and free radicals.
- 1.2 Inductive, resonance, hyperconjugation and steric effects – an elementary idea.
- 1.3 Aromatic compounds - Benzene, phenol, benzaldehyde and acetophenone –preparation, properties and uses.

**Extra reading/keywords :** *Carbenes and Nitrenes*

**UNIT 2 - QUANTUM NUMBERS AND PERIODIC TABLE**

**12 Hrs**

- 2.1 Quantum numbers:- Principal, Azimuthal, Magnetic and spin quantum numbers. Electronic configuration of elements – Aufbau principle, Hund's rule and Pauli's exclusion principle.
- 2.2 Long form of periodic table, division of elements into s, p, d and f blocks, cause of periodicity.
- 2.3 Periodic properties – atomic radius, ionic radius – Ionization energy - Electron affinity – Electronegativity - definitions and variation along a group and period.

**Extra reading/keywords :** *Discovery of new elements - Nihonium and Moscovium*

### UNIT 3 - CHEMICAL BONDING

12 Hrs

- 3.1 Ionic bond – definition, Factors influencing formation of ionic bonding, variable electrovalency, properties of ionic compounds. Covalent bond - orbital overlap concept of molecules like H<sub>2</sub>, F<sub>2</sub>, O<sub>2</sub> and HF, Variable covalency, properties of covalent compounds.
- 3.2 Polarity in covalent bonds, Fajan's rules. Polarisation of molecules, Effects of polarization, percent ionic character.

**Extra reading/keywords :** *Problems in dipole moment and planar pentacoordinate carbons*

### UNIT 4 - ELECTRICAL AND MAGNETIC PROPERTIES OF MOLECULES 12 Hrs

- 4.1 Dipole moment – Polar and nonpolar molecules, Induced dipole moment – polarisability, polarization of molecule in an electric field. Mosotti – Clausius equation and Debye equation (derivation not required).
- 4.2 Dipole moment and molecular structure - CO<sub>2</sub>, BCl<sub>3</sub>, NH<sub>3</sub>, CCl<sub>4</sub>, and H<sub>2</sub>O.
- 4.3 Magnetic properties – Magnetic permeability, magnetic susceptibility and magnetic moment. Diamagnetism, paramagnetism and ferro magnetism.

**Extra reading/keywords :** *Magnetic hypothermia and ferrimagnetism*

### UNIT 5 - SOLUTIONS AND PHASE EQUILIBRIA

12 Hrs

- 5.1 Solutions of liquids in liquids – ideal and non-ideal solutions – Raoult's law – criteria for ideal solutions, non-ideal solutions – Type I, Type II and Type III.
- 5.2 Colligative properties – Lowering of vapour pressure by a non-volatile solute, Measurement of vapour pressure lowering by Ostwald-Walker method, Osmosis and osmotic pressure – Measurement of osmotic pressure by Berkeley – Hartley method, Isotonic solutions, Reverse osmosis.
- 5.3 Phase Equilibria:- Phase, component, degree of freedom, Phase rule (derivation not required). One component system – water system. Two component system – simple eutectic system (Pb-Ag system).

**Extra reading/keywords :** *Alloy and three component phase diagram*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

#### Course Outcomes:

1. Identify the type of organic reaction and field effect in the given examples.
2. Predict the periodic trends along the group and the period.
3. Calculate the percent ionic character for the molecules.
4. Distinguish the polar and non polar molecules.
5. Construct the phase diagram of water and lead - silver system.

**TEXT BOOKS:**

1. Puri B.R. Sharma L.R. and Kalia K.C., *Principles of Inorganic Chemistry*. New Delhi: Shoban Lal Nagin Chand and Co., 1997.
2. Puri B.R. Sharma L.R and Madan S. Pathania, *Principles of Physical Chemistry*. New Delhi: 35<sup>th</sup> edition, Shoban Lal Nagin Chand and Co., 1994.
3. Vasudevan, A.N.S. *Ancillary Chemistry*, Part I and Part II. 1981.

**BOOKS FOR REFERENCE:**

1. Huheey, J.E., Ellen. A. Keiter and Richard L. Keiter. *Inorganic Chemistry*. London: 4<sup>th</sup> edn., Addison & Wesley, 2003.
2. Lee, J.D. *A New Concise Inorganic Chemistry*. London: 4<sup>th</sup> edn., ELBS, 1995.
3. Veeraiyan , V. *Text Book of Allied Chemistry*, Volume I and Volume II. 1997.
4. Parmer V.S. and Chawla B.M. *Principles of reaction mechanism in Organic Chemistry* New Delhi: 2<sup>nd</sup> edn., Sultan Chand., 1973.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER VI**  
**SBE 3: INDUSTRIAL CHEMISTRY**

**TOTAL HOURS: 30 Hrs**

**HOURS: 2 Hrs/Wk.**

**Credits: 2**

**Code: U17CH3SBT03**

**General Objective:**

To gain knowledge in the manufacture of various industrial products like aspirin, soap and detergents, glass, cement, pigment and paper.

**Course Objectives:**

**The learner will be able to**

1. illustrate the preparation of p-acetamol, aspirin and ibuprofen.
2. understand the theories of colour and constitution and identifies the preparation and uses of various dyes
3. describe the mechanism of ionic and free radical polymerization and discuss the stereochemistry of polymers
4. summarizes the raw materials and manufacturing of glass and cement industry
5. discuss the processes involved in fertilizer and paper industry

**UNIT 1 - PHARMACEUTICS AND SOAPS**

**6 Hrs**

- 1.1 Pharmaceutical industries - Process development for industrial applications. Preparation of p-acetamol, aspirin and ibuprofen.
- 1.2 Soaps and soapless detergents. Special varieties of soaps. Cleansing action of soaps. Synthetic detergents – composition.

**Extra reading/keywords:** *Preparation of soaps, candles.*

**UNIT 2 - DYES**

**6 Hrs**

- 2.1 Dyes – colour sensation, colour and constitution (Otto-Witt theory), valence bond theory.
- 2.2 Classification of dyes according to application. Classification of dyes according to structure.
- 2.3 Malachite green, Methyl orange, Bismarck brown. Phenolphthalein, Fluorescein, alizarin, Indigo, Anillin yellow, crystal violet – preparation and uses.

**Extra reading/keywords:** *Preparation and dyeing of fabric.*

**UNIT 3 – POLYMERS**

**6 Hrs**

- 3.1 Addition polymerization, condensation polymerization – examples. Mechanisms – ionic and free radical polymerization. Ziegler – Natta polymerization.
- 3.2 A brief introduction to Silicones. Stereo chemistry of polymers, plasticity. Types of plastics. Natural and synthetic rubbers.

**Extra reading/keywords:** *Polymer testing*

## UNIT 4 - GLASS, CEMENT AND PIGMENTS

6 Hrs

- 4.1 Glass Industry – Raw materials. Manufacture Annealing, varieties of glass.
- 4.2 Portland cement – raw materials, Manufacture, setting of cement, concrete.
- 4.3 Lead pigments – white lead, red lead - manufacture.

**Extra reading/keywords:** *Raw materials used in Textile Industries*

## UNIT 5 - FERTILIZERS AND PAPER INDUSTRY

6 Hrs

- 5.1 Fertilizers – Functions of essential nutrients. Types of Manures, N.P.K fertilizers.
- 5.2 Paper industry – raw materials used, Manufacture, Filling and sizing, calendaring.

**Extra reading/keywords:** *Process of Leather Industry*

### Course Outcome:

1. Describe the synthesis of p-acetamol, aspirin and ibuprofen.
2. Discuss the theories behind the colour and constitution of dyes.
3. Examine the stereochemistry involved in polymerization reactions.
4. Summarize the various process involved in glass and cement industry.
5. Identify the essential nutrients present in fertilizers.

### Text Books:

1. Jain M.K., Sharma S.C., *Modern organic chemistry*, Fourth edition, Vishal Publishing Co., Jalandhar. 2012.
2. Soni P.L., Mohan Katyal., *Text book of Inorganic Chemistry*, New Delhi: Sultan Chand And Sons, 1996.

### BOOKS FOR REFERENCE:

1. Gopalan R., *Inorganic Chemistry*, 1<sup>st</sup> Edn., Chennai: Universities Press India Ltd., 2009.
2. Soni P.L., Chawla H.M., *Text Book of Organic Chemistry*, 6<sup>th</sup> Reprint, New Delhi: Sultan Chand & sons, 2006.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**

**SBE-3 & 4 : EXPERIMENTAL CHEMISTRY FOR LIFE SCIENCE [BOTANY & ZOOLOGY ]**

**Total Hours: 30**

**Hours: 2 hrs/ Wk.**

**Credits : 2**

**Code: U15CH3SBP04/  
U15CH5SBP04**

**General Objective:**

The student learns about preliminary ideas of phytochemistry, water quality parameters, pH meter, determines the physical constants of given organic compounds and identifies the amino acids using paper chromatographic technique.

**Course Objectives:**

**The Learner will be able to**

1. deliver the concepts of primary and secondary metabolites and outline the phytochemical analysis and separation of aminoacids by paper chromatography.
2. elaborate the principle and procedures for the determination of physical parameters.
3. determine the physical parameters of given organic compounds and samples of water.

**UNIT1- PHYTOCONSTITUENTS**

**5 Hrs**

- 1.1 Primary metabolites- Definition and examples. Secondary metabolites- sources and effects. Differences between primary and secondary metabolites.
- 1.2 Preliminary phytochemical Analysis. Extraction of phyto constituents from plants by soxhlation method.
- 1.3 Chromatography – Principle, separation of amino acids by paper chromatography.

**Extra reading/keywords :** *Soxhlet apparatus*

**UNIT 2- DETERMINATION OF PHYSICAL PARAMETERS**

**5 Hrs**

- 2.1. Purity of organic compounds- melting and boiling point determination- principle and Procedures.
- 2.2. Water quality parameters- Turbidity, pH, Temperature, electrical conductivity, salinity, dissolved oxygen, nitrate and phosphate. Testing water quality parameters- water sampling, and testing procedures- Physical tests and chemical tests.
- 2.3. Buffer- definition, pH and buffer, Types of buffer, preparation of buffer solution, buffer action, determination of pH and Hendersen equation.

**Extra reading/keywords :** *Hardness of water*

**PRACTICAL:**

**20 Hrs**

1. Determination of melting point of the given organic compound.
2. Determination of boiling point of the given organic compound.
3. Preparation of buffer solutions and the determination of pH of the given buffer solution.
4. Determination of Water parameters using water analyzer.
5. Extraction of phytoconstituents from a dried plant powder using Soxhlet apparatus
6. Separation of amino acids using Paper Chromatography



**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Identify the phytoconstituents present in plant extracts.
2. Separate the amino acids using paper chromatography.
3. Test water quality parameters.
4. Determine the melting and boiling points of the given organic compounds.

**BOOKS FOR REFERENCE:**

1. Phytochemical methods by J.B. Harborne, Chapman and Hall, Newyork, 3<sup>rd</sup> edition,1998.
2. Environmetnal Chemistry, A.K.De, 8<sup>th</sup> edition, 2017.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**  
**B.A./B.Sc./ B.Com./ B.C.A./B.B.A DEGREE COURSE**  
**II YEAR: SEMESTER - III**  
**(Students who are admitted from 2015 onwards)**

**GENDER STUDIES**

**Hours: 1Hr/wk**

**CODE: U15WS3GST01**  
**CREDITS: 1**

**Objectives**

To make boys and girls aware of each other's strength and weakness

To develop sensitivity towards both genders in order to lead an ethically enriched life

To promote attitudinal change towards a gender balanced ambience and women empowerment

**Unit I**

**Concepts of Gender** : Sex-Gender-Biological Determination-Patriarchy-Feminism-Gender Discrimination-Gender Division of Labour -Gender stereotyping – Gender Sensitivity-Gender Equity

– Equality – Gender Mainstreaming – Empowerment.

**Unit II Women's Studies Vs Gender Studies:** UGC's Guidelines – VII to XI Plans –

Gender Studies :Beijing Conference and CEDAW-Exclusiveness and Inclusiveness.

**Unit –III Areas of Gender Discrimination** : Family – Sex Ratio – Literacy – Health – Governance – Religion Work Vs Employment – Market – Media – Politics – Law – Domestic Violence – Sexual Harassment – State Politics and Planning.

**Unit – IV Women Development and Gender Empowerment** : Initiatives – International Women's Decade – International Women's Year – National Policy for Empowerment of Women – Women Empowerment Year 2001 – Mainstreaming Global Policies.

**Unit – V**

**Women's Movements and Safeguarding Mechanism:** In India National / State Commission for Women (NCW) – All Women Police Station – Family Court – Domestic Violence Act – Prevention of Sexual Harassment at Work Place Supreme Court Guidelines – Maternity Benefit Act – PNDT Act – Hindu Succession Act 2005 – Eve Teasing Prevention Act – Self Help Groups – 73<sup>rd</sup> Amendment for PRIs.

**BOOK FOR STUDY**

Manimekalai. N & Suba. S (2011), Gender Studies, Publication Division, Bharathidasan University, Tiruchirappalli

(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**

**B.A. /B.Sc. / B.Com. / BBA/ B.C.A. DEGREE COURSE**

**LIFE ORIENTED EDUCATION**

**ETHICS – II: EMPOWERMENT OF WOMEN**

**HRS / Wk : 1**

**CODE: U15VE4LVE02**

**CREDIT : 1**

**MARKS : 100**

**OBJECTIVES:**

- To make the learners aware of various gender and social issues and Cyber Crimes.
- To make the learners understand and appreciate the role of media, in facing the challenges on various life issues.
- To enable the learners to understand the ways of empowering women and cyber crime against women

**UNIT – I: GENDER ISSUES**

Feminism, Responsibilities of men and women towards Egalitarian society, Gender Identity- Factors contributing to gender identity (Family values, culture, tradition, religion, societal values, mass media)

**UNIT – II: SOCIAL ISSUES RELATED TO WOMEN**

Eve teasing, Rape, Dowry, Harassment in marriage, Divorce and Widows Remarriage, HIV & AIDS, Transgender, Female Genocide, sex workers, trafficking, fugitive, Female foeticide, handicapped children and women and evils of drug abuse.

**UNIT – III: WOMEN AND MEDIA**

Portrayal of women in media world - News paper, Magazine, Cinema, TV, Video and Advertisements - Morality in Media and Right use of Media

**UNIT – IV: WAYS OF EMPOWERING WOMEN**

Need for empowerment –Skills required for empowerment and Career Oriented Skills, Women's bill- Property rights, Models of Empowered Women- St. Teresa of Kolkata, Indira Gandhi, Helen Keller, Chanu Sharmila and Malala

**UNIT – V: CYBER CRIME AGAINST WOMEN**

Harassment and Spoofing via e-mail, Cyber Stalking, Cyber Pornography, Morphing. Cyber Laws, Social network: Face book, Twitter and Whatsapp

## **REFERENCES:**

1. Dr.M.Arumairaj et al., 1999, "Marching towards the Millenium ahead".
2. Thomas Anjugandam, 1999, "Grow Free Live Free" Salesian Publicaiton.
3. H.C Petti Nandhini Upreti, jaipur 2000 "Women and problems of Gender Discrimination".
4. Thomas B.Jayaseelan, 2002, "Women: Rights and law" Indian Social Institute, New Delhi.
5. Reni Jacob vol I & II, April- June 2004, "Vikasimi – The journal of Women's Empowerment, Ed,"

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2 B.A./ B.Sc./  
B.Com/ BBA/ B.C.A - DEGREE COURSES  
LIFE ORIENTED EDUCATION  
CATECHISM – II: CHURCH AND SACRAMENTS**

**HRS / Wk : 1  
CREDIT : 1**

**CODE : U15VE4LVC02  
MARKS : 100**

**OBJECTIVES:**

- To enable the students to understand the ways of Christian living with the Church
- To understand God's gift of the Holy Spirit.
- To understand the methods of building relationship with Jesus.
- To learn the life of Sacraments and Prayer
- To enrich our devotion to Mother Mary and Saints.

**UNIT – I: MISSION OF THE CHURCH**

What is church (attributes) – Interpretation: body of Christ- Bride of Christ, goal of all things- Historical as well as spiritual- Mystery and Sacrament-Pilgrim Church.

**UNIT – II: PARTICIPATORY CHURCH**

Work of the Holy Spirit- Salt and leaven in the world “Church of modern World” Church as community – Its important aspect, early Christian Church – People of God as Church- Its characteristics and structure

**UNIT – III: THE FUNCTIONARY CHURCH AND I**

Ministerial Church – Relating Church –Parish Church- Role of lay faithful in the Church – Its challenges – Church and I.

**UNIT – IV: SACRAMENTS**

Sacraments – Initiation– Healing – Service (all the seven) – Emphasis on Confession, Confirmation and Holy Communion. Sacramental: holy “things” used –Their sanctity.

**UNIT – V: MARY AND SAINTS**

Mary as a young virgin- Disciple- Her role in the Catholic Church-Annual feasts- Pilgrimages- Devotion to Mary, Dogmas. Saints in the Church- Prominent Women in the old testament

**REFERENCES:**

1. “Vatican II Revised” Archbishop Angelo Fernandes Published by X.Diya de Rio S.J. Gujarat Sahitya Prakash, P.O.Box. 70, Gujarat, 388001, India.
2. “The Sacraments The Word of God at the Mercy of the Body” Claretian Publications, Malleswaram, Bangalore 560055.
3. Documents of Vatican II – St. Paul's Publications, Bombay 1966.

(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE(AUTONOMOUS) TRICHIRAPALLI-2.**

**B.A/B.Sc./B.Com /B.C.A – DEGREE COURSES**

**LIFE ORIENTED EDUCATION**

**BIBLE STUDIES – II: OLD TESTAMENT**

**HRS / Wk :1**

**CODE: U15VE4LVBO2**

**CREDIT : 1**

**MARKS : 100**

**OBJECTIVE:**

- To enable the students to understand the desires of God through Prophetic revelation and to become sensitive to the heart beat of God.

**UNIT – I: PURPOSE OF LIFE**

Creation of man – fall of man (Gen 1-4) Plan of redemption through the life of :

- Noah (Gen 6-9); Abraham (Gen 12-18);
- Joseph (Gen 37-40); Moses (Exo 4-5);
- Joshua (Joshua 1-8)

**UNIT – II: JUDGES AND KINGS**

- Judges: Deborah (Judges 4); Samson (Judges 6-8); Gideon (Judges 13-16)
- Kings: David (I Sam 17-31, II Sam 1-12); Solomon (I Kings 1-11)

**UNIT – III: MINOR PROPHETS**

Brief Life History and teachings of

- Amos
- Jonah
- Micah
- Nahum
- Habakkuk

**UNIT – IV: MAJOR PROPHETS**

Brief Life History and teachings of

- Isaiah (Is 1,6,11,36-38,40-42,44,50,53,61)
- Jeremiah (Jer 1-3,7-12,18-19,23)
- Ezekiel (chapters 1,2,3,5,8,12 visions)
- Daniel (Daniel 1-6)

**UNIT – V: WOMEN IN THE BIBLE**

Women in the Old Testament

- Eve (Gen 3)
- Ruth (Ruth 1-4)
- Hannah (I Sam 1:1-28)
- Esther (Esther 1-6)

**REFERENCES:**

1. Russell Fueller (1999) The Text book of the Twelve Minor Prophets. Wipf & Stock Publishers, UK.
2. Willis Judson Beecher (2002) The Prophets and The Promise. Wipf & Stock Publishers, UK

புனித சிலுவை தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி – 620 002.  
தமிழாய்வுத்துறை  
இளம் வணிகவியல் / இளங்கலை / இளம் அறிவியல் பட்ட வகுப்பு  
இரண்டாம் ஆண்டு – நான்காம் பருவம் - 2017 – 2018  
தாள் - IV

**Total Hours : 75**  
**Hrs : 5Hrs /Wk**  
**Credit : 3**

**Code : U15TL4TAM04**  
**Marks : 100**

**நோக்கங்கள்:**

1. மாணவர்களுக்குத் தமிழர்தம் வாழ்வியல் விழுமியங்களை உணர்த்துதல்.
2. அறநெறிகள் வாழ்க்கைக்கு வழிகாட்டும் விதத்தினை எடுத்துரைத்தல்
3. சிகரம் தொட்ட சாதனையாளரின் வாழ்வியலைப் புலப்படுத்துதல்
4. மொழித்திறன் வளர்த்தல்.

**பயன்கள்:**

1. வாழ்க்கையின் பல்வகை நிலைகளையும் உணர்ந்து செயல்படச் செய்தல்
2. தன்னைத் தானே நெறிப்படுத்திக்கொள்ள, பயன்பாடடைய இலக்கியம் வழிகாட்டுவதை புரிந்துகொள்ளச் செய்தல்.
3. இடைவிடாத முயற்சியின் வெற்றிப்படிகளைக் கண்டுணர்ந்து மேன்மை அடையச் செய்தல்.
5. இருமொழிப் புலமையை வளர்த்தல்.

**அலகு:1 செய்யுள்**

**1. குறுந்தொகை**

1. கொங்கு தேர் வாழ்க்கை அஞ்சிறைத் தும்பி - இறையனார்
2. யாரும் இல்லை தானே கள்வன் - கபிலர்
3. வேம்பின் பைங்காய்என் தோழி தரினே – மிளைக் கந்தன்
4. உள்ளது சிதைப்போர் உளரெனப் படாஅர் - பாலை பாடிய பெருங்கடுங்கோ
5. நோற்றோர் மன்ற தோழி – குறுங்குடி மருதன்

**2. நற்றிணை**

1. மனையுறை புறவின் செங்கால் பேடை
2. நீள்மலைக் கலித்த பெருங்கோற் குறிஞ்சி - பாண்டியன் மாறன் வழுதி
3. ஆய்மலர் மழைக்கண் தெண்பனி உறைப்பவும் - நல்விளக்கனார்
4. சிறுவீ முல்லைப் பெரிது கமழ் அலரி - மதுரை பேராலவாயர்

**3. கலித்தொகை**

1. எறித்தரு கதிர்தாங்கி ஏந்திய குடைநீழல் - கபிலர்



2. பாடுகம் வா வாழி தோழி - கபிலர்

**அலகு:2 செய்யுள்**

**4.புறநானூறு**

1. நின் நயந்து உறைநர்க்கும் - பெருஞ்சித்திரனார்
2. காய்நெல் அறுத்துக் கவளம் கொளினே - பிசிராந்தையார்
3. படைப்புப் பலபடைத்து - பாண்டியன் அறிவுடைநம்பி
4. கேட்டல் மாத்திரை - கோப்பெருஞ்சோழன்
5. ஈன்று புறந்தருதல் எந்தலைக் கடனே - பொன்முடியார்

**5. பதிற்றுப்பத்து - ஐந்தாம் பத்து**

1. சுடர் வீ வேங்கை
2. தசம்பு துளங்கு இருக்கை
3. ஊன்துவை அடிசில்

**6. திருக்குறள்**

1. அறத்துப்பால் - இனியவை கூறல்
2. பொருட்பால் - வினை செயல்வகை
3. காமத்துப்பால் - புலவி நுணுக்கம்

**அலகு:3**

தமிழ் இலக்கிய வரலாறு (துறை வெளியீடு)

சங்ககாலம் - சங்கம் மருவியகாலம்

எட்டுத்தொகை, பத்துப்பாட்டு, பதினெண்கீழ்க்கணக்கு நூல்கள்

**அலகு:4**

**வாழ்க்கை வரலாறு**

அன்னை தெரசா - பா. தீனதயாளன்

**அலகு:5**

பொது - மொழிபெயர்ப்பு

**பாட நூல்கள்**

1. செய்யுள் நூல் - தமிழாய்வுத்துறை வெளியீடு
2. தமிழ் இலக்கிய வரலாறு - தமிழாய்வுத்துறை வெளியீடு
3. வாழ்க்கை வரலாறு  
பா.தீனதயாளன் - அன்னை தெரசா
4. மொழிபெயர்ப்பு - தமிழாய்வுத்துறை வெளியீடு

(for the candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002 DEPARTMENT OF  
HINDI**

**PART – I LANGUAGE HINDI FOR B.A, B.Sc & B.Com HINDI  
PAPER-IV FUNCTIONAL HINDI & TRANSLATION SEMESTER –**

**IV**

**HRS/WEEK : 5  
CREDITS : 3**

**CODE: U15HN4HIN04  
MARKS : 100**

**UNIT – I** Functional Hindi **UNIT-**

**UNIT –II** Adhunic Kaal **UNIT-**

**UNIT –III** General Essays

Parishram Ka Mahatva, Anushasan, Paropakar, Jawaharlal Nehru, Deepavalli,  
Bharath Mein Computer

**UNIT- IV** Letter Writing

**UNIT- V** Anuvad Abhyas - III Books

Prescribed :

1. General Essays - D.B.H.P. Sabha Publishers, Chennai-17
2. Abinava Patra Lekhan - D.B.H.P. Sabha Publishers, Chennai-17
3. Anuvad Abhyas– III - D.B.H.P. Sabha Publishers, Chennai-17

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2**

**DEPARTMENT OF FRENCH**

**SYLLABUS**

**SEMESTER IV**

**PART I - LANGUAGE - FRENCH PAPER IV [LANGUAGE & CULTURE  
(ÉCHO A2 2<sup>e</sup> édition)]**

**(For candidates admitted 2015 onwards)**

***HRS/WEEK : 5***

***CREDIT : 3***

***CODE : U16FR4FRE04***

***MARKS : 100***

**Unit 1 C'est la fête !**

Les pronoms objets directs et indirects – parler d'une fête – exprimer des goûts et des préférences – fêtes sans frontières – plats des fêtes – les jours fériés – les saisons

***Unit 2 Vous plaisantez !***

Le conditionnel présent, la distinction du futur et du conditionnel – le mouvement en général – raconter une anecdote – journée de détente – la naissance d'un chef d'œuvre - l'art au début du 20<sup>e</sup> siècle – le plaisir de jeux de mots.

***Unit 3 On s'entend bien !***

Les constructions « faire + verbe » et « laisser + verbe », le discours rapporté – décrire le caractère ou le comportement, exprimer l'accord et le désaccord – le langage des couleurs – sujets de conversation – sujets d'étonnement.

***Unit 4 À vos risqué et périls !***

Le subjonctif présent, la voix passive – l'aventure d'aujourd'hui – travailler pour la planète – réussites et échecs - marathon de Paris – plaisir des sports – les sports les plus regardés et pratiqués - les français et les sports.

***Unit 5 La vie est dure***

Les pronoms possessifs, les adjectifs, les pronoms indéfinis – parler de ses activités quotidiennes, exprimer la confiance ou la méfiance – les tâches ménagères – la France insatisfaite - sans travail.

***TEXT BOOKS :***

**ECHO A2 – METHODE DE FRANÇAIS & CAHIER PERSONNEL D'APPRENTISSAGE**

**Authors: J. Girardet and J. Pécheur Publication: CLÉ INTERNATIONAL, 2013.**

**(for candidates admitted from June 2016 onwards)**

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2.**

**II YEAR UG – SEMESTER IV**

**PART II – ENGLISH 4 - GENERAL ENGLISH IV**

**HOURS : 6**

**CODE : U15EL4GEN04**

**CREDIT : 3**

**MARKS: 100**

**EMPLOYABILITY SKILLS**

**OBJECTIVES:**

1. To develop both receptive (reading, listening) and productive (speaking, writing) skills through communicative classes.
2. To acquire proficiency in oral and written language.
3. To train the students for employability skills such as team skills, communication skills and presentation skills.
4. To acquire values related to personal integrity and excellence in work propagated in the literary works.
5. To create interest among students for self-learning.

**UNIT I – Personal integrity –Honesty, dependability, adaptability and loyalty.**

**Listening** to identify a person's attitude, values, situation and the decision made.

**Speaking** about one's action, expressing opinions, character analysis.

**Reading** for comprehension (inferring a character's method of managing a situation, adaptability and the like).

**Writing** recommendations.

**Grammar** – use of appropriate adjectives and adverbs in contexts and reporting speeches

**Vocabulary** – differentiating shades of meaning, use of idioms and phrases in sentences

**Composition** – Your thoughts are the architects of your destiny – David O' Mckay

Honesty is the first chapter in the book of wisdom – Thomas Jefferson

**TEXTS**

1. "How far is the river" by Ruskin Bond
2. *The Pie and the Tart* by Hugh Chesterman.
3. An excerpt from Shakespeare's "Julius Caesar" Act III Scene II Lines 13 - 33– Antony's speech

**UNIT II – Key to success – Self-esteem, perfection and excellence**

**Listening** to differentiate duty from obligation.

**Speaking** – Discussing one's knowledge about different subjects, learning skills, thirst for knowledge, learning from experiences.

**Reading** for comprehension exhibiting higher perception of life's experiences.

**Writing** paragraphs with cause and reason, analyzing motives behind people's actions and behavior.

**Grammar** – use of cohesive devices

**Vocabulary** – figures of speech– simile, metaphor.

**Composition** –

1. Excellence is not a destination, it is a continuous journey that never ends – Brian Tracy
2. To be perfect is to change often – Winston Churchill

**TEXTS**

1. Our urgent need for self-esteem by Nathaniel Brandon.
2. Five senses by Judith Wright
3. Three questions by Leo Tolstoy

**UNIT III – Team skills**

**Listening** to speaker's ideas, opinions, and suggestions and analyzing their character.

**Speaking** –Discussing, questioning, interacting, respecting, sharing and participating.

**Reading** for comprehension – absorbing the attitude of the people.

**Writing** – personal essays and report writing

**Grammar** – use of inverted structures

**Vocabulary** –New words in current usage.

**Composition** –1. “Talent wins games, but teamwork and intelligence wins championships.”

2. “It takes two flints to make a fire.”

### **TEXTS**

1. “The Little Black Boy” by William Blake

2. How to get cooperation by Dale Carnegie.

### **UNIT IV – Communication skills for interpersonal relationship**

**Listening** to specific information and guessing.

**Speaking** –Facing interview and situational speeches (Master of ceremony, felicitation and the like).

**Reading** for comprehension to identify the methods of persuasion.

**Writing** formal letters and invitations.

**Grammar** – Transformation of sentences.

**Vocabulary** – Words related to technical registers.

**Composition** –1. “Communication is an art form that is crafted throughout our lives.”

2. Birds of same feather flock together.

### **TEXTS**

1. The Refund by Fritz Karinthy

### **UNIT V –Presentation skills**

**Listening** to commands, information, announcements, and discussions in a meeting.

**Speaking** –role play in panel discussion, mock parliament and public speaking.

**Reading** for comprehension.

**Writing** agenda, minutes, memo, notice, circular, project proposal.

**Grammar** – use of simple, compound, complex, imperative sentences and punctuations.

**Vocabulary** – Business terms.

**Composition** – writing a project.

### **TEXTS**

1. An excerpt from Abraham Lincoln’s speech in Gettysburg.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER IV**  
**MAJOR CORE - 6 : GENERAL CHEMISTRY – IV**

**Total Hrs: 75**

**Theory: 5 hrs./wk**

**Credits: 5**

**Code: U15CH4MCT06**

**General objective:**

To study the general characteristics of d- block elements and their compounds, Halogen compounds, carbonyl compounds, mechanisms of  $SN_i$ ,  $SN_1$  and  $SN_2$  reactions and the kinetics of the reaction rate.

**Course Objectives:**

**The Learner will be able to**

1. analyze the characteristics of d-block elements and outline the industrially important compounds of d-block elements.
2. deliver the main ideas regarding the general methods of formation, properties of aliphatic, aromatic halides, organo metallic compounds, formulate and explain the mechanisms of  $SN_1$ ,  $SN_2$  and  $SN_i$  reactions.
3. measure the reaction rates and determine the rate laws.
4. discuss the theories of reaction rates, catalysis and to understand the basic concepts involved in photochemistry.
5. discuss the mechanism of various reactions of carbonyl compounds.

**UNIT 1 - d-BLOCK ELEMENTS**

**15Hrs**

- 1.1 General characteristics of d-block elements – electronic configuration, comparative study of elements of first transition series with reference to atomic and ionic radii, ionization potential, oxidation states, redox active metals, magnetic properties, complex formation, catalytic activities and colour.
- 1.2 Biological function and toxicity of elements – Cr, Mn, Co, Ni, Cu, Mo, Cd, Hg, Pb, Fe and Zn.
- 1.3 Prussian blue – preparation, uses and structure. Verdigris – preparation and uses. Oxidizing properties of  $K_2Cr_2O_7$  and  $KMnO_4$ .  $TiO_2$ ,  $V_2O_5$ , Sodium nitro prusside – preparation, properties and uses.
- 1.4 Ammonium molybdate, amalgams, philosopher's wool (ZnO), colloidal Au, Tungsten carbides, Silver chloride – Properties and uses.

**Extra reading/Keywords:** *Industrially important compounds of d-block elements.*

**UNIT 2- HALOGEN COMPOUNDS**

**15Hrs**

- 2.1 Alkyl halides – Nomenclature, structure, General methods of formation and General chemical properties. DDT –structure and uses.
- 2.2 Aliphatic Nucleophilic substitution reactions – Mechanism of  $SN_1$ ,  $SN_2$  and  $SN_i$  reactions. Effect of solvents, leaving groups, Nucleophiles and structure of substrates. Ambient nucleophiles and regioselectivity, ambient substrates – examples.
- 2.3 Aromatic Halogen Compounds – General methods of preparation and properties. Low reactivity of aryl halides. Chemical properties of Aryl halides.
- 2.4 Organo metallic compounds: Grignard reagents – Synthetic applications. Haloalkenes (allyl chloride and vinyl chloride) – nucleophilic substitution at allylic carbon and vinylic Carbon.

**Extra reading/Keywords:** *Aromatic nucleophilic substitution reaction*

### UNIT 3 - CHEMICAL KINETICS I

15Hrs

- 3.1 Rate of reaction, its determination, rate equation, rate constant, factors influencing rate of reaction, stoichiometry, order and molecularity of reactions.
- 3.2 Setting up and solving simple differential equations and derivation of half-life periods for first, second, third and zero order reactions, determination of order of reactions.
- 3.3 Experimental techniques involved in following the kinetics of reactions – volumetry, manometry, dilatometry, polarimetry and colorimetry – typical examples for each of the techniques.
- 3.4 Theoretical aspects: Effect of temperature on the rate constant – Arrhenius equation – derivation, activation energy and its determination.

**Extra reading/Keywords:** *Problems in activation energy.*

### UNIT 4- CHEMICAL KINETICS II AND PHOTOCHEMISTRY

15Hrs

- 4.1 The collision theory of reaction rates and its limitations. The theory of absolute reaction rates, comparison of collision theory with absolute reaction rate theory, significance of free energy of activation and entropy of activation.
- 4.2 Lindemann's theory of unimolecular reactions, thermal chain reactions – hydrogen-bromine reaction.
- 4.3 Catalysis – Types of Catalysis- Homogeneous catalysis – the intermediate compound formation theory – Enzyme catalysis – the mechanism of enzyme catalysed reaction, Heterogeneous catalysis – the adsorption theory – active centers, poisoning of catalyst.
- 4.4 Photochemical reactions, Grothuss Draper's law, Stark Einstein's law of photochemical equivalence, quantum yield – definition, classification of photochemical reactions based on quantum yield and determination. Photochemical kinetics of hydrogen – bromine reaction.

**Extra reading/Keywords:** *Photochemical kinetics of hydrogen – chlorine, iodine reaction.*

### UNIT 5 - CARBONYL COMPOUNDS

15Hrs

- 5.1 Carbonyl compounds – general properties of aliphatic and aromatic aldehydes and ketones.
- 5.2 Individual members : Formaldehyde, acetone, acetophenone – preparation and properties.
- 5.3 Mechanisms of Aldol, Claisen, Perkin, Knoevenagel, Benzoin condensation, Reformatsky, Wittig, Claisen- Schmidt, Cannizzaro and haloform reactions. Mechanisms of reduction ( $\text{NaBH}_4$ , Wolff-Kishner and MPV reduction)
- 5.4  $\alpha$ ,  $\beta$  – unsaturated carbonyl compounds – preparation and properties, Mechanism of Michael addition.

**Extra reading/Keywords:** *Salicylaldehyde, Benzophenone*

**Note:** Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

#### Course Outcomes:

1. Compare the periodic properties of d-block elements.
2. Explain the Nucleophilic substitution mechanisms.
3. Discuss the synthetic applications of Organometallic compounds.
4. Derive the rate equation of the first, second, third and zero order reactions.
5. Calculate the activation using Arrhenius equation.
6. Discuss the theories of reaction rates.
7. Problems in quantum yield.
8. Discuss the mechanism of given naming reactions.

### **Text Books:**

1. Puri B.R., Sharma L.R. and Madan S. pathania, "*Principles of Physical Chemistry*", Shoban Lal Nagin Chand and Co, 35<sup>th</sup> edn., 1994.
2. Puri B.R. and Sharma L.R., '*Principles of Inorganic Chemistry*', Shoban Lal Nagin Chand and Co., 2002.
3. M.K. Jain, "*Modern Organic Chemistry*", 4<sup>th</sup> Edition, Vishal Publising Co, Jalandhar

### **BOOKS FOR REFERENCE:**

1. Gurtu J.N. and Amit Gurtu, '*Chemical Kinetics*', 5<sup>th</sup> edn., Mittal K.K., 1979.
2. Madan R.D., '*Modern Inorganic chemistry*', S. Chand and Company (PVT) limited. Ist edn., 1987.
3. Samuel Glasstone, '*Text Book of Physical Chemistry*', 2<sup>nd</sup> edn., 1974.
4. Parmar V.S. and Chawla H.M., "*Principles of reaction mechanism in Organic Chemistry*", 2<sup>nd</sup> edition, Sultan Chand, 1978.
5. Gurdeep Chatwal R, '*Photochemistry*', Good Publishing House.
6. Tewari K.S., Vishnoi N.K., Mehrotra S.N., "*A Text Book of Organic Chemistry*", 2<sup>nd</sup> revised edition, Vikas Pulbishing House Pvt. Ltd.
7. Jagadamba singh and Yadav L.D.S., "*Advanced Organic Chemistry*", 22<sup>nd</sup> edition, Pragati Prakashan Educational Publishers, 2015.
8. Clayden, Warrenn, Wothers., '*Organic chemistry*', 2<sup>nd</sup> Edition, Oxford University Press, 2012.
9. John Mc Murray, '*Organic chemistry*', 8<sup>th</sup> Edition, Internation Edition, 2012.
10. Paula Yurkanis Bruice, '*Organic chemistry*', 8<sup>th</sup> Edition, Pearson Education Ltd.
11. Robert Thornton Morrison, Robert Neilson Boyd , Saibal Kanti Bhattacharjee, '*Organic Chemistry*', 7<sup>th</sup> Edition, Pearson Education India, Chennai, 2011.



(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER IV**  
**MAJOR ELECTIVE – 1: THEORY CUM LAB – II**  
**(LABORATORY TECHNIQUES AND VIRTUAL LAB EXPERIMENTS)**

**TOTAL HOURS: 75**

**HOURS: 5 HRS/WK**

**CREDITS: 5**

**CODE: U17CH4MEP01**

**General Objective:**

To enable the students to learn about adsorption, adulteration, colligative properties of dilute solutions, Nernst distribution law and to develop practical skills.

**Course Objectives:**

**The Learner will be able to**

1. analyze the applications of adsorption and detection of adulterants in food items.
2. discuss the different Colligative properties and solves the problems.

**UNIT 1 - ADSORPTION AND FOOD ADULTERATION**

**15 Hrs**

- 1.1 Adsorption by solids: Adsorption – Types of adsorption – physical adsorption, chemical adsorption. Some important applications of adsorption.
- 1.2 Adsorption isotherms: Langmuir adsorption isotherm, Freundlich adsorption isotherm and Gibbs adsorption isotherm. (Derivations not needed)
- 1.3 Adulteration – definition. Common food adulterants – it's effects. Incidental adulterants. Metallic contamination. Contamination by pest and pesticide residues.
- 1.4 Simple physical tests and chemical tests for detection of food adulterants.  
Detection of food additives: Detection of saccharin, Dulcin, flavours, lead chromate, water in milk, streptomycin, pesticides.

**Extra reading/Keywords:** *Techniques to estimate adulterants.*

**UNIT 2 – SOLUTIONS II AND DISTRIBUTION LAW**

**15 Hrs**

- 2.1 Lowering of vapour pressure by non-volatile solute, relationship between relative lowering of vapour pressure and mole fraction, experimental determination of molecular weight of non-volatile solute.
- 2.2 Osmosis and osmotic pressure, relationship between osmotic pressure and lowering of vapour pressure of an ideal solution, isotonic solutions, measurement of osmotic pressure, reverse osmosis.
- 2.3 Elevation in boiling point and depression in freezing point by a non volatile solute – thermodynamic derivation and experimental determination.
- 2.4 Abnormal molecular weights – Van't Hoff factor, association and dissociation.
- 2.5 Nernst distribution law & its applications.

**Extra reading/Keywords:** *Application of Colligative Properties and Distribution Law.*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Compare physical and chemical adsorption and explain the application of adsorption.
2. Distinguish different types of adsorption isotherms.
3. Detect the food adulterants in different food items.
4. Discuss the different colligative properties.
5. Solve the problems under different colligative properties.
6. Apply distribution law to some chemical concepts.

**Text Books:**

1. Puri B.R., Sharma L.R. and Madan S. Pathania, *Principles of Physical Chemistry*, New Delhi: 35<sup>th</sup> edn. Shobanlal Nagin Chand and Co., 2003.
2. Negi A.S. and Anand S.C., *A Text book of Physical Chemistry*, 3<sup>rd</sup> Edition, Wiley Eastern Ltd., 1994.
3. Arun Bahl, B.S. Bahl and G.D. Tuli, *Essentials of Physical Chemistry*, New Delhi: S. Chand & company Pvt. Ltd., 2014.

**BOOKS FOR REFERENCE:**

1. Atkins, P. W. and Paula, J. *Physical Chemistry*, Oxford Publications, 8<sup>th</sup> edn., 2009.
2. Silbey, R. J. Albert, R. A. and Bawendi, M. G. *Physical Chemistry*, Wiley, 4<sup>th</sup> edn., 2004.
3. Levine, I. N. *Physical Chemistry*, McGraw-Hill Science/Engineering/Math, 6<sup>th</sup> edn., 2008.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER IV**  
**MAJOR ELECTIVE – 1 : PHYSICAL CHEMISTRY - THEORY CUM LAB – II**  
**(VERIFICATION OF COLLIGATIVE PROPERTIES)**

**Hours: 5Hrs./wk**

**Credits : 5**

**Code: U17CH4MEP02**

**OBJECTIVES:**

To expose the students to the knowledge of solutions and phase equilibria and also to develop practical skills in the same topics by giving them certain experiments.

UNIT: I

Solutions II and Distribution law

- 1.1 Lowering of vapour pressure by non-volatile solute, relationship between relative lowering of vapour pressure and mole fraction, experimental determination of molecular weight of non-volatile solute.
- 1.2 Osmosis and osmotic pressure, relationship between osmotic pressure and lowering of vapour pressure of an ideal solution, isotonic solutions, measurement of osmotic pressure, reverse osmosis.
- 1.3 Elevation in boiling point and depression in freezing point by a non volatile solute - thermodynamic derivation and experimental determination.
- 1.4 Abnormal molecular weights – Van't Hoff factor, association and dissociation.
- 1.5 Nernst distribution law & its applications.

PHYSICAL CHEMISTRY PRACTICAL – HEATING EXPERIMENTS

1. Determination of Molal depression constant of a solvent by Rast Macro method.
2. Determination of Molecular weight of a solute by Rast Macro method.
3. Determination of Transition Temperature of a given salt-hydrate.
4. Critical solution temperature of phenol-water system.
5. Effect of impurity on the critical solution temperature.

**BOOKS RECOMMENDED:**

Test Books:

1. Puri B.R., Sharma L.R. and Madan S. Pathania, 'Principles of Physical Chemistry', (2003), Shobanlal Nagin Chand and Co., Delhi, 35<sup>th</sup> edn.

Reference Books:

1. Samuel Glasstone M.Sc. Ph.D., 'Text Book of Physical Chemistry', (1974), 2<sup>nd</sup> Edn.

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY SEMESTER IV**  
**ALLIED – 5 : ALLIED CHEMISTRY PAPER II (FOR PHYSICS MAIN)**

**Total Hours: 60**

**Hours : 4Hrs./Wk**

**Credits: 4**

**Code: U15CH4AOT02**

**General Objective:**

To learn about the basic concepts in solid state, photochemistry, electrochemistry and chemical kinetics.

**Course Objectives :**

**The Learner will be able to**

1. understand the fundamental concepts in solid state and to predict the structure of sodium chloride
2. explain the photochemical and photophysical processes and their mechanisms.
3. identify the different terms in electrochemistry and different conductometric titrations.
4. understand the working of galvanic cell and explains the emf series, corrosion and overvoltage.
5. describe the general forms of rate equations and state the Arrhenius equation.

**UNIT 1- THE SOLID STATE**

**12 Hrs**

- 1.1 Structure of solids – classification, isotropy and anisotropy, interfacial angle. Symmetry in crystals – cubic system, space lattice and unit cell, law of rational indices, Miller indices.
- 1.2 Packing arrangements in crystals – hexagonal and cubic close packing. Simple, body centered and face centered cubes.
- 1.3 Structure of NaCl - rotating crystal technique.
- 1.4 Defects in solid state, conductors, semi conductors and super conductors.

**Extra reading/Keywords :** *Structure of zinc oxide and cesium chloride*

**UNIT 2- PHOTOCHEMISTRY**

**12 Hrs**

- 2.1 Photochemical reactions – Differences between thermal and photochemical reactions. Stark-Einstein law of photochemical equivalence, Lambert – Beer's law.
- 2.2 Quantum yield – definition, classification of photochemical reactions based on quantum yield, reasons for high and low quantum yield with one example for each.
- 2.3 Photosensitized reactions, photo processes – fluorescence, phosphorescence and chemiluminescence.

**Extra reading/Keywords :** *Problems in quantum yield and applications of photochemistry*

**UNIT 3- ELECTROCHEMISTRY – I**

**12 Hrs**

- 3.1 Electrical conductance, Ohm's law, specific conductance, equivalent conductance, molar conductance. Determination of conductance, variation of equivalent conductance with dilution.

- 3.2 Kohlrausch's law and its application – Calculation of molar conductance at infinite dilution for weak electrolyte. Conductometric titrations - HCl with NaOH, CH<sub>3</sub>COOH with NaOH, CH<sub>3</sub>COOH with NH<sub>4</sub>OH and KCl with AgNO<sub>3</sub>.

**Extra reading/Keywords :** *Conductance determination by experiments*

#### **UNIT 4- ELECTROCHEMISTRY – II**

**12 Hrs**

- 4.1 Galvanic cell – Daniel cell, single electrode potential, standard electrode potential, determination of electrode potential.
- 4.2 Reference electrodes – hydrogen and calomel electrodes. Electrochemical series and its applications.
- 4.3 Corrosion – definition, electrochemical theory of corrosion, prevention. Over-voltage – definition and application of over-voltage.

**Extra reading/Keywords :** *Fuel cells and batteries*

#### **UNIT 5- CHEMICAL KINETICS**

**12 Hrs**

- 5.1 Order and molecularity of reactions, setting up and solving simple differential equation and half-life period for first order reaction.
- 5.2 Setting up and solving simple differential equations and half-life periods for second order and zero order reactions.
- 5.3 Determination of order of reactions, effect of temperature on reaction rate – Arrhenius equation, the activation energy.

**Extra reading/Keywords :** *Dilatometry and polarimetry*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

#### **Course Outcomes:**

1. Predict the structure of sodium chloride.
2. Construct the Jablonski diagram.
3. Explain the different types of conductometric titrations.
4. Calculate the reduction potential for various metals.
5. Derive the rate equation for first order and second order equations.

#### **TEXT BOOKS:**

1. Puri B.R. and Sharma L.R., '*Principles of Inorganic Chemistry*', Shoban Lal Nagin Chand and Co., 2002.
2. Vasudevan A.N.S., *Ancillary Chemistry*, Part I and Part II, 1981.
3. Dr. V. Veeraiyan, *Text Book of Allied Chemistry*, Volume I and Volume II, 1997.

#### **BOOKS FOR REFERENCE:**

1. Cotton F.A. and Wilkinson. G. *Advanced Inorganic Chemistry*, 4<sup>th</sup> Edn., London: John Wiley and Sons Inc., 1999.
2. Huheey, J.H.. *Inorganic Chemistry*, 4<sup>th</sup> Edn.. London: Pearson Education Pvt., Ltd., 2002.
3. Puri B.R. Sharma L.R and Madan S. Pathania, *Principles of Physical Chemistry*, 35<sup>th</sup> edition, shoban Lal Nagin Chand and Co., 1994.
4. Soni P.L. and Chawla H.M., '*Text Book of Organic Chemistry*', 27<sup>th</sup> Edition, Sultan Chand and sons, 1997.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY SEMESTER IV**  
**ALLIED 6: ALLIED CHEMISTRY PRACTICAL PAPER III**  
**[FOR PHYSICS MAIN]**

**Total Hours: 60**  
**Hours: 4Hrs./wk.**  
**Credits: 3**

**Code: U15CH4AOP03**

**General Objective:**

To expose the students to various concepts in volumetric analysis and to gain skill in volumetric analysis.

**Course Objective:**

**The Learner will be able to**

1. determine the strength of the given solution from different types of titrations like acid base, redox, precipitation and complexometric titration.

**UNIT 1 - VOLUMETRIC ANALYSIS**

**12Hrs**

- 1.5 Terminology, Basic requirement of a titration, standard solution – primary standard, preservation of standard solution, expressing concentration of standard solution, simple correlation for quick and convenient volumetric calculation, p-functions.
- 1.6 Volumetric Titrations: Acid base titration – acid base titration and use of indicators, titration of a strong acid against a strong base, titration of a weak acid with a strong base, titration of a weak base with strong acid, titration of  $\text{Na}_2\text{CO}_3$  with HCl, the theory of acid base indicators, action of phenolphthalein and methyl orange.
- 1.7 Redox titration – theory – titration of Mohr salt against  $\text{KMnO}_4$ , oxalic acid against  $\text{KMnO}_4$ ,  $\text{FeSO}_4$  against  $\text{K}_2\text{Cr}_2\text{O}_7$ , internal indicator, external indicator, starch, iodimetry and iodometry. Precipitation titrations – conditions for precipitation titration and indicators.
- 1.8 Complexometric titration:-EDTA titrations, indicators of EDTA titrations, complexometric titration curves, EDTA – titration methods – masking of ions, precautions to avoid errors in titrimetric analysis, corrections for unavoidable errors.

**Extra reading/Keywords :** *Determine the total hardness present in the given water sample*

**VOLUMETRIC ANALYSIS:**

1. Acidimetry  
Estimation of Oxalic acid.
2. Permanganometry:
  - i. Estimation of  $\text{FeSO}_4$ .
  - ii. Estimation of Calcium. (Direct Method).
3. Iodimetry & Iodometry:
  - i. Estimation of copper.
  - ii. Estimation of Arsenious oxide.
4. Dichrometry:  
Estimation of Ferrous ion.
5. EDTA Titrations:
  - i. Estimation of Magnesium.

ii. Estimation of Zinc.

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Calculate the various concentration units.
2. Prepare the standard solution of different strength.
3. Explain the acid base, redox and complexometric titrations with examples.
4. Estimate the strength of the given unknown solution.

**TEXT BOOKS:**

1. Venkateswaran V., Veeraswamy R. and Kulandaivelu A.R. *Basic Principles of Practical Chemistry*. New Delhi: 2<sup>nd</sup> edn, Sultan Chand & Sons, 1997.

**BOOKS FOR REFERENCE:**

1. Svehla G. *Vogel's Qualitative Inorganic Analysis*. US: 7<sup>th</sup> Edition, Prentice Hall, 1996.
2. Mendham J., Denney R. C., Barnes J. D. and Thomas M. J. K. *Vogel's Prescribed Book of Qualitative Chemical Analysis*, US: 6<sup>th</sup> Edition, Prentice Hall, 2000.
3. Puri B.R. and Sharma L.R. *Principles of Inorganic Chemistry*. New Delhi: Shoban Lal Nagin Chand and Co., 2002.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**  
**B.A. /B.Sc. / B.Com. / BBA/ B.C.A. DEGREE COURSE**

**LIFE ORIENTED EDUCATION**

**ETHICS – II: EMPOWERMENT OF WOMEN**

**HRS / Wk : 1**

**CODE: U15VE4LVE02**

**CREDIT : 1**

**MARKS : 100**

**OBJECTIVES:**

- To make the learners aware of various gender and social issues and Cyber Crimes.
- To make the learners understand and appreciate the role of media, in facing the challenges on various life issues.
- To enable the learners to understand the ways of empowering women and cyber crime against women

**UNIT – I: GENDER ISSUES**

Feminism, Responsibilities of men and women towards Egalitarian society, Gender Identity-Factors contributing to gender identity (Family values, culture, tradition, religion, societal values, mass media)

**UNIT – II: SOCIAL ISSUES RELATED TO WOMEN**

Eve teasing, Rape, Dowry, Harassment in marriage, Divorce and Widows Remarriage, HIV & AIDS, Transgender, Female Genocide, sex workers, trafficking, fugitive, Female foeticide, handicapped children and women and evils of drug abuse.

**UNIT – III: WOMEN AND MEDIA**

Portrayal of women in media world - News paper, Magazine, Cinema, TV, Video and Advertisements - Morality in Media and Right use of Media

**UNIT – IV: WAYS OF EMPOWERING WOMEN**

Need for empowerment –Skills required for empowerment and Career Oriented Skills, Women's bill- Property rights, Models of Empowered Women- St. Teresa of Kolkata, Indira Gandhi, Helen Keller, Chanu Sharmila and Malala

**UNIT – V: CYBER CRIME AGAINST WOMEN**

Harassment and Spoofing via e-mail, Cyber Stalking, Cyber Pornography, Morphing. Cyber Laws, Social network: Face book, Twitter and Whatsapp

**REFERENCES:**

1. Dr.M.Arumairaj et al., 1999, "Marching towards the Millenium ahead".
2. Thomas Anjugandam, 1999, "Grow Free Live Free" Salesian Publicaiton.
3. H.C Pretti Nandhini Upreti, jaipur 2000 "Women and problems of Gender Discrimination".
4. Thomas B.Jayaseelan, 2002, "Women: Rights and law" Indian Social Institute, New Delhi.
5. Reni Jacob vol I & II, April- June 2004, "Vikasimi – The journal of Women's Empowerment, Ed,"



(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2 B.A./ B.Sc./  
B.Com/ BBA/ B.C.A - DEGREE COURSES  
LIFE ORIENTED EDUCATION  
CATECHISM – II: CHURCH AND SACRAMENTS**

**HRS / Wk : 1  
CREDIT : 1**

**CODE : U15VE4LVC02  
MARKS : 100**

**OBJECTIVES:**

- To enable the students to understand the ways of Christian living with the Church
- To understand God's gift of the Holy Spirit.
- To understand the methods of building relationship with Jesus.
- To learn the life of Sacraments and Prayer
- To enrich our devotion to Mother Mary and Saints.

**UNIT – I: MISSION OF THE CHURCH**

What is church (attributes) – Interpretation: body of Christ- Bride of Christ, goal of all things- Historical as well as spiritual- Mystery and Sacrament-Pilgrim Church.

**UNIT – II: PARTICIPATORY CHURCH**

Work of the Holy Spirit- Salt and leaven in the world “Church of modern World” Church as community – Its important aspect, early Christian Church – People of God as Church- Its characteristics and structure

**UNIT – III: THE FUNCTIONARY CHURCH AND I**

Ministerial Church – Relating Church –Parish Church- Role of lay faithful in the Church – Its challenges – Church and I.

**UNIT – IV: SACRAMENTS**

Sacraments – Initiation– Healing – Service (all the seven) – Emphasis on Confession, Confirmation and Holy Communion. Sacramental: holy “things” used –Their sanctity.

**UNIT – V: MARY AND SAINTS**

Mary as a young virgin- Disciple- Her role in the Catholic Church-Annual feasts- Pilgrimages- Devotion to Mary, Dogmas. Saints in the Church- Prominent Women in the old testament

**REFERENCES:**

4. “Vatican II Revised” Archbishop Angelo Fernandes Published by X.DiAx de Rio S.J. Gujarat Sahitya Prakash, P.O.Box. 70, Gujarat, 388001, India.
5. “The Sacraments The Word of God at the Mercy of the Body” Claretian Publications, Malleswaram, Bangalore 560055.
6. Documents of Vatican II – St. Paul's Publications, Bombay 1966.

(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE(AUTONOMOUS) TRICHIRAPALLI-2.**

**B.A/B.Sc./B.Com /B.C.A – DEGREE COURSES**

**LIFE ORIENTED EDUCATION**

**BIBLE STUDIES – II: OLD TESTAMENT**

**HRS / Wk :1**

**CODE: U15VE4LVBO2**

**CREDIT : 1**

**MARKS : 100**

**OBJECTIVE:**

- To enable the students to understand the desires of God through Prophetic revelation and to become sensitive to the heart beat of God.

**UNIT – I: PURPOSE OF LIFE**

Creation of man – fall of man (Gen 1-4) Plan of redemption through the life of :

- Noah (Gen 6-9); Abraham (Gen 12-18);
- Joseph (Gen 37-40); Moses (Exo 4-5);
- Joshua (Joshua 1-8)

**UNIT – II: JUDGES AND KINGS**

- Judges: Deborah (Judges 4); Samson (Judges 6-8); Gideon (Judges 13-16)
- Kings: David (I Sam 17-31, II Sam 1-12); Solomon (I Kings 1-11)

**UNIT – III: MINOR PROPHETS**

Brief Life History and teachings of

- Amos
- Jonah
- Micah
- Nahum
- Habakkuk

**UNIT – IV: MAJOR PROPHETS**

Brief Life History and teachings of

- Isaiah (Is 1,6,11,36-38,40-42,44,50,53,61)
- Jeremiah (Jer 1-3,7-12,18-19,23)
- Ezekiel (chapters 1,2,3,5,8,12 visions)
- Daniel (Daniel 1-6)

**UNIT – V: WOMEN IN THE BIBLE**

Women in the Old Testament

- Eve (Gen 3)
- Ruth (Ruth 1-4)
- Hannah (I Sam 1:1-28)
- Esther (Esther 1-6)

## **REFERENCES:**

3. Russell Fueller (1999) The Text book of the Twelve Minor Prophets. Wipf & Stock Publishers, UK.
4. Willis Judson Beecher (2002) The Prophets and The Promise. Wipf & Stock Publishers, UK

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER V**  
**MAIN CORE – 7: INORGANIC CHEMISTRY**

**TOTAL HOURS: 60**  
**HOURS: 4HRS. /WK.**  
**CREDITS : 4**

**CODE: U15CH5MCT07**

**General objective:**

To make the students to learn about the nomenclature, isomerism, theories, distortion and stability of coordination complexes, the structure of solids and defects in crystals, the concepts of nuclear chemistry, important bio-inorganic molecules, lanthanides and actinides.

**Course Objectives:**

**The Learner will be able to**

1. differentiate different types of isomerism.
2. discuss the characteristic properties of complexes.
3. explain the structure of crystalline solids, crystal axis, planes, lattices and defects and apply XRD analysis for characterization of crystalline materials.
4. apply the principles of nuclear chemistry in various nuclear reactions and understand the applications of radioactive isotopes.
5. analyse the chemistry of metal ions in different biological co-ordination compounds and describe the differences and similarities between the chemistry of lanthanides and actinides.

**UNIT 1 - CO-ORDINATION CHEMISTRY I**

**12Hrs**

- 1.1 Double salts, co-ordination compounds, co-ordination complexes and complex ions, co-ordination number, classification of ligands, chelates, physical methods in the study of complexes.
- 1.2 Nomenclature of co-ordination compounds, Werner's theory, Effective atomic number (EAN) and 18 electron rule.
- 1.3 Structural isomerism – hydrate isomerism, co-ordination isomerism, linkage isomerism, coordination position isomerism, ionization isomerism and polymerization isomerism.
- 1.4 Stereoisomerism – Geometrical isomerism and optical isomerism in 4 and 6 co-ordinated complexes.

**Extra reading/Keywords:** *The spectral data to elucidate the structure of complexes.*

**UNIT 2 - CO-ORDINATION CHEMISTRY II**

**12Hrs**

- 2.1 Valence bond theory – Postulates, formation of inner and outer sphere complexes, application of VBT (Magnetic property and geometry of complexes), defects of VBT.
- 2.2 Crystal field theory – crystal field splitting of energy levels of d-orbitals in octahedral, tetrahedral and square planar complexes, Crystal field stabilization energy, Factors affecting the magnitude of  $\Delta_o$ . Application of CFT – colour, magnetic properties and spin states of the complexes. Distortion of octahedral complexes and Jahn-Teller theorem, cause and types of distortion, Defects of CFT.
- 2.3 Stability of complexes – stepwise formation and overall formation constant. Labile and inert Complexes. Factors affecting the stability of complexes. Experimental determination of stability constant (Job's method, Bjerrum method). Irving Williams theory.

**Extra reading/Keywords:** *Jahn Teller theorem and MOT*

### UNIT 3 - SOLID STATE

12Hrs

- 3.1 Structure of solids – Classification, isotropy and anisotropy, interfacial angle, symmetry in crystals – cubic and hexagonal systems. Space lattice and unit cell, Bravais lattices, designation of planes in crystals – Miller indices. Diffraction of X-rays by crystals – Bragg's equation – derivation, rotating crystal technique.
- 3.2 Types of crystals, close packing of identical solid spheres - interstitial sites, limiting Radius ratios (derivation not needed), radius ratio rule and shapes of ionic crystals. Structures of NaCl, CsCl, ZnS, CaF<sub>2</sub> and Rutile.
- 3.3 Defects in stoichiometric crystals – Schottky and Frenkel defects. Defects in Non- stoichiometric crystals – metal excess and metal deficiency defects. Impurity defects – semi conductors – n-type and p-type semi conductors.

**Extra reading/Keywords:** *Applications of semiconductors.*

### UNIT 4 -NUCLEAR CHEMISTRY

12Hrs

- 4.1 Subatomic particles, nuclear size, nuclear forces – Meson theory of nuclear forces. Magic number, nuclear shell structure - Liquid drop model.
- 4.2 Mass defects in atomic nucleus, nuclear binding energies. Nuclear stability – n/p ratio, the whole number rule and packing fraction. Isotopes, Isobars, Isotones and isomers – definition and examples.
- 4.3 Definition of nuclear transformation, Bohr's theory of nuclear reactions. Classification of nuclear reactions, Q value of nuclear reactions, Nuclear fission - controlled nuclear fission. Nuclear fusion - stellar energy.
- 4.4 Artificial transmutation of elements, induced radioactivity, applications of radioisotopes in medicine, agriculture and industry, carbon dating.

**Extra reading/Keywords:** *Types of Radioactive decay and their effect on the nucleus.*

### UNIT 5 - BIO-INORGANIC CHEMISTRY AND f- BLOCK ELEMENTS

12Hrs

- 5.1 The porphyrin ring system –Oxygen transport- Hemoglobin and Myoglobin- biological functions only. Cytochrome-C - structure and biological functions. Blue copper proteins, Fe-S protein – Ferridoxin and vitamin B<sub>12</sub>- biological functions only.
- 5.2 Lanthanide series - Properties of lanthanides – electronic configuration, oxidation states, ionic radii, lanthanide contraction, colour, magnetic properties, basic character, solubility of compounds and chemical reactivity, separation of lanthanides.
- 5.3 Actinide series – electronic configuration, oxidation states, ionic radii, colour and formation of complexes, Transuranic elements. Comparison between actinides and lanthanides.

**Extra reading/Keywords:** *Spectral properties of lanthanides.*

**Note:** Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

**Course outcomes:**

1. Classify the various types of isomerism of coordination compounds.
2. Analyze the stability of complex based on EAN and 18 electron rule.
3. Compare the various theories of coordination complexes.
4. Categorise the different types of crystals and its defects,.
5. Sketch and explain the packing arrangements of atoms and the structures of few ionic crystals.
6. Recall the subatomic particles and explain the nuclear shell and liquid drop model.
7. Evaluate the nuclear stability based of n/p ratio, whole number rule, mass defect and packing fraction.
8. Categorize the various nuclear reactions and summarize the applications of radio isotopes.
9. Sketch and explain the biological functions few bio inorganic compounds.
10. Summarize the chemistry of inner transition elements.

**TEXT BOOKS:**

1. Puri B.R. and Sharma L.R., *Principles of Inorganic Chemistry*, New Delhi: Sultan Chand. 1989.
2. Madan R.D., *Modern Inorganic Chemistry* S.Chand and company (PVT) limited, 1st edn. 1987.

**BOOKS FOR REFERENCE:**

1. Soni P.L. and Chawla H.M *Text Book of Inorganic Chemistry* (26<sup>th</sup> edn), New Delhi, Sultan Chand and sons, 2004.
2. Lee J D, *Concise inorganic chemistry*, 5<sup>th</sup> edn, Wiley India Edition, 2009.
3. Cotton F A, Wilkinson G, Murillo C. A and Bochmann, M *Advanced Inorganic Chemistry*, 6<sup>th</sup> edn, John Wiley & Sons, 2008.
4. Huheey J. E., Keiter E. A., Keiter R. L. and Medhi O. K., *Inorganic Chemistry - Principles of Structure and Reactivity*, 4<sup>th</sup> edn, Pearson Education, 2006.
5. Atkins P, Overton T, Rourke J M. Weller and Armstrong F, *Inorganic Chemistry*, 5<sup>th</sup> edn, Oxford University Press, 2010.
6. Puri B.R., Sharma, L.R and Madan S. Pathania . *Principles of Physical Chemistry* (35<sup>th</sup> edn), New Delhi, Shoban Lal Nagin Chand and Co. 2008.
7. Gopalan R., Ramalingam, V. *Concise Co-ordination Chemistry*, Vikas Publishing House Pvt. Ltd. 2001.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER V**  
**MAJOR CORE – 8: ORGANIC CHEMISTRY – I**

**Total Hours: 60**  
**Hours: 4hrs./wk.**  
**Credits: 4**

**Code: U15CH5MCT08**

**General objective:**

The student learns the preparations and properties involved in the organic compounds containing oxygen and nitrogen.

**Course Objectives:**

**The Learner will be able to**

1. understand the preparation, properties and strength of aliphatic, aromatic carboxylic, sulphonic acids and their derivatives.
2. appraise and justify the preparation, properties and basicity of nitrogen containing organic compounds.
3. classify, formulate and discuss the concepts of amino acids, proteins and nucleic acids.
4. reproduce and describe the preparation, properties of oxygen and sulphur containing compounds.
5. classify, distinguish and elucidate the structures of few carbohydrates.

**UNIT 1 - ORGANIC ACIDS AND DERIVATIVES**

**12Hrs**

- 1.1 General methods of preparation and properties of aliphatic and aromatic mono carboxylic acids. Ionization of carboxylic acids. Acidity constant. Comparison of acid strengths of substituted halo acids and substituted benzoic acids.
- 1.2 Aromatic sulphonic acid – preparation and properties. Aliphatic hydroxy acids – Action of heat on  $\alpha$ ,  $\beta$ ,  $\gamma$  hydroxy acids. Acyl substitution.
- 1.3 Aliphatic dicarboxylic acid – Blanc's rule. Problems related to mono and di carboxylic acids.
- 1.4 Malonic and aceto acetic ester – characteristics and synthetic uses.

**Extra reading/Keywords:** *Benefits of Hydroxy citric acids*

**UNIT 2- NITRO COMPOUNDS AND AMINES**

**12Hrs**

- 2.1 Aliphatic nitro compounds – comparison between primary, secondary and tertiary Nitrocompounds. Conversion of nitrobenzene to o, m and p-dinitro benzene. TNT. Reduction of nitrobenzene in neutral, acidic and alkaline media.
- 2.2 Relative basic characters of aliphatic, aromatic amines and guanidine. Separation of aliphatic amines. Phenylene diamines – preparation, properties and uses.
- 2.3 Diazotisation - Illustration and mechanism. Synthetic applications of diazonium salts.
- 2.4 Diazomethane and diazo acetic ester – preparations, structure and their synthetic uses.

**Extra reading/Keywords:** *Role of Nitrogen containing compounds in daily life*

**UNIT 3- AMINO ACIDS, PROTEINS AND NUCLEIC ACIDS**

**12Hrs**

- 3.1 Amino acids – introduction, classification, zwitter ions, iso electric point, Preparation and Properties.
- 3.2 Polypeptides – peptide synthesis. Structural determination of polypeptides – end group analyses.
- 3.3 Proteins – classification based on physical and chemical properties. Physiological functions, Primary, secondary and tertiary structures of proteins.
- 3.4 Nucleic acids: RNA and DNA - Biological functions.

**Extra reading/Keywords:** *Nuclear bases*

#### **UNIT 4- OXYGEN AND SULPHUR CONTAINING COMPOUNDS**

**12Hrs**

- 4.1 Alcohols - distinction of primary, secondary and tertiary alcohols. Thioalcohol (Ethyl Mercaptan), Poly-hydric alcohols ( Glycol and Glycerol), Unsaturated alcohol (Allyl alcohol) – preparation and properties.
- 4.2 Ethers - (Diethyl ether and anisole), Epoxide (Ethylene oxide), Thioether (Ethyl Sulphide) - Preparation and properties. Mustard gas – structure and preparation.
- 4.3 Phenols : Preparation and acidic character of phenols - explanation on the basis of resonance stabilization, Effect of substituent on acidity. Ring substitution in phenols – Orientation of phenolic group towards electrophiles. Esterification, nitration, sulphonation, halogenation, coupling, Kolbes reaction (mechanism), Reimer-Tiemann reaction (mechanism). Lederer-Manasse, Liebermann's, Hoesh reactions, Elb's persulphate oxidation, phthalein reaction and Peckmann condensation.
- 4.4 Cresols, Di and Trihydric phenols and naphthols – reactions.

**Extra reading/Keywords:** *Harmful effects of Resorcinol*

#### **UNIT 5- CARBOHYDRATES**

**12Hrs**

- 5.1 Introduction. Classification. Preparation and reactions of glucose and fructose.
- 5.2 Ascending and descending of sugar series. Interconversions. Mutarotation and its mechanism. Epimerization. Constitution of glucose and fructose.
- 5.3 Disaccharides – preparations, reactions and structure of maltose, lactose and sucrose (Structural elucidation not expected).
- 5.4 Polysaccharides : Starch and cellulose – properties and uses.

**Extra reading/Keywords:** *Deficiency of Carbohydrates*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

#### **Course Outcomes:**

1. Formulate and discriminate the preparation, properties and strength of aliphatic, aromatic carboxylic, sulphonic acids and their derivatives.
2. Discuss the preparation, properties and basicity of nitrogen containing organic compounds.
3. Describe the physiological functions and structures of proteins, amino acids and nucleic acids.
4. List out the preparation, properties of oxygen and sulphur containing compounds.
5. Elucidate the structure of glucose and fructose.

#### **TEXT BOOKS:**

1. Jain M.K., Sharma S.C., *Modern organic chemistry*, Fourth edition, Vishal Publishing Co., Jalandhar, 2012.
2. Tewari K.S., Vishnoi N.K., Mehrotra S.N., “*A Text Book of Organic Chemistry*”, 2<sup>nd</sup> Revised edition, Vikas Publishing House Pvt. Ltd.



## BOOKS FOR REFERENCE:

1. Soni P.L. and Chawla H.M., "*Text Book of organic Chemistry*", 27<sup>th</sup> Edition, Sultan Chand and Sons, 1997.
2. Subash Chandra Rastogi, Satiskumar, Agarwala, Ashok Kumar Sharma. "Natural Products" – Vol. I.
3. I.L.Finar, Organic chemistry, Vol. I- 6<sup>th</sup> edition, vol.2 – fifth edition, Pearson Education, 2002.
4. Jonathan Clayden, Nick Greeves, Stuart Warren, *Organic chemistry*, 2nd Edition, Oxford University Press, 2012.
5. John McMurray, *Organic chemistry*, 8<sup>th</sup> Edn., International Edition, Mary Firch, 2011.
6. Robert Thornton Morrison, Robert Neilson Boyd, Saibal Kanti Bhattacharjee, *Organic Chemistry*, 7<sup>th</sup> Edition, Pearson Education India, Chennai, 2011.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER V**  
**MAIN CORE – 9: PHYSICAL CHEMISTRY – I**  
**[ELECTRO CHEMISTRY AND PHASE RULE]**

**TOTAL HOURS: 60**  
**HOURS : 4 HRS./WK.**  
**CREDITS : 4**

**CODE: U15CH5MCT09**

**General Objective:**

To make the students learn the basic concepts of electrolytic conductance, understand the different types of electro chemical cells, EMF of cell and its measurement and concepts of phase rule.

**Course Objectives :**

**The Learner will be able to**

1. understand the basic concepts of electrolytic conductance and transport number measurements.
2. classify the electrolytes and interprets the various theories of electrolytes
3. implement electrode potential and apply Nernst equation for calculating the emf of the galvanic cell.
4. apply emf measurements and outlines corrosion and overvoltage as electrochemical processes
5. interpret Gibbs phase rule and its application in separation of metals from ores and alloys

**UNIT 1 - ELECTROLYTIC CONDUCTION – I**

**12 Hrs**

- 1.1 Specific conductance, equivalent conductance, relation between specific conductance and equivalent conductance, molar conductance, variation of molar conductance with dilution.
- 1.2 Determination of conductance and cell constant. Ionic mobility and its determination, discharge of ions on electrolysis – Hittorf's theoretical device.
- 1.3 Transport number, determination of transport number – Hittorf's method and moving boundary method, effect of concentration on transport number.

**Extra reading/Keywords:** *Conductance determination by experiments*

**UNIT 2- ELECTROLYTIC CONDUCTION – II**

**12Hrs**

- 2.1 Kohlrausch's law – statement, applications of Kohlrausch's law – calculation of molar conductance at infinite dilution for weak electrolyte and determination of transport number.
- 2.2 Applications of conductance measurements – determination of degree of dissociation of weak electrolyte, ionic product of water, solubility of sparingly soluble salt and conductometric titrations.
- 2.3 An elementary treatment of Debye Huckel theory of strong electrolytes, significance of Debye - Huckel - Onsagar equation. Conductance at high field and high frequencies - Wein & Debye – Falkenhagen effects.

**Extra reading/Keywords:** *Degree of dissociation of strong and weak electrolytes and solubility product determination by experiments*

### UNIT 3- ELECTROCHEMICAL CELLS – I

12 Hrs

- 3.1 Galvanic cells, reversible electrodes and their types – metal/metal ion, gas/ion, metal/insoluble salt/anion, oxidation – reduction electrodes.
- 3.2 Single electrode potential, sign of electrode potential, reference electrodes – hydrogen, calomel and silver/silver chloride electrodes.
- 3.3 Thermodynamics of reversible cells and reversible electrodes – electrical energy in a galvanic cell, electrical energy and free energy change of the cell reaction, relation between electrical energy and enthalpy of a cell reaction. Effect of concentration of electrolyte on cell potential and electrode potential – Nernst equation.
- 3.4 E.M.F. of a cell and its measurement, Weston standard cell, the electrochemical series and its applications.

**Extra reading/Keywords:** *Fuel cells, primary and secondary batteries*

### UNIT 4 - ELECTROCHEMICAL CELLS – II

12 Hrs

- 4.1 Electrolyte concentration cells with and without transference, liquid junction potential.
- 4.2 Applications of E.M.F. measurements – determination of valency of ions, solubility product and pH – hydrogen electrode, quinhydrone electrode and glass electrode, potentiometric titrations.
- 4.3 Over Voltage – definition, determination and applications. Corrosion of metals – definition, types, electrochemical theory of corrosion and prevention.

**Extra reading/Keywords:** *Electrical double layer and corrosion inhibitors*

### UNIT 5- PHASE EQUILIBRIA AND PHASE RULE

12Hrs

- 5.1 Meaning of the terms – phase, component and degree of freedom. Criteria of phase equilibrium, Derivation of Gibb's phase rule.
- 5.2 Phase equilibria in one component systems – phase diagrams of water, carbon di-oxide and sulphur system.
- 5.3 Simple eutectic system – Lead-Silver system and Potassium iodide-Water system. Applications of thermal analysis in the construction of simple eutectic diagram.
- 5.4 Systems giving rise to compounds with congruent melting point – Zinc-Magnesium system. Systems giving rise to compounds with incongruent melting point – Sodium-Potassium system. Partially miscible liquids – Phenol-Water system, triethylamine-water and Nicotine-Water systems.

**Extra reading/Keywords:** *Three component systems*

**Note:** Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

#### Course Outcomes

1. Analyse the variation of specific and equivalent conductance with dilution
2. Recall the applications of conductance measurement
3. Classify the types of electrodes
4. Explain the electrochemical theory of corrosion
5. Sketch and discuss the phase diagram of simple eutectic systems

#### Text Books:

1. Puri B.R., Sharma L.R. and Madan Pathania S. , *Principles of Physical Chemistry*, 35<sup>th</sup> edn., Shobanlal nagin Chand and Co, 1994..
2. Arun Bahl, B.S. Bahl & G.D. Tuli, *Essentials of Physical Chemistry*, S.Chand & company Pvt. Ltd, 2014.

## **BOOKS FOR REFERENCE:**

1. Negi, A.S. & Anand, S.C., *A Text book of Physical Chemistry*, 3<sup>rd</sup> edn., Wiley Eastern Ltd, 1994.
2. Walter J Moore *Physical Chemistry*, 5th edn.,, Prentice-Hall, 1999.
3. Bockris, J.O.M and Reddy, A.K.N. *Modern Electro Chemistry* 2<sup>nd</sup> edn.,, New York: Plenum Press, 1998.
4. Crow, D.R. *Principles And Applications To Electrochemistry*, Chapman And Hall, 1991.
5. Samuel Glasstone, *An Introduction to Electrochemistry* McMillan India Ltd.,2015.

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER V**  
**MAJOR ELECTIVE – 2 : DAIRY CHEMISTRY**

**Hours : 5hrs/week**

**CODE: U15CH5MET01**

**Credits: 4**

UNIT I:

Milk: Definition – General composition of milk – Physical properties of milk – colour, odour, acidity – natural and developed, specific gravity – Recknagel effect, viscosity and conductivity, factors affecting the gross composition of milk, Physico – chemical change taking place in milk due to processing parameters – boiling pasteurization, sterilization and homogenization. Adulterants, preservatives and neutralizers – examples and their detection. Estimation of fat, specific gravity, acidity and total solids in milk.

UNIT II:

Milk lipids – terminology and definitions classification – saponifiable (triglycerides) and unsaponifiable matters (sterols and cholesterol) phospholipids – structure and properties (Lecithin and Cephalin) Milk fat constants – refractive index – saponification number, Iodine number, R.M. number and Polenske number.

Milk proteins – chemistry of proteins in general structure –N-terminal and C-terminal, hydrogen bond, disulphide bond and salt linkages, outlines of primary, secondary and tertiary structure of proteins. Physical properties of milk proteins – electrical properties and hydration, solubility, reaction of milk proteins with formaldehyde and ninhydrin. Non-protein nitrogen constituents of milk, effect of heat on milk protein, milk enzyme and functions.

Milk carbohydrate – Lactose – its structure, solubility, hydrolysis, oxidation and reduction, estimation of lactose in milk.

Milk vitamins – water and fat soluble vitamins, effect of heat and light on vitamins. Ash and mineral matters in milk.

UNIT III:

Creams: Definition – composition – chemistry of creaming process – gravitational and centrifugal methods of separation of cream – factors influencing cream separation (Mention the factors only) – cream neutralization. Estimation of fat in cream.

Butter: Definition - % composition – manufacture – Estimation of fat, acidity, salt and moisture content – Desi butter.

Ghee: Major constituents – common adulterants added to ghee and their detection – rancidity – definition – types (hydrolytic, oxidative and ketonic) prevention and anti oxidants and synergist (natural and synthetic) – Measurements.

UNIT IV:

Fermented Milk products: Fermentation of milk – definition, conditions, cultured milk – definition of culture – examples, conditions, types – cultured cream – cultured butter milk – Bulgaricus milk - acidophilus milk – yogurt. Recteriophage – definition and its function.

Indigenous Products: Definition – percentage composition – preparation – physico- chemical changes take place during khoa making – khoa sweet – Gulabjamun, Chana sweet – Rossogolla – ingredients and preparation.

Ice Cream: Definition – Percentage composition – types – ingredients needed – manufacture of ice-cream stabilizers – emulsifiers and their role.

UNIT V:

Milk Powder: Definition – need for making powder – drying process – spray drying, drum drying, jet drying and foam drying – principles involved in each. Manufacture of whole milk powder by spray drying process – keeping quality of milk powder.

Dairy Detergents: Definition – characteristics – classification – washing procedure (modern method) sterilization – Chloramines – T and hypochlorite solution.

REFERENCE:

1. Outlines of Dairy Technology – Sukumar De.
2. Principles of Dairy Chemistry – Robert Jenness & S. Patorn.
3. Indian Dairy products – K.S. Rangappa and K.T. Achaya.
4. Modern Dairy products – L.M. Lampert.
5. Principles of Dairy processing – Warner.

PRACTICAL:

1. Estimation of fat, acidity and T.S. in various samples of milk.
2. Estimation of protein in milk.
3. Detection of adulterants, preservatives and neutralizers in milk.
4. Detection of rancidity I ghee.
5. Estimation of rancidity, salt content, fat in butter.

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER V**  
**MAJOR ELECTIVE – 2 : POLYMER CHEMISTRY**

**Hours : 5hrs/week**

**Credits: 4**

**Code: U15CH5MET02**

**OBJECTIVES:**

To expose the students to important concepts about polymers.

**UNIT I:**

- 1.1 Introduction, classification of polymers.
- 1.2 Polymerization - step polymerization, chain polymerization and co-ordination polymerization.
- 1.3 Catalysts in polymerization, degree of polymerization, kinetic chain length.

**UNIT II:**

- 2.1 General methods of polymerization bulk, solution, suspension and emulsion polymerization.
- 2.2 Study of commercial polymers – polyacrylonitrile, polymethyl methacrylate, polyurethanes, polyvinyl chloride, polytetra fluoroethylene, polyamides.
- 2.3 Silicones, rubber, elastomers, vulcanization.

**UNIT III:**

- 3.1 Characterisation of polymers – chemical structure and polymer properties – Degree of crystallinity,  $T_m$ ,  $T_g$ , mechanical, electrical, thermal, optical and chemical properties.
- 3.2 Molecular weights and averages – number average, weight average, molecular weight distribution.
- 3.3 Determination of molecular weight – Viscosity method, osmometry and end group analysis, spectral analysis and thermogravimetric analysis.

**UNIT IV:**

- 4.1 Polymer degradation – definition, types.
- 4.2 Thermal degradation, mechanical degradation.
- 4.3 Photo degradation, oxidative degradation – rubber oxidation, ozone oxidation.

**UNIT V:**

- 5.1 Compounding – compounding materials and their significances.
- 5.2 Fabrication – Techniques – Compression, injection, lamination mouldings.
- 5.3 Applications of polymers and plastics.

**BOOKS RECOMMENDED:**

**Text Book:**

1. Gowarikor V.R., Viswanathan N.V., Jayadev Sreedhar, Polymer Science , Revised edition 2005, New Age International PVT. LTD.

**Reference Book:**

1. Fred W. Billmeyer JR, 3<sup>rd</sup> edition John Wiley & Sons (P) Ltd.

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER V**

**MAIN ELECTIVE – 2 : CHEMISTRY OF BIOMOLECULES**

**TOTAL HOURS: 75**

**HOURS: 5 HRS./WK.**

**CREDITS : 4**

**CODE: U15CH5MET03**

**General objective:**

To make the students to learn about carbohydrates, lipids, proteins, enzymes, blood and bile pigments.

**Course objectives:**

**The Learner will be able to**

1. understand the importance and different classes of lipids and describe the metabolism and functions of lipids.
2. describe what happens during carbohydrate digestion, glycolysis, glycogenesis, glycogenolysis and gluconeogenesis.
3. analyse the metabolism, anabolism and catabolism of proteins and detect the effects of starvation on different metabolism.
4. analyse the properties, mechanism of action metabolic effects of Thyroxine and find out the diseases associated with abnormal metabolism of thyroxine.
5. describe the functions and properties of blood, Haemoglobin, bile pigments, bile acids and distinguish blood groups.

**UNIT 1 - CARBOHYDRATES**

**15 Hrs**

- 1.1 Definition, Biological Significance, Digestion and absorption of carbohydrates, Chemical and Physical changes of glucose after absorption (Preliminary idea).
- 1.2 Intermediary metabolism of carbohydrates – glycogenesis, glycogenolysis, glycolysis, gluconeogenesis.
- 1.3 Regulation of blood sugar – Regulation by liver and regulation by kidney, glucose Tolerance Tests. Diabetics – types, pathological condition and treatment, glycosuria.

**Extra reading/Keywords:** *Carbohydrates as valuable tool for product development.*

**UNIT 2 – LIPIDS**

**15 Hrs**

- 2.1 Introduction, Biological significance of fats, classification, Blood lipids.
- 2.2 Oxidation of fatty acids – $\beta$ -oxidation cycle of saturated fatty acids.
- 2.3 Ketogenesis, Ketosis, Ketolysis, role of liver in fat metabolism.
- 2.4 Cholesterol – absorption, factors influencing absorption, Cholesterol content of serum, fatty liver. Hyper and Hypochlolesterolemia – pathological condition and treatment.

**Extra reading/Keywords:** *Characterization and analysis of lipids.*



### UNIT 3 – PROTEINS

15 hrs

- 3.1 Absorption, metabolic pool, general pathway of protein metabolism, nitrogen metabolism. Diseases due to abnormal composition of urine.
- 3.2 Anabolism of protein – protein turnover and Biosynthesis of protein.
- 3.3 Catabolism of proteins – Removal of amino group, Fate of amino group and fate of Carbon skeleton, diseases due to deficiency of protein.
- 3.4 Inborn errors of phenylalanine metabolism, effects of starvation on different metabolism.

**Extra reading/Keywords:** *Importance and deficiency of proteins.*

### UNIT 4 - ENZYMES AND THYROXINE

15 Hrs

- 4.1 Enzymes – properties, classification, mechanism of enzyme action, Factors influencing enzyme action, enzyme inhibitors, introduction to co-factors.
- 4.2 Digestive enzymes and their action – salivary digestion, gastric digestion, pancreatic and intestinal digestion.
- 4.3 Intestinal fermentation and putrefaction – Action of Bacteria on CH<sub>2</sub>O, Fat, Protein and Bilirubin.
- 4.4 Thyroxine – Circulating thyroid hormone, metabolic effects of thyroxine, Agents interfering with the synthesis of thyroid hormone, Diseases associated with abnormal metabolism of thyroxine – treatment.

**Extra reading/Keywords:** *Consequences of enzyme deficiency in human body.*

### UNIT 5 - BLOOD, BILE ACIDS AND PIGMENTS

15 Hrs

- 5.1 Blood – functions of blood and plasma proteins, blood groups and Rh factor, coagulation of blood mechanism.
- 5.2 Haemoglobin – structure, properties of Hb, metabolism.
- 5.3 Bile pigments – examples, properties, Types of Jaundice (preliminary idea).
- 5.4 Bile acids – examples, function and diseases associated.

**Extra reading/Keywords:** *Types and Derivatives of Haemoglobin.*

**Note:** Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

#### Course Outcomes:

1. Explain the digestion and absorption of carbohydrates, processes involved in their metabolism and regulation of blood sugar.
2. Recognize the different types of blood lipid, discuss the metabolism of fatty acids and analyze the factors influencing the absorption of cholesterol.
3. Describe the metabolic pathway of proteins and recognize the effect of starvation on metabolism.
4. Order the different classes of enzymes, list their properties and describe the action of enzymes and bacteria on digestion of various nutrients.
5. Analyze the metabolic effects of thyroxine.
6. Discuss the function and properties of blood, bile pigments and bile acids.

**TEXT BOOKS:**

1. Ambika Shanmugam. *Fundamentals of Biochemistry for medical students*. 4<sup>th</sup> edn., Navabharat offset works, 1983.
2. Satyanarayana U. and Chakrapani U. *Biochemistry*, 4<sup>th</sup> Revised edn., Elsevier, 2013.

**BOOKS FOR REFERENCE:**

1. Dulsy Fatima, Narayanan L.M. and Co-workers. *BioChemistry*, Saras Publication.1993.
2. Richard A. Harvey and Denise R. Ferrier, *Biochemistry* 4<sup>th</sup> edn., Lippincott Williams and Wilkins, 2008.
3. David L. Nelson, Albert L. Lehninger and Michael M. Cox , *Principles of Biochemistry*.New York: 5<sup>th</sup> edn., Worth *Publishers*, 2008.

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER V**  
**MAIN ELECTIVE – 2 : FOOD CHEMISTRY**

**Total Hours : 75**

**Hours: 5 Hrs./Wk.**

**Credits : 4**

**Code: U17CH5MET03**

**General objective:**

The student learns various concepts of all the nutrients, food preparation, preservation and adulteration.

**Course Objectives:**

**The Learner will be able to**

1. appraise the functions, sources, deficiency diseases, daily allowances of major nutrients.
2. enumerate the functions, sources, deficiency diseases, daily allowances of minor nutrients.
3. categorize and summarize the various techniques of food preparation and recommend steps to retain the nutritive value.
4. describe the concepts involved in food preservation techniques
5. identify the different types of food adulteration and suggest few tests for their detection and relates chemical structure of ingredients with taste.

**UNIT 1-NUTRIENTS –I**

**15 Hrs**

- 1.1 Protein – functions, sources, deficiency diseases, daily allowances.
- 1.2 Carbohydrates – functions, sources, deficiency diseases, daily allowances.
- 1.3 Fats and oils – functions, sources, deficiency diseases, daily allowances, disorders due to excess of fat.
- 1.4 Minerals – Ca, P, Fe, I, Na – functions, sources, deficiency diseases and disorders of taking excess. Importance of micronutrients.

**Extra reading/Keywords:** *Organic sources of nutrients.*

**UNIT 2 -NUTRIENTS –II**

**15 Hrs**

- 2.1 Vitamins – H<sub>2</sub>O soluble and fat soluble vitamins – sources, functions, deficiency and disorders of taking excess of vitamins.
- 2.2 H<sub>2</sub>O – functions, sources, deficiency diseases.
- 2.3 Fibre – functions, requirements and sources. Effects of deficiency of fibre.
- 2.4 Algae and fungi as foods, Toxicants naturally present in foods. Fermented foods and pickles.

**Extra reading/Keywords:** *Preparation of Spirulina and dosage*

**UNIT 3 - FOOD PREPARATION**

**15 Hrs**

- 3.1 Food preparation - Effect of cooking and heat processing on the nutritive value of foods. Food faddism and faulty food habits.
- 3.2 Cooking methods: Moist heat methods and dry heat methods – merits and demerits. Biofortification and Nutraceuticals – definition and examples.
- 3.3 Retention of nutritive value during preparation. Microwave cooking, solar cooking – description, advantages and disadvantages.

**Extra reading/Keywords:** *Obesity*

## UNIT 4 - FOOD PRESERVATION

15 Hrs

- 4.1 Food preservation: Importance of food preservation, causes of food spoilage. Principles of food preservation. Home scale methods of food preservation.
- 4.2 Methods of food preservation: Low temperature, high temperature, preservatives osmotic pressure, dehydration, irradiation – merits and demerits.
- 4.3 Practical rules for good sanitation, food selection, purchase and storage – Non perishable foods, semi-perishable and perishable foods.
- 4.4 Browning reactions in foods – enzymic browning and non-enzymic browning.

**Extra reading/Keywords:** *Organic insecticides*

## UNIT 5 - FOOD ADULTERATION AND TASTE SENSATION

15 Hrs

- 5.1 Food Adulteration – Types, international, Metallic, incidental adulteration and their ill effects.
- 5.2 Simple physical and chemical tests for detection of food adulterants, consumer protection.
- 5.3 Packaging hazards, Food borne diseases. Control of insects and rodents.
- 5.4 Physiological and chemical aspects of taste sensation – mechanism of sensation of taste, factors affecting taste response. Relation between chemical structure and taste.

**Extra reading/Keywords:** *Adulteration in Maida*

**Note:** Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

### Course Outcomes:

1. Identify the nutrients present in food.
2. Discuss the deficiency diseases due to lack of nutrients.
3. Explain the effect of deficiency of fibre.
4. List out the toxicants present in various food items.
5. Describe the different methods of cooking.
6. Explain the importance and methods of food preservation.
7. Detect the adulterants present in various food stuffs.

### TEXT BOOKS:

1. Dr. M. Swaminathan, Hand book of food and Nutrition' Reprint, published by The Bangalore printing and publishing co. ltd. 2008.
2. B. Srilakshmi, Food Sceince, Third Edition, New Age international publishers, 2003.

### BOOKS FOR REFERENCE:

1. Dr. M. Swaminathan, Food Science Chemistry and Experimental foods, second enlarged edition, published by Bangalore press. (1987)
2. Dr. M. Swaminathan, 'Advanced test Book on Food and Nutrition' Volume I and II second edition, The Bangalore printing and publishing co. ltd.
3. Sumathi.R. Mudambi, 'Fundamentals of food and Nutrition', Second edition, Wiley Eastern Limited, "1983.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER V/VI**  
**NON MAJOR ELECTIVE – 1: HOME CARE**

**TOTAL HOURS : 30**

**Hours: 2Hrs / WK**

**Credits: 2**

**Code: U15CH5NMT01/**

**U15CH6NMT01**

**General Objective:**

To enable the students to learn about balanced diet, food nutrition, marriage and family, fire prevention and protection, care of household metals and safe use of pesticides.

**Course Objectives :**

**The Learner will be able to**

1. understand and identifies the different types of food nutrition.
2. Categorize and summarize the types of Marriage and Family.
3. Describe the concepts involved in fire prevention techniques.
4. List out the Care of house hold metals .
5. Outline the general methods for the Safe applications and prevention of Pesticides.

**UNIT 1- DIETETICS AND FOOD NUTRITION**

**6 Hrs**

Balanced diet, Specific functions of nutrients, Effects of cooking on various nutrients.

**Extra reading/Keywords:** *Nutraceuticals*

**UNIT 2- MARRIAGE AND FAMILY**

**6 Hrs**

Family life cycle, Different types of marriage, Parenting styles, Single parenthood, Types of family.

**Extra reading/Keywords:** *Balancing Family and Social responsibility in life.*

**UNIT 3-FIRE PREVENTION**

**6 Hrs**

Major causes of fire in homes, Fire prevention and fire fighting in homes, Methods of extinguishing fire – starvation, cooling and smothering. Simple extinguishing agents. Chemical fire extinguisher – CO<sub>2</sub> extinguisher.

**Extra reading/Keywords:** *First Aid techniques and Rescue Victims.*

**UNIT 4- CARE OF HOUSE HOLD METALS**

**6 Hrs**

Metal polishes – functions, composition, mode of action. General rules for cleaning and polishing, cleaning and polishing of aluminium utensils, silverwares, copper and brassware, gold and teflon.

**Extra reading/Keywords :** *Applications of metals in day today life.*

**UNIT 5- SAFE USE OF PESTICIDES**

**6 Hrs**

Need of pesticides at home, Types of insect and their control at home - mosquitoes, flies, ants, cock roaches, termites and head lice. Precautions in application of pesticides.

**Extra reading/Keywords :** *Pest Management and Control.*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Categorize the Composition of a balanced diet.
2. Explain the different types of marriages.

3. Describe the methods of fire prevention and fire fighting in homes.
4. List out the rules involved in cleaning and polishing of various metal ware.
5. Enumerate the Precautions in application of pesticides.

**TEXT BOOKS:**

1. Swaminathan M., 'Essentials of food and *nutrition*' the Bangalore printing & publishing Co., Ltd. 1985.
2. Sumati Mudambi R. and Rajagopal M.V., *Fundamentals of food and nutrition*, third edition.
3. Thankamma Jacob 'A Text Book of Applied Chemistry' Macmillan India Ltd. 1987.
4. Matin Khan, 'Consumer Behaviour' New age international (p) Ltd., publishing 2008.
5. Raheena Begum, "A Text Book of applied Chemistry' Sterling publishers private Ltd, 1991.

**BOOKS FOR REFERENCE:**

1. Bharathi V.V. and M. Jacinth 'Family resource management' Discovery publishing house, 1994.
2. Shankar Rao C.N., 'Sociology' S.Chand & Company Ltd., 1997.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER V & VI**  
**NON MAJOR ELECTIVE – 1: COSMETOLOGY**

**Total Hours :30**

**Hours: 2 Hrs./Week**

**Credit : 2**

**Code: U15CH5NMT02/  
U15CH6NMT02**

**General Objective:**

To expose the students to the study of skin, hair, facial, cosmetics and hazards of cosmetics.

**Course Objectives :**

**The Learner will be able to**

1. categorizes and identifies the types, functions and threats to the skin.
2. understand and identify the types and problems of hair and suggests treatments.
3. list out the advantages and disadvantages of manual massage and mask treatment
4. outline the preparations of facecreams, toilet powders and suggest facial packsfor different types of skin.
5. enumerate the hazards due to cosmetics and appraise various techniques for the beautification of facial skin.

**UNIT 1 -SKIN**

**6 Hrs**

Study of Skin: Types, functions, diet and skin, threats to skin, effects of summer, winter, wind and rain on skin. Common skin disease – acne and warts.

**Extra reading/Keywords:** *Skin diseases :Leucoderma and Psoriasis*

**UNIT 2-HAIR**

**6 Hrs**

Types of hair, problems of hair – Hair falling, baldness, graying of hair, problems with lice, dandruff, hair care conditioning.

**Extra reading/Keywords:** *Ill effects of using chemical hair conditioner and hair colourants*

**UNIT 3 - FACIAL**

**6**

**Hrs**

Manual massage – advantages, disadvantages. Mask treatment – setting and non-setting masks and uses.

**Extra reading/Keywords:** *Ayurvedic Massage Techniques*

**UNIT 4 – COSMETICS**

**6 Hrs**

Face creams, toilet powders – ingredients, preparations. Preparation of facial packs for different types of skin, Dentifrices.

**Extra reading/Keywords:** *Herbal Facial Packs*

**UNIT 5- STEPS IN FACIAL**

**6 Hrs**

Hazards due to cosmetics, skin – cleansing, toning, moisturizing, exfoliation – types, preparation, applications and uses.

**Extra reading/Keywords:** *Advantages of Herbal Cleansers, Toners and Moisturizers*

**Note:** Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

**Course Outcomes:**

1. Discuss the different types of skins and their functions.
2. Identify the various hair problems.
3. Outline the advantages and disadvantages of mask treatment.
4. Prepare the natural facial packs on their own.
5. Summarizes the hazards due to usage of cosmetics.

**TEXT BOOKS:**

1. Thankamma Jacob ‘A Text Book of Applied Chemistry’ Macmillan India Ltd. 1987.

**BOOKS FOR REFERENCE:**

1. ParveshHanda, “ A complete book on Beauty, Body, Make-up and Hairstyles, Goodwill publishing House, New Delhi.
2. ParveshHanda, “ Herbal Beauty Care”, Orient paperbacks, New Delhi 2004



**HOLY CROSS COLLEGE ( AUTONOMOUS), TIRUCHIRAPPALLI-2**

**B.A. /B.Sc. / B.Com. / BBA/ B.C.A. DEGREE COURSE**

**LIFE ORIENTED EDUCATION**

**ETHICS – III: FAMILY AND CAREER DEVELOPMENT**

**HRS / Wk : 1**

**CREDIT : 1**

**CODE: U15VE6LVE03**

**MARKS : 100**

**OBJECTIVES:**

- To help the students acquire skills, knowledge and talents to lead a meaningful life.
- To make the students learn skills of nurturing family and children.
- To make the students aware of emotional intelligence and choose their career.

**UNIT – I: PERSONAL COMPETENCE**

Emotional Intelligence for Professional growth, Management Vs Leadership-Management and Leadership Skills - Conflict Management - Tips for Professional growth

**UNIT – II: MARRIAGE AND FAMILY**

Family Vision - Family Values, Family relationship, Family Management, Sex in Marriage, Emotional Balance and Imbalance, Compatibility between Husband and Wife

**UNIT – III: PARENTHOOD**

Bringing up Children - Development stages (Eric Ericson model), Spirituality: Spirituality in Family - Prayer, God's Will , Role of Mother

**UNIT – IV: PERSONALITY DEVELOPMENT**

Self Analysis; interpersonal relation, introspection – Character formation towards positive personality- Values, self and college motto, punctuality, good moral, poverty, honesty, politeness, humanity, gentleness, friendship, fellowship and patriotism

**UNIT – V: CAREER CHOICE**

Career Choice according to Personality, Preparation for Competitive Exams, Sources of Knowledge, Memory Techniques, Mind Mapping

**REFERENCES:**

1. Tony B and Barry Buzan(2003), The mind map book, BBC world wide limited, London.
2. Susan Nash(2005), Turning team performance inside out, Jai CO. publishing House, New Delhi.
3. Fr. Ignacimuthu (1999) “Values for Life”, Vaigarai Pathipagam.
4. Grose. D.N. (2000), “A text book on Value Education”, Dominant Publishers.

(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2**

**B.A./B.Sc./B.Com/BBA./B.C.A - DEGREE COURSES**

**LIFE ORIENTED EDUCATION**

**CATECHISM – III: LITURGY AND CHRISTIAN LIFE**

**HRS / Wk : 1**

**CODE:U15VE6LVC03**

**CREDIT : 1**

**MARKS : 100**

**OBJECTIVES:**

- To prepare the students to participate meaningfully in the liturgical celebration and experience GOD in their day today life.
- To enable the students to become living witnesses to Jesus Christ in their personal, family and social life.

**UNIT – I: LITURGY**

Personal prayer ( Know oneself) – Vocal prayer – Community prayer – Meditation – Contemplation – Knowing the prayers : Our Father – Hail Mary – Holy Rosary – Mysteries of the Rosary- Litany of Mary – Family prayer-Popular devotion

**UNIT – II: HOLY SACRIFICE OF THE MASS**

Significance – Meaning and need for spiritual growth – Mass prayers – Part of the mass – Liturgical year, its division and its significance. – The Creed – Act of contrition – Discernment of spirits – Counseling – Spiritual direction.

**UNIT – III: CHRISTIAN VOCATION AS DISCIPLE FOR THE KINGDOM OF GOD**

Who am I as a Christian? – Christian dignity and others – The values of the Kingdom opposing to the values of the World – Christian social conscience – Christian in the reformation of the world – A call to be salt and light in today's context.

**UNIT – IV: CHRISTIAN FAMILY**

Holy Family- Characteristic of good family – Bible centered, Prayer centered, Christian centered-Responsibilities of parents and children in the family –Laws of the Church towards marriage-Pro life (Abortion, Euthanasia) – Lay Vocation – Lay Participation – Lay associates.

**UNIT – V: CONSECRATED LIFE**

“Come and follow me” – special disciples - Religious vocation – “I have called you to be mine”- Role of Nuns and Priest - called to be prophets and agents for God's Kingdom – nucleus of the church – Eschatological signs of the God's Kingdom.

**REFERENCES:**

1. Compendium – Catechism of the Catholic Church Published by Vaigarai Publishing House for the Catholic Church of India.
2. You are the light of the World, A course on Christian living for II year Religion published by Department of Foundation Courses, St. Joseph's College (Autonomous), Tiruchirappalli– 620 002.
3. Documents of Vatican II – St. Paul's Publications, Bombay 1966.

(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TRICHIRAPALLI-2.**  
**B.A/B.Sc./B.COM/B.C.A – DEGREE COURSES**  
**LIFE ORIENTED EDUCATION**  
**BIBLE STUDIES – III: ESSENCE OF CHRISTIAN LIVING**

**HRS / Wk : 1**  
**CREDIT :1**

**CODE: U12VE6LVBO3**  
**MARKS : 100**

**OBJECTIVE:**

- Prepare the students to practice Christian principles in family, church and society as young women.

**UNIT – I: ESSENTIALS OF CHRISTIAN FAITH**

- Salvation – Deliverance from sin (Is 53), Assurance of salvation and New life (II Cor 5:17)
- Sacraments – Baptism (Luke 3: 6-14), Lord's Supper (I Cor 10: 16,17; 11: 23-29)
- Trinity – One in three and three in one. Illustrations from the Bible. (John 14: 16,17)
- Heaven and Eternal life (John 14: 13, 3: 13-21)

**UNIT – II: MARRIAGE AND FAMILY LIFE**

- Finding the God's Will - Issac (Gen 24)
- Man and woman as Partners – Abraham and Sarah (Gen 16-18,22), Aquila and Priscilla (Acts 18: 1-3,26)
- Evils to be avoided – Premarital Sex, Extramarital Sex, Homosexuality, Abortion (Heb 13: 4, Psalm 127 : 4)
- Ideal Wife – Sarah (I Peter 3: 1-6), Ruth, (Eph 5)

**UNIT – III: CHRISTIAN HOME**

- Parental Responsibilities and bringing up children – Abraham (Gen 22), Eli (I Sam 2: 24-36, 3: 11- 18), Mary Mother of Jesus (Luke 2: 51,52)
- Caring for the Aged (I Sam 2: 31,32)

**UNIT – IV: CHRISTIAN ETHICS**

- Holiness – Joseph (Gen 39:9) Levi 11: 45, Ecc 12
- Obedience to God - Abraham (Gen 12) ; St.Paul (Acts 9)
- Freedom and Accountability
- Justice and Love

- Choices in Life – Making Decisions(Studies, job, life Partner)
- Model to follow – Who is your model? (John 15: 1-17)
- Social Evils – Dowry, Caste discrimination, Accumulation of wealth

#### **UNIT – V: MISSIONARIES DOWN THE LANE**

- William Carrie(Calcutta)
- Pandithar Rama Bai (Karnataka)
- Amy Carcheal (Dohnavur)
- Dr. Ida Scudder (Vellore)
- Devasagayam (Nagercoil)
- St. John DeBritto (Oriyur)
- Graham Staines & Family (Odisha)
- St. Mother Teresa (Calcutta)

#### **REFERENCES:**

1. Alban Douglass (1982) One Hundred Bible Lessons. Gospel Literature Service, Mumbai.
2. Derek Prince (1993) Foundations for Righteous Living. Derek Prince Ministries-South Pacific, New Zealand.
3. Derek Prince and Ruth Prince (1986) God is a Match maker. Derek Ministries, India.
4. Ron Rhodes(2005) Hand book on Cults. Amazon.com
5. Stanley.R. (1997) With God Again. Blessing Youth Mission, India.
6. Taylor.H. (1993) Tend My Sheep. SPCK, London.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER VI**  
**MAJOR CORE PAPER – 11: ORGANIC CHEMISTRY - II**

**Total Hours : 75**  
**Hours: 5hrs./wk.**  
**Credits : 5**

**Code: U15CH6MCT12**

**General objective:**

The student learns the concepts of stereochemistry, mechanisms of rearrangement reactions, chemistry of heterocyclic compounds and structural elucidation of few natural products.

**Course Objectives:**

**The Learner will be able to**

1. elaborate the concepts of optical isomerism and illustrate, assign the notations for the same.
2. discuss and justify the conformational analysis of alkanes, cycloalkanes, geometrical isomers and their stability.
3. illustrate and apply the mechanism of various molecular rearrangements to the given substrates.
4. classify, formulate and defend the preparation, properties of Heterocyclic compounds.
5. outline the general methods of structural elucidation and apply to the prescribed natural products.

**UNIT 1- STEREOCHEMISTRY I**

**15 Hrs**

- 1.1 Isomerism-Types and examples. Tautomerism-Types and examples.
- 1.2 Optical isomerism - Asymmetric centre, chirality, achiral and prochiral molecules. Elements of symmetry.
- 1.3 Enantiomers and diastereomers – properties. Racemisation. Resolution. Asymmetric synthesis. Walden Inversion. Vant Hoff's rule of superposition. Freudenberg's rule of shift.
- 1.4 Notations of optical isomers – Cahn, Ingold, Prelog rules. R – S notations for optical isomers with one asymmetric carbon.
- 1.5 Optical activity in compounds containing no asymmetric carbon – Biphenyls, allenes and spiranes – Elementary treatment only. Optical isomers of lactic, tartaric and malic acid - Structures and preparations.

**Extra reading/Keywords:** *Conversion of Enantiomers into Diastereomers*

**UNIT 2- STEREOCHEMISTRY II**

**15 Hrs**

- 2.1 Geometrical Isomerism- Nomenclature of geometrical isomers ( E and Z, syn and anti system for aldoximes and ketoximes)
- 2.2 Cycloalkanes: Introduction – preparation and reactions, Baeyer's strain theory and theory of strainless rings, Coulson and Moffit's concept, orbital picture of angle strain.
- 2.3 Conformational analysis: Introduction of terms – conformers, configuration, dihedral angle, torsional strain. Conformational analyses of ethane and n - butane. Conformation of 1,3-butadiene.
- 2.4 Conformers of cyclohexane – axial and equatorial bonds, ring flipping showing axial and equatorial bonds and their inter-conversions. Conformations of mono substituted cyclohexanes – 1,3-diaxial interaction.

**Extra reading/Keywords:** *Conformation in cis-1,4-di-t-butylcyclohexane*

**UNIT 3- MOLECULAR REARRANGEMENTS**

**15 Hrs**

- 3.1 Molecular Rearrangements: Classification.
- 3.2 Mechanism of Pinacol – Pinacolone, Beckmann, Benzidine rearrangements.
- 3.3 Hofmann, Curtius, Schmidt, Cope rearrangement.
- 3.4 Claisen, Fries, Benzil – Benzilic acid rearrangements.

**Extra reading/Keywords:** *Rearrangements extended to unknown substrate*

#### **UNIT 4- HETEROCYCLIC COMPOUNDS**

**15 Hrs**

- 4.1 Aromatic characteristics of heterocyclic compounds. Importance of Heterocyclic compounds.
- 4.2 Five membered Hetero cyclics- Furan, pyrrole, thiophene- Preparation and properties .
- 4.3 Six membered hetero cyclics – pyridine- Preparation and Properties. Comparison of basicity of pyrrole and Aniline with pyridine.
- 4.4 Condensed Hetero cyclics - Indole, Quinoline, isoquinoline – properties only. Examples of condensed heterocyclics containing more than one hetero atom.

**Extra reading/Keywords:** *Nonaromatic Heterocyclics*

#### **UNIT 5- NATURAL PRODUCTS**

**15 Hrs**

- 5.1 Alkaloids: Introduction, General methods of structural elucidation. Structural elucidation of Coniine, Piperine and Nicotine.
- 5.2 Terpenes: Introduction, classification, Isoprene rule. Structural elucidation of Menthol and  $\alpha$  – terpineol.
- 5.3 Vitamins: Introduction, classification and structural elucidation of Ascorbic acid and Pyridoxine.

**Extra reading/Keywords:** *Terpenes are the volatile constituents of palanresins and essential oils*

**Note:** Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

#### **Course Outcomes:**

1. Identify the chirality and configuration in various organic compounds.
2. Predict the nomenclature of geometrical isomers.
3. Illustrate the conformational analysis of alkanes, cycloalkanes and their stability.
4. Discuss the mechanisms of various molecular rearrangements.
5. List out the preparation and properties of Heterocyclic compounds.
6. Elucidate the structure of terpenes and alkaloids.

#### **TEXT BOOKS:**

1. Parmar V.S. and Chawla H.M., “*Principles of reaction mechanism in Organic Chemistry*”, 2<sup>nd</sup> edition, Sultan Chand, 1978.
2. Soni P.L. and Chawla H.M., “*Text Book of Organic Chemistry*”, 27<sup>th</sup> edition, Sultan Chand, 1997.

#### **BOOKS FOR REFERENCE:**

1. Jain M.K. “*Organic Chemistry*”, 12<sup>th</sup> edition, Shoban Lai Nagin Chand and Co.
2. Jerry March, “*Advanced Organic Chemistry*” Reactions, Mechanisms and Structure”, 4<sup>th</sup> Edition, John Wiley and Sons(Asia)Pte. Ltd, New delhi, 1997.
3. Robert Thornton Morrison, Robert Neilson Boyd , Saibal Kanti Bhattacharjee, *Organic Chemistry*, 7<sup>th</sup> Edition, Pearson Education India, Chennai, 2011.
4. I.L. Finar, “*Organic Chemistry*” 5<sup>th</sup> Edition, Dorling Kindersly (India) Pvt. Ltd., 1975.
5. Subhash Chandra Rastogi, Satis Kumar Agarwala, Ashok Kumar Sharma, “*Chemistry of Natural Products*”, Vol I & Vol. II, I Edition 1974-75. Jai Prakash Nath & Co., Leading Educational Publishers.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER VI**  
**MAIN CORE – 12 : PHYSICAL CHEMISTRY – II [SPECTROSCOPY]**

**Total Hours : 75 Hrs**

**Hours: 5 Hrs./Wk.**

**Credits : 5**

**Code: U15CH6MCT13**

**General objective:**

To study the basic principles and applications involved in Rotational spectra, IR spectra, Raman spectra, Electronic spectra, Mass spectra, NMR spectra and ESR spectra.

**Course Objectives:**

**The Learner will be able to**

1. identify different molecular energies, interprets rotational spectrum of diatomics, apply the interpretation to calculate bond length, rotational constant, moment of inertia and analyze the rotational spectra of simple molecules.
2. distinguish between harmonic and anharmonic vibrations, interprets the spectrum of vibrating rotator and attribute to group frequencies, hydrogen bonding and finger print region.
3. recognize the existence of Raman lines, differentiate Raman from IR and elucidate structures of simple inorganic molecules based on the mutual exclusion principle.
4. explain electronic spectroscopy, fragmentation pattern in mass spectrometry and apply it to simple organic molecules.
5. understand the processes responsible for NMR chemical shifts, identify, interpret the signals in simple molecules, recalls the theory of ESR and explain the ESR spectrum for simple organic radicals.

**UNIT 1- ROTATIONAL SPECTROSCOPY**

**15Hrs**

- 1.1 Properties of electromagnetic radiation, electromagnetic spectrum, Molecular energies, interaction of electromagnetic radiation with matter.
- 1.2 Microwave spectroscopy – rotation of molecules, rotational spectra – diatomic molecules.
- 1.3 Rotational spectra of polyatomic molecules – linear molecules, symmetric top molecules. Applications to simple molecules.

**Extra reading/Key words:** *Microwave assisted synthesis*

**UNIT 2 - VIBRATIONAL SPECTROSCOPY**

**15Hrs**

- 2.1 Infra – red spectroscopy – energy of a diatomic molecule, the simple harmonic oscillator, the anharmonic oscillator – fundamental absorption, overtones and hot bands.
- 2.2 The diatomic vibrating rotator, the vibrations of polyatomic molecules – CO<sub>2</sub> and H<sub>2</sub>O, combination and difference bands.
- 2.3 Analysis by infrared techniques – finger print region, group frequencies, hydrogen bonding, structure of thio acetic acid.

**Extra reading/Key words:** *Interpret and elucidate structures from IR data*

**UNIT 3- RAMAN SPECTROSCOPY**

**15Hrs**

- 3.1 Raman spectroscopy – Occurrence of Raman lines, stokes and antistokes lines, classical theory of Raman effect, Quantum theory of Raman effect.

- 3.2 Pure rotational Raman spectrum of linear molecules, symmetric top molecules, Raman activity of vibrations of CO<sub>2</sub> and water, Rule of mutual exclusion.
- 3.3 Structure determination from Raman and infrared spectroscopy – CO<sub>2</sub>, N<sub>2</sub>O, H<sub>2</sub>O, SO<sub>2</sub>, NH<sub>3</sub>, NO<sub>3</sub><sup>-</sup>, ClO<sub>3</sub><sup>-</sup> and ClF<sub>3</sub>.

**Extra reading/Key words:** *Application of Group theory in IR and Raman*

#### UNIT 4 - ELECTRONIC AND MASS SPECTROSCOPY

15Hrs

- 4.1 Electronic spectroscopy of molecules – Electronic spectra of diatomic molecules, Born-Oppenheimer Approximation, Vibrational course structure, Intensity of vibrational electronic spectra - Franck–Condon principle.
- 4.2 Dissociation energy – determination from electronic spectrum, V<sub>max</sub> and Birge–Sponer method, Pre-dissociation.
- 4.3 Mass spectrometry – Basic Principles of Mass spectrometry – Molecular ion peak – Base peak – isotopic peak – Meta stable peak – nitrogen rule – Modes of fragmentation of simple organic compounds - n-butane, 2& 3 pentanone.

**Extra reading/Key words:** *Elucidate structure from UV and Mass spectrum, Photoelectron spectroscopy*

#### UNIT 5 - NMR AND ESR SPECTROSCOPY

15Hrs

- 5.1 Nuclear Magnetic Resonance spectroscopy – spin of nucleus – Theory of NMR spectroscopy.
- 5.2 Chemical shift – spin-spin splitting – NMR spectrum of ethanol – Applications to simple organic molecules like simple alkanes, alkenes, alkyl halides, aldehydes, ketones and benzene.
- 5.3 Electron Paramagnetic Resonance spectroscopy – Theory of EPR spectroscopy – presentation of the spectrum – Hyperfine splitting in some simple systems – proton, methyl free radical. General rules governing hyperfine splitting – applications to simple organic radicals like methyl, ethyl, benzene, naphthalene, anthracene and para semibenzoquinone.

**Extra reading/Key words:** *Interpretation of NMR spectrum, 2DNMR, ESR of complexes*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

#### Course Outcomes:

1. Explain the principles of Rotational spectroscopy calculate moment of inertia from rotational spectra of diatomic molecules.
2. Distinguish harmonic and anharmonic vibrations
3. Discuss the Classical and Quantum theories of Raman effect
4. Outline Salient features of fragmentation pattern of organic compounds
5. Demonstrate NMR chemical shifts and splitting patterns with illustrations
6. Determine the dissociation energy using Birge-Sponer method.

#### Text Books:

1. Colin Bannwell N and Elaine McCash M, *Fundamentals of molecular spectroscopy*, 4<sup>th</sup> edition, McGraw hill Publishing company limited, 1994.
2. Sharma Y. R. *Elementary Organic spectroscopy*, Chand S. and Co., 1989.

#### BOOKS FOR REFERENCE:

1. Russell S. Drago, *Physical methods for chemists*, Saunders, 1992.
2. Manas Chanda, *Atomic structure and Chemical Bond Including Molecular Spectroscopy*, Tata McGraw-Hill Publishing Company Ltd, 1972.
3. McHale, J.L “*Molecular spectroscopy*”, Prentice Hall Publishers, 1999.



4. Sindhu, P.S “*Fundamentals of Molecular spectroscopy*” 1<sup>st</sup> edition, New Age International publishers, 2006.
5. William Kemp “*Organic Spectroscopy*”, 3<sup>rd</sup> edition, ELBS publishers, 1991.
6. Russell S. Drago, *Physical methods in Inorganic Chemistry*, East West student edition, 1978.
7. Manas Chanda , *Atomic structure and Chemical Bond Including Molecular Spectroscopy*, Tata McGraw-Hill Publishing Company Ltd, 1972.
8. Levine, I.N “*Molecular spectroscopy*”, John Wiley and Sons, 2000.

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER V & VI**  
**MAJOR CORE – 10: PRACTICAL PAPER II/III**

**Hours: 8hrs./wk.**

**Credits: 5**

**Code: U15CH5MCP10/**

**U15CH6MCP11**

**Course Objective:**

Student acquires the skill in gravimetric analysis, preparation of organic compounds and analyses various organic compounds.

Gravimetric analysis:

1. Nickel as nickel dimethyl glyoxime.
2. Lead as lead chromate.
3. Barium as barium sulphate.
4. Calcium as calcium oxalate.
5. Calcium as calcium carbonate.

Organic Preparation:

1. Preparation involving oxidation, hydrolysis, nitration and halogenation (Internal valuation only).
2. Characterization of organic compounds by their functional groups and confirmation by preparation of derivative.

Substances for organic analysis:

Urea, Nitrobenzene, Glucose, Phthalic acid, m-dinitro benzene, aniline, benzoic acid, cinnamaldehyde, resorcinol, acetanilide, benzamide, succinic acid, sucrose, ethyl benzoate, acetophenone, benzaldehyde, phenol, cinnamic acid.

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER V & VI**  
**MAIN CORE – 13: MAIN PRACTICAL III/II**

Hours: 8hrs./wk.  
Credits : 5

Code: U15CH5MCP11/  
U15CH6MCP10

**Course Objective:**

To expose the students to develop practical skills in few physical chemistry experiments.

**Conductivity:**

1. Determination of cell constant.
2. Determination of equivalent conductance of a strong electrolyte.
3. Determination of dissociation constant of a weak electrolyte.

**Conductometric titrations:**

4. Strong acid versus strong base. (HCl Vs NaOH)
5. Weak acid versus strong base. (CH<sub>3</sub>COOH Vs NaOH)

**Potentiometric Titrations:**

6. To find the strength of HCl potentiometrically using quinhydrone electrode.
7. To determine the strength of Ferrous ammonium Sulphate potentiometrically.

**Colorimetry:**

8. To verify Beer's law for K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution using photoelectric colorimeter and determine the unknown concentration.
9. Estimation of Fe (III) as ferric thiocyanate complex.

**PH Meter:**

10. To determine the strength of the given CH<sub>3</sub>COOH by titrating with given NaOH.

**Polarimetry:**

11. To determine the concentration of the given sugar solution using a polarimeter.

**Chemical Kinetics:**

12. I order - Acid catalysed hydrolysis of ester.
13. II order - Saponification of ester.

**Nernst Distribution law:**

14. Determination of partition coefficient of iodine between CCl<sub>4</sub> and H<sub>2</sub>O.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER VI**  
**MAJOR ELECTIVE – 3- ENVIRONMENTAL POLLUTION**

**Hours: 5Hrs/Wk**

**Credits : 5**

**Code: U15CH6MET01**

**GENERAL OBJECTIVES:**

To learn the various forms of pollution and contaminants of the environment, solid waste management and environment acts.

**UNIT I**

**Air pollution:**

- 1.1 Atmosphere – structure of atmosphere, hydrosphere, hydrological cycle, Lithosphere, Biosphere.
- 1.2 Air pollution – composition of air – major sources of air pollution – classification and effects of air pollutants. Particulates – effect and control of particulates.
- 1.3 Effect of ozone on man and plants, effect of photochemical smog – chlorofluorocarbons –green house effect – major source and consequences of green house effect. Acid rain formation – adverse effects of acid rain, control of acid rain.
- 1.4 Prevention and control of air pollution – control by fuel selection and utilization, control by process modification, control by site selection and zoning, general method of air pollution control, control at source, control by devices, stacks, planting trees and growing vegetation.

**UNIT II:**

- 2.1 Definition – types of water pollution, sources of water pollution, sewage and domestic wastes, harmful effects of sewage and domestic waste, industrial effluents.
- 2.2 Agricultural discharges – fertilizers, effect of fertilizer and detergents. Pesticides – biodegradation of pesticides – farm waste – biofertilizers.
- 2.3 Industrial wastes – characteristics, types, principles, treatment and disposal of industrial waste with organic and inorganic impurities. Sewage – municipal waste water – composition, properties, method of treatment – removal of P, N from waste water, Aerobic and Anaerobic biological oxidation of plants.
- 2.4 Prevention, control of water pollution and recycling and reuse of waste water.

**UNIT III**

- 3.1 Chemistry of soil, soil irrigation by effluents, Agricultural pollution, role of micro nutrients in soil, Analysis of micronutrients in soil.
- 3.2 Pesticides and pollution – DDT problem, classification of pesticides, degradation of pesticides, disease caused by soil pollution, impact of soil pollution on air quality.
- 3.3 Control of sewage, domestic and industrial waste, ecoforming and ecotechnology, integrated nutrient management, genetic resource management, hand use systems, water management.
- 3.4 Ecotechnology – ecological farming system, organic farming, advantages of organic, farming, biotechnology – integrated plant nutrient management integrated pest management, soil solarisation, water shed management.

**UNIT IV**

**Solid wastes – pollution, treatment and disposal:**

- 4.1 Introduction, classification and origin, characteristics of solid wastes, objectives and consideration in solid waste management .

- 4.2 Biomedical wastes, chemical wastes – environmental effects, Love canal episode, toxic chemicals identification of hazardous wastes, management of hazardous wastes – treatment and disposal – physical, chemical and biological process, co disposal, security land fill.
- 4.3 Microbiology involved in solid waste disposal, methods of solid waste disposal – composting, sanitary land filling – economic, aesthetic and environmental problems.
- 4.4 Thermal process of solid waste disposal – incineration, pyrolysis, recycling and reuse of solid wastes, bioconversion.

## UNIT V

### **Environmental Management:**

- 5.1 Introduction, objectives, component, Environmental impact assessment (EIA), elements of the EIA process, participants of EIA process, contents of EIS, Design of EIA.
- 5.2 The wild life protection act, the forest conservation act, the water prevention and control act, Air prevention and control of pollution act.
- 5.3 Environment protection act – preliminary, general powers of the central Government, prevention, control and abatement of environmental protection.
- 5.4 Hazardous wastes management and Handling rules, the hazardous micro-organisms rules.

### Text Books:

- 1. Dara S.S.,(2002) A Text Book of Environmental Chemistry and Pollution Control, S. Chand and Company, 5<sup>th</sup> Revised edition.
- 2. Sharma B.K. (2005) Environmental Chemistry, Goel publishing house, Meerut 9<sup>th</sup> Edn.

### Reference Books:

- 1. Kudesia V.P. and Ritu (2003), Environmental Chemistry, Pragathi Prakashan, Meerut 2<sup>nd</sup> Edn.
- 2. Mukherjee S & Ghosh A(2002), Environmental studies, Books and Allied (P) Ltd, 3<sup>rd</sup> Edn.
- 3. Kaur H, (2005), Environmental studies, Pragati Prakashan, Ist Edn.

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**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER VI**  
**MAJOR ELECTIVE – 3 : DYE CHEMISTRY**

**Hours: 5 Hrs./Wk.**

**Credits : 5**

**Code: U15CH6MET02**

**General Objectives:**

To make the students understand and learn about the different types of dyes, properties, applications and hands on training on dyeing.

**UNIT I:**

Dyes and Dye Intermediates

- 1.1 Dye – definition – colour and constitution.
- 1.2 Classification of dyes (based on their use and on their structures) – Classes of Dyes for dyeing on different fabrics (Natural & Man Made).
- 1.3 Important dye stuff intermediates – their names.
- 1.4 General properties of dye stuff-linearity, co planarity, fastness, fluorescence and optical brighteners.

**UNIT II**

Fibre Science

- 2.1 Fibre classification, properties – Count, Denier, Tex, staple length, spinning properties, strength, elasticity and creep.
- 2.2 Natural fibres – cotton, wool and silk – General characteristics.
- 2.3 Synthetic fibres – poly amide (Nylon 6,6), polyester fibre, polyacrylonitrile and viscose (properties only)

**UNIT III:**

Dye Application I Pretreatments

- 3.1 Sizing and designing – purpose, designing methods (Hydrolytic & Enzymatic).
- 3.2 Scouring – purpose – Kier boiling – Alkali scouring – Acid scouring – Principles involved in these methods.
- 3.3 Bleaching – Methods (peroxide and bleaching powder bleaching)

**UNIT IV**

- 4.1 Dye bath preparation – M.L Ratio – Fixation of dye and additive concentration on the basis of weight of the material – Methods of expressing the concentrations in dye bath (gpl).
- 4.2 Dyeing assistants – Wetting agent (Turkey red oil) – (preparation and purpose), Anionic and non-ionic detergents, leveling agents, fastness improvers, dispersing agents, exhausting agents (examples and functions). Mordants Ingrain.
- 4.3 Dye bath recipe model – (Dyeing of cotton with reactive dyes, sulfur dyes, azoic dyes. Dyeing of polyester with disperse dyes with and without carriers. Dyeing silk with metal complex dyes.

**UNIT V**

Dye Application-II Dyeing process

- 5.1 Vat dyeing – classification of vat dyes, Vatting, Dyeing procedure.
- 5.2 Reactive dyeing – Hot and cold brand – Principles involved in the dyeing process.
- 5.3 Dyeing of polyester and blends – function of dispersing agents, fibre swelling, carrier dyeing, High temperature dyeing and selection of dye stuff.

## PRACTICALS

15 Hrs.

Dyeing using direct dyes and Batik printing.

## REFERENCES:

1. Shenai V.A. – ‘An introduction to dye stuff and intermediates’, Sevak publications, Wadelka Bombay-3.
2. Abrahard E.N. – ‘Out lines of chemistry of dye stuff and intermediates’, chemical publishing, New York.
3. Shenai V.A – ‘Technology of textiles processing’.
  - a. Textiles fibres – Vol-I.
  - b. Techniques of bleaching Vol-III.
  - c. Principles of dyeing Vol-IV
4. Charwal and Anand, ‘Synthetic Organic dyes’, Himalaya publishing House.
5. Sharma B.K., ‘Industrial Chemistry’, COEL Publishing house, Meert.
6. Venkataraman K., ‘The Chemistry of synthetic dyes’. Academic press Vol-I – VIII.
7. Gites C.H., ‘A laboratory course in Dyeing’, the society of Dyes and coloursits.

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**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER VI**  
**MAJOR ELECTIVE – 3 : HEALTH AND HYGIENE**

**TOTAL HOURS: 75**  
**HOURS: 5HRS/WK.**  
**CREDITS : 5**

**CODE: U15CH6MET03**

**UNIT I: ASPECTS OF HEALTH**

15 Hrs.

Definition of health, factors influencing health – human biology, ways of living, economic status, health services, cultural factors and health, physical factors and health – heat and cold, ecological factors and health – definition, factors influencing the ecology of man – Physical environment and biotic environment.

Health education – aims, areas of health education, education of the general public, uses of health statistics. Public health and sanitation, sewage disposal, advantages and disadvantages of incineration.

**UNIT II: ENVIRONMENT AND HEALTH**

15 Hrs.

Environment – definition, water pollution – sources, impurities in water – natural impurities and result of human activities, purification of H<sub>2</sub>O – slow sand or biological filter, rapid sand or mechanical filter and house hold purification of water.

Air pollution – factors affecting air composition, air pollutants, health effects of air pollution, pollution control, reasons for discomfort in occupied rooms.

Noise pollution – definition, sources, effects, noise control, community noise levels, refuse disposal – health hazard, methods of refuse disposal, excreta disposal – health hazards, septic tank, working of septic tank, field toilets.

**UNIT III: DISEASES**

15 Hrs.

Transmission of diseases, concept of diseases, disease cycle, spectrum of disease, levels of prevention.

Mosquito – types, habits, mosquito home diseases, control of mosquitoes, anti-larval measures, anti-adult measures.

House fly – general characters, transmission of diseases, fly borne diseases, fly control measures.

AIDS: AIDS in India, HIV targets in India, symptoms of HIV infection, Tests for antibodies, accuracy of blood tests, treatment possibilities, means of transmission and prevention.

**UNIT IV: MENTAL HEALTH**

15 Hrs.

Definition, characteristics of a mentally healthy person, foundations of mental health (brief account), needs of M.H. warning signs of poor M.H. Types of mental illness.

Emotion – mind, emotion – definition, types of emotion, role of emotions in health, causes of mental illness – hereditary and environment. Prevention of mental illness, emotional quotient.

Tensions – definition, types, effects discharging of tension, behaviour – physical response.



UNIT V:

15 Hrs.

Personal hygiene – good posture, causes of incorrect posture, habits, sunlight and fresh air, rest and sleep, fatigue, exercises, cleanliness of the body – bath, care of hair, teeth, eyes, ears, nails, feet, hands, skin, recreation, nutrition, elimination (brief account) menstrual hygiene, sex hygiene, human biological clock, Biorhythms, Circadian rhythms, Role of biological clock in health.

TEXT BOOK:

1. J.E. Park and K. Park, Text Book of Community health for nurses, Fourth edn. Asrani Publishers, Jabalpur, (1982)

REFERENCE BOOK:

1. Lily Pritam Telu Ram, Environmental health and Hygiene, Second revised edition, Pashupathi Printers, New Delhi, (1993)
2. Gracious Thomas AIDS in India-Myth and Reality, Rewat Publications, New Delhi.

(For Candidates admitted from June 2015 onwards)  
**HOLY CROSS COLLEGE (Autonomous), TIRUCHIRAPPALLI – 2**  
**PG AND RESEARCH DEPARTMENT OF CHEMISTRY**  
**SEMESTER VI**  
**MAJOR ELECTIVE – 3 : ANALYTICAL CHEMISTRY**

**TOTAL HOURS: 75**  
**HOURS: 5HRS/WK.**  
**CREDITS : 5**

**CODE: U15CH6MET04**

**General objective:**

To make the students to learn about the laboratory hygiene and safety, data analysis, dipole moment and magnetic properties, principle of precipitation, applications of thermogravimetric analysis, photochemical reactions and colorimetric estimation.

**Course Objectives:**

**The Learner will be able to**

1. identify various chemicals used in the laboratory and explain first aid techniques and treatment for specific poisons.
2. understand, apply and analyse the various tests in data analysis and different chromatographic techniques.
3. analyse the applications of dipole moment and magnetic properties for inorganic and organic molecules.
4. analyse the thermogram of various compounds using thermoanalytical methods.
5. apply and evaluate the principle of photometric techniques in the estimation of metal ions.

**UNIT 1 - LABORATORY, HYGIENE AND SAFETY**

**15Hrs**

- 1.1 Storage and Handling of chemicals – carcinogenic chemicals – Handling of Ethers – Toxic and Poisonous chemicals – safe limits of vapour concentrations.
- 1.2 Waste disposal – Fume disposal - precautions for avoiding accidents, Material safety data sheet (MSDS).
- 1.3 First Aid techniques , precautions to avoid poisoning,t reatment for specific poisons, laboratory safety measures.

**Extra reading/Key words:** *Hazardous waste management.*

**UNIT 2 - DATA ANALYSIS**

**15Hrs**

- 2.1 The mean, The median, significant numbers, confidence limits, data ethics, precision and accuracy, standard deviation.
- 2.2 Errors – Types of errors, correction of determinate errors.Methods for improving accuracy – Rejection of data – Q test. Presentation of tabulated data – Scatter diagram – Method of least squares, S.I. units.

**Separation Techniques:**

- 2.3 Precipitation,solvent extraction , chromatography – Types, Column chromatography,Thin layer chromatography.
- 2.4 Paper chromatography – Paper electrophoresis , Ion exchange chromatography, Gas liquid chromatography. HPLC, GC-MS, LC-MS- preliminary idea.

**Extra reading/Key words:** *GC-MS Techniques.*

### **UNIT 3 - DIPOLE MOMENT AND MAGNETIC PROPERTIES**

**15Hrs**

- 3.1 Dipole moment and magnetic properties – Dipole moment – polar and non polar molecules – polarization of molecules – atomic, induced and orientation polarizations – Mosotti-Clausius equation and Debye equation.
- 3.2 Measurement of dipole moment and its applications to structural studies of simple inorganic and organic molecules including substituted benzenes - estimation of percent ionic character.
- 3.3 Magnetic properties of matter – diamagnetism – paramagnetism – ferro magnetism – antiferromagnetism – magnetic flux – magnetic permeability. Magnetic susceptibility – its determination using Guoy balance, Application to structural problems.

**Extra reading/Key words:** *Dipole moment and magnetic properties in spectroscopy.*

### **UNIT 4 - GRAVIMETRIC ANALYSIS AND THERMO ANALYTICAL METHOD**

**15Hrs**

- 4.1 Principles of Gravimetric analysis- Methods of gravimetric analysis – requirements of gravimetric analysis. Precipitation – Theory of precipitation.
- 4.2 Types of precipitates – co-precipitation, post precipitation and precipitation from Homogeneous solution – Digestion, filtration and washing, drying and ignition. Inorganic and organic precipitating agents and sequestering agents. Types, care and use of crucibles.
- 4.3 Thermogravimetric analysis – Principles, thermal analysis of silver nitrate, methods of obtaining thermograms – Derivative thermogravimetry. Factors influencing the thermogram – TGA. Instrumentation – precautions in the use of thermobalance – Application of TGA.
- 4.4 Differential thermal analysis - DTA of calcium oxalate monohydrate – thermal analysis of calcium acetate monohydrate.

**Extra reading/Key words:** *Electrogravimetry.*

### **UNIT 5 - VISIBLE SPECTROPHOTOMETRY AND COLORIMETRY**

**15Hrs**

- 5.1 Beer-Lamberts law, Molar absorptivity and absorbance, Types of photochemical reactions – Fluorescence, Phosphorescence, Chemiluminescence, photosensitisation.
- 5.2 Instrumentation – Radiation sources, filters and monochromators, photo tubes, photomultiplier tubes, power supply.
- 5.3 Visual comparators – multiple standard methods, duplication and dilution method, balance method, photoelectric colorimeter, spectrophotometer.
- 5.4 Criteria for satisfactory colorimetric estimation, advantages of colorimetric estimation, determination of composition of complexes, colorimetric estimation of iron, chromium and nickel.

**Extra reading/Key words:** *AAS and flame photometry.*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

#### **Course Outcomes:**

1. Categorize the various chemicals and recognizes the precautions to handle poisonous chemicals and to avoid the accidents.
2. Summarize the principles and applications of various chromatographic techniques.

3. Explain the different types of polarization and differentiate the magnetism.
4. Evaluate the determination , application of dipole moment and magnetic susceptibility of molecules.
5. Categorize the various types of precipitation and analyze the theories of precipitation.
6. Summarize the principle, instrumentation and application of thermogravimetric analysis.
7. Sketch the schematic instrumentation of various photometric methods.

#### **TEXT BOOKS:**

1. Gopalan R, Subramanian PS and Rengarajan K '*Elements of Analytical Chemistry*' Second revised edition, Sultan chand. 1993
2. Puri B.R. and Sharma L.R. *Principles of Inorganic Chemistry* :New Delhi.Sultan Chand. 1989

#### **BOOKS FOR REFERENCE:**

1. Puri B.R., Sharma, L.R and Madan S. Pathania , *Principles of Physical Chemistry* New Delhi: 35<sup>th</sup>edn, Shoban Lal Nagin Chand and Co. 2008
2. Willard H H, Merritt L. L., and Dean J. A., *Instrumental Methods of analysis*, Delhi, 6th edn, CBS Publishers & Distributors, Shahdara 1986.
3. Skoog D and West D, *Principles of Instrumental Analysis*; 6<sup>th</sup> edn, Cengage Learning 2006.
4. Gurdeep R. Chatwal, Sham K. Anand *Instrumental methods of chemical analysis*, Himalaya publishing house. 2005
5. Gary D. Christian, *Analytical Chemistry*, John Wiley & Sons, 6th edition, 2007.
6. Bobbitt J. M, Roy Gritter, *Introduction to chromatography*, Holden Day; 2nd edition.1985
7. Soni P.L., Chawla H.M., *Text Book of Organic Chemistry*, 6<sup>th</sup> Reprint, New Delhi: Sultan Chand & sons, 2006.

**(For Candidates admitted from June 2015 onwards)**  
**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-2**  
**B.SC. CHEMISTRY - SEMESTER VI**  
**SBE 5: LABORATORY TECHNIQUES**

**Hours: 2 hrs./wk.**

**Code: U15CH6SBT05**

**Credits: 2**

**Course objectives:**

**To understand the principles involved in various chromatographic techniques and various separation techniques. To gain knowledge about green techniques, adsorption and adsorption isotherms. To acquire knowledge about adulteration and food additive and methods to detect the adulterants and food additives. To develop skills in various experimental techniques.**

**UNIT I:**

**Chromatography - I**

- 1.1 Types of chromatography, column chromatography, thin layer chromatography.
- 1.2 HPLC

**UNIT II:**

**Chromatography - II**

- 2.1 Paper chromatography, paper electrophoresis.
- 2.2 Ion exchange chromatography.

**UNIT III:**

**Green Techniques:**

- 3.1 Twelve principles of Green Chemistry – Green catalyst.
- 3.2 Microwave induced reaction, ultrasound assisted green synthesis.

**UNIT IV**

**Adsorption:**

- 4.1 Adsorption types and adsorption isotherms- Freundlich and Langmuir isotherms
- 4.2 Applications of Adsorption

**UNIT V**

**Food Preparation**

- 5.1 Food preservation: Principles and methods of food preservation. Causes of food spoilage.
- 5.2 Various methods to detect the adulterants and food additives.

**BOOKS FOR STUDY:**

1. Srivastava A.K., Jain P.C., (2008), Instrumental approach to chemical Analysis, 4<sup>th</sup> Revised Edition, S. Chand, New Delhi.
2. Puri B.R., Sharma L.R., Madan .S. Pathania, (2014), 'Principles of Physical Chemistry', Vishal Publishing Co., Jalandhar.
3. Gopalan, R., Subramanian, P.S. and Rengarajan K., (2003) "Elements of Analytical Chemistry" 3<sup>rd</sup> edition, Sultan Chand and sons.
4. Ahluwalia, V.K. (2013) " A Text Book of Green Chemistry", Narosa Publishing House, New Delhi.

(For candidates admitted from 2015 onwards)  
**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**

**SEMESTER VI**  
**SBE- 6 RESEARCH METHODOLOGY**

**Credits -2**

**Hrs – 2/Week**

**Code: U15DS6SBT06**

**General Objective:**

Students get introduced to concept of research and to carryout research projects.

**Unit I Introduction to research:**

Definition - Types – Nature and Scope of Research – Research Design – Plagiarism

**Unit II – Data Collection**

Types – Primary and Secondary data collection – Data processing –Hypothesis Testing

**Unit III – Plan and Execution**

Methodology – Work Plan and Execution – Analysis –Interpretation - Documentation

**Unit IV - Format and Presentation of Project Report** Art

of writing and Structure of Project report – Viva Voce **Unit**

**– V Project –**

Project Work ( Applying Real Expertise in the Project Work)

**The students will be evaluated internally by a test for 50marks. The Project will be evaluated by an external evaluator and a viva-voce will be conducted for 50marks.The students can carry out their projects individually or in groups.**

**REFERENCES:**

Blaxter,L., Hughes,C. and Tight(1999) How to research? Viva Book private Limited

Kothari,C.R.(2004)research Methodology-Methods and Techniques, New Age International Publishers, India

Lal,B.(2002) Research Methodology, ABD Publishers. India

**HOLY CROSS COLLEGE ( AUTONOMOUS), TIRUCHIRAPPALLI-2**

**B.A. /B.Sc. / B.Com. / BBA/ B.C.A. DEGREE COURSE**

**LIFE ORIENTED EDUCATION**

**ETHICS – III: FAMILY AND CAREER DEVELOPMENT**

**HRS / Wk : 1**

**CREDIT : 1**

**CODE: U15VE6LVE03**

**MARKS : 100**

**OBJECTIVES:**

- To help the students acquire skills, knowledge and talents to lead a meaningful life.
- To make the students learn skills of nurturing family and children.
- To make the students aware of emotional intelligence and choose their career.

**UNIT – I: PERSONAL COMPETENCE**

Emotional Intelligence for Professional growth, Management Vs Leadership-Management and Leadership Skills - Conflict Management - Tips for Professional growth

**UNIT – II: MARRIAGE AND FAMILY**

Family Vision - Family Values, Family relationship, Family Management, Sex in Marriage, Emotional Balance and Imbalance, Compatibility between Husband and Wife

**UNIT – III: PARENTHOOD**

Bringing up Children - Development stages (Eric Ericson model), Spirituality: Spirituality in Family - Prayer, God's Will , Role of Mother

**UNIT – IV: PERSONALITY DEVELOPMENT**

Self Analysis; interpersonal relation, introspection – Character formation towards positive personality- Values, self and college motto, punctuality, good moral, poverty, honesty, politeness, humanity, gentleness, friendship, fellowship and patriotism

**UNIT – V: CAREER CHOICE**

Career Choice according to Personality, Preparation for Competitive Exams, Sources of Knowledge, Memory Techniques, Mind Mapping

**REFERENCES:**

1. Tony B and Barry Buzan(2003), The mind map book, BBC world wide limited, London.
2. Susan Nash(2005), Turning team performance inside out, Jai CO. publishing House, New Delhi.
3. Fr. Ignacimuthu (1999) “Values for Life”, Vaigarai Pathipagam.
4. Grose. D.N. (2000), “A text book on Value Education”, Dominant Publishers.

(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2**

**B.A./B.Sc./B.Com/BBA./B.C.A - DEGREE COURSES**

**LIFE ORIENTED EDUCATION**

**CATECHISM – III: LITURGY AND CHRISTIAN LIFE**

**HRS / Wk : 1**

**CODE:U15VE6LVC03**

**CREDIT : 1**

**MARKS : 100**

**OBJECTIVES:**

- To prepare the students to participate meaningfully in the liturgical celebration and experience GOD in their day today life.
- To enable the students to become living witnesses to Jesus Christ in their personal, family and social life.

**UNIT – I: LITURGY**

Personal prayer ( Know oneself) – Vocal prayer – Community prayer – Meditation – Contemplation – Knowing the prayers : Our Father – Hail Mary – Holy Rosary – Mysteries of the Rosary- Litany of Mary – Family prayer-Popular devotion

**UNIT – II: HOLY SACRIFICE OF THE MASS**

Significance – Meaning and need for spiritual growth – Mass prayers – Part of the mass – Liturgical year, its division and its significance. – The Creed – Act of contrition – Discernment of spirits – Counseling – Spiritual direction.

**UNIT – III: CHRISTIAN VOCATION AS DISCIPLE FOR THE KINGDOM OF GOD**

Who am I as a Christian? – Christian dignity and others – The values of the Kingdom opposing to the values of the World – Christian social conscience – Christian in the reformation of the world – A call to be salt and light in today's context.

**UNIT – IV: CHRISTIAN FAMILY**

Holy Family- Characteristic of good family – Bible centered, Prayer centered, Christian centered-Responsibilities of parents and children in the family –Laws of the Church towards marriage-Pro life (Abortion, Euthanasia) – Lay Vocation – Lay Participation – Lay associates.

**UNIT – V: CONSECRATED LIFE**

“Come and follow me” – special disciples - Religious vocation – “I have called you to be mine”- Role of Nuns and Priest - called to be prophets and agents for God's Kingdom – nucleus of the church – Eschatological signs of the God's Kingdom.

**REFERENCES:**

4. Compendium – Catechism of the Catholic Church Published by Vaigarai Publishing House for the Catholic Church of India.
5. You are the light of the World, A course on Christian living for II year Religion published by Department of Foundation Courses, St. Joseph's College (Autonomous), Tiruchirappalli– 620 002.
6. Documents of Vatican II – St. Paul's Publications, Bombay 1966.



(For Candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TRICHIRAPALLI-2.  
B.A/B.Sc./B.COM/B.C.A – DEGREE COURSES  
LIFE ORIENTED EDUCATION  
BIBLE STUDIES – III: ESSENCE OF CHRISTIAN LIVING**

**HRS / Wk : 1  
CREDIT :1**

**CODE: U12VE6LVBO3  
MARKS : 100**

**OBJECTIVE:**

- Prepare the students to practice Christian principles in family, church and society as young women.

**UNIT – I: ESSENTIALS OF CHRISTIAN FAITH**

- Salvation – Deliverance from sin (Is 53), Assurance of salvation and New life (II Cor 5:17)
- Sacraments – Baptism (Luke 3: 6-14), Lord's Supper (I Cor 10: 16,17; 11: 23-29)
- Trinity – One in three and three in one. Illustrations from the Bible. (John 14: 16,17)
- Heaven and Eternal life (John 14: 13, 3: 13-21)

**UNIT – II: MARRIAGE AND FAMILY LIFE**

- Finding the God's Will - Issac (Gen 24)
- Man and woman as Partners – Abraham and Sarah (Gen 16-18,22), Aquila and Priscilla (Acts 18: 1-3,26)
- Evils to be avoided – Premarital Sex, Extramarital Sex, Homosexuality, Abortion (Heb 13: 4, Psalm 127 : 4)
- Ideal Wife – Sarah (I Peter 3: 1-6), Ruth, (Eph 5)

**UNIT – III: CHRISTIAN HOME**

- Parental Responsibilities and bringing up children – Abraham (Gen 22), Eli (I Sam 2: 24-36, 3: 11- 18), Mary Mother of Jesus (Luke 2: 51,52)
- Caring for the Aged (I Sam 2: 31,32)

**UNIT – IV: CHRISTIAN ETHICS**

- Holiness – Joseph (Gen 39:9) Levi 11: 45, Ecc 12
- Obedience to God - Abraham (Gen 12) ; St.Paul (Acts 9)
- Freedom and Accountability
- Justice and Love

- Choices in Life – Making Decisions(Studies, job, life Partner)
- Model to follow – Who is your model? (John 15: 1-17)
- Social Evils – Dowry, Caste discrimination, Accumulation of wealth

#### **UNIT – V: MISSIONARIES DOWN THE LANE**

- William Carrie(Calcutta)
- Pandithar Rama Bai (Karnataka)
- Amy Carcheal (Dohnavur)
- Dr. Ida Scudder (Vellore)
- Devasagayam (Nagercoil)
- St. John DeBritto (Oriyur)
- Graham Staines & Family (Odisha)
- St. Mother Teresa (Calcutta)

#### **REFERENCES:**

7. Alban Douglass (1982) One Hundred Bible Lessons. Gospel Literature Service, Mumbai.
8. Derek Prince (1993) Foundations for Righteous Living. Derek Prince Ministries-South Pacific, New Zealand.
9. Derek Prince and Ruth Prince (1986) God is a Match maker. Derek Ministries, India.
10. Ron Rhodes(2005) Hand book on Cults. Amazon.com
11. Stanley.R. (1997) With God Again. Blessing Youth Mission, India.
12. Taylor.H. (1993) Tend My Sheep. SPCK, London.