HOLY CROSS COLLEGE (AUTONOMOUS)
Affiliated to Bharathidasan University
Nationally Accredited(3rd Cycle) with 'A' Grade by NAAC
College with Potential for Excellence.
Tiruchirapalli - 620002.

PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS
Programme: B.Sc. Biotechnology

PO No.	Programme Outcomes *Upon completion of the B.Sc. Degree Programme, the graduate will be able to*
PO-1	Obtain hands-on experience in state of art laboratory techniques.
PO-2	Acquire basic and specific skills to full fill the manpower need of biotechnological industries.
PO-3	Gain knowledge in the scientific development and problems involved with the national and international community.
PO-4	Acquire self-confidence and determination to become entrepreneur and startup.
PO-5	List opportunities in reputed companies, research institutions for higher education towards teaching and research.

PSO No.	Programme Specific Outcomes *Upon completion of the courses the student would be able to*
PSO-1	Gain knowledge on basic tools and techniques learnt for designing and performing new experiments.
PSO-2	Decide and apply suitable tools and techniques in biotechnological manipulation (data analysis, soft skill, biotechnological manipulation, team work, laboratory documentation).
PSO-3	Understand and acquire knowledge on ethical legal issues, innovations in environment, health sector and agriculture; and there by implementation for finding sustainable solution to issues pertaining to environment upliftment.
PSO-4	Learn and identify the existing needs and narrow down their specific field of interest.
PSO-5	Able to equip her reading, presenting, oral, verbal and written scientific communication skills in focusing higher education.

(For The Candidates Admitted From 2018 Onwards)
HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI – 2
COURSE CONTENT AND SCHEME OF EXAMINATIONS
DEPARTMENT OF BIOTECHNOLOGY- CHOICE BASED CREDIT SYSTEM
UG COURSE PATTERN B.Sc. BIOTECHNOLOGY

Semester	Part	Course	Title of the Paper	Code	Hrs/ Week	Credit	Marks
I	I	Language	Tamil paper I/ Hindi paper I / French paper 1	U15TL1TAM01/ U18HN1HIN01/ U16FR1FRE01	6	3	100
I	II	English	English Paper 1	U15EL1GEN01	6	3	100
I	III	Major Core 1	Cell Biology	U18BT1MCT01	4	3	100
I	III	Major Core 2	Practical I-Cell Biology	U18BT1MCP02	3	2	100
I	III	Allied-1(Optinal)	Chemistry for Biology/Plant science and Phytochemical Techniques	U18BT1AOT01/ U18BT1AOT02	4	4	100
I	III	Allied-2 (Optional)	Allied Practical I-Chemistry for Biology/ Plant science and phytochemical techniques	U18BT1 AOP03/ U18BT1 AOP04/	4	3	100
I	IV	Environmental studies	Environmental studies	U18RE1EST01	1	1	100
I	IV	Value Education	Bible/Catechism/Ethics	U15VE2LVE01/ U15VE2LVB01/ U15VE2LVC01	1	-	-
I	VI	Extension Activities			1	1	
				Total	**30**	**20**	**700**
Semester	**Part**	**Course**	**Title of the Paper**	**Code**	**Hrs/ Week**	**Credit**	**Marks**
II	I	Language	Tamil paper II/ Hindi paper II / French paper II	U15TL2TAM02/ U18HN2HIN02/ U16FR2FRE02	5	3	100
II	II	English	English Paper II	U15EL2GEN02	6	3	100
II	III	Major Core 3	Biochemistry	U18BT2MCT03	3	3	100
II	III	Major Core 4	Biological Techniques	U18BT2MCT04	3	3	100
II	III	Major Core 5	Practical-II (Biochemistry & Biological Techniques)	U18BT2MCP05	4	3	100
II	III	Allied-3 (Optinal)	Bioinformatics/Biostatistics & SPSS(Theory cum Lab)	U18BT2AOT05/ U18BT2AOT06	4	3	100
II	IV	Skill Based Elective-1	Soft Skill Development	U15RE2SBT01	2	2	100
II	IV	Skill Based Elective-2	Sustainable rural Development and Students Social Responsibility	U18RE2SBT02	2	2	100
II	IV	**Value Education**	**Bible Studies /Catechism / Ethics**	U15VE2LVB01/ U15VE2LVC01/	1	1	100

				U15VE2LVE01			
		Internship/Field Work/Field Project 30 hours- Extra Credit		**U18SP2ECC01**	-	02	100
				Total	**30**	**23**	**1000**

Semester	**Part**	**Course**	**Title of the Paper**	**Code**	**Hrs/ Week**	**Credit**	**Marks**
III	I	Language	Tamil paper III/ Hindi paper III/ French paper III	U15TL3TAM03/ U18HN3HIN03/ U16FR3FRE03	6	3	100
III	II	English	English Paper III	U15EL3GEN03	6	3	100
III	III	Major Core 6	Genetics	U18BT3MCT06	3	3	100
III	III	Major Core 7	Developmental Biology	U18BT3MCT07	4	4	100
III	III	Major Core 8	Practical-III (Genetics & Developmental Biology)	U18BT3MCP08	3	3	100
III	III	Allied-4 (Compulsory)	Biology of Invertebrates and Chordates	U18BT3ACT07	4	3	100
III	IV	Skill Based Elective-3	Computer Skills for Life science / Computer applications for Life Sciences (Theory cum Lab)	U18BT3SBP03/ U18BT3SBT03	2	2	100
III	IV	Gender Studies	Gender Studies	U15WS3GST01	1	1	100
III	IV	Value Education	Bible Studies II/Catechism II/ Ethics II	U15VE4LVB02/ U15VE4LVC02/ U15VE4LVE02/	1		
				Total	**30**	**22**	**800**

Semester	**Part**	**Course**	**Title of the Paper**	**Code**	**Hrs/ Week**	**Credit**	**Marks**
IV	I	Language	Tamil paper IV/ Hindi paper IV/ French paper IV	U15TL4TAM04/ U18HN4HIN04/ U16FR4FRE04	5	3	100
IV	II	English	English Paper IV	U15EL4GEN04	6	3	100
IV	III	Major Core-9	Animal Physiology	U18BT4MCT09	4	4	100
IV	III	Major Core-10	Practical IV-Animal Physiology, Enzymology	U18BT4MCP10	3	3	100
IV	III	Major Elective- 1	Enzymology/Microbial Technology	U18BT4MET01/ U18BT4MET02	3	3	100
IV	III	Allied-5 (Compulsory)	Biophysics	U18BT4ACT08	4	4	100
IV	III	Allied-6 (Compulsory)	Allied Practical II-Biophysics	U18BT4ACT09	4	3	100
IV	IV	Value Education	Bible II/Catechism II/ Ethics II	U15VE4LVB02/ U15VE4LVC02/	1	1	100

				U15VE4LVE02			
IV	VI	Extension Activity outside the class hours from Semester I –IV		Any one activity based on the Student's choice (15Activities)	-	1	100
IV		**Internship/Field Work/Field Project 30 hours- Extra Credit**		U18SP4ECC01	-	2	100
				Total	**30**	**25**	**1000**

Semester	**Part**	**Course**	**Title of the Paper**	**Code**	**Hrs/ Week**	**Credit**	**Marks**
V	III	Major Core-11	Molecular Biology	U18BT5MCT11	4	3	100
V	III	Major Core-12	R- DNA Technology	U18BT5MCT12	4	3	100
V	III	Major Core-13	Genomics & Proteomics	U18BT5MCT13	4	3	100
V	III	Major Core-14	Immunology	U18BT5MCT14	4	3	100
V	III	Major Core 15	Practical-V Molecular Biology, & Recombinant DNA Technology	U18BT5MCP15	3	3	100
V	III	Major Core 16	Practical-VI Genomics & Proteomics & Immunology	U18BT5MCP16	3	3	100
V	III	Major Elective-2	Drug Biology (Theory Cum Practical)/ Nanotechnology(Theory Cum Practical)	U18BT5MET03/ U18BT5MET04	3	3	100
V	III	Non-Major Elective - 1	Nutrition: A lifespan approach	U18BT5NMT01	2	2	100
V	IV	Skill Based Elective-4	Bioinformatics(Lab Cum Theory) /Computational Biology(Lab Cum Theory)	U18BT5SBP04/ U18BT5SBT04	2	2	100
V	IV	Value Education	Bible III/Catechism III/Ethics III	U15VE6LVB03/ U15VE6LVC03/ U15VE6LVE03	1	-	100
				Total	**30**	**25**	**1000**

Semester	**Part**	**Course**	**Title of the Paper**	**Code**	**Hrs/ Week**	**Credit**	**Marks**
VI	III	Major Core-17	Animal Biotechnology	U18BT6MCT17	4	3	100
VI	III	Major Core-18	Plant Biotechnology	U18BT6MCT18	4	4	100
VI	III	Major Core-19	Bioprocess Technology	U18BT6MCT19	4	4	100
VI	III	Major Core-20	Practical-VII Animal Biotechnology & Plant	U18BT6MCP20	4	3	100

			Biotechnology				
VI	III	Major Core-21	Practical-VIII Cheminformatics & Bioprocess Technology	U18BT6MCP21	4	3	100
VI	III	Major Elective-3	Cheminformatics / Medical Informatics	U18BT6MET05/ U18BT6MET06	3	3	100
VI	IV	Non Major Elective-2	Women and health	U18BT6NMT02	2	2	100
VI	IV	Skill Based Elective-5	Food Toxicology (Theory cum Lab)/ Dairy Microbiology (Theory cum Lab)	U18BT6SBP05/ U18BT6SBT05	2	2	100
VI	IV	Skill Based Elective-6	Research Methodology (Theory Cum Project)	U15DS6SBT06	2	2	100
VI	IV	Value Education	Bible III/Catechism III/Ethics III	U15VE6LVB03/ U15VE6LVC03/ U15VE6LVE03	1		100
VI		**Internship/Field Work/Field Project 30 hours -Extra Credit**		**U18SP6ECC01**	-	2	100
				Total	**30**	**26**	**1100**
				Grand Total	**180**	**141**	**5600**

HOLY CROSS COLLEGE (Autonomous), Tiruchirappalli - 620 002.
TAMIL DEPARTMENT
For Candidate admitted from 2015 onwards
First Year - Semester – I

Course Title	முதலாமாண்டு – முதற்பருவம
Total Hours	90
Hours/Week	6 Hrs Wk
Code	U15TL1TAM01
Course Type	Theory
Credits	3
Marks	100

General Objectives:

தமிழ் இலக்கியப் பரப்பையும், பாரம்பரியத்தையும் அறிமுகப்படுத்துதல்.

- To find out the ways to handle the Tamil language effectively and productively.
- To introduce the tradition and the grammar of Tamil language.
- To encourage the creatively development.
- Creating curiosity to make life according to high moral.
- Helping to create healthy thoughts among themselves.

Course Objectives:

CO No.	Course Objectives
C0-1	தமிழ் இலக்கியப் பரப்பையும்,விழுமியங்களையும் அறிமுகப்படுத்துதல்.
C0-2	தமிழ் மொழியின் தொன்மை, தாய்மொழிப்பற்று, தன்னம்பிக்கை சூழல்களை எதிர்கொள்ளும் திறன் முதலியவற்றை அறிந்து கொள்வா
C0-3	கவிதையின் வாயிலாக அன்பு உணர்வினை வளர்க்கச் செய்தல
C0-4	கலைச்சொற்கள் வாயிலாக பிறமொழிச் சொற்களை ஆராயும் தன்மைப் பெறுவர
C0-5	படைப்பாற்றல் திறனை வளர்த்துக்கொள்வர்.

. **அலகு:1** செய்யுள்

1. பாரதியார் கவிதைகள் - தமிழ் கண்ணன் என் சேவகன்
2. பாரதிதாசன் கவிதைகள் - உலகம் உன்னுடையது
3. உமர்கய்யாம் - உமர்கய்யாம் பாடல்கள்
4. பட்டுக்கோட்டையார் - செய்யும் தொழிலே தெய்வம் **18 Hrs**
5. ந. பிச்சமூர்த்தி - ஒளியின் அழைப்பு
6. வைரமுத்து - ஐந்து பெரிது ஆறு சிறிது
7. சிற்பி - ஒரு கிராமத்து நதி

key Words (Extra Reading)

1. ந. காமராசு கவிதைகள்
2. தமிழன்பன் கவிதைகள்

அலகு:2 செய்யுள்

8. கல்யாண்ஜி - பேசும்பார் என் கிளி
9. நிர்மலா சுரே' - தைலச்சிமிழும் தச்சன் மகனும்
10. இரா. மீனாட்சி - ஒரு கோதை **18Hrs**
11. விஜி - குரங்கு மனிதன்
12. பா. சத்திய மோகன் - எங'கெங்கு காணினும்
13. ஹைகூ கவிதைகள்

key Words (Extra Reading)

1. ந.முத்துக்குமார் கவிதைகள்
2. சென'ரியூ கவிதைகள்

அலகு:3 **18Hrs**

தமிழ் இலக்கிய வரலாறு

தமிழாய்வுத்துறை வெளியீடு 20-ஆம் நூற்றாண்டு (தற்காலம')

key Words (Extra Reading) தமிழ் இலக்கிய வரலாறு -மு.வரதராசன்

அலகு:4

படைப்பிலக்கியம் - சிறுகதைத் தொகுப்பு(துறை வெளியீடு) **18Hrs**

அலகு:5

பொதுப்பகுதி - கலைச்சொற்கள் **18Hrs**

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

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	To evaluate the highness of tamil language, patriotism, standard in all situation, self discipline, unity, growth path of the nation.	PSO 1	U
CO-2	To evaluate poems and enrich knowledge on religious faith, preserving nature, social atrocities against women and resistance	PSO 2	E
CO-3	To enhance creative spirit among the youth through the present tamil literatures.	PSO 2	AN
CO-4	Awareness towards human rights and humanism through short stories.	PSO 3	Ap
CO-5	5 cultural language of various departments and similar	PSO 4	U

	English words to have knowledge in both.		

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply;

பார்வை நூல்கள்

பாட நூல்கள்

செய்யுள் - தமிழாய்வுத்துறை வுத்துறை வெளியீடு

தமிழ் இலக்கிய வரலாறு - தமிழாய்வுத்துறை வெளியீடு

சிறுகதைத் தொகுப்பு - தமிழாய்வுத்துறை வெளியீடு

கலைச்சொற்கள் - தமிழாய்வுத்துறை வெளியீடு

(For the candidates admitted from June 2018 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002

DEPARTMENT OF HINDI

SEMESTER – I

Course Title	**PART – I LANGUAGE HINDI – I PROSE, SHORT STORY AND GRAMMAR –I**
Total Hours	**90**
Hours/Week	**6Hrs/Wk**
Code	**U18HN1HIN01**
Course Type	**Theory**
Credits	**3**
Marks	**100**

General Objective : To enable the students to understand the importance of human values and patriotism

Course Objectives (CO):

The learner will be able to:

CO No.	**Course Objectives**
CO -1	Evaluate Self Confidence, Human values
CO- 2	Understand and analyze Gandhian Ideology
CO- 3	Understand Indian Culture, custom
CO- 4	Analyze communal Harmony and Unity in Diversity
CO- 5	Evaluate Friendship

UNIT – I **(18 Hours)**

1. Aatma Nirbharatha
2. Idgah
3. Sangya

Extra Reading (Key Words): Takur ka kuvam, Bhuti Kaki

UNIT- II **(18 Hours)**

1. Mahatma Gandhi
2. Vusne Kaha Tha
3. Sarva Naam

Extra Reading (Key Words): Chandradhar Sharma Guleri, Gandhian Ideology

UNIT- III **(18 Hours)**

1. Sabhyata Ka Rahasya
2. Karva Va Ka Vrat
3. Visheshan

Extra Reading (Key Words): Sabhyata Aur Sanskriti, Yashpal ki Sampoorna khaniyan

UNIT- IV **(18 Hours)**

1. Bharat Ek Hai
2. Sharandhata
3. Kriya

Extra Reading (Key Words): Ramante Tatra Deavata, Badala

UNIT- V **(18 Hours)**

1. Mitrata
2. Vapasi
3. Ling Aur Vachan

Extra Reading (Key Words): Aacharya Ramachandra Shukla,Usha Priyamvadha ki kahaniyan

Note : Texts given in the Extra Reading (Key Words) must be tested only through Assignment and Seminars.

Course Outcomes:

The learner will be able to:

CO No.	Course Outcomes	Cognitive Level
CO -1	Compare human values of present and past generations	E
CO- 2	Test for Gandhian Ideology in the literary works.	U, An
CO- 3	Interpret Indian Culture in a scientific manner.	U
CO- 4	Assess casteless and classless India.	An
CO- 5	Value the interests of one's friend.	E

CO- Course Outcome; R- Remember; U- Understand; Ap- Apply; An- Analyze; E- Evaluate; C- Create

Reference Books :

- GadyaSudha: Edt. Dr. M. SaleemBaig; RakaPrakashan; Ilahabad. U.P.
- Hindi GadyaPrabhakar:Edi. Dr.Hiranmay; ShikshaBharathi; Kashmiri Gate; Delhi
- KahaniVividha;RajkamalPrakashan; Ilahabad.; New Delhi.
- Vyakaranpradeep; Dr. Ram Dev. M.A; LokBharathiPrakashan ;Illahabad

(For candidates admitted 2016 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2

DEPARTMENT OF FRENCH

SEMESTER I

Course Title	**PART I – LANGUAGE - FRENCH PAPER I** (GRAMMAR & CIVILISATION (ÉCHO A1 2e édition)
Total Hours	90
Hours/Week	6Hrs/Wk
Code	U16FR1FRE01
Course Type	Theory
Credits	3
Marks	100

General Objective: To enable the students to learn the fundamentals of French Grammar and Cultural aspects of France.

Course Objectives (CO):

The learner will be able to

CO1	Remember alphabets, numbers, nationalities and professions; understand the term Francophone, a brief introduction of France and oneself.
CO2	Remember and understand verb conjugation and articles and apply the same in first contact
CO3	Remember the pronouns placed after prepositions; analyse and evaluate leisure time activities in France and across the world.
CO4	Apply past tense in writing personal diaries; comparison and adjectives in sketching travel journals
CO5	Understand the usage of articles and inversion in interrogation and analyse the food habit of the French.

Unit 1 Parcours d'initiation ; Vous comprenez (15 Hours)

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.

Extra Reading (Key Words): La carte de la France et La carte du monde francophone

Unit 2 Au travail! (15 Hours)

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

Extra Reading (Key Words): *Fiches de renseignement de ses parents*

Unit 3 On se détend! (15 Hours)

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

Extra Reading (Key Words): Lieux de loisirs que l'étudiant apprécie

Unit 4 Racontez-moi ! ; Bon voyage ! (30 Hours)

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

Extra Reading (Key Words):La vie des personnalités célèbres

Unit 5 Bon appétit! (15 Hours)

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.

Extra Reading (Key Words): Recette de la crêpe et des tartes

Course outcomes	**Cognitive level**
Introduce oneself to the class and classify Francophone countries in the world map.	Ap, E
Demonstrate regular verb conjugation	U, Ap
List out pronouns placed after prepositions	R, U
Survey leisure time activities in European countries	An
Develop personal diary	C
Outline the food habits of the French.	An

TEXT BOOKS :

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

Books for Reference:

La Conjugaison – Nathan

French made easy – Beginners level - Goodwill Publishing

House Je parle français I –Abhay Publications

Le français avec des jeux et des activités -

ELI Langue et la civilisation – I – Mauger

Bleu

Note : Texts given in the Extra Reading (Key Words) must be tested only through Assignment and Seminars.

(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 **CODE : U15EL1GEN01**

CREDIT : 3 **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 **s**pecific 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 2018 Onwards)
HOLY CROSS COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS
Programme: B.Sc., Biotechnology
First Year - Semester – I

Course Title	Major Core 1 – Cell Biology
Total Hours	60
Hours/Week	4 Hrs Wk
Code	U18BT1MCT01
Course Type	Theory
Credits	3
Marks	100

General Objective:

Student learns the ultrastructural details and functions of cellular organelles such as cell membrane, lysosomes, mitochondria, ribosome, endoplasmic reticulum, Golgi complex, centrosome, nucleus and chromosomes. They also learn the cell division – mitosis and meiosis. Student also learns the structure and replications of DNA, transcription, post transcriptional modification, structure and functions of RNAs, translation and post translational modification.

Course Objectives:

After completion the student will be able to

CO No.	Course Objectives
CO1	Identify the basic structure and functions of a living cell and differentiate between prokaryotic and eukaryotic cells.
CO2	Comprehend the ultrastructure and functional roles of all the cellular organelles.
CO3	Outline the role of autonomous and semi-autonomous organelles in the cell.
CO4	Demonstrate the organization, ultrastructure and chemistry of specialized types of chromosomes.
CO5	Explain the basic mechanics of cell division and cell cycle control.

UNIT I **12hrs**

Discovery of Cell and Cell theory:

Cell as basic unit of life: Viral, bacterial, fungal, plant and animal cells. **Ultra structure cell:** Prokaryotic & eukaryotic cell

Extra Reading (Key words): *Stem Cell*

UNIT II **12hrs**

Plasma Membrane: Ultrastructure -Unit membrane and Fluid mosaic models; Modifications; Permeability Functions- Passive, Facilitated, Active, Exo and Endocytosis; Introduction to signal transduction. **Ribosomes:** Structure – Composition and Assembly - Functions.

Endoplasmic Reticulum: Ultra structure - Types – Protein trafficking- Other functions. **Golgi Complex**: Ultra structure - Role in cell secretion

Extra Reading (Key words): *Vesicular traffic in secretion*

UNIT III **12hrs**

Nucleus: Ultrastructural Organization – Functions**. Semi- autonomous Organelles: Mitochondria** -Ultra structure – chemistry and functions & Chloroplast - Endosymbiotic theory. **Lysosome**: Polymorphic forms, Cytochemistry – Functions.

Extra Reading (Key words): *Red hot mitochondria*

UNIT IV **12hrs**

Chromosomes: Prokaryotic & eukaryotic -Organization - Chemistry- Functions. **Centrosome**: Ultra structure and Functions. **Structure of specialized chromosomes**: Polytene and Lamp Brush– Organization and functions.

Extra Reading (Key words): *Free chromosomal region*

UNIT V **12hrs**

Cell division: **Mitosis -** Stages- Spindle mechanics- mitotic inhibitors, **Meiosis** – Stages – Significance.

Cell Cycle control. Programmed Cell Death.

Extra Reading (Key words): *Check points of cell cycle*

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

Course Outcomes:

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Differentiate between structural and functional details of prokaryotic and eukaryotic cells.	PSO-3	An
CO-2	Illustrate the detailed structural aspects of cell organelles.	PSO-1	R
CO-3	Exemplify the basic signal transduction and protein trafficking mechanism.	PSO-3	U
CO-4	Explain the ultrastructure and functions of the nucleus, mitochondria and chloroplast.	PSO-2	U

CO-5	Categorize chromosomes based on their structural organization and specialized functions.	PSO-3	Ap
CO-6	Relate to the different stages of mitosis and meiosis.	PSO-4	E
CO-7	Explore the basis of cell cycle control mechanism and programmed cell death.	PSO-4,5	Ap

The learner will be able to cultivate laboratory skills to enhance understanding of cell structure and function while participating in a group environment.

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

Text Book

1. Agarwal**,** V.K., (Latest Edition). Molecular Biology, S. Chand and Company Ltd., New Delhi
2. Verma P.S. & Agarwal V.K. (Latest Edition). Cell Biology, S.Chand and Company Ltd, New Delhi.

Reference Books

1. Freifelder, D. (Latest Edition), Essentials of molecular Biology, fourth edition, Jones and Bartlett Publications Inc.
2. De Robertis DP (2012) Cell and Molecular Biology, 8th Edition, Lippincott Williams and Williams.
3. Gerald Karp, (2013), Cell Biology, VII edition Internationl Student Version, Wiley publication.
4. Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, Angelika Amon, Matthew P. Scott, (2012), Molecular Cell Biology, VII edition, W.H. Freeman and Company, New York.
5. Lodish, Harvey, Arnold, Matsudaira, Paul, Kaiser, Chris A., Krieger, Monty Scott, Matthew P.**,** Zipursky, Lawrence, Darnell, James (2004), Molecular Cell Biology, W.H. Freeman and Company.
6. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter, (2002), Molecular Biology of the Cell, IV edition, Garland Publishing, New York.

(For Candidates Admitted from 2018 Onwards)
HOLY CROSS COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS
Programme: B.Sc., Biotechnology
First Year - Semester – I

Course Title	**Major Core 2-Practical - I – Cell Biology**
Total Hours	**45**
Hours/Week	**3 Hrs Wk**
Code	**U18BT1MCP02**
Course Type	**Practical**
Credits	**2**
Marks	**100**

Objectives

Student learns the skills of performing experiments, analyzing the results and discussing the observations pertaining to courses studied.

Cell Biology

1. Identification of plant, fungi, bacteria and animal cells.
2. Identification of different types of human cells.
3. Preparation of polytene chromosomes in salivary gland of Chironomous larva/ Drosophila larva
4. Study of mitotic stage in onion root tip.
5. Study of mitosis and meiosis from permanent slides.
6. Preparation of buccal cells.
7. Study of meiosis in Grasshopper testis.
8. Identification, maintenance and culturing of Drosophila stock.
   Epistasis and codominance, 2 point test cross, gene mapping

(For Candidates Admitted from 2018 Onwards)
HOLY CROSS COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS
Programme: B.Sc., Biotechnology
First Year - Semester – I

Course Title	Allied I (Optinal) – Chemistry for Biology
Total Hours	60
Hours/Week	4 Hrs Wk
Code	U18BT1AOT01
Course Type	Theory
Credits	4
Marks	100

General Objectives:

Students develop a comprehensive understanding of basic chemical concepts to solve qualitative and quantitative problems and apply them in biological research.

Course Objectives:

After completion the student will be able to

CO No.	Course Objectives
CO1	Explain the phenomenon of radioactivity and the basic properties of radioactive isotopes.
CO2	Extend the concept of acids, bases, buffers and determination of pH.
CO3	Outline the principle of chemical bond formation and categorize the different types of chemical bonds.
CO4	Elucidate the kinetics of chemical reactions and the various factors affecting the rate of reactions.
CO5	Portray the properties of stereo and optical isomerism of aliphatic and aromatic compounds.

UNIT I **12 hrs**

Radio Activity and Isotopes: Radio activity – units- stability of nucleus – N/P ratio, mass defect – binding energy – theory of nuclear disintegration – decay law, half life period –radioactive equilibrium. Radioactive series – nuclear reactions – nuclear reactions induced by P,N,D – nuclear fission – fusion – reactors. Isotopes and their separation by mass spectrograph and diffusion methods – separation of H2 and Uranium.

Extra Reading /Key words: *Radio labelling of tissues & autoradiography*

UNIT II **12 hrs**

Acids, Bases and Buffers: Various concepts of acids and bases and buffers – ionic product of water – pH – determination of pH – hydrolysis constant – buffer solution –Henderson Hasselbach equation – determination of pH by indicators, glass electrode.

Extra Reading /Key words: *Biological buffers*

UNIT III **12 hrs**

Chemical bonding: Ionic bonds – lattice energy of ionic compound – Born-Lande equation. Born-Haber cycle –covalent character of ionic bond. Covalent bond – hybridization involving S,P,d and f orbitals – SP3, SP2, SP dSP3,d2 SP3 hybridization. Hydrogen bonding in water, organic molecules and biomolecules (brief study).

Extra Reading /Key words: *Bonds helix and folding*

UNIT IV **12 hrs**

Chemical Kinetics: Rates of reactions – factors influencing rates of reactions – order and molecularity – first, second and third order – units – derivation of first order rate equation – half life –influence of temperature on reaction rates – Arrhenius equation. Calculation of Arrhenius parameters.

Extra Reading /Key words: *Pharmacokinstics*

UNIT V **12 hrs**

Sterio Chemistry and Optical Isomerism: Optical isomerism – chirality – lactic acid, tartaric acid. Racemisation and resolution – relative and absolute configurations –asymmetric synthesis. Geometrical isomerism – E and Z notations, malic acid and fumeric acid. Aldoxime and Ketoxime.

Benzene and Aromaticity: Nomenclature – structure and stability, M.O concept. Aromaticity and Huckels Rule –reactions of Benzene – electrophilic substitution reactions with mechanism – halogenation, nitration, sulphonation. Friedel Crafts reaction - naphthalene and anthrecene – structure and reaction.

Extra Reading /Key words: *Aromatic biomolecules*

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

Course Outcomes:

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Elaborate the basic principles of radioactive isotopes and nuclear fission and fusion reactions.	PSO-3	U
CO-2	Classify acids, bases and buffers and explain the basic concept of pH determination.	PSO-1	R
CO-3	Compare and contrast Ionic and Covalent bonds and		

	explain hybridization in organic molecules and biomolecules.	PSO-3	An
CO-4	Differentiate between first, second and third order reactions and assess the influence of temperature on reaction rate.	PSO-2	E
CO-5	Derive the Arrhenius equation and estimate the Arrhenius parameters.	PSO-3	Ap
CO-6	Explain the principle of chirality, racemisation, resolution and geometrical isomerism of acids.	PSO-4	U

The learners will be able to nurture proficiency in the foundational concepts of the course and possess the skills needed to practice as professionals in laboratories or research institutions.

Text Books:

1. Text book of Physical Chemistry by P L Soni, O P Dharmashe
2. Physical Chemistry by Puri Sharma Pathani.
3. Advanced Physical Chemistry" by Gurdeep Raj.

Reference Books

1. Modern Organic Chemistry by M K Jain and S C Sharma
2. Principles of Chromatography" by Srivastava
3. Organic Chemistry by Mc Murrey.

HOLY CROSS COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS
Programme: B.Sc., Biotechnology
First Year - Semester – I
(For Candidates Admitted from 2018 Onwards)

Course Title	Allied Optional I – Plant science and phytochemical techniques
Total Hours	60
Hours/Week	4 Hrs Wk
Code	U18BT1AOT02
Course Type	Theory
Credits	4
Marks	100

General Objectives:
Students will be able to develop knowledge on natural product, drug discovery and to isolate, identify extract the phytoconstituents.

Course Objectives:
After completion the student will be able to

CO No.	Course Objectives
CO-1	Explain the phenomenon of nutrition, transport, storage and the physiological improvement of plants.
CO-2	Extend the distribution and role of elements and inorganic compounds in plants.
CO-3	Outline the principle of medicinal plants and policies of their conservation.
CO-4	Portray the structure, properties and production of secondary metabolites.
CO-5	Recognize and determine the applications of medicinal plants.

UNIT I **12 hrs**

Nutrition and transport and storage: Inorganic and organic nutrient requirement, mineral deficiency; Transport of water and solutes in plant body, role of membranes in transport, water balance, transpiration, accumulation and storage of organic compounds in plant tissues; Growth and development**:** chemical regulation**,** centers of growth, cell differentiation and morphogenesis; physiology of reproduction; Seed germination, seed viability, seed dormancy, seed vigour and longevity, factors affecting seed quality, seed testing and certification

Physiological improvement of plants: Physiological efficiency of target characteristics for improvement (salt tolerance, draught and flood resistance, low and high temperature tolerance, pest and pathogens resistance, herbicide resistance, photoperiodism, nitrogen fixation, enhanced nutritional value, shelf life.)

Extra Reading /Key words: *energy relation in photosynthesis, aerobic oxidation of sugars and secondary oxidative mechanisms*

UNIT II **12 hrs**

Bioinorganic and organic compounds: Distribution and role of elements and inorganic compounds in plants; General classification and basic molecular structure of phenolic compounds, terpenes and terpenoids; their biosynthesis, and degradation, function and distribution in plants Phyto-hormones: Chemical structure, synthesis, translocation; Mode of action and physiological effects of growth regulators and inhibitors: Auxins, cytokinins, giberellines, ethylene and abscissic acid.

Extra Reading /Key words: *Aromatherapy, Bach's flower remedies*

UNIT III **12 hrs**

Medicinal and Aromatic plants: Important medicinal and aromatic plants of India; Problems of overexploitation and deforestation; Rare and endangered species of medicinal and aromatic plants; Policies for their conservation, regeneration and sustainable use; Medicinal Plant Specialist Group of Species Survival Commission.

Extra Reading /Key words: *Ayurvedha, Siddha*

UNIT IV **12 hrs**

Bioactive secondary metabolites: ***Steroids***: Occurrence and distribution in plants, saponins, sapogenins and steroids; Isolation, structure elucidation and synthesis of bioactive steroids such as cholesterol, diosgenin, estrone, estrodiol, etc.; ***Terpenoids***: Occurrence and distribution in plants, essential oils, aroma chemicals, mono and sesquiterpenoids, their use in flavour and perfumery industry, diterpenes, triterpenes, isolation and characterization of terpenes, their synthesis; ***Alkaloids***: occurrence and distribution in plants, bioactive alkaloids-isolation and structure elucidation of alkaloids such as atropine, quinine, papaverine, thebaine, vincristine, etc.; ***Anthocyanidin***: occurrence and distribution in plants, isolation and characterization of anthocyanins, chalcones, flavones, isoflavones, chromones, coumarins; structure elucidation of quercetin, kaempferol, etc.

Extra Reading /Key words: *Phytochemical techniques*

UNIT V **12 hrs**

Applications: Applications of biomolecular chemistry in plant systematics, plant physiology, medicine and pharmaceuticals, forensic science, environmental science, biotechnology, herbal and modern drug industries, food flavour and cosmetic industries.

Processing of plant drugs: Methods of collection, process and storage of medicinal and aromatic plants; purification of raw drugs; factors causing drug contamination, methods of storage of drugs.

Extra Reading /Key words: *Pharmacognosy*

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

Course Outcomes:

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Elaborate the basic principles of nutritional transport and storage.	PSO 1	U
CO-2	Illustrate the general classification and basic molecular structure of secondary metabolites.	PSO 2	E
CO-3	Compare and contrast the importance of medicinal and aromatic plants in India.	PSO 1	An
CO-4	Describe the isolation methods and structural elucidation of secondary metabolites.	PSO 2	R
CO-5	Elucidate the methods of processing plant drug and their application in cosmetics.	PSO 1	An
CO-6	Explain the principle and purification of raw drug.	PSO 4	U

The students will be able to improve their employability skills in laboratories or to choose higher education in developing their skills towards drug development.

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

References

Text Books:

1. Bhattacharjee, S.K. 2004. *Handbook of Medicinal Plants* (4th ed.). Pointer Publishers, Jaipur.
2. Dennis, D.T and Turpin, D.H. (Eds.). 1990. *Plant physiology, Biochemistry and Molecular biology*, Longman Scientific and Technical Essex
3. Harborne, J.B. 1984. *Phytochemical Methods* (2nd ed). Chapman and Hall, London.

Reference Books:

1. Pushpangadan, P. and Nair, K.N. 1997. Medicinal Plants. In: *The Natural Resources of Kerala*. K. Balachandran Thampi *et al*. (Eds.), World Wide Fund for Nature-India, Kerala Chapter, Thiruvananthapuram
2. Trivedi, P.C. 2004. Medicinal Plants: Utilization and Conservation. Aavishkar Publishers and Distributors, Jaipur
3. Dennis, D.T and Turpin D.H. (ed). 1990. Plant physiology, Biochemistry and Molecular biology, Longman Scientific and Technical Esses

(For Candidates Admitted from 2018 Onwards)
HOLY CROSS COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS
Programme: B.Sc., Biotechnology
First Year - Semester – I

Course Title	Allied II – Chemistry for Biology Practical
Total Hours	60
Hours/Week	4 Hrs Wk
Code	U18BT1AOP03
Course Type	Theory
Credits	3
Marks	100

Objectives:
Upon learning the subject, the students will be able to take part in laboratory practices and skills. Explain and evaluate mixtures containing cations.

1. Qualitative analysis – Analysis of a mixture containing two cations [lead, copper, bismuth, cadmium, aluminum, iron, zinc, manganese, cobalt, nichel, barium, calcium, strontium, magnesium, ammonium.
2. Quantitative analysis – Acidimetry and Alkalimetry – permangenometry, dichrometry, iodometry.

(For Candidates Admitted from 2018 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Programme: B.Sc., Biotechnology

First Year - Semester – I

Course Title	Allied Optional II – Plant science and phytochemical techniques – Practical
Total Hours	60
Hours/Week	4 Hrs Wk
Code	U18BT1AOP04
Course Type	Practical
Credits	3
Marks	100

Objectives:

To enable students to understand and skilled on secondary metabolites isolation and quantitation in various natural plants.

1. Estimation of chlorophyll: Spectrophotometric assay of total chlorophyll, chlorophyll-a and chlorophyll-b.
2. Estimation of fixed oil from fruit kernel (e.g. Percentage yield of coconut oil in copra)
3. Determination of saponification value, Iodine value and acid value of fixed oil
4. Estimation of nitrogen in plant parts using Kjeldahl's method
5. Estimation of the alkaloid piperine from Pepper, vasicine from *Adhatoda* leaves and carbohydrates in plant samples
6. Isolation of Starch from Potato
7. Isolation and estimation of caffeine from tea leaves.
8. Qualitative analysis of secondary metabolites.
9. Field trip to Phytochemistry Laboratory

(For candidates admitted from 2018 onwards)
HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
/B.Sc./B.Com/B.R.SC/B.C.A/ B.B.A DEGREE EXAMINATION
SEMESTER I

Course Title	ENVIRONMENTAL STUDIES
Total Hours	15
Hours/Week	1
Code	U18RE1EST01
Course Type	Theory
Credits	1
Marks	100

General Objectives:

The Student will be able to understand the concept of ecosystem, biodiversity, conservation, disaster management, analyse the prospects of natural resources, evaluate the effect and control of pollution

Course Objectives:

The student will be able to

1. understand the prospects of the various natural resources.
2. analyse the concept and need for biodiversity
3. evaluate the effect of the different types of pollution.
4. understand the need for disaster management
5. understand the Environment and Social Issues.

Unit I – Awareness and Natural Resources **3hrs**

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.

Extra reading (Key Words): *Non renewable sources- location in India*

Unit II – Ecosystems and Biodiversity **3hrs**

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 megadiversity country, hotspots – threats to biodiversity and conservation measures.

Extra reading (Key Words): *Red list (any 10 plants and animals)*

Unit III – Environmental Pollution **3hrs**

Causes, effects and control of water, and air pollution – global warming – ozone depletion – nuclear hazards. Population growth at national and global level World food production – effects of modern agriculture on land ecosystems – GMOs and related issues .Environmental pollution and diseases – malaria, chikungunya

Extra reading (Key Words): *Environmental factors affecting human behaviour*

Unit IV – Disaster Management **3hrs**

Bomb Threat – Earthquake – Explosion – Hazardous material spill / release – campus shooting – Terrorist incidence – Financial emergency – a sudden health emergency, unexpected loss of income, death in the family or other family emergency. Rent in arrears and risk of eviction. Natural disasters

Extra reading (Key Words): *Causative factors of any 2 disasters*

Unit V – Environment and Social Issues **3hrs**

Rich – poor wide – at national and global levels Urbanization – slums Changing value systems – AIDS Family welfare programs

Extra reading (Key Words): *Scholarships and funds benefitting the welfare of the family*

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

Course Outcomes:

1.Explain the importance of the various natural resources.

2.Analyze the concepts, structure and types of ecosystem. Add note on the biodiversity concepts

3. Evaluate the effect of the different types of pollution

4. Explains the various disaster management.

5. Discuss the need of environment and the social issues

REFERENCES:

1. Agarwal, K.C. (2001). Environmental Biology, Nidi Publication Ltd. Bikaner.
2. 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.
5. Krebs, C.J. (2001).Ecology.VI Edition.Benjamin Cummings.
6. Nebel, B.J. and Wright, R.T.(1996). Environmental Science, Prentice Hall, New Jersey
7. Odum, E.P.(2008) Fundamentals of Ecology.Indian Edition. Brooks / Cole.

8. Sharma, B.K. and Kaur (1997). Environmental Chemistry. Goel Publishing House, Meerut. Sharma, B.K. and Kaur, (1997). An Introduction to Environmental Pollution. Goel Publishing House, Meerut.
9. Sinhe, A.K. Boojh, R. and Vishwanathan, P. N. (1989). Water Pollution Conservation and Management, Gyansdaya Prakashan, Nainital.

HOLY CROSS COLLEGE (Autonomous), Tiruchirappalli - 620 002.
TAMIL DEPARTMENT
For Candidate admitted from 2015 onwards
First Year - Semester – II

Course Title	முதலாமாண்டு – இரண்டாம் பருவம்
Total Hours	**75**
Hours/Week	**5**
Code	**U15TL2TAM02**
Course Type	**Theory**
Credits	**3**
Marks	**100**

General Objectives:

இறைச்சிந்தனை வழி மாணவர்களை ஒருமுகப்படுத்துதல்.

- To harmonize the students in Religious thoughts.
- To Introduce the specialties of Tamil caureates
- To infuse the friendly nature in to the students
- To improvise the good habits among students

Course Objectives:

CO No	Course Objective
CO-1	இறைச்சிந்தனை வழி மாணவர்களை ஒருமுகப்படுத்துதல்.
CO-2	மதநல்லிணக்கத்தை உருவாக்குதல்.
CO-3	ஆளுமைத்திறனை வளர்த்தல்
CO-4	படைப்பாற்றல் திறனை ஊக்கப்படுத்துதல்.
CO-5	பிழையின்றி எழுதவும் படிக்கவும் மாணவர்களை தயார்ப்படுத்துதல்.

அலகு:1 செய்யுள் **15 Hrs**

1. தேவாரம் - சுந்தரர் (திருமழப்பாடி)
2. திருவாசகம் - மாணிக்கவாசகர் (குயில் பத்து)
3. திருமந்திரம் - திருமூலர்
4. திருப்பாவை - ஆண்டாள்
5. நாலாயிர திவ்யப்பிரபந்தம் - குலசேகராழ்வார் (பெருமாள் திருமொழி)

key Words (Extra Reading)

1. அற்புதத் திருவந்தாதி - காரைக்கால் அம்மையார்
2. திருவாய்மொழி - நம் மாழ்வார்

அலகு :2 செய்யுள் **15Hrs**

6. மீனாட்சியம்மை பிள்ளைத்தமிழ் - குமரகுருபரர்
7. இரட்சணிய யாத்திரிகம் (சிலுவைப்பாடு) - எச்.ஏ.கிருட்டிணப்பிள்ளை
8. வேதநாயக சாஸ்திரியார் பாடல்கள் - - வேதநாயசாஸ்திரியார்
9. நபிகள்நாயக மான்மியமஞ்சரி - செய்குதம்பிப்பாவலர்

key Words (Extra Reading)

1. நந்திக்கலம்பகம்
2. குற்றாலக்குறவஞ்சி –திரிகூடராசப்பக்கவிராயர்

அலகு: 3 **15 Hrs**

தமிழ் இலக்கிய வரலாறு
பல்லவர்காலம்
நாயக்கர்காலம்

அலகு: 4 **15Hrs**

படைப்பிலக்கியம் - புதினம்
கல்கி - பார்த்திபன் கனவு

key Words (Extra Reading)

வில்லோடு வா நிலவே – வைரமுத்து

அலகு: 5 **15 Hrs**

கடிதம் எழுதுதல்

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

Course Outcomes:

CO No.	Course Outcomes	PSOs	Cognitive Level
CO-1	to evaluate the religious works and the growth of religious literature	PSO 1	U
CO-2	to bring-out the similarities in religious teachings and to ensure unity	PSO 2	AN
CO-3	the commendable personality of the kings and agriculture farmers could be a model to developing personality.	PSO 3	Ap
CO-4	to enrich literature reading, creativity and vocabulary strength	PSO 4	U
CO-5	To volunteer to write application letter without any set back	PSO 5	U

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

பாடவை நூல்கள்

செய்யுள் - தமிழாய்வுத்துறை வெளியீடு

தமிழ் இலக்கிய வரலாறு - தமிழாய்வுத்துறை வுத்துறை வெளியீடு

நாவல்

கல ் கி - பார்த்திபன் கனவு

கடித இலக்கியம - பயிற்சி ஏடு

(For the candidates admitted from June 2018 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002

DEPARTMENT OF HINDI

SEMESTER – II

Course Title	**PART- I LANGUAGE: HINDI- II DRAMA, NOVEL AND GRAMMER-II**
Total Hours	75
Hours/Week	5
Code	U18HN2HIN02
Course Type	Theory
Credits	3
Marks	100

General Objective : To enable the students to appreciate and critically evaluate the prescribed literary works.

Course Objectives (CO):

The learner will be able to:

CO No	**Course Objective**
CO-1	Critically evaluate moral values in the drama
CO-2	Critically appreciate and evaluate the novel in an ethical perspective.
CO-3	Understand and apply tense and case
CO-4	Remember and apply adverbs and prepositions
CO-5	comprehend the usage of conjunctions and interjections

UNIT – I **(15 Hours)**

1. Ashad ka ek dhin
2. Gaban
3. Kaal

Extra Reading (Key Words): Mohan Rakesh, Laharon Ke Rajahams

UNIT- II **(15 Hours)**

1. Ashad ka ek dhin
2. Gaban
3. Karak

Extra Reading (Key Words): *Premchand, Nirmala*

UNIT- III **(15 Hours)**

1. Ashad ka ek dhin
2. Gaban
3. Kriya Visheshan

Extra Reading (Key Words): Seva Sadhan, Aadhe Adhure

UNIT- IV **(15 Hours)**

1. Ashad ka ek dhin
2. Gaban
3. Sambandha Bodhak

Extra Reading (Key Words): Andhere Bandh Kamare, Mispal

UNIT- V **(15 Hours)**

1. Ashad ka ek dhin
2. Gaban
3. Yojak(Samuchaya Bhodak) Aur Dhyodak (Vismyadhi Bhodak)

Extra Reading (Key Words): Poos Ki Raat, Shatranj Ke Khiladi

Note : Texts given in the Extra Reading (Key Words) must be tested only through assignment and Seminars.

Course Outcomes:

The learner will be able to:

CO No.	Course Outcomes	Cognitive Level
CO -1	Appraise moral values in the Society	E
CO- 2	Distinguish necessity and luxury	E
CO- 3	To make use of present, past and future tense and build stories.	U, Ap
CO- 4	Utilize adverbs and prepositions in a text.	R, Ap
CO- 5	Rephrase using conjunctions and interjections.	U

CO- Course Outcome; R- Remember; U- Understand; Ap- Apply; An- Analyze; E- Evaluate; C- Create

Reference Books :

- Ashadka ek dhin : Mohan Rakesh;Rajpal and Sons,Delhi.
- Nirmala: Premchand;Sri Jwalaji Books Educational Enterprises,New Delhi.
- Vyakaran pradeep; Dr. Ram Dev. M.A; LokBharathiPrakashan ;Illahabad.
- Manak Hindi Vyakaran: ChandraBhan ‘Rahi’;SreyaPrakashan, Illahabad

(For candidates admitted 2016 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2

DEPARTMENT OF FRENCH

SEMESTER II

Course Title	**PART I – LANGUAGE - FRENCH PAPER II** **(**GRAMMAR, CIVILISATION & TRANSLATION (ÉCHO A1 2e édition)
Total Hours	75
Hours/Week	5 Hrs/Wk
Code	U16FR2FRE02
Course Type	Theory
Credits	3
Marks	100

General Objective: To enable the students to learn French Grammar and Cultural aspects of France.

Course Objectives (CO):

The learner will be able to

CO1	understand pronominal verbs and apply the same in narrating one's own everyday activities.
CO2	remember prepositions and understand climate in France and dwelling place.
CO3	apply past tenses in a biography and analyse relationships and family structure in France
CO4	understand object pronouns and evaluate savoir-vivre in France.
CO5	understand the usage of relative pronouns and secondary tenses and remember SOS and evaluate French style

Unit 1 Quelle journée ! (15 Hours)

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.

Extra Reading (Key Words): lettre amicale, compléter un dialogue

Unit 2 Qu'on est bien ici ! (12 Hours)

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)

Extra Reading (Key Words): des affiches et des panneaux

Unit 3 Souvenez-vous ? (12 Hours)plois 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.

Extra Reading (Key Words): la biographie d'une personne importante

Unit 4 On s'appelle ? (12 Hours)

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.

Extra Reading (Key Words):le savoir vivre en Inde

Unit 5 Un bon conseil ! ; Parlez-moi de vous ! (24 Hours)

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.

Extra Reading (Key Words): SOS en Inde, les marques internationales des vêtements.

Course outcomes:	**Cognitive level**
Make use of pronominal verbs to sketch one's routine.	U, Ap
Illustrate habitat in France.	An
Utilize a biography to identify past tenses.	E
Compare family structure in France and in India.	E
Apprise savoir-vivre in class room.	Ap, An
Examine « Style » in a French context.	An
Relate SOS in India and in France.	E

TEXT BOOKS :

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

Books for Reference:

La Conjugaison – Nathan
French made easy – Beginners level - Goodwill Publishing
House Je parle français II - Abhay Publications

Le français avec des jeux et des activités – ELI
Langue et la civilisation – I – Mauger Bleu

Note : Texts given in the Extra Reading (Key Words) must be tested only through Assignment and Seminars.

(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 **CODE : U15EL2GEN02**

CREDIT : 3 **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 2018 Onwards)
HOLY CROSS COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS
Programme: B.Sc., Biotechnology
First Year - Semester – II

Course Title	Major Core 3 – Biochemistry
Total Hours	45
Hours/Week	3 Hrs Wk
Code	U18BT2MCT03
Course Type	Theory
Credits	3
Marks	100

General Objectives:

To provide an overall understanding of biomolecules and their interactions in the metabolic pathways of living systems

Course Objectives:

After completion the student will be able to

CO No.	Course Objectives
CO-1	Distinguish the role of biomolecules, their properties and explain the metabolic pathway of carbohydrates.
CO-2	Comprehend the basics of amino acid and protein structure, classification and metabolism.
CO-3	Outline the basic classification, metabolism and functions of lipids and fatty acids.
CO-4	Outline the basic classification, metabolism and functions of nucleic acids.
CO-5	Explain the basics of vitamins, classification, functions and deficiencies.

UNIT I **09 hrs**

Carbohydrates: Importance, classification and physical and chemical properties of carbohydrates

Monosaccharides: Structure, configuration and biochemical importance of Monosaccharides (Glucose and Fructose) Oxidation, Reduction, Osazone formation, Aldose & Ketose, Glycosides (Streptomycin, Cardiac glycosides and Ouabain)

Disaccharides: Structure, configuration and biochemical importance of Disachharides and glycosidic bond, Mutarotation, Haworth projection (Sucrose, Trehalose, Lactose, Maltose, Isomaltose, Cellobiose)

Homo polysaccharides: Starch, Glycogen, inulin, Cellulose and Chitin

Hetero polysaccharides: Hyaluroic acid, Chondroitin sulfate, heparin, peptidoglycan.
Extra Reading /Key words: *Carbohydrates Metabolism*

UNIT II **09 hrs**

Amino Acids: Classification, structure and physical and chemical properties of aminoacids and synthesis of Peptide bond.

Proteins: Structural aspects – General introduction, Classification & General characteristics, Structure of Primary, Secondary, Tertiary & -Quaternary proteins & chains of proteins (elementary idea)

Extra Reading /Key words: *Amino acids and protein Metabolism*

UNIT III **09 hrs**

Lipids: Structural aspects – General introduction, Classification & Structure of Simple & Compound lipids, derived lipids, sterols. Properties of Lipid aggregates, Biological membrane, Membrane protein – structural aspects, Lipoproteins.

Fatty acids: Importance, properties and classification. Saturated and Unsaturated fatty acids- with examples.

Extra Reading /Key words: *Fatty acid Metabolism*

UNIT IV **09 hrs**

Nucleic acid: Structural aspects – Components of DNA and RNA, Nucleosides & Nucleotides (introduction, structure & bonding), – Biologically important nucleotides. Double helical structure of DNA (Watson-Crick model), various forms of DNA.

Extra Reading /Key words: *Nucleic acid Metabolism*

UNIT V **09 hrs**

Vitamins- Classification, sources, functions and applications.

Extra Reading /Key words: *Vitamins Metabolism*

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

Course Outcomes:

CO No.	Course Outcomes	PSOs addressed	Cognitive Level
CO-1	Outline the chemical composition and properties of biomolecules.	PSO 1	R, U
CO-2	Demonstrate the structure, classification and metabolism of carbohydrates.	PSO 2	R
CO-3	Summarize and explain the structural conformations of proteins, their properties and metabolism.	PSO 2	U

CO-4	Illustrate nucleic acid metabolism and the classification and properties of vitamins and minerals.	PSO 3	R
CO-5	Classify lipids based on their structure, functions and properties and explain its metabolic pathways.	PSO 3	An
CO-6	Discuss the chemistry and functions of various vitamins and their sources.	PSO 4	U, An
CO-7	Discuss the deficiency conditions of various vitamins.	PSO 4	R, Ap

The learners will be able to nurture proficiency in the foundational concepts of the course and possess the skills needed to practice as professionals in laboratories or research institutions.

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create.

Text Books:

1. Jain, J.L., Sunjay Jain and Nitin Jain (2007). Fundamentals of Biochemistry, S. Chand & Company Ltd., New Delhi.
2. Satyanarayanan, U (2004). Essentials of Biochemistry, Uppala Author – Publisher Interlinks, Vijayawada.

Reference Books:

1. Alison Snape, Despo Papachristodoulou, William H. Elliott, Daphne C. Elliott, (2014). Biochemistry and Molecular Biology, V edition, Oxford University press.
2. David Lee Nelson, Michael M. Cox, (2013). Lehninger Principles of Biochemistry, VI edition, W.H. Freeman and Company, New York.
3. Murray, R.K., Granner, D. K., Mayes, P.A., Rodwell, V.W (2003). Harper's Biochemistry, Prentice Hall International Inc.,
4. Stryer, L., (2003), Biochemistry, V edition, W.H.Freeman and Co.
5. Geoffrey L.Zubay, William W. Passon, Dennis L. Vance, (Latest Edition), Principles of Biochemistry, IV edition, W.M.C. Brown Publishers, Australia.

(For Candidates Admitted from 2018 Onwards)
HOLY CROSS COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS
Programme: B.Sc., Biotechnology
First Year - Semester – II

Course Title	Major Core 4 – Biological Techniques
Total Hours	45
Hours/Week	3 Hrs Wk
Code	U18BT2MCT04
Course Type	Theory
Credits	3
Marks	100

General Objective:

To provide a strong foundation in the principle and working mechanism of various biological techniques and instrumentation.

Course Objectives:

After completion the student will be able to

CO No.	Course Objectives
CO-1	Describe the fundamental principles and working of different types of microscopes and lab instruments.
CO-2	Explain the phenomenon of spectroscopy and the applications of analytical spectroscopic techniques in research.
CO-3	Outline the basic concepts of centrifugation techniques and their applications.
CO-4	Explicate the working principle of chromatography in the separation of macromolecules and discuss the types of chromatography.
CO-5	Explicate the working principle of electrophoresis in the separation of macromolecules and discuss the types of electrophoresis.

UNIT I **9hrs**

Microscopy - Principle and applications of Light microscope, Phase contrast, Confocal scanning light microscopy, Fluorescence and Electron (TEM, SEM and STEM) microscopy.

Microtechnique – Fixatives and principles of fixation; Tissue preparation, block making and sectioning. Stains and principles of staining; Haematoxylin and Eosin staining method for histology and mounting.

Extra Reading /Key words: *Cryo-Electron Microscopy*

UNIT II **9hrs**

Units of measurement and Preparation of solutions: Percentage, Normality, Molarity, ppm, buffers, stock and working solution.

pH meter- principle and application.

Spectrophotometry: Principle and applications of Colorimeter; Spectrophotometer. Raman Spectroscopy, NMR Spectroscopy, adsorption Spectroscopy –

Extra Reading /Key words: *GC-MS-MS*

UNIT III **9 hrs**

Centrifugation –concepts of relative centrifugal force and sedimentation coefficient. Factors affecting Sedimentation velocity, Standard Sedimentation Coefficient, Centrifugation of associating systems. Principle and applications of Preparative Centrifuge –Differential and Gradient centrifugation; Analytical centrifuges- Ultra centrifuge.

Extra Reading /Key words: *Separation of cell organelles, genomic and plasmid DNA*

UNIT IV **9 hrs**

Chromatography - Principle and applications of Paper, Thin layer, Column, HPLC, Gas-liquid, Ion-exchange, Affinity and Gel permeation, GC-MS, MALDI TOF, LC-MS.

Extra Reading /Key words: *UPLCMS*

UNIT V **9 hrs**

Electrophoresis – Principle and applications of Paper, Polyacrylamide gel electrophoresis - PAGE and SDS – PAGE, Agarose gel electrophoresis (AGE) Immunoelectrophoresis and Isoelectric focusing. **Introduction to Nanobiology.**

Extra Reading /Key words: *Microchip in separation of DNA fragments, hPAGE*

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

Course Outcomes:

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Identify the underlying working principle of various lab instruments with their specific applications.	PSO 1	U
CO-2	Interpret the role of centrifugal and frictional force and the biological applications of centrifugation.	PSO 2	E
CO-3	Integrate the use of centrifugation principle for developing new instruments.	PSO 2	U
CO-4	Compare the principles and applications of various electrophoretic techniques and invent new applications for electrophoresis.	PSO 1	An
CO-5	Integrate spectroscopic techniques in their research projects and utilize them to discover the structure of novel compounds.	PSO 4	An

The learners were able to cultivate employability skills as Industrial analyzer in construction and working of various analytical instruments.

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

Text Books:

1. Upadhyay, A., Upadhyay, K. and Nath, N, (2002), Biophysical Chemistry, Himalayan Publication House, New Delhi.
2. Wilson K., Walker. (2000), Practical Biochemistry– Principles and Techniques, fifth edition, Cambridge University Press, Cambridge.

Reference Books:

3. Keith Wilson and Jhon Walker, (2010) Principles and Techniques of Biochemistry and Molecular Biology- seventh Edition. Cambridge University Press, Cambridge
4. Walker, John M. Rapley, Ralph (Eds.), (2008), Molecular Biomethods Handbook, 2nd ed., Humana Press.
5. Prescott LM., Harley JP., Klein DA., (2006). Microbiology sixth edition. McGraw –Hill, New York.
6. Plummer D., (1987). Introduction to Practical Biochemistry third edition. McGraw –Hill, New York.

(For Candidates Admitted from 2018 Onwards)
HOLY CROSS COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS
Programme: B.Sc., Biotechnology
First Year - Semester – II
(For Candidates Admitted from 2018 Onwards)

Course Title	Major Core 5 – Practical II- Biochemistry & Biological Techniques
Total Hours	45
Hours/Week	3 Hrs Wk
Code	U18BT2MCP04
Course Type	Practical
Credits	4
Marks	100

Objectives:
The scope of this work is to make the students to understand the basic technique in detail. The practical focus on the basic techniques in Biochemistry and Biological techniques.

BIOCHEMISTRY

1. Preparation of solutions
2. Qualitative tests of Sugars, amino acids and lipids
3. Estimation of proteins by Biuret method
4. Estimation of total sugars by Anthrone method
5. Estimation of cholesterol by Zak,s method
6. Estimation of amino acid – Ninhydrin method

BIOLOGICAL TECHNIQUES

1. Preparation of Buffers
2. Separation of DNA by Agarose Gel Electrophoresis
3. Separation of protein by SDS – PAGE
4. Separation of amino acids by paper chromatography& TLC
5. Separation of pigments by colomn chromatography
6. Isolation of cell organelles by differential centrifugation

(For Candidates Admitted from 2018 Onwards)
HOLY CROSS COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS
Programme: B.Sc., Biotechnology
First Year - Semester – II

Course Title	Allied Optional –III Bioinformatics (Theory cum Lab)
Total Hours	60
Hours/Week	4 Hrs Wk
Code	U18BT2AOT05
Course Type	Theory Cum Lab
Credits	3
Marks	100

General Objective

The paper enables the students to familiar with all the available databases and their related software to analyze and compare the sequence and structure of the biomolecules. The students can predict the genes responsible for the defect using gene prediction method

Course Objectives:

After completion the student will be able to

CO No.	Course Objectives
CO-1	Understand the overview of bioinformatics and the set of databases utilized for data retrieval, analysis and manipulation.
CO-2	Compute the significant relationship between two or more biological sequences using bioinformatics tools.
CO-3	Study the different types of protein secondary structures and its associated structure prediction tools in bioinformatics.
CO-4	Study the different types of protein secondary structures and its associated structure prediction tools in bioinformatics.
CO-5	Understand the set of databases utilized for data retrieval, analysis and manipulation and able to apply the tools in analysis.

UNIT -I **12hrs**

Overview of Bioinformatics – Scope-Application-History-Resources – NCBI –EBI, ExPasy-Introduction to Biological Database. Types of Biological databases. Nucleotide Sequence Databases- Genbank, DDBJ, EMBL. Protein Sequence Databases- Swissprot, TrEMBL. Protein Structure Database- PDB. Derived Databases- Prosite, Pfam. Literature Databases- Pubmed, OMIM.

Extra Reading (Key words): *Newly developed databases*

Unit – II **12hrs**

Sequence analysis – Sequence alignment methods- Pairwise sequence alignments – BLAST, FASTA ,multiple sequence alignment,Clustal X, phylogenetic analysis.

Introduction to Genomics-Types of Genomics-Functional Genomics, Structural and Copmarative Genomics- Map Viewer-Genome database-GOLD Database-Metabolic Pathway Database- KEGG.

Extra Reading (Key words): *Statistical methods and scoring functions*

UNIT- III **12hrs**

Protein Secondary structure prediction – Use of sequence pattern, leucine zipper, coiled coil, transmembrane, signal peptide, cleavage site Chou-Fasman, Garnier-Osguthorpe-Robson (GOR) methods

Extra Reading (Key words): *Protein-protein interaction networks and patterns*

UNIT- IV **12hrs**

Protein Structure Prediction

Prediction of 3D structures by comparative modeling-Homology modeling, fold recognition by threading,ab-initio prediction. Protein Visualisation Tools-Rasmol and SwisspdbViewer.

Extra Reading (Key words): *Tools and software packages used in homology modeling*

UNIT- V (PRACTICAL)

1. Nucleotide Sequence database
   - Genbank
   - DDBJ
   - EMBL
2. Protein Sequence database
   - Swissprot
3. Protein Structure Database
   - PDB
4. Literature Database
   - Pubmed, OMIM
5. Visualization Tools
   - Rasmol
6. Metabolic Pathway Database
   - KEGG
7. Map Viewer

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

Course Outcomes:

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Understand the history and basic concepts in bioinformatics.	PSO 1	U
CO-2	Knowledge on the informative databases available for all the biological macromolecules.	PSO1	U

CO-3	The global and local sequence alignment tools and their importance were conceptualized.	PSO 2, 3	An
CO-4	Study of various protein structure prediction methods through computational approaches.	PSO 3	R
CO-5	Understanding the significance of gene prediction methods.	PSO 1	U
CO-6	Apply the tools and software in the analysis of nucleic acid and protein.	PSO 2	E

The learners will be able to nurture employability skill in laboratories as skilled person, research analyst in biotechnology industries or as R&D scientist in the companies after taking up their research career, apply the software as bioinformatics tools in biomedical sciences.

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

TEXT BOOK:

1. Attwood. T.K and Parry Smith D.J,(2004), Introduction to Bioinformatics, 1st Edition, Pearson Education Ltd, NewDelhi.

REFERENCE BOOKS

1. Arthur M. Lesk, Introduction to Bioinformatics, Oxford University Press, New Delhi, 2003.
2. Baxevanis and B.F. Ouellette. Bioinformatics: A practical Guide to the Analysis of Genes and Proteins, Wiley- Interscience, Hoboken, NJ, 2005.
3. D. Higgins and W. Taylor (Eds), Bioinformatics- Sequence, structure and databanks, Oxford University Press, New Delhi, 2000.
4. David W. Mount.Bioinformatics Sequence and Genome Analysis. 2001. Cold Spring Harbor Laboratory Press.
5. Jeffrey et al. 2000. Structural genomics and its importance for gene function analysis. *Nature Biotechnology*. 18:283 – 287

(For Candidates Admitted from 2018 Onwards)
HOLY CROSS COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS
Programme: B.Sc., Biotechnology
First Year - Semester – II

Course Title	Allied Optional –III Biostatistics & SPSS (Theory cum Lab)
Total Hours	60
Hours/Week	4 Hrs Wk
Code	U18BT2AOT06
Course Type	Theory Cum Lab
Credits	3
Marks	100

General Objectives:

This paper enables the students to describe the fundamental concepts, procedures, applications of statistics; the main principles of probability, statistical theory and the mathematical foundation which can be applied to other fields such as Actuarial Science and Computer Science

Course Objectives:

The learner will be able to

CO No.	Course Objectives
CO-1	Estimate the measures of central tendency and describe the different indications of the central value in the distribution.
CO-2	Critically appraise the association between two variables and more than two variables using correlation and regression analysis.
CO-3	Observe and utilize the various methods of hypothesis testing and assess the functions of different elements of probability.
CO-4	Apply the concept of matrices algebra and vector algebra in Bioinformatics algorithms.
CO-5	Examine the Basic differentiation of algebraic and trigonometric functions.

UNIT – I **12 hrs**

Basics of Statistics - Nature of biological and clinical experiments – collection of experimental data - Measures of central tendency of a set of observations - Purpose of statistical investigations - arithmetic mean - mean of grouped data - median – mode - range, mean deviation, variants and standard deviation.

Statistical Package for Social Sciences (SPSS) - Introduction to SPSS for windows - data entry on SPSS - Variable naming- Analysis of data - Formulation of frequency tables. Applications of SPSS.

Extra Reading/Key words: *Statistics in Bioinformatics.*

UNIT – II **12hrs**

Correlation and Regression - Scatter diagram – Karl Pearson's Coefficient of Correlation - Correlation Coefficient for a bivariate frequency distribution – Rank correlation - Linear regression - Principles of least squares – Student's't' test for mean, difference of means – paired't' test for difference of means – test for correlation and regression coefficients – Chi-square test for goodness of fit and independence of attributes - Simple problems based on biochemical data.

Extra Reading/Key words: *Statistics module, rating scales*

UNIT – III **12hrs**

Basic Concepts of Probability - Sample space and events - The use of counting methods in probability - Addition law - Conditional probability - Simple problems involving the estimation of probabilities - Normal Distribution and Binomial distribution – Z-score, P-value and E-value.

Extra Reading/Key words: *Probability in Bioinformatics*

UNIT – IV **12hrs**

Matrices: Matrix algebra – Types of matrices – determinant – inverse, rank of matrix – solution of simultaneous equations.

Vectors: Vector algebra - addition and subtraction of vectors – product of vectors, dot & cross products - scalar triple product – vector calculus – gradient, divergence, curl of a vector & identities – applications.

Extra Reading/Key words: *Matlab,Minitab*

UNIT – V **12hrs**

Differentiation and Integration

Basic differentiation of algebraic and trigonometric functions – Maxima and Minima - Integration of simple functions - Definite and non-definite integrals – Table of integrals – applications.

Extra Reading/Key words: *Dataport, Datamining*

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

Course Outcomes:

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Study on data collection, analysis, interpretation and documentation.	PSO 1	U
CO-2	Investigate the SPSS software packages in data analysis and evaluations.	PSO 2	R
CO-3	Familiarize in the concepts of measures of central	PSO 2	Ap

	tendencies.		
CO-4	Analysis of correlation and regression between two variables and perform hypothesis testing.	PSO 1	R
CO-5	Study the basic concepts and laws in probability distribution.	PSO 4	An
CO-6	Apply statistical hypothesis testing including Chi-square, F‟ test, ANOVA in identification of significant relationship between two or multiple variables.	PSO 4	U

The students gain knowledge on the basics of research that pay way in finding their careers involving teaching, research, and data analyst in the scientific data for public health, life sciences, and survey research.

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

Text Books:

1. Jerold. H. Zar. 2010. Biostatistical analysis (Fifth Edition). Prentice Hall.

Reference Books:

1. D.W. Jordan and P. Smith, Mathematical Techniques, Oxford University Press, New Delhi, 1997.s
2. E. Batschelet, Introduction to Mathematics for Life Scientists, 2nd Edition., Springer International Student Edition., Narosa Publishing House, New Delhi, 1991.
3. L. Forthofer, Introduction to Biostatistics, Academic Press, 1995.
4. Robert R. Sokal and F.J. Rohlf, Introduction to Biostatistics (Biology- Statistics Series), W.H. Freeman & Company, New York, 1987.
5. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical, Statistics, 11th Edition, Sultan Chand & Sons, New Delhi, 2002.

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

Course Title	SKILL – BASED ELECTIVE 1: SOFT SKILL DEVELOPMENT
Total Hours	30
Hours/Week	2
Code	Code U15RE2 SBT01
Course Type	Theory
Credits	2
Marks	100

General Objective:

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

Course Outcomes:

The student will be able to

1. Understand the importance of self-awareness, values and leadership skills in capacity building
2. Understand and analyze the factors affecting interpersonal skills
3. Understand and evaluate the concepts of vision, mission and goals for corporate skills
4. Understand, apply and analyze the importance of body language, time management and stress management
5. Understand the concept and need for self-development plan

UNIT I: **6 hrs**

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.

Extra reading / Key Words: *Biographies of any 2 Indian leaders*

UNIT II : **6 hrs**

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

Extra reading / Key Words: *Tips for building relationship*

UNIT III: **6 hrs**

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

Extra reading / Key Words: *Group dynamics and communication skills*

UNIT IV: **6 hrs**

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.

Extra reading / Key Words: *Polite conversations and dialogue skills*

UNIT V: **6 hrs**

Self Development Plan Concept and Need for Self Development Plan – Preparing Self Development Plan 9 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.

Extra reading / Key Words: *Case study*

Note: Extra reading/Key words are only for internal testing(Seminar/Assignment) Course

Course Outcome:

1. Explain the importance of self awareness, values and leadership skills in capacity building
2. Analyze the factors affecting interpersonal skills.
3. Evaluate the concepts of vision, mission and goals for corporate skills
4. Apply and analyze the importance of body language, time management and stress management
5. Summarize the concept and need for self development plan

REFERENCES:

1. Alex K.(2012) Soft Skills – Know Yourself & Know the World, S. Chand & Company Ltd., New Delhi
2. Meena K. Ayothi V. (2013). A Book on Development of Soft Skills (Soft Skills: A Road Map to Success), P.R. Publishers & Distributors, Trichy.
3. Francis Thamburaj S.J. (2009). Communication soft skills for Professional Excellence, 1st Ed., Grace Publishers, Rathan Reddy B.(2005). Team Development and Leadership, Jaico Publishing House, Mumbai.

(For candidates admitted from 2018 onwards)
HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2
B.A./ B.Sc.,/B.Com./BCA & BBA, DEGREE EXAMINATION
SEMESTER II / III

Course Title	**SKILL – BASED ELECTIVE 2: SUSTAINABLE RURAL, DEVELOPMENT AND STUDENTS SOCIAL RESPONSIBILITY**
Total Hours	**30**
Hours/Week	**2**
Code	**U15RE2 SBT01**
Course Type	**Theory**
Credits	**2**
Marks	**100**

General Objective:

The Student will be able to understand the concept of natural resources and resource mapping of villages and strengthen their leadership qualities, keeping in mind their responsibilities towards society.

Course Objectives:
The student will be able to:

1. understand the functioning of NGO's and SHG's
2. educate themselves about the different farming methods.
3. practice alternative agricultural methods
4. understand the need for social responsibility through NCC.
5. understand the Leadership and Man Management.

Unit – I **6hrs**

Village – Survey of natural resources and resource mapping of villages , village level Participating Approach (VLPA) – Role of NGO'S and SHG'S – Impact of the Green Revolution.
Extra reading/Key word: *resource mapping tools*

Unit –II **6hrs**

Alternative agriculture models – Traditional Farming – Organic Farming – Zero budget farming – Precision Farming ,Terrace Farming and Kitchen garden.
Extra reading / Key word: *Practices in India*

Unit – III **6hrs**

Elements in Alternative Agriculture models ,Vermi compost, Azolla, Amirthakarasal ,Mulligai Puchiviratti and neem products

Extra reading/Key word: *Government policy for Alternative Agriculture farming.*

Unit IV **6hrs**

Aims of NCC , MOTTO , Cardinal Principles, Equivalent Rank (Army, Navy ,Airforce)

Extra reading/Key word: *Benefits of being an NCC cadet.*

Unit –V **6hrs**

Leadership and Man Management – duties of citizen, leadership Training – Types, qualities – Discipline, Duty, Moral – Man Management, Civil Defense – Aims, Types, Services, Problems.

Extra reading/Key word: *Defense recruitment modes.*

Note: Extra Reading/ keywords are only for Internal Testing (Seminar/ Assignments)

Course Outcome:

1. Explain the functioning of NGO's and SHG's
2. Summarize themselves about the different farming methods.
3. Explain the alternative agricultural methods
4. Point out the need for social responsibility through NCC.
5. Evaluate the Leadership and Man Management.

REFERENCES:

1. Packages of organic practices from Tamil Nadu Center for Indian Knowledge System(CIKS)
2. Tracey, S. and Anne, B. (2008). Sustainable development linking economy, society, environment. OECD insights. 3.www.fao.org.in

(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 **CODE: U15VE2LVBO1**
CREDIT : 1 **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 Biblex
- 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. (For Candidates admitted from June 2015.

(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 **CODE: U15VE2LVC01**
CREDIT : 1 **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 – Paschal Mystery

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.

(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 **CODE:U15VE2LVE01**
CREDITS : 1 **MARKS : 100**

OBJECTIVES:
To enable the students to understand and appreciate all Religions and Culture
To help the students to becom
To 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.