HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
DEPARTMENT OF ZOOLOGY
CHOICE BASED CREDIT SYSTEM
UG COURSE PATTERN B.Sc. ZOOLOGY (SPECIALIZATION IN BIOTECHNOLOGY)
(FOR STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2015 onwards)

PROGRAMME – B.Sc. ZOOLOGY

PO NO.	PROGRAMME OUTCOMES Upon completion of the B.Sc. Degree programme, the graduate will be able to
PO–1	Gain knowledge in basic biological principles and understands the interdependence among various organisms and the environment.
PO–2	understand the scientific methods, apply the knowledge of internal structure of cells, its functions in control of various metabolic functions
PO–3	Do systematic investigations in order to establish facts and reach new conclusions
PO–4	Apply the knowledge and understanding of zoology to one‟s own life and work
PO–5	Develop responsibility and concern towards the fauna and is conservation

PSO NO.	PROGRAMME SPECIFIC OUTCOMES Upon completion of these courses the student would
PSO–1	Know the fundamental concepts of zoological sciences and biotechnology
PSO–2	Be able to comprehend and apply accurately and creatively the principles of taxonomy, cellular and molecular biology, genetics, ecology and evolution.
PSO–3	Perform experimental procedures and interpret the results in the areas of physiology, ecology, cell biology, genetics, applied zoology, biochemistry, animal biotechnology, immunology and research methodology
PSO–4	Acquire critical interrogatory skills on various biological and environmental issues and apply the concepts of biochemistry, immunology and developmental biology.
PSO–5	Acquire knowledge on microbes, biotechnology, bioinformatics and biostatistical tools and implement it in biological and medical fields
PSO–6	Be prepared to successfully compete in graduate programs, job placement, and become a socially responsible citizen

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
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(FOR STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2015 onwards)

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
	II	English	English Paper 1	U15EL1GEN01	6	3	100
	III	Major Core 1	Animal Diversity1:Invertebrata	U15ZO1MCT01	7	5	100
	III	Allied-1(Optional)	Basics in Biotechnology	U15ZO1AOT01	4	4	100
	III	Allied-2 (Optional)	Environmental Management	U15ZO1AOT02	4	3	100
	IV	Environmental studies	Environmental studies	U18RE1EST01	1	1	100
	IV	Value Education	Bible/Catechism/Ethics	U15VE2LVB01/ U15VE2LVC01/ U15VE2LVE01	1	-	-
	VI	Service Oriented Course		Any one activity based on the Student's choice (15 activities)	1	-	-
		Internship/Field Work/Field Project 30 hours - Extra Credit		U18SP1ECC01	-	2	100
				Total	**30**	**21**	**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/ U19HN2HIN02/ U16FR2FRE02	5	3	100
	II	English	English Paper II	U15EL2GEN02	6	3	100
	III	Major Core 2	Animal Diversity-2: Chordata	U15ZO2MCT02	5	5	100
	III	Major Core 3	Practical-I (Animal Diversity I & II)	U15ZO2MCP03	5	4	100
	III	Allied-3 (Optional)	Basics in Bioinformatics	U15ZO2AOT03	4	3	100
	IV	Skill Based Elective-1	Soft Skill Development	U15RE2SBT01	2	2	100
	IV	Skill Based Elective-2	Sustainable Rural Development and Student Social Responsibility	U18RE2SBT02	1	1	100
	IV	Industrial Relations	Poultry Farming	U19ZO2IRT01	1	1	100
	IV	Value Education	Bible/Catechism/ Ethics	U15VE2LVB01/ U15VE2LVC01/ U15VE2LVE01	1	1	100
	VI	Service Oriented Course		Any one activity based on the Student's choice (15 activities)		-	
		Internship/Field Work/Field Project 30 hours - Extra Credit		U18SP2ECC02	-	2	100
				Total	**30**	**25**	**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
	II	English	English Paper III	U15EL3GEN03	6	3	100
	III	Major Core 4	Cell & Molecular Biology	U15ZO3MCT04	5	5	100
	III	Major Core 5	Genetics	U15ZO3MCT05	5	5	100
	III	Allied-4 (Compulsory) for Botany students	Biology of Invertebrates and Chordates	U15ZO3ACT04	4	3	100
	IV	Skill Based Elective-3*	Animal Science Skills for Physics Students-(Theory cum Lab)	U17ZO3SBP03	2	2	100
	IV	Gender Studies	Gender Studies	U15WS3GST01	1	1	100
	IV	Value Education	Bible/Catechism/ Ethics	U15VE4LVB02/ U15VE4LVC02/ U15VE4LVE02	1		
	VI	Service Oriented Course		Any one activity based on the Student's choice (15 activities)		-	
		Internship/Field Work/Field Project 30 hours - Extra Credit		U18SP3ECC03/ U18SP3ECC02	-	2	100
				Total	**30**	**24**	**800**

***Zoology students will take up SBE - 3 from Physics Department**

Semester	Part	Course	Title of the Paper	Code	Hrs/ Week	Credit	Marks
IV	I	Language	Tamil paper IV/ Hindi paper IV/ French paper IV	U15TL5NMT01/ U18HN4HIN04/ U16FR4FRE04	5	3	100
	II	English	English Paper IV	U15EL4GEN04	6	3	100
	III	Major Core-6	Practical-II (Cell biology, Genetics & Biochemistry)	U15ZO4MCP06	5	5	100
	III	Major Elective- 1	Biochemistry & Biostatistics / Aquaculture	U15ZO4MET01/ U15ZO4MET02	5	5	100
	III	Allied-5 (Compulsory for Botany students)	Zoology and Human Welfare	U15ZO4ACT05	4	4	100
	III	Allied-6 (Compulsory for Botany students)	Allied Zoology-Practical	U15ZO4ACP06	4	3	100
	IV	Value Education	Bible/Catechism/ Ethics	U15VE4LVB02/ U15VE4LVC02/ U15VE4LVE02	1	1	100
	VI	Service Oriented Course		Any one activity based on the Student's choice (15 activities)		1	
		Internship/Field Work/Field Project 30 hours - Extra Credit		U18SP4ECC04/ U18SP4ECC02		2	100
			Total		**30**	**27**	**800**

Semester	Part	Course	Title of the Paper	Code	Hrs/ Week	Credit	Marks
V	III	Major Core-7	Developmental Biology & Evolution	U15ZO5MCT07	5	5	100
	III	Major Core-8	Fundamentals of Biotechnology	U15ZO5MCT08	5	4	100
	III	Major Core-9	Biological techniques	U15ZO5MCT09	5	4	100
	III	Major Core 10	Practical-III Developmental Biology, Evolution, Microbiology, Biotechnology& Bioinformatics	U15ZO5MCP10	5	4	100
	III	Major Elective-2	Microbiology & Bioinformatics/ Applied Entomology	U15ZO5MET03/ U15ZO5MET04	5	4	100
	III	Non-Major Elective -1	Ornamental Fish Culture	U15ZO5NMT01	2	2	100
	IV	Skill Based Elective-4*	Animal Science Skills for Chemistry students-(Theory cum Lab)	U17ZO5SBP04	2	2	100
	IV	EXTRA CREDIT	Online Course	U19ZO5OCT01	-	2	100
		Internship/Field Work/Field Project 30 hours - Extra Credit		U18SP5ECC05/ U18SP5ECC02	-	2	100
	IV	Value Education	Bible/Catechism/ Ethics	U15VE6LVB03/ U15VE6LVC03/ U15VE6LVE03	1	-	
				Total	**30**	**27+2 (extra Credit) =29**	**900**

***Zoology students will take up SBE - 4 from Chemistry Department**

Semester	Part	Course	Title of the Paper	Code	Hrs/ Week	Credit	Marks
VI	III	Major Core-11	Animal Physiology	U15ZO6MCT11	6	5	100
	III	Major Core-12	Applied Biotechnology	U15ZO6MCT12	6	5	100
	III	Major Core-13	Practical-IV Animal Physiology, Environmental Biology & Immunology	U15ZO6MCP13	6	5	100
	III	Major Elective-3	Immunology / Environmental Science	U15ZO6MET05 / U15ZO6MET06	5	5	100
	III	Non Major Elective-2	First Aid and Home Nursing	U15ZO6NMT02	2	2	100
	IV	Skill Based Elective-5	Computer Literacy for Zoology	U19ZO6SBT05	2	2	100
	IV	Skill Based Elective-6	Research Methodology (Theory Cum Project)	U15DS6SBT06	2	2	100
	IV	Value Education	Bible/Catechism/Ethics	U15VE6LVB03/ U15VE6LVC03/ U15VE6LVE03	1		
	V		RESCAPES-Impact study	U15RE6ETF01		1	100
		Internship/Field Work/Field Project 30 hours - Extra Credit		U18SP6ECC06/ U18SP6ECC02	-	2	100
				Total	**30**	**29**	**900**
				Grand Total	**180**	**153+2**	**4500**

HOLY CROSS COLLEGE (Autonomous), Tiruchirappalli - 620 002.

TAMIL DEPARTMENT

For Candidate admitted from 2015 onwards

First Year - Semester – I

Course Title	முதலாமாண்டு – முதற்பருவம்
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
CO-1	தமிழ் இலக்கியப் பரப்பையும்,விழுமியங்களையும் அறிமுகப்படுத்துதல்.
CO-2	தமிழ் மொழியின் தொன்மை, தாய்மொழிப்பற்று, தன்னம்பிக்கை சூழல்களை எதிர்கொள்ளும் திறன் முதலியவற்றை அறிந்து கொள்வர்.
CO-3	கவிதையின் வாயிலாக அன்பு உணர்வினை வளர்க்கச் செய்தல்.
CO-4	கலைச்சொற்கள் வாயிலாக பிறமொழிச் சொற்களை ஆராயும் தன்மைப் பெறுவர்.
CO-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 தெய்வம **18 Hrs**
5. ந. பிச்சமூர்த்தி – ஒளியின் அழைப்பு
   தி
6. வைரமுத்து – ஐந்து பெரிது ஆறு சிறிது
7. சிற்பி – ஒரு கிராமத்து நதி

மநல றுழசனள (நுஒவசய
சுநயனபை)

1. ந. காமராசு கவிதைகள்
2. தமிழன்பன் கவிதைகள்

அலகு:2 செய்யுள் -பேசும்பார்

8. கல்யாண்ஜி பேசும்பார் என் கிளி
9. நிர்மலா சுரேஷ் - தைலச்சிமிழும் தச்சன் மகனும்
10. இரா. மீனாட்சி - ஒரு கோதை **18Hrs**
10. விஜி - குரங்கு மனிதன்
11. பா. சத்திய மோகன் - எங்கெங்குகாணினும

12. ஹைகூ கவிதைகள்

key Words (Extra Reading)

1. ந.முத்துக்குமார் கவிதைகள்
2. செனட்ரியூ கவிதைகள்

அலகு:3 **18Hrs**

தமிழ் இலக்கிய வரலாறு

தமிழாய்வுத்துறை வெளியீடு 20-ஆம் நூற்றாண்டு (தற்காலம்)

key Words (Extra Reading)

தமிழ் இலக்கிய வரலாறு -மு.வரதராசன்

அலகு:4 வெளியீடு) **18Hrs**

படைப்பிலக்கியம் - சிறுகதைத் தொகுப்பு(துறை

அலகு:5 **18Hrs**

பொதுப்பகுதி

-

கலைச்சொற்கள்

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	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	cultural language of various departments and similar English words to have knowledge in both.	PSO 4	U

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

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	**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 2018 onwards)
HOLY CROSS COLLEGE (AUTONOMOUS), Tiruchirapalli – 620002
PG AND RESEARCH DEPARTMENT OF ENGLISH
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

GrammarSentence patterns (5 basic types)

VocabularyAppropriate 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

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
B.Sc. ZOOLOGY (Specialization in Biotechnology)
(For the candidates admitted from 2015 onwards)
First Year - Semester I

Course Title	**Major Core: 1 Animal Diversity 1: Invertebrata**
Total Hours	**105**
Hours/Week	**7**
Code	**U15ZO1MCT01**
Course Type	**Theory**
Credits	**5**
Marks	**100**

General Objectives

The student will be able to acquire knowledge of the classification of invertebrates upto order, describe their organization with examples of biological importance and analyse the coral wealth of India.

Course Objectives

The student will be able to

CO 1	understand the classification, characteristics and analyze the structural organization of Protozoa, Porifera and Coelenterata
CO 2	understand the classification, characteristics and analyze the structural organization of Platyhelminthes, Aschelminthes, Nematode and Annelids
CO 3	Understand the classification, characteristics and analyze the structural organization of Arthropods
CO 4	understand the classification, characteristics and analyze the structural organization of Mollusca and Echinodermata
CO 5	understand the classification, characteristics and analyze the structural organization of Hemichordate, phylogeny and levels of organization in invertebrates

UNIT I: Protozoa to Coelenterata **(21hrs)**

Concepts, Methods of grouping, Methods and Significance of
Taxonomy Phylum: Protozoa, Type study : Paramecium
Phylum: Porifera, Type study : Sponge
Phylum: Coelenterata, Type study : Obelia
Coral Wealth of India

Extra Reading/Key words: *Coral reefs, identification of sponges*

UNIT II: Platyhelminthes to Annelida **(21 hrs)**

Phylum:Platyhelminthes, Type study: Tape worm
Phylum: Aschelminthes, Type study: *Ascaris*
Nematode Parasites of Man – *Enterobius, Ancylostoma, Wuchereria, Dracunculus* Phylum: Annelida, Type study: Leech

Extra Reading/Key words: *Common parasites in your locality*

UNIT III: Arthropoda **(21 hrs)**

Phylum: Arthropoda- Classification of Phylum up to Classes
Class: Insecta – Classification up to Orders, Type study: Cockroach

Extra Reading/Key words: *Identify Arthropods in your locality*

UNIT IV: Mollusca and Echinodermata **(21 hrs)**

Phylum: Mollusca, Type study :Pila
Phylum: Echinodermata, Type study : Starfish

Extra Reading/Key words: *Report on star fishes in Rameswaram*

UNIT V Hemichordata and Phylogeny of Invertebrata **(21 hrs)**

Phylum: Hemichordata, Type study: Balanoglossus.
Phylogeny of Invertebrata, Levels of organization

Extra Reading/Key words: *Evaluate the phylogeny of any Arthropod*

Note: General and Distinguishing characters of classes. An outline classification up to orders and study of the representative types. Applicable to all 5 units

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Outline the Classification and characterize structural organization of Protozoa, Porifera and Coelenterate	PSO 1,2,3,6	U, An
CO-2	Identify and classify the various organisms belonging to Protozoa, Porifera and Coelenterate	PSO 2,3.6	U, An
CO-3	Outline the Classification and characterize the structural organization of Platyhelminthes, Aschelminthes, Nematode and Annelid	PSO 2,3,6	U, An
CO-4	Identify and classify the various organisms belonging to Platyhelminthes, Aschelminthes, Nematode and Annelid	PSO 2,3,6	U, An
CO-5	Outline the Classification and characterize structural organization of Arthropods, Mollusca, Echinodermata and hemichordate	PSO 2,3,6	U, An
CO-6	Identify and classify the various organisms belonging to Arthropods, Mollusca, Echinodermata and hemichordata	PSO 2,3,6	U, An
CO-7	Relate the phylogeny and levels of organization in invertebrates	PSO 1,2,3,6	U, An

Text Book:

Ekambaranatha Ayyar.M and Ananthakrishnan.T.N. (1994). Manual of Zoology, Vol I, Part –I, S. Viswanathan Pvt. Ltd. Madras.

Shipley, A. E. (2013). *Zoology of the Invertebrata: A Text-Book; For Students*. London: Forgotten Books. (Original work published 1929)

Books for Reference:

Agarwal, V.K. (2000) Invertebrate Zoology. S. Chand & Co. New Delhi.

Agarwal, V.K. and Gupta U. (2004) Animal Taxonomy. S. Chand & Co. New Delhi
Jordan, E.L. and Verma, P.S. (2009), Invertebrate Zoology 14th Ed, S. Chand & Co., New Delhi
Kotpal,R.L.(2011).Modern Text Book of Zoology, Invertebrates Animal Diversity –I,10th Ed. Rastogi Publications
Mukerji, D (1977) Textbook of Zoology Vol I & II The New book stall, Calcutta.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2 PG & RESEARCH DEPARTMENT OF ZOOLOGY (For candidates admitted from 2015 onwards)

First Year - Semester I

Course Title	**ALLIED: 1 (Optional) – BASICS IN BIOTECHNOLOGY**
Total Hours	**60**
Hours/Week	**4**
Code	**U15ZO1AOT01**
Course Type	**Theory**
Credits	**4**
Marks	**100**

General Objective

The student will be able to classify prokaryotes and eukaryotes, describe the structure of DNA, RNA and proteins and apply the techniques of genetic engineering in medicine, waste water treatment, plant and animal tissue culture.

Course Objectives

The student will be able to

CO 1	Understand and analyze the structure of prokaryotic and eukaryotic cell, and protein synthesis
CO 2	Understand the steps in recombinant DNA technology and DNA isolation and identification
CO 3	Analyse and apply knowledge of recombinant DNA technology in the production of insulin, vaccines, monoclonal antibodies and gene therapy
CO 4	Analyse and apply the knowledge of biotechnology in plant tissue culture, biopesticides and SCP production
CO 5	Apply and evaluate the knowledge of biotechnology in solving environmental issues and biopharming

UNIT I - Basics and Scope of Biotechnology (12 hrs)

Scope of biotechnology - biotechnology as an interdisciplinary pursuit. Outline structure of prokaryotic and eukaryotic cells. Brief account of structure, synthesis and functions of DNA, RNA and proteins.

Extra Reading/Key words: *Biotechnological tree*

UNIT II - Methods in Biotechnology (12 hrs)

Restriction enzymes, vectors (plasmid and bacteriophage) - Recombinant DNA technology: Isolation of DNA, linking of DNA, gene transfer technique, selection and screening of recombinant clones - genomic and cDNA library.

Demonstration: Isolation of Genomic DNA, amplification of DNA by PCR, identification of DNA by AGE

Extra Reading/Key words: *Microinjection in fishes*

UNIT III - Medical biotechnology - **(12 hrs)**

Production of recombinant insulin and HBV vaccine. Monoclonal antibodies and their uses Stem cell research. Gene therapy: protocol, ADA as an example.
Extra Reading/Key words: *Raising antisera in animals*

UNIT IV -Plant Biotechnology (12 hrs)
Plant tissue culture and transgenic plants. Biopesticides and biofertilizers. Production of penicillin and single cell protein (SCP).
Extra Reading/Key words: *Bt brinjal*

UNIT V - Environmental and Animal Biotechnology (12 hrs)
Sewage treatment. Superbug and oil degradation. Biofuels, biosensors & biochip. Animal cloning, Transgenic fish and livestock, biopharming.
Extra Reading/Key words: *Graphine*

Note: Texts given in the Extra Reading/Keywords must be tested only through Assignment and seminars.

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Evaluate and discuss the structure of Nucleic acid and proteins.	PSO-1,5	E
CO-2	List and assess the enzymes and molecular tools involved in rDNA Technology.	PSO-1,6	E
CO-3	Discuss the strategies for developing vaccine and explain the importance of monoclonal antibodies.	PSO-1,6	C
CO-4	Elaborate and discuss the prospects for developing stem cell and gene therapy against infectious diseases.	PSO-1,3,6	C
CO-5	Explain and examine the processes involved invitro tissue culturing & methods in plant biotechnology industry.	PSO-1,5	U, An
CO-6	Examine and interpret the environmental issues and new technology in animal pharming.	PSO-1,5,6	An, E

Text Book:

R. C. Dubey and D. K. Maheswari (1994) Text book of Biotechnology, Chand and Co. New Delhi.

Books for Reference:

Gupta, P.K. (2004) Elements of Biotechnology, Rastogi Publication, Meerut.
Irfan Ali Khan and Athiya Khanum (2004) Fundamentals of Molecular biology, Genetic engineering and Biotechnology, Ukaaz Publication, Hyderabad
Old R.W. and Primrose. S.B.(1989) Principles of Gene Manipulations,BlackwellScientific Publications.
Primrose. S.B. and R.M. Twyman (2006), Principles of Gene Manipulation and Genomics Blackwell Publishing, UK.
Satyanarayana (2006) Biotechnology, Books and Allied (P) Ltd., Kolkata.
Smith John.E. (1988) Biotechnology, Edward Arnold, London.
Walker, J.M. and Gingold, E.D. (Eds) (2012), Molecular Biology and Biotechnology, Panima Educational Book Agency. New Delhi

Watson, J.D., Michael G., Tam Witkowski and Mark Zollew (1999) Recombinant DNA, Scientific American Books, New Delhi

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2 PG & RESEARCH DEPARTMENT OF ZOOLOGY (For candidates admitted from 2015 onwards)

First Year - Semester I

Course Title	**ALLIED: 2 (Optional) - ENVIRONMENTAL MANAGEMENT**
Total Hours	**60**
Hours/Week	**4**
Code	**U15ZO1AOT02**
Course Type	**Theory**
Credits	**3**
Marks	**100**

General Objective:

The student will learn about the global ecosystem, concept of community and population, pollution, biodiversity, and disaster management and environmental economics.

Course Objectives:

The student will be able to

CO 1	understand the components of ecosystem and impact of man on the ecological balance
CO 2	understand and analyses the concept of community and population
CO 3	analyse the impact of pollution
CO 4	understand and evaluates the importance of biodiversity and its conservation
CO 5	evaluate the causes of disasters and the strategies of its management

UNIT I: Scope of environmental management (12 hrs)

Global ecosystem and its components- Man‟s manipulation of environment and its impact on ecological balance Measures for sustainable environmental management-Abiotic factors- water; oxygen; carbon dioxide; temperature; light- photoperiodism; soil – types and profile. **Extra Reading/Key words:** *changes in rainfall and summer temperatures*

UNIT II: Community and Population (12 hrs)

Ecological succession- concept, process, concept of climax community. Animal Population: Concept, attributes-density, natality, mortality, growth form, fluctuations, equilibrium, self regulation. World human population- industrialization, Urbanization and environmental degradation, Biomagnification, Pest outbreak- IPM. **Extra Reading/Key words:** *population explosion*

UNIT III: Pollution (12 hrs)

Radiation pollution episodes: Hiroshima-Nagasaki, Chernobyl. Water Pollution: Effects, Minamata episode, Gulf war 1990, Bombay high oil slick 1993. Anaerobic and aerobic treatment of sewage water- sewage as resource-WHO standard for drinking water. Air Pollution – acid rain, Stone leprosy and Taj Mahal, Bhopal Tragedy smog, global warming, ozone depletion and ecological disturbance-emission standards and control measures.

Extra Reading/Key words: *Fukushima, impact of photochemical smog on transport*

UNIT IV: Biodiversity and Conservation (12 hrs)

Deforestation – causes, impact and management. Eco-tourism – India as a mega diversity nation – hot spots of biodiversity – threats to biodiversity – endangered species of India and conservation measures.

Extra Reading/Key words: *Sunderbans, silent valley*

UNIT V: Disaster Management and Environmental Economics (12 hrs)

Earth quakes, floods and cyclones- Causes, magnitude, predictions and control measures. International Environmental Organization and Conventions. Environmental Economics – Environmental Auditing. Environmental Acts of India.

Extra Reading/Key words: *Tsunami, tectonic plates*

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Illustrate the components of ecosystem and relate the impact of man on the ecological balance	PSO1,2	U
CO-2	Analyze the concept of community and population	PSO2	An
CO-3	Test for the impact of pollution	PSO4	An
CO-4	Interpret the importance of biodiversity and its conservation	PSO3	E
CO-5	Justify the causes of disasters	PSO4	E
CO-6	Recommend the strategies of its management	PSO4,5	E

Text Book:

Odum, E.P.(1971). Fundamentals of Ecology. W.B. Saunders Company, Phil. London.

Books for Reference:

Agarwal, K.C. (2001). Environmental Biology, Nidi Publication Ltd. Bikaner.
Chairas, D.D. (1985). Environmental Science. The Benjamin Cummings Publishing company., Inc.
Clarke George, L. (1954). Elements of Ecology. Hohn Wiley and SONS, Inc.
Hodges, L. (1977). Environmental Pollution, II Edition. Holt, Rinehart and Winston, New York.
Krebs, C.J. (2001). Ecology.VI Edition.Benjamin Cummings.
Nebel, B.J. and Wright, R.T.(1996). Environmental Science, Prentice Hall, New Jersey Odum, E.P. (2008) Fundamentals of Ecology.Indian Edition. Brooks / Cole.
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.
Sinhe, A.K. Boojh, R. and Vishwanathan, P. N., (1989). Water Pollution Conservation and Management, Gyansdaya Prakashan, Nainital.

(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 / V

Course Title	ENVIRONMENTAL STUDIES
Total Hours	15
Hours/Week	1
Code	U18RE1EST01/ U18RE5EST01
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:

Agarwal, K.C. (2001). Environmental Biology, Nidi Publication Ltd. Bikaner.

Chairas, D.D. (1985). Environmental Science. The Benjamin Cummings Publishing company., Inc.

Clarke George, L. (1954). Elements of Ecology. Hohn Wiley and SONS, Inc.

Hodges, L. (1977). Environmental Pollution, II Edition. Holt, Rinehart and Winston, New York.

Krebs, C.J. (2001).Ecology.VI Edition.Benjamin Cummings.

Nebel, B.J. and Wright, R.T.(1996). Environmental Science, Prentice Hall, New Jersey

Odum, E.P.(2008) Fundamentals of Ecology.Indian Edition. Brooks / Cole.
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.
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 Hrs Wk
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 Objectives
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 நாலாயிர திவ்யப்பிரபந்தம் - குலசேகராழ்வார் (பெருமாள் திருமொழி)

key Words (Extra Reading)

1. அற்புதத்திருவந்தாதி - காரைக்கால் அம்மையார்
2. திருவாய்மொழி - நம்மாழ்வார்

அலகு:2 செய்யுள் **15 Hrs**

6. மீனாட்சியம்மை பிள்ளைத்தமிழ் - குமரகுருபரர்
7. இரட்சணிய யாத்திரிகம் (சிலுவைப்பாடு) - எச்.ஏ.கிருட்டிணப்பிள்ளை
8. வேதநாயக் சாஸ்திரியாா ் 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 Addressed	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 2	AP
CO-4	to enrich literature reading, creativity and vocabulary strength	PSO 3	U
CO-5	To volunteer to write application letter without any set back	PSO 4	U

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

பார்வை நூல்கள்

செய்யுள் - தமிழாய்வுத்துறை வெளியீடு

தமிழ் இலக்கிய வரலாறு - தமிழாய்வுத்துறை வுத்துறை வெளியீடு

நாவல்

கல்கி - பார்த்திபன் கனவு

கடித இலக்கியம் - பயிற்சி ஏடு

(For the candidates admitted from June 2019 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002

DEPARTMENT OF HINDI

SEMESTER – II

Course Title	**PART – I LANGUAGE** **HINDI – II DRAMA , NOVEL AND GRAMMAR –II**
Total Hours	**75**
Hours/Week	**5Hrs/Wk**
Code	**CODE: U19HN2HIN02**
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 Objectives**
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. Nirmala
3. Kaal

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

UNIT- II **(15 Hours)**

1. Ashad ka ek dhin
2. Nirmala

3. Karak

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

UNIT- III **(15 Hours)**

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

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

UNIT- IV **(15 Hours)**

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

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

UNIT- V **(15 Hours)**

1. Ashad ka ek dhin
2. Nirmala
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	Study the situation of women in the society	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)

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.

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 2018 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS), Tiruchirapalli – 620002

PG AND RESEARCH DEPARTMENT OF ENGLISH

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)

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2 PG & RESEARCH DEPARTMENT OF ZOOLOGY I B.Sc. ZOOLOGY (Specialization in Biotechnology) (For candidates admitted from 2015 onwards) **First Year - Semester II**

Course Title	ANIMAL DIVERSITY- 2: CHORDATA
Total Hours	75
Hours/Week	5
Code	U15ZO2MCT02
Course Type	Theory
Credits	5
Marks	100

General Objectives:

To enable the student to acquire knowledge on outline classification of vertebrates upto order.

Course Objectives :

The student will be able to

3. CO	understand Geological Time Scale,Structural organisation of amphioxus and analyse classification of prochordates
4. CO	understand the outline classification of Pisces with Shark as an example and analyse the few locally available fishes of aquaculture importance.
5. CO	understand the outline classification of Amphibia and Reptiles with Frog and Calotes as an example, evaluate poisonous and non poisonous snakes.
6. CO	understand the outline classification of Aves with Pigeon as an example and analyse significance of Archaepotryx.
7. CO	understand the general characters and outline classification of prototheria,metatheria and Eutheria with Rabbit as an example.

UNIT I: Origin of Chordates and classification of Prochordates (15hrs)

Geological time scale, Origin of chordates, Vertebrate relationships and basic structure. Type study: Amphioxus Prochordates- Classification, characters and relationship.

Extra Reading/Key words: *Study of 2 extinct species*

UNIT II: Pisces (15 hrs)

General characters and outline classification upto orders with suitable examples of biological interest. Type study: Shark.

Identification and study of a few locally available fishes and fishes of aquaculture importance (Catla, Tilapia, Rohu, Carp, Anabas, Arius, Mrigal) (Lab Cum theory).

Extra Reading/Key words: *Pisciculture*

UNIT III: Amphibia and Reptilia (15hrs)

General characters and outline classification up to orders with suitable examples of biological interest.

Type study: Frog and Calotes.

Identification and study of a few Poisonous and non-poisonous snakes.

Extra Reading/Key words: *Poisonous and non-poisonous snakes in the locality.*

UNIT IV: Aves **(15hrs)**

General characters and outline classification up to orders with suitable examples of biological interest. Type study: Pigeon

Arachaeopteryx, Significance of Arachaeopteryx, Flightless birds.

Extra Reading/Key words: *Finding out endangered birds in the locality*

UNIT V: Mammalia **(15hrs)**

General characters and outline classification up to orders with suitable examples of biological interest. Prototheria, Metatheria and Eutheria

Type study: Rabbit

Differences between Prototheria, Metatheria and Eutheria.

Extra Reading/Key words: *Parental care in mammals.*

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	Compare era, epoch and period.	PSO 2	U
CO-2	List characters of prochordate.	PSO 1, 2	R
CO-3	List the characters of Pisces.	PSO 1, 2	R
CO-4	Construct a table with the characters of locally available fish to help in its identification.	PSO 2	Ap
CO-5	Explain how Frog belongs to the class Amphibia.	PSO 2	U
CO-6	Defend the given snake is poisonous or non poisonous by analyzing its characters.	PSO 2, 5	E
CO-7	Critically analyze the characters of Archaeopteryx with reptiles and birds.	PSO 2	An
CO-8	Compare and contrast Prototheria, Metatheria and Eutheria.	PSO 2	An

Text Books:

Kotpal , R.L. (2001)Modern Textbook of Zoology Chordates. Rastogi publications, Meerut.
Miller, A.S. and John P. Harvley, (1996). Zoology. Latest Edition. Wm. C.Brown Publishers.
EkambaranathaAyyar, M. and Anantha Krishnan, T. N. (1994). A Manual of Zoology Part I (Chordata). S.ViswanathanPvt.Ltd.

Books for Reference:

Arnold, G. Kluge, (1971) Chordate structure and function. Latest Edition. Macmillan. Harvey, P.F., Christine, M.J., John,B.H(2006)Vertebrate Life, Latest edition. Pearson Education Pvt.Ltd
Jordan,E.L.andVerma,P.S.(2008) Chordate Zoology S. Latest Edition Chand &Co.NewDelhi

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2

PG & RESEARCH DEPARTMENT OF ZOOLOGY
I B.Sc. ZOOLOGY (Specialization in Biotechnology)
(For candidates admitted from 2015 onwards)
First Year - Semester II

Course Title	MAJOR CORE 3: PRACTICAL I - ANIMAL DIVERSITY I & II
Total Hours	75
Hours/Week	5
Code	U15ZO2MCP03
Course Type	Practical
Credits	4
Marks	100

General Objectives:

The **s**tudent will learn the art of mounting the mouth parts of cockroach, body setae of earthworm and placoid scales of shark, dissects the digestive, nervous and reproductive system of Earthworm, Cockroach and Frog through virtual lab and classify selected animals of biological importance.

Course Objectives:

The student will be able to:

CO 1	understand the structural organization of mouth parts
CO 2	correlate the mouth parts of insects to their feeding habit
CO 3	mount the body setae, placoid scales, and mouth parts of insects
CO 4	analyze the structural organization of the different systems in Earthworm, Cockroach and Frog
CO 5	apply knowledge of classification in the identification of specimens of biological importance

1. Cockroach, House fly, Head Louse and Mosquito– Mount and labeling of Mouth parts.
   Cockroach – Flag labelling of Digestive system, Nervous system and Reproductive system.
2. Earthworm- Nervous system, Reproductive system using virtual class study and Mounting of Body setae.
3. Shark – Mounting of Placoid scales
4. Frog- Digestive system, Circulatory system (Arterial and Venous system), Urinogenital system using virtual class study. Nervous system – Flag labelling of Brain V, VII, IX and X cranial nerves and I spinal nerve study.
5. Spotters: Animal Diversity I and II
   Identification of prepared slides and specimens of Biological importance.

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Demonstrate and illustrate the structural organization of mouth parts in insects	PSO 2,3	R, U
CO-2	Compare, contrast and interpret the organization of mouth parts to their feeding habit	PSO 2,3,6	U, An
CO-3	Dissect and mount the body setae, placoid scales, and	PSO 2,3	R, U

	mouth parts of insects		
CO-4	Compare and examine the structure and function of the different systems in Earthworm, Cockroach and Frog	PSO 2,3,6	U, Ap
CO-5	Identify and utilize the knowledge of classification in the identification of specimens of biological importance	PSO 2,3,6	U, Ap

A Record of the work done is to be submitted at the time of examination

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2 PG & RESEARCH DEPARTMENT OF ZOOLOGY (For the candidates admitted from 2015onwards)

First Year - Semester –II

Course Title	ALLIED: 3 (Optional) – BASICS IN BIOINFORMATICS
Total Hours	60
Hours/Week	4
Code	U15ZO2AOT03
Course Type	Practical
Credits	3
Marks	100

General Objective:

The student will be able to understand the structure of biomolecules, types of databases, tools of proteomics and genomics, sequence alignment, phylogenetic analysis.

Course Objectives:

The student will be able to

CO 1	Remember and understand the structure of biomolecules
CO 2	Understand, analyse and evaluate the different structural databases
CO 3	Understands and analyses the proteome databases
CO 4	Understands and analyses the genome databases
CO 5	Understands and analyses, apply software and tools in sequence alignment and phylogenetic analysis

UNIT I: Basics and Scope (12 hrs)

Bioinformatics- Definition, Scope. Biomolecular Structure (Primary, secondary, tertiary and quarternary) – Proteins and Nucleic acids.

Extra Reading/Key words: A*pplication of bioinformatics*

UNIT II: Data bases (12 hrs)

Web Browsing – Structural Data bases- Introduction, primary data base, protein data bank (PDB) - Nucleic acid structural data base (NDB) - Secondary or derived data base- Molecular modeling data base (MMDB).

Extra Reading/Key words: *Softwares in development of databases*

UNIT III: Proteomics (12hrs)

Protein information resources (PIR) - Martinsried Institute for protein sequences (MIPS) – Swiss-Prot - Translated EMBL (TrEMBL) - Composite pattern Database- Structural classification of proteins (SCOP), ORF Prediction.

Extra Reading/Key words: *Docking*

UNIT IV: Genomics (12 hrs)

Genome Information Resource – European Molecular Biology Laboratories (EMBL) - DNA Data Bank Japan (DDBJ) - Gen Bank.

Extra Reading/Key words: *Gene prediction*

UNIT V: Sequence Alignment and Phylogenetic Analysis (12 hrs)

Sequence Alignment- Multiple sequence alignment – Software used in sequence alignment. Phylogenetic analysis.

Extra Reading/Key words: *Algorithm for sequence alignment*

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Illustrate the structure of biomolecules	PSO 2,4	R, U
CO-2	Interpret the data retrieved from different structural databases	PSO 5	U
CO-3	Interpret the data retrieved proteome databases	PSO 5,6	U
CO-4	Interpret the data retrieved genome databases	PSO 5,6	U
CO-5	Utilize the software and tools in sequence alignment	PSO 5,6	Ap
CO-6	Utilize the software and tools in phylogenetic analysis	PSO 2, 5	Ap

Text Book

Arthur, M.L. (2007). Introduction to Bioinformatics. Oxford Uni . Press, USA.

Books for Reference

Irfan Ali Khan and Atiya Khanum. (2003). Fundamentals of Bioinformatics. Ukaaz Publications Hyderabad, AP, India.

Jonathan , P.(2009). Bioinformatics and Functional genomics, 2nd edition. Sinauer Associates, Inc.

Lovric, J. (2011). Introducing Proteomics: From concepts to sample separation, mass spectrometry and data analysis . Wiley.

Murthy, C. S. V. (2003). Bioinformatics. Himalaya Publishing House. Mumbai, Delhi, Nagpur. Bangalore, Hyderabad, India.

Subramanian, C. (2004). A Textbook of Bioinformatics**.** Dominant Publishers and Distributors. New Delhi, India.

(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	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*

6 hrs

UNIT V:

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:

Alex K.(2012) Soft Skills – Know Yourself & Know the World, S. Chand & Company Ltd., New Delhi Meena K. Ayothi V. (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). 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 STUDENT SOCIAL RESPONSIBILITY**
Total Hours	**30**
Hours/Week	**2**
Code	**U18RE2SBT02/ U18RE3SBT02**
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

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2. PG & RESEARCH DEPARTMENT OF ZOOLOGY (For candidates admitted from 2019 onwards)

FIRST YEAR - SEMESTER - II

Course Title	**INDUSTRIAL RELATIONS:POULTRY FARMING**
Total Hours	**15**
Hours/Week	**1**
Code	**U19ZO2IRT01**
Course Type	**Theory**
Credits	**1**
Marks	**100**

General objectives:

The main objective of the programme is intended to impart basic knowledge and technical proficiency in poultry breeding, housing, management and nutrition and to create awareness about the opportunities of employment and livelihood in poultry sector.

Course objectives:

The student will be able to

CO 1	Know about poultry production in India.
CO 2	Know the classification of poultry breeding.
CO 3	Understand the poultry nutrition and feeding of poultry.
CO 4	List out the diseases of poultry and its control measures.
CO 5	Know the employment opportunities in poultry farming.

Unit I: Introduction to Poultry Farming: - Farm History – Poultry Production in India – Poultry housing – General management.

Extra reading: Future plan for poultry farming

Unit II: Poultry breeding: Classification of Poultry Breeding – layers, broiler, and other class of poultry – Indian hybrids.

Extra reading: dual purpose breeds and non-descript birds.

Unit III: Poultry Nutrition and Feeding: Fundamentals of Poultry Nutrition, Feeding of Poultry – Forms of feed, feed ingredients.

Extra reading: Nutrient analysis

Unit IV: Poultry Health Care and Bio-security Measures: Processing and Preservation of eggs and poultry Meat, Diseases of poultry, prevention and control of poultry diseases.

Extra reading: Vaccination schedule of Poultry.

Unit V: Economic importance of poultry: Enterpreunership – Scope and policies related to poultry sector.

Extra reading: Poultry Academic and Development Institutions.

Course Outcomes:

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Evaluate the present status of poultry production in India.	PSO 1	E
CO-2	Classify the poultry breeds	PSO1&3	A

CO-3	Apply different methods to prepare poultry feed	PSO 1	Ap
CO-4	Analyze the diseases of poultry and its control measures	PSO 4	An & Ap
CO-5	Develop entrepreneurship skills in poultry farming	PSO 5	C

Text Book:

1. Shukla, P. K., Blahwar, P., Sujit Nayak and A. Arun Kumar. 2014-15.. Poultry Farm Manual. Dolphin Printo-Graphics, New Delhi.

Reference Book:

1. Bell D. Donald and Weaver D. William Jr., 2007. Commercial Chicken Meat and Egg Production. 5th Edition. Springer India Pvt. Ltd., Noida.
2. Singh, R. A.,2011. Poultry Production. 3rd Edition. Kalyani Publishers, New Delhi.
3. Jull A. Morley, 2007. Successful Poultry Management. 2nd Edition. Biotech Books, New Delhi.
4. Hurd M. Louis, 2003. Modern Poultry Farming. 1st Edition. International Book Distributing Company, Lucknow.

(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: U15VE2LVB01**

CREDIT : 1 **MARKS : 100**

OBJECTIVE:

x 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

x Books of the Bible – Division into Old Testament and New Testament – History of the Bible-

x Messianic Prophecies (Isaiah 9:6,40:3,53:1-12,61:1-3,Micah 5:2)

x The Birth and Ministry of John the Baptist (Luke 1:1-80,Mat 3:1-17,14:1-12)

x The Birth, Passion, Death and Resurrection of Jesus (Luke 1:26-80,2:1-52,John 1 :18-21)

UNIT – II: MINISTRY OF JESUS

x Miracles (Mark 2:1-12,Luke 4:38-41,6:6-11,7:1-17,8:26-56,John 2:1-12)

x Parables (Luke 6:46-49,8:4-15,10:25-37,15:1-32)

x Preaching

¾ Sermon on the mount (Mat 5-7)

¾ Lord‟s Prayer (Luke 11: 1-13)

¾ Kingdom of God (Mat 13: 24-50)

x Prayer life of Jesus (Luke 5:12-16,John 11:41-45,17:1-26,Mark 14:32-42)

x Rich and Poor (Luke 16: 19-31,21:1-4)

x Women Liberation (John 4:1-30,8:1-4)

x Women in the New Testament

x Martha & Maria (Luke 10: 38- 42, John 11: 1-46)

UNIT – III: CHURCH – BIRTH AND GROWTH

x Early Church

x Birth (Acts 2:1-41)

x Unity and sharing (Acts 2:42-47,4:1-37,5:1-11)

x 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 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.

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.

HOLY CROSS COLLEGE (Autonomous), Tiruchirappalli - 620 002.

TAMIL DEPARTMENT

For Candidate admitted from 2015 onwards

Second Year - Semester – III

Course Title	இரண்டாமாண்டு – மூன்றாம் பருவம்
Total Hours	90
Hours/Week	6 Hrs Wk
Code	U15TL3TAM03
Course Type	Theory
Credits	3
Marks	100

General Objectives:

வாழ்வியல் நெறிகளாகிய அறம், பொருள், இன்பம், வீடுபேறு ஆகியவற்றின் சிறப்பினை எடுத்துரைத்தல்

- To explain the greatness of the values such as dharma, knowing the meaning of life attaining pleasure and household life.
- To create the awareness about social life.
- To strengthen the religious ideologies.

Course Objectives:

CO No.	Course Objectives
CO-1	வாழ்வியல் நெறிகளாகிய அறம், பொருள், இன்பம், வீடுபேறு ஆகியவற்றினை எடுத்துரைத்தல்
CO-2	சமயங்கள் உணர்த்தும் அறக்கருத்துக்களை அறிந்து கொள்ளச்செய்தல்.
CO-3	சோழர்கால காப்பிய இலக்கியங்கள் மற்றும் இலக்கண நூல்களை வகைப்படுத்துதல்.
CO-4	நாடகம் நடிப்பதன் வாயிலாக மாணவர்களின் திறன்களை வளர்த்தல்.
CO-5	தமிழக கோயில்களின் கலைநுட்பங்களையும், பண்பாட்டுச் சிறப்புகளையும் விவரித்தல்

அலகு:1 செய்யுள் **18 Hrs**

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

key Words (Extra Reading)
சீவகசிந்தாமணி

அலகு:2 செய்யுள; **18 Hrs**

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

அலகு:3 **18 Hrs**

தமிழ் இலக்கிய வரலாறு

சோழர் காலம்

அலகு:4 **18Hrs**

நாடகம்

சத்திய வேள்வி – அய்க்கண;

key Words (Extra Reading)
யாருக்கும் வெட்கமில்லை - சோ

அலகு:5 **18 Hrs**

கோயிற்கலை

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	the life with the nature of the people may be learned through epics and to learn	PSO 1	U
CO-2	to learn the values taught by religion	PSO 2	AN
CO-3	to remember the king choola's period epics, literature and grammar books	PSO 2	R
CO-4	to enhance the acting habit in the epics	PSO 3	U
CO-5	to make students to evaluate the art, culture and other aspects of the temples in tamil.	PSO 4	U

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

பாட நூல்கள்

1. செய்யுள் - தமிழாய்வுத்துறை வுத்துறை வெளியீடு
2. தமிழ் இலக்கிய வரலாறு - தமிழாய்வுத்துறை வுத்துறை வெளியீடு
3. நாடகம்
   அய்க்கண் - சத்திய வேள்வி
4. கோயிற்கலை - தமிழ்நாட்டிலுள்ள ஆலயங்களைக் கலை நுணுக்கத்துடன் காணுதல்

(For the candidates admitted from June 2018 onwards) **HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002 DEPARTMENT OF HINDI**

SEMESTER – III

Course Title	**PART – I LANGUAGE HINDI- III-MEDIEVAL–MODERN POETRY AND HISTORY OF HINDI LITERATURE-1 (Veergadha Kal Aur Bakthi Kal)**
Total Hours	**90**
Hours/Week	**6Hrs/Wk**
Code	**CODE: U18HN3HIN03**
Course Type	**Theory**
Credits	**3**
Marks	**100**

General Objective : To enable the students to appreciate and critically evaluate Spirituality in Hindi Literature.

Course Objectives (CO):

The learner will be able to

CO No.	**Course Objectives**
CO -1	remember, understand and evaluate the Poetry of the masters.
CO- 2	understand and analyse the history of Hindi literature in the literary works.
CO- 3	understand and analyse the cause and consequence on revolution in literature.
CO- 4	Evaluate various streams of Bhakthi kaal.
CO- 5	appreciate and analyse the works of Bihari.

UNIT – I **(18 Hours)**

1. Kabir Das
2. Todathi pathar
3. Veergatha Kal
   (Pravarithiyan, Kavi, Rachanayean)

Extra Reading (Key Words): *PrithviRaj Rasoo, Jago phir ek bhar*

UNIT- II **(18 Hours)**

1. Thulasi Das
2. Anal Kireet
3. BhaktiKal – Gnanashrayi Sakha

Extra Reading (Key Words): *Kabir, Ramdhari Singh Dinakr*

UNIT- III **(18 Hours)**

1. Rahim Ke Dohe
2. Jhoote Patte
3. BhaktiKal – Prem Margi Sakha

Extra Reading (Key Words): *Rahim*

1. Raskhan
2. Aavo phir se gaaon basayen
3. BhaktiKal –Ram Bhakti Sakha

Extra Reading (Key Words):

1. Bihari Ke Dohe
2. Sipahi
3. BhaktiKal – Krishna Bhakthi Sakha

Extra Reading (Key Words): *Bihari satsai*

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	Recite the poems of Kabir Das	R,U,E
CO- 2	Distinguish necessity and luxury Place Bhakthi kaal in Hindi Literature	U, An
CO- 3	Debate on pros and cons of a revolution	U, An
CO- 4	Summarize the four streams of Bhakthi kaal	E
CO- 5	Examine the powerful words of Bihari	An

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

Prescribed Books

- History Of Hindi Literature ; Aacharya Ramachandra Shukla, Delhi.
- Kavya Surabh: Pub.Dakshina Bharat Hindi Prachar Sabha , Cheenai.

(For candidates admitted 2016 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2

DEPARTMENT OF FRENCH

SEMESTER III

Course Title	**PART I – LANGUAGE - FRENCH PAPER III** **(**LANGUAGE & CIVILISATION (ÉCHO A2 2e édition)
Total Hours	90
Hours/Week	6 Hrs/Wk
Code	U16FR3FRE03
Course Type	Theory
Credits	3
Marks	100

General Objective: To enable the students to understand the French cultural aspects and apply the grammar learnt in appropriate situations.

Course Objectives (CO):

The learner will be able to

CO 1	understand the French education system and evaluate the same across the world.
CO 2	understand the usage of pronouns that denote quantity and place and apply them in answers; analyse extracts from magazines and work conditions in France.
CO 3	remember the rules of construction and usage of subjunctive mode and apply the same in sentences; evaluate French politics.
CO 4	understand gerund, adverbs, relative pronouns and evaluate press and media in France.
CO 5	remember the usage of tenses and analyse the benefits of learning a foreign language.

Unit 1 Vivement demain ! (18 Hours)

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.

Extra Reading (Key Words): le système éducatif en France.

Unit 2 Tu as du boulot ? (18 Hours)

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

Extra Reading (Key Words): l‟organnigramme d‟une enterprise.

Unit 3 Qu‟en pensez-vous? (18 Hours)

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

Extra Reading (Key Words): étude comparée de la politique en France et en Inde

Unit 4 C‟est tout un programme ! (18 Hours)

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)

Extra Reading (Key Words):TV5 Monde, les journaux français.

Unit 5 On se retrouve (18 Hours)

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.

Extra Reading (Key Words): Paris, la capital de la mode!

Course outcomes	**Cognitive level**
Contrast French education system to that of India.	E
Examine press and work conditions in India	An
Label subjunctive mode and its usages	U, Ap
Interpret politics in France	E
Categorize French media and press	E
Simplify “FLE”	An

TEXT BOOKS :

ECHO A2 – 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 – Intermediate level – Goodwill Publishing House
Je parle français III – 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), Tiruchirapalli – 620002

PG AND RESEARCH DEPARTMENT OF ENGLISH

I YEAR UG – SEMESTER III

PART II – ENGLISH 3 - GENERAL ENGLISH III

HOURS : 6 **CODE : U15EL3GEN03**

CREDIT : 3 **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 (1st 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

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HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2
PG & RESEARCH DEPARTMENT OF ZOOLOGY B.Sc. ZOOLOGY
(Specialization in Biotechnology) (For Students Admitted from 2015 onwards)
Second Year - Semester III

Course Title	**MAJOR CORE: 4- CELL AND MOLECULAR BIOLOGY**
Total Hours	**75**
Hours/Week	**5**
Code	**U15ZO3MCT04**
Course Type	**Theory**
Credits	**5**
Marks	**100**

General Objective:

The student will learn the ultra structure and functions of cells and cellular organelles and the molecular mechanisms involved in various cellular processes.

Course Objectives:
The student will be able to

CO 1	remember and understand the structural and functional aspects of plasma membrane, mitochondria and lysosome
CO 2	remember and understand the role of cell organelles in various cellular functions
CO 3	understand, apply and analyze the organization of nuclear components and cell cycle events
CO 4	understand, apply and analyze the structure, replication and transcription of DNA
CO 5	understand, apply and analyze the structure and functions of RNA and synthesis of proteins

UNIT I **(15hrs)**

Plasma Membrane: Ultra structure -Unit membrane and Fluid mosaic models; Modifications; Permeability Functions- Passive, Facilitated, Active, Exo- and Endocytosis; Introduction to signal transduction.
Mitochondria: Ultra structure – chemistry and functions.
Lysosome: Polymorphic forms, Cytochemistry – Functions.
Extra Reading/Key words: *Extra cellular matrix, Endosymbiont theory*

UNIT II **(15hrs)**

Ribosomes: Structure – Composition and Assembly - Functions.
Endoplasmic Reticulum: Ultra structure - Types – Protein trafficking- Other functions.
Golgi Complex: Ultra structure - Role in cell secretion
Centrosome : Ultra structure and Functions.
Extra Reading/Key words: *Cytoskeleton, Microfilaments, Transport vesicles*

UNIT III **(15hrs)**

Chromosomes: Organization - Chemistry- Functions
Giant Chromosomes – Polytene and Lampbrush – Organization and functions
Nucleus: Ultra structural Organization – Functions

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

Extra Reading/Key words: *Checkpoints, Recombination*

UNIT IV **(15hrs)**

DNA Structure and Replication: Nitrogenous bases, nucleosides, nucleotides. DNA– double helix, Watson and Crick model. DNA replication and semi-conservative method. Central dogma of molecular biology

Transcription: Eukaryotic transcription, RNA polymerase-types, transcription factors, reverse transcription, transcription regulators

Post-transcriptional modification: Processing of mRNA-capping, poly adenylation, splicing – introns and exons

Extra Reading/Key words: *Junk DNA, DNA sequencing*

UNIT V **(15hrs)**

Structure and functions - mRNA, tRNA and rRNA

Translation: Genetic code and its characteristics, Protein synthesis– initiation, elongation, termination in eukaryotes

Post-translational modifications: Polypeptide to functional proteins (Glycosylation and, Phosphorylation)

Extra Reading/Key words: *Unnatural amino acids, unusual tRNA bases*

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	Recall the structure and explain the functions of plasma membrane, mitochondria and lysosomes.	PSO 1,2	R, U
CO-2	Describe and relate the structure and functions of ribosome and endoplasmic reticulum.	PSO 1,2	R, U
CO-3	Recall the structure of Golgi apparatus and explain its importance in cell secretion.	PSO 1,2	R, U
CO-4	Reproduce the ultra structure of centrosome and recognize its role in different applications	PSO 1,2	Ap
CO-5	Recall and explain the detailed structure and functions of nucleus	PSO 1,2	R, U
CO-6	Describe the stages of cell division and distinguish between mitosis and meiosis	PSO 2,5	An
CO-7	Explain the structure of DNA, its replication, RNA structures and Recall the Central Dogma	PSO 2, 5,6	An
CO-8	Restate and interpret the processes and significance of transcription, translation and post – transcriptional and – translational modifications.	PSO 2, 5, 6	E

Books for Reference:

Agarwal**,** V.K., (2010). Molecular Biology, S. Chand and Company Ltd., New Delhi Agarwal**,** V.K., (2000). Molecular Biology, S. Chand and Company Ltd., New Delhi Verma P.S. & Agarwal V.K. (2016). Cell Biology, S.Chand and Company Ltd, New Delhi.

Verma P.S. & Agarwal V.K. (1998). Cell Biology, S.Chand and Company Ltd, New Delhi.
Alberts B., Bray D., Lewis J., Raff M., Roberts K. & Watson J. (2002). Molecular Biology of theCell ,4th Ed, Garland Science. Publishing Inc, New York & London.
Harvey Lodish , Arnold Berk, Lawrence Zipursky, Paul Matsudaira, David Baltimore, James Darnell (1999) .Molecular Cell Biology4th Ed. W. H. Freeman., USA.
Darnell, J., Lodish,H., and Baltimore, D. (1986) .Molecular Cell Biology. Scientific American Book Inc., USA.
De Robertis E.D.P. & De Robertis E.M.F. (1995).Cell and Molecular Biology, 8th Edition, Saunders College, PA.
Freifelder, D (1990) .Molecular Biology, Narosa Publishing House, New Delhi
Sheeler P. & Bianchi D.E. (1987) .Cell and Molecular Biology, III Edition, John Wiley & Sons.

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
B.Sc. ZOOLOGY (With Specialization in Biotechnology)
(For the candidates admitted from 2015 onwards)
Second Year - Semester III

Course Title	MAJOR CORE: 5 – GENETICS
Total Hours	75
Hours/Week	5
Code	U15ZO3MCT05
Course Type	Theory
Credits	5
Marks	100

General Objective

The student will learn the basic concepts of Genetics, mechanism of sex determination and inheritance of genes, metabolic disorder and its management, types of mutation, bacterial and cancer genetics.

Course Objectives:

The student will be able to

CO 1	understand and analyze the Mendelian traits, inheritance of multiple alleles, concept of linkage, crossing over and gene map.
CO 2	understand the mechanism of sex determination, concept of sex-linked inheritance and role of sex limited and influenced genes.
CO 3	understand the various genetic disorders in man and analyze the need of prenatal diagnosis for its management.
CO 4	remember and understand the types of mutation, mutagens and its biological effects and apply the Hardy-Weinberg law for calculation of gene frequency.
CO 5	understand the concept of bacterial recombination, control of gene expression and cancer genetics.

UNIT I **(15hrs)**

Mendelian traits in human - Pedigree charts.
Multiple alleles: Blood group inheritance-ABO, Rh-applications.
Linkage: Morgan‟s experiment.
Crossing over: Kinds, theories & cytological basis.
Gene map: Determination of map distance and gene order.
Polygenic inheritance – Skin colour in man.
Extra Reading/Key words: *MN Blood groups*

UNIT II **(15 hrs)**

Sex determination in animals.
Sex determination in man - sex determining genes - Lyon hypothesis.
Non-disjunction – types – gynandromorphism - origin.
Sex linked inheritance: X linked genes in man - colour blindness and haemophilia-Y linked genes.
Sex limited genes and sex influenced genes.
Cytoplasmic inheritance: Kappa particles in *Paramecium* and shell coiling in *Limnaea*.
Extra Reading/Key words: *Sex linkage in Drosophila and Mitochondria inheritance.*

UNIT III **(15 hrs)**

Introduction to gene function-Metabolic disorders associated with phenylalanine metabolism. Thalassemia and Sickle cell anemia.

Genetic counselling: Prenatal diagnosis: Ultrasound scanning-amniocentesis-chorionic villus sampling - AFP test- management of genetic disorders.

Extra Reading/Key words: *Twins study and Genetic disorders – Diabetes Mellitus and hypertension.*

UNIT IV **(15 hrs)**

Mutation: Types, major molecular mechanisms; mutagens-radiation and chemical.

Mutation detection-ClB method.

Variation in chromosomes: Structural-deletion, duplication, inversion and translocation. Numerical-aneuploidy-types, syndromes in man - Down, Turner and Klinefelter-polyploidy-types. Population genetics: Hardy-Weinberg law and equilibrium and calculation of gene frequency for recessive alleles.

Extra Reading/Key words: *Edward and Cridu-chat syndromes*

UNIT V **(15 hrs)**

Recombination in bacteria: Transfer of genetic material-conjugation-F+,F- and Hfr strains, transformation, transduction and sexduction.

Operon model for transcriptional regulation in prokaryotes-lac operon in E.coli - promoter, operator, regulator, repressor, inducible and repressible operon.

Cancer genetics - oncogenes -activation of proto-oncogenes -anti oncogenes.

Extra Reading/Key words: *Gene regulation in Eukaryotes.*

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

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Examine the inheritance of mendelian traits in man.	PSO 1	U & An
CO-2	Explain the concept of crossing over, linkage and gene map.	PSO 2	U
CO-3	Illustrate the mechanism of sex determination.	PSO 2	U
CO-4	Explain the inheritance of sex linked genes and the role of sex limited and influenced genes in man.	PSO 2	U
CO-5	Analyze the need of prenatal diagnosis and apply it for management of genetic disorders.	PSO 4	An, Ap
CO-6	List the types of mutation and explain its biological effects.	PSO 2	R, U
CO-7	Apply Hardy – Weinberg law to calculate the gene frequency in population genetics.	PSO 6	Ap
CO-8	Explain the concept of bacterial and cancer genetics and make use of it in research.	PSO 2	U, Ap

Text Book:

Verma,P.S. and Agarwal, V.K. (2010) Genetics. S.Chand & Company Ltd, New Delhi.

Books for Reference:

Alice Marcus (2009). Genetics, MJP Publishers, Chennai.

Manu L. Kothari & Lopa A. Mehta, Sadhana S. Roy Choudhury (2009). Essentials of human Genetics, Orient Black Swan Ltd.

Anthony J.F. Griffiths; Susan R Wessler; Sean B Carroll and John F Doebley (2015). Introduction to genetic analysis. Freeman company, NewYork.

Ricki, L (2018). Human genetics. WLB Publishers.

Robert H. Tamarin (2002). Principle of Genetics.McGraw Hill Publishers

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
(For the candidates admitted from 2015 onwards)
Second Year - Semester III

Course Title	ALLIED ZOOLOGY: 4 (Compulsory for Botany students) BIOLOGY OF INVERTEBRATES AND CHORDATES
Total Hours	60
Hours/Week	4
Code	U15ZO3ACT04
Course Type	Theory
Credits	3
Marks	100

General Objective

The student will be able to analyze the levels of organization and general characters of various phyla of invertebrates and chordates with examples.

Course Objective

The student will be able to

CO No.	Course Objectives
CO-1	Understand the different levels of organization and its distinguishing features with respect to the life history of specific examples relating to invertebrates.
CO-2	Apprehend the organ system of organization and its distinguishing features with respect to the life history of specific examples.
CO-3	Scrutinize the salient features and detailed study of Arthropoda, Mollusca and Echinodermata with one specific example.
CO-4	Deliberate the salient features of Pisces, Amphibians and Reptiles and detailed study of Calotes
CO-5	Discuss and exemplify the characeristic features of Aves and Mammalia

BIOLOGY OF INVERTEBRATES

UNIT 1 **(12 hrs)**

General characters and levels of organization

1. Protozoa: Acellular organization- distinguishing features, detailed study of the structure and life history of Plasmodium

2. Coelenterata: Tissue grade of organization-Organization and life history of *Aurelia*.

Extra Reading/Key words: *Diseases of Plasmodium*

UNIT II **(12 hrs)**

Organ system level of organization.

Detailed study of the structure and life history of representative types of the following phyla. 1.Platyhelminthes: *Fasciola hepatica*

2 Annelida-Hirudinaria.

Extra Reading/Key words: *Medicinal value of leech*

UNIT III **(12 hrs)**

Detailed study of salient features and all the systems of the following type

1.Arthropoda-*Penaeus*

2. Mollusca-*Pila*
3. Echinodermata-*Asterias*
Extra Reading/Key words: *Amphibian mode of respiration in Pila*

BIOLOGY OF CHORDATES

UNIT IV **(12 hrs)**

Salient features of prochordates
Vertebrata : Characterestic features of Pisces, Amphibians and Reptiles. General features and type study of *Calotes* (excluding skeletal system)
Extra Reading/Key words: Identify any five locally available ornamental and edible fishes

UNIT V **(12 hrs)**

General features and type study of the following
1.Aves – Pigeon 2.Mammalia – Rabbit(excluding skeletal system)
Extra Reading/Key words: *Homing instinct*

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	Classify the different levels of organization with respect to its distinguishing characters and specific examples.	PSO-1 & 2	R,U
CO-2	Interpret the organ system of organization and its distinguishing features with specific examples.	PSO-2	U
CO-3	Discuss the salient features of Arthropoda, Mollusca and Echinodermata with one specific example.	PSO-3	U
CO-4	Describe the salient features of prochordates with examples.	PSO-3	U
CO-5	Ilustrate the characeristic features of Aves and Mammals with specific examples.	PSO-3	U

Text Book:

Ekambaranatha Iyer, M. & Ananthakrishnan, T.N.(2003). Outlines of Zoology, Volume I & II, Vishwanathan Printers and Publishers Private Limited, Chennai.

Books for Reference:

Jordan,E.L. and Verma, P.S. (2001). Invertebrate Zoology, 25th edition. S. Chand & Company.
Jordan,E.L. and Verma, P.S. (2013). Chordate Zoology. S. Chand & Company.
Kotpal, R.L.(2014). Modern Text Book of Zoology- Invertebrates, 11 th edition, Rastogi company, Meerut (U.P.), India.

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2
PG & RESEARCH DEPARTMENT OF ZOOLOGY (for candidates admitted from 2017 onwards)
SECOND YEAR - SEMESTER III

Course Title	**SBE – 3 ANIMAL SCIENCE SKILLS FOR PHYSICS STUDENTS (Theory cum Lab)**
Total Hours	**30**
Hours/Week	**2**
Code	**U17ZO3SBP03**
Course Type	**Theory cum Lab**
Credits	**2**
Marks	**100**

General Objective:

To enable the students to learn the skills of performing experiments, analyzing the results and discussing the observations interlinking the information of biology to physics.

Course Objectives:

The student will be able to

CO 1	understand, apply and evaluate the laws of Physics in the Biological Adaptations of selected examples in invertebrates and chordates.
CO 2	remembers and understands the different types of cells involved in functioning of the biological systems
CO 3	apply, analyze and evaluate the knowledge of Cell Biology through selected techniques.
CO 4	evaluate the techniques relating to the Physiology of organs and organ systems, and how they work within the body to respond to challenges.
CO 5	understand and apply the concepts of heredity and inheritance in Genetics

Unit I: Biological adaptation in invertebrate and chordate **(6hrs)**

Sponge Gemmule, Physalia

Taenia scolex, Leech (Triradiate bite), Honey- bee and Hornet, Pila Radula, Water vascular system in starfishes

Swimming adaptation in fishes, Poison apparatus in snakes, Flight adaptation in birds. **Extra Reading/Key words:** *Thermodynamics, Aerodynamics*

Unit: II Biological Systems **(6hrs)**

Observation of different types of animal cells

Preparation of blood smear and identification of WBC and RBC

Observation of Barr body

Pregnancy test

Extra Reading/Key words: *Menstrual cycle, Sex determination*

Unit III: Cell Biology **(6hrs)**

Study of mitotic stage in onion root tip

Differentiation of Normal and abnormal cells

Observation of sperm suspension

Study of abnormal sperm
Isolation of DNA from Human buccal wash

Extra Reading/Key words: *Cell cycle, Forensic DNA typing*

Unit IV: Physiology

Measurement of their own Blood Pressure (**6hrs)**
Determination of Bleeding time & Clotting time
Determination / Estimation of Heamoglobin in Blood
Preparation of Haemin crystals from human blood
Normal and abnormal ECG
Test for presence of sugar in urine

Extra Reading/Key words: *Stroke, Artificial blood cells, Homeostatic regulation*

Unit V: Genetics (6hrs) Survey of Mendelian Traits

Pedigree analysis
Syndrome and their Karyotypes
Analyzing their Blood Groups

Extra Reading/Key words: *Chromosome banding and painting, Gene regulation*

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Describes the structural adaptation of the organism to continue their mode of living.	PSO 2	R
CO-2	Relates and learns the skill of identifying the cells and its role.	PSO 2	U
CO-3	Identifies the genetic role of the cell.	PSO 1, 2	R
CO-4	Learns the skill of finding the physiology of cells.	PSO 4	E
CO-5	Analyse the genetics and the inheritance pattern.	PSO 2	An

Books for Reference:

Ekambaranatha Iyer, M. & Ananthakrishnan, T.N. (1990) Outlines of Zoology (Viswanathan Publishers) Vol. I & II.
Verma P.S. & Agarwal V.K. (1998). Cell Biology, S.Chand and Company Ltd, New Delhi.
Mariakuttikan, A. and Arumugam, N. (2007). Animal Physiology, Saras Publication, Tamil Nadu.
Alice Marcus (2009) Genetics, MJP Publishers, Chennai.
Halliday Resnick W, 2001. Fundamentals of Physics, VI Edition, John Wiley and Sons Inc.

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

SEMESTER – III / VI

Course Title	GENDER STUDIES
Total Hours	15
Hours/Week	1
Code	U15WS3GST01 / U15WS6GST01
Course Type	Theory
Credits	1
Marks	100

General Objective:

To help students to realize their strengths and weaknesses in leading an ethically enriched life and to enjoy a gender-balancedambience

Course Objectives:

The student will be able to

1. understand the concepts ofgender.
2. differentiate women studies from genderstudies
3. analyze the areas of genderdiscrimination
4. analyze and evaluate the initiative and policies for womenempowerment
5. remember the women‟s movements and safeguardingmechanisms

Unit I — 3 hrs

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.

Extra reading /Key Words: *Acts on gender*

Unit II — 3 hrs

Women‟s Studies Vs Gender Studies:

UGC‟s Guidelines – VII to XI Plans – Gender Studies: Beijing Conference and CEDAW-Exclusiveness and Inclusiveness.

Extra reading /Key Words: *Origin of Women's studies in India*

Unit–II **3hrs**

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.

Extra reading / Key Words: *Survey of level of discrimination*

Unit–IV **3hrs**

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.

Extra reading/Key Words: *Case study*

Unit–V **3hrs**

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 – 73rdAmendment for PRIs.

Extra reading / Key Words: *Laws on gender equality*

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

Course Outcome:

a) evaluate the concepts of gender discrimination.
b) compare women‟s studies with gender studies.
c) describe the areas of gender discrimination.
d) evaluate the initiative and policies for women empowerment.
e) Explain the different women movement.

REFERENCES:

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

Bharathidasan University, Tiruchirappalli

Jane, P. & Imelda, W. (2004), 50 Key Concepts in Gender Studies.

(For the candidates admitted from June 2018 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002

DEPARTMENT OF HINDI

SEMESTER – IV

Course Title	**PART – I LANGUAGE HINDI -IV FUNCTIONAL HINDI & TRANSLATION**
Total Hours	**75**
Hours/Week	**5Hrs/Wk**
Code	**CODE: U18HN4HIN04**
Course Type	**Theory**
Credits	**3**
Marks	**100**

General Objective : To enable the students to Learn the Language Skills.

Course Objectives (CO):

The learner will be able to

CO No.	**Course Objectives**
CO -1	apply technical translation in Functional Hindi
CO- 2	understand and evaluate global marketing
CO- 3	create general essays
CO- 4	apply the formats and create office orders
CO- 5	apply translation techniques in a text.

UNIT – I **(15 Hours)**

1. Personal Letters
2. Technical Terms
3. Translation Ex-1
4. General Essay - Pollution

UNIT- II **(15 Hours)**

1. Commercial Letters
2. Technical Terms
3. Translation Ex-4
4. General Essay - Globalisation

1. Office Memorandum
2. Technical Phrases
3. Translation Ex-6
4. General Essay – Self Employment

Extra Reading (Key Words): *Kisan*

UNIT- IV*:* **(15 Hours)**

1. Office Order
2. Technical Phrases
3. Translation Ex-13
4. General Essay – India – Unity in Diversity

Extra Reading (Key Words): *Hamara Bharat*

1. Circular
2. Reminder
3. TranslationEx-15
4. General Essay – My Favourite Author

Extra Reading (Key Words): *Jayashankar Prasad, Premchand*

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	Utilize technical terms in translating a text.	Ap
CO- 2	Mark the global brands and their countries.	U, E
CO- 3	Develop an essay on any social issue.	E, C
CO- 4	Formulate an office order for the university	Ap, C
CO- 5	Make use of translation techniques in a text.	Ap

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

Prescribed Books

- Vyavaharik Hindi,by Dr. Mahendra Mittal,Shabari Sansthan, Delhi.
- Aalekhan Aur Tippan: Prof.Viraj, M.A; Raj Pal And Sons;Kashmiri Gate,Delhi.
- Anuvad Abhyas : Bholanath Tiwari; Lokbharathi Prakashan; New Delhi.

Reference Books :

- Raj Bhasha Hindi Aur Vuska Swaroop- Shanthi kumar Syal; Parampara Prakasha, Delhi.
- Vyaharopayogi evam kam kaji Hindi – Ananth Kedharea .;Sahityayan Prakashan; Kanpur.

HOLY CROSS COLLEGE (Autonomous), Tiruchirappalli - 620 002.

TAMIL DEPARTMENT

For Candidate admitted from 2015 onwards

Second Year - Semester – IV

Course Title	இரண்டாமாண்டு –நான்காம் பருவம்
Total Hours	75
Hours/Week	5 Hrs Wk
Code	U15TL4TAM04
Course Type	Theory
Credits	3
Marks	100

General Objectives:

வாழ்வியல் நெறிகளாகிய அறம், பொருள், இன்பம், வீடுபேறு ஆகியவற்றின் மேன்மையை எடுத்துரைத்தல்

- Make the student to understand the cultural and tradition of Tamilians.
- Student will learn understand the religions knowledge to Sustain
- Understand the depth of Tamil Literature & Culture.
- Know about the structure of the family, manners is disciplines.
- Know about the right of equality.

Course Objectives:

CO No.	Course Objectives
CO-1	அறம், பொருள், இன்பம், வீடுபேறு ஆகியவற்றின் மேன்மையை உணர்த்துதல்.
CO-2	இலக்கியங்களின் வாயிலாக வாழ்க்கைத் தத்துவத்தினை அறியச் செய்தல்.
CO-3	தமிழ் இலக்கிய வரலாற்றின் வாயிலாகத் தமிழரின் பண்பாடு, கலாச்சாரத்தை அறியச் செய்தல்.
CO-4	மனிதநேய சிந்தனைகளை உருவாக்குதல்.
CO-5	மொழிப்பெயர்ப்புத்திறனை வளர்த்தல்.

அலகு:1 செய்யுள்; **15 Hrs**

1. குறுந்தொகை

1. கொங்கு தேர் வாழ்க்கை அஞ்சிறைத் தும்பி - இறையனார்
2. யாரும் இல்லை தானே கள்வன் - கபிலர்
3. வேம்பின் பைங்காய்என் தோழி தரினே – மிளைக்கந்தன்
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 கதிரதாங்கி ஏந்திய குடைநீழல் - கபிலர்
2. பாடுகம் வா வாழி தோழி - கபிலர;

அலகு:2 **15 Hrs**

அகநானூறு

1.வானம் வாய்ப்பக் கவினிக் கானம் - சீத்தலைச் சாத்தனார்

2. எம்வெங் காம மியைவதாயின் - மாமூலனார்

5.புறநானூறு

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

6. பதிற்றுப்பத்து - ஐந்தாம் பத்து

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

7. திருக்குறள்

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

அலகு:3 **15 Hrs**

தமிழ் இலக்கிய வரலாறு

சங்ககாலம் - சங்கம் மருவியகாலம்

எட்டுத்தொகை, பத்துப்பாட்டு, பதினெண்கீழ்க்கணக்கு நூல்கள்

அலகு:4 **15 Hrs**

வாழ்க்கை வரலாறு

அன்னை தெரசா - பா. தீனதயாளன்

மநல றுழசனள (நுஒவசய சுநயனனபை)

அக்னி சிறகுகள் - அப்துல் கலாம்

அலகு:5 **15 Hrs**

பொது – மொழிப்பெயர்ப்பு

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	Attitude to consider the living beings of the world as relations	PSO 1	U
CO-2	the life style of traditional Tamils may be known with the help of literature	PSO 2	AN
CO-3	to be inspired by the traditional culture and values and be value oriented	PSO 2	R
CO-4	to feel the dedicated service of mother Theresa and to practice the same	PSO 3	U
CO-5	to enhance skills on translation	PSO 4	C

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

பாடநூல்கள்

1. செய்யுள் - தமிழாய்வுத்துறை

2. தமிழ் இலக்கிய வரலாறு - தமிழாய்வுத்துறை

3. வாழ்க்கை வரலாறு
   பா.தீனதயாளன் - அன்னை தெரசா

4. மொழிப்பெயர்ப்பு - தமிழாய்வுத்துறை

(For the candidates admitted from June 2018 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002

DEPARTMENT OF HINDI

SEMESTER – IV

Course Title	**PART – I LANGUAGE HINDI -IV FUNCTIONAL HINDI & TRANSLATION**
Total Hours	**75**
Hours/Week	**5Hrs/Wk**
Code	**CODE: U18HN4HIN04**
Course Type	**Theory**
Credits	**3**
Marks	**100**

General Objective : To enable the students to Learn the Language Skills.

Course Objectives (CO):

The learner will be able to

CO No.	**Course Objectives**
CO -1	apply technical translation in Functional Hindi
CO- 2	understand and evaluate global marketing
CO- 3	create general essays
CO- 4	apply the formats and create office orders
CO- 5	apply translation techniques in a text.

UNIT – I **(15 Hours)**

5. Personal Letters
6. Technical Terms
7. Translation Ex-1
8. General Essay - Pollution

UNIT- II **(15 Hours)**

5. Commercial Letters
6. Technical Terms
7. Translation Ex-4
8. General Essay - Globalisation

5. Office Memorandum
6. Technical Phrases
7. Translation Ex-6
8. General Essay – Self Employment

Extra Reading (Key Words): *Kisan*

UNIT- IV*:* **(15 Hours)**

5. Office Order
6. Technical Phrases
7. Translation Ex-13
8. General Essay – India – Unity in Diversity

Extra Reading (Key Words): *Hamara Bharat*

5. Circular
6. Reminder
7. TranslationEx-15
8. General Essay – My Favourite Author

Extra Reading (Key Words): *Jayashankar Prasad, Premchand*

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	Utilize technical terms in translating a text.	Ap
CO- 2	Mark the global brands and their countries.	U, E
CO- 3	Develop an essay on any social issue.	E, C
CO- 4	Formulate an office order for the university	Ap, C
CO- 5	Make use of translation techniques in a text.	Ap

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

Prescribed Books

- Vyavaharik Hindi,by Dr. Mahendra Mittal,Shabari Sansthan, Delhi.
- Aalekhan Aur Tippan: Prof.Viraj, M.A; Raj Pal And Sons;Kashmiri Gate,Delhi.
- Anuvad Abhyas : Bholanath Tiwari; Lokbharathi Prakashan; New Delhi.

Reference Books :

- Raj Bhasha Hindi Aur Vuska Swaroop- Shanthi kumar Syal; Parampara Prakasha, Delhi.
- Vyaharopayogi evam kam kaji Hindi – Ananth Kedharea .;Sahityayan Prakashan; Kanpur.

(for candidates admitted from June 2017 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS), Tiruchirapalli – 620002

PG AND RESEARCH DEPARTMENT OF ENGLISH

I 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 dutyfrom obligation.
Speaking – Discussing one‟s knowledge about different subjects, learning skills, thirst for knowledge, learning form experiences.
Reading for comprehension exhibiting higher perception of life‟s experiences.
Writingparagraphs 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.
Writingformal 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.
Writingagenda, 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.

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HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
II B. Sc. ZOOLOGY (With Specialization in Biotechnology)
(For the candidates admitted from 2015 onwards)
Second Year - Semester IV

Course Title	MAJOR CORE 6 – PRACTICAL – II (CELL BIOLOGY, GENETICS AND BIOCHEMISTRY)
Total Hours	75
Hours/Week	5
Code	U15ZO4MCP06
Course Type	Practical
Credits	5
Marks	100

General Objective:
Student learns the skills pertaining to cell biology, genetics and biochemistry through experimental analysis.

Course Objectives:

The student will be able to

CO 1	understand and analyze the variations in cell types and significance of polytene chromosomes
CO 2	understand, apply and critically analyze the scientific evidences on cellular processes
CO 3	apply, analyze and evaluate the basic techniques in genetics by means of problem solving and experimental analysis
CO 4	understand and analyze the life cycle and mutations in *Drosophila* and operon model in *E.coli*
CO 5	analyze and experiment the biochemical components of biological samples qualitatively and quantitatively

Cell Biology

Different types of cells.
Preparation of polytene chromosomes in salivary gland of Chironomous larva/ Drosophila larva
Study of mitotic stage in onion root tip
Study of meiosis in Grasshopper testis

Genetics

Blood group inheritance – A, B, O and Rh
Pedigree analysis
Syndromes and their karyotypes
Preparation of buccal cells
Hardy – Weinberg law Calculation of ABO, MN blood grouping and PTC tasters.
Observation of Drosophila life cycle using culture
Drosophila mutants
Operon model in E.coli using virtual class study

Biochemistry

Quantitative estimation of proteins in a biological sample

Quantitative estimation of carbohydrates in a biological sample
Quantitative estimation of cholesterol in a biological sample
Quantitative estimation of urea and creatinine in a biological sample
Analysis of human urine for sugar and albumin
Analysis of sodium, potassium and calcium (minerals) using Flame photometer.

Course Outcomes:

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	contrast and identify different types of cells, cell division and the stages	PSO 1, 2, 3	U, Ap
CO-2	interpret Karyotypes, pedigrees and identify blood groups	PSO 1, 2, 3	Ap, E
CO-3	test for the Hardy-Weinberg equilibrium of a character in a population	PSO 3, 2, 5	An
CO-4	outline the life cycle of *Drosophila melanogaster* and identify its mutant forms	PSO 3, 2, 4	U, Ap
CO-5	examine and estimate the presence of biomolecules and minerals in biological samples	PSO 3, 4	U, Ev

A record of the work done is to be submitted at the time of the examination.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY B. Sc.
ZOOLOGY (With Specialization in Biotechnology)
(For the candidates admitted from 2015onwards)
Second Year - Semester IV

Course Title	MAJOR ELECTIVE: 1 – BIOCHEMISTRY AND BIOSTATISTICS
Total Hours	75
Hours/Week	5
Code	U15ZO4MET01
Course Type	Theory
Credits	5
Marks	100

BIOCHEMISTRY

General Objective:

The student will learn the structure, classification and metabolism of specified biomolecules like carbohydrates, proteins, lipids, nucleotides and the classification of enzymes and their mechanisms of action.

BIOSTATISTICS

General Objective:

The Student will learn the steps in the collection, classification, tabulation and presentation of data and the tools to describe the data and the applications of statistical tests.

Course Objectives:
The student will be able to

CO 1	Understand the structure and classification of carbohydrate, proteins and lipids.
CO 2	Understand the metabolism of carbohydrate, proteins and lipids.
CO 3	Understand the biologically important nucleotides, classification of enzymes and their mechanism of enzyme action.
CO 4	Understand and analyze the process of collection, classification, tabulation and presentation of data and apply various tools to describe the data.
CO 5	Explain and apply statistical tests, Correlation, regression, Student t test and Chi-square (X^2) test to infer on the given data.

UNIT I: Structure and classification (15 hrs)

Carbohydrates – Structure and classification – monosaccharides, disaccharides, oligosaccharides and polysaccharides.

Amino acids- Structure, classification and properties.

Proteins – Structure (primary, secondary, tertiary & quaternary) and classification.

Lipids- Structure and classification.

Extra Reading/Key words: *Distribution of biomolecules, Macronutrient requirements in regular and modified diet.*

UNIT II: Metabolism **(15 hrs)**

Carbohydrate – Glycolysis, Citric acid cycle, Glycogenesis, Glycogenolysis, Gluconeogenesis and HMP Shunt.

Lipid- Biosynthesis of long chain fatty acids, Oxidation of fatty acids – β oxidation – Significance of omega 3 fatty acids.

Aminoacid- Transamination, deamination, decarboxylation, oxidative deamination and Urea cycle.

Extra Reading/Key words: *Case study of disorder of Carbohydrates, aminoacid and Lipids metabolism.*

UNIT III: Nucleotide and Enzymes **(15 hrs)**

Biologically important nucleotides- CTP, ATP, GTP, UDP. FAD, NAD.

Enzymes – Nomenclature, classification, Mechanism of enzyme action – Fischer‟s lock and key model and Koshland‟s induced fit model, Michaelis – Menten hypothesis, Factors affecting enzyme action, Coenzymes.

Extra Reading/Key words: *Application of enzymes. Enzyme inhibitors, Coenzymes.*

UNIT IV: Descriptive Statistics **(15 hrs)**

Definition and scope – Variables in biology – Data collection – Classification – Tabulation, Diagrammatic representation – Bar, Pie and Histogram.

Measures of central tendency – Mean (Arithmetic), Median, Mode

Measures of dispersion – Standard deviation, Standard error, Co-efficient of variance.

Extra Reading/Key words: *Data analysis using basic statistical tools and inference*

UNIT V: Inferential Statistics **(15 hrs)**

Correlation – Graphic and Mathematical method (Karl Pearson‟s correlation coefficient) Regression – simple linear regression.

Test of significance – hypothesis testing – Type 1 error – Type II error, Level of significance.

Student t test – comparison of mean of two samples.

Chi-square (X^2) test – Test for goodness of fit.

Extra Reading/Key words: *statistical analysis using tests of significance and derive inference*

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	Explain the structure and classification of carbohydrate, proteins and lipids.	PSO 4, 6	R,U
CO-2	Explain the reactions of Glycolysis, TCA cycle, Glycogen metabolism, Gluconeogenesis and HMP Shunt.	PSO 4, 6	U
CO-3	Explain the general reactions in aminoacid metabolism, Urea cycle, Fatty acid synthesis and β oxidation	PSO 4, 6	U
CO-4	Describes the various biologically important nucleotides, explains the classification of enzymes and their mechanism of enzyme action.	PSO 2, 4, 6	U
CO-5	Explain the process of collection, classification, tabulation and presentation of data.	PSO 5, 6	U, An

CO-6	Describe and calculate mean, median, mode, standard deviation and Co-efficient of variance.	PSO 5, 6	U, An
CO-7	Explain and calculate Karl Pearson‟s correlation coefficient and simple linear regression.	PSO 5, 6	An, E
CO-8	Explain the test of significance and calculates Student t test and Chi-square (X^2) test to infer on the given data.	PSO 5, 6	An, E

Text Book:

Satyanarayanan, U Chakrapani U Fifth Edition (2017). *Biochemistry,*Elsevier Publications.

Satyanarayanan, U (2004). *Essentials of Biochemistry,*Uppala Author – Publisher Interlinks, Vijayawada.

Jain, J.L., Sunjay Jain and Nitin Jain Revised Edition(2016). *Fundamentals of Biochemistry*, S. Chand & Company Ltd., New Delhi.

Jain, J.L., Sunjay Jain and Nitin Jain (2007). *Fundamentals of Biochemistry*, S. Chand & Company Ltd., New Delhi.

Books for Reference:

Jain, J.L., Sunjay Jain and Nitin Jain Revised Edition(2016). *Fundamentals of Biochemistry*, S. Chand & Company Ltd., New Delhi.

Victor W. Rodwell , David Bender, Kathleen M. Botham, Peter J. Kennelly, P. Anthony Weil.31st Edition (2018).*Harper's Illustrated Biochemistry*. McGraw-Hill Education / Medical.

Murray, R.K., Granner, D. K., Mayes, P.A., Rodwell, V.W (2000). *Harper's Biochemistry,* Prentice Hall International Inc.,

Stryer, L (1988). *Biochemistry*. W.H. Freeman and Company, New York.

BIOSTATISTICS

Text Book:

Palanichamy, S. & Manoharan,M. (1991). *Statistical methods for biologists.* Palani, Paramount Publications, Palani, Tamil Nadu.

Books for Reference:

Bailey, N.T.J. (1959). *Statistical Method in Biology.* The English Language book society and English University Press Ltd.

Snedecor, G.W. and William, G. (1975). *Statistical Methods.* Harvard University, Oxford & IBH Publication Co., Calcutta. Bombay, New Delhi.

Sokal, R. and James, F.R. (1973). *Introduction to Bio-statistics,* W.H. Freeman & Company, Toppan company, Ltd., Tokyo, Japan.

HOLY CROSS COLLEGE (AUTONOMOUS),
TIRUCHIRAPPALLI-2 PG & RESEARCH DEPARTMENT OF ZOOLOGY B.Sc. ZOOLOGY (With Specialization in Biotechnology)
(For candidates admitted from 2015 onwards)
Second Year - Semester IV

Course Title	**MAJOR ELECTIVE 1 - AQUACULTURE**
Total Hours	**75**
Hours / Week	**5**
Code	**U15ZO4MET02**
Course Type	**Theory**
Credits	**5**
Marks	**100**

General Objective:

The student will learn about the methods of culturing economically viable species of fish. Prawn farming, oyster and clam farming are also introduced along with fish farming. Common fish diseases and methods of their control are also learnt.

Course Objectives:
The student will be able to

CO 1	analyse and evaluate the freshwater and brackish water resources for aquaculture
CO 2	understand, analyse and construct fish ponds
CO 3	analyse and apply the knowledge of aquaculture in composite fish farming
CO 4	understand and apply the concept of integrated farming
CO 5	analyse fish diseases and induced breeding techniques

Unit I: **(15 hrs)**

Need and scope of aquaculture, Fresh water, brackish water and near shore resources of India for aquaculture: Qualities of fresh water and brackish water aquaculture - Environmental problems caused by aquaculture.

Extra Reading/Key words: *Agriculture in backwaters*

Unit II: **(15 hrs)**

Different aquaculture practices – Selection of sites for aquaculture practices – Engineering aspects of fish pond construction. Preparation of fish ponds – Fertilization – Formulation and preparation of fish feeds – culture of live food organisms.

Extra Reading/Key words: *Visit to fish culture units in Thittai*

Unit III: **(15 hrs)**

Culturable species of fin fish and shell fish and their characteristics. Composite fish culture – Murrel and Tilapia. Prawn and Tilapia farming – oyster and clam farming. Shrimp culture.

Extra Reading/Key words: *Maintain a composite fish pond in the garden*

Unit IV: **(15 hrs)**

Culture of cat fish, Integrated farming of fish with agriculture crops (i.e) paddy cum fish culture and live stock – (Chick, duck, and pig) – Sewage fed fish culture.

Extra Reading/Key words: *Visit to a farm house*

Unit V: **(15 hrs)**

Common fish diseases and methods of control. Induced breeding and fish seed production. Prawn seed production through eye stalk ablation. Economic returns – starting investments. Bank Facility, Marketing, byproducts.

Extra Reading/Key words: *Fish feed formulations*

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	Evaluate the freshwater and brackish water resources for aquaculture	PSO 1	E
CO -2	Identify the environmental caused by aquaculture	PSO 3 PSO 4	Ap
CO -3	Describe different aquaculture practices	PSO 6	Ap
CO -4	Apply the knowledge of aquaculture in composite fish farming	PSO 6	Ap
CO-5	Apply the concept of integrated farming	PSO 6	Ap
CO-6	Discuss the sewage fed fish culture	PSO 1	C
CO-7	Identify fish diseases and explain induced breeding techniques	PSO 3 PSO 5	Ap
CO-8	Discuss the economic returns of aquaculture	PSO 6	C

Text Book:

Santhanam,R. Sukumaran,N. and Natarajan, P. (1990) A manual of fresh water aquaculture. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

Books for Reference:

Bardach, J.E.et al., (1997) Aquaculture John Wiley and sons. New York.

Jhingaran,V.G. (2002) "Fish and fisheries of India". Hindustan Publishing Corporation, New Delhi.

Shukla,G.S. and Upadhyay, V.B. (2008): Economic Zoology, Rakesh Rastogi, Meerut.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2

PG & RESEARCH DEPARTMENT OF ZOOLOGY

(For the candidates admitted from 2015 onwards)

Second Year - Semester IV

Course Title	ALLIED ZOOLOGY 5 – ZOOLOGY AND HUMAN WELFARE (Compulsory for Botany Students)
Total Hours	60
Hours/Week	4
Code	U15ZO4ACT05
Course Type	Theory
Credits	4
Marks	100

General Objective

The student will be able to signify the culture of commercially important animals and analyze the important agricultural pests along with their control. They will analyze the bacterial, viral, protozoan and helminth diseases with causative organism, symptoms and treatment.

Course Objectives:

The student will be able to

CO No.	Course Objectives
CO-1	Exemplify the culture methods of different commercially important animals.
CO-2	Differeniate the bacterial, viral, protozoan and helminth diseases of man along with causative organism, symptoms and treatment.
CO-3	Analyze the various cells and organs of immune system; discuss the vaccination schedule of children.
CO-4	Discuss the important agricultural pests and methods of their control.
CO-5	Understand, analyse and exemplify the principle of genetics.
CO-6	Use combinational ideas to detect errors in pregnancy and justify the need for genetic counseling.

UNIT I **(12 hrs)**

Culture methods of commercially important animals Apiculture, Prawn culture and Fish culture.

Extra Reading/Key words: *Sericulture*

UNIT II **(12 hrs)**

Causes - modes of transmission, symptoms and preventive measures of the following.

Viral diseases - Polio, rabies, mumps, influenza, measles, Japanese encephalitis, hepatitis group of virus - water borne (A and E), Blood borne- (B, C and D), AIDS.

Bacterial diseases –Dysentery, cholera, tuberculosis, tetanus, diphtheria, typhoid, STD – gonorrhea and syphilis and Leptospirosis

Extra Reading/Key words: *H17N10 and Ebola*

UNIT III **(12 hrs)**

Protozoan diseases – Amoebiasis and malaria.

Helminthiasis - Taeniasis, ascariasis, ancylostomiasis and elephantiasis

Immune system – Organs, cells, antigens, antibodies, immune response; Vaccination schedule for children in India.

Extra Reading/Key words: *Types of immunity*

UNIT IV **(12 hrs)**

Insects of agricultural importance:

Any two pests of paddy (*Leptocorisa varicornis* & *Spodoptera mauritia*), sugarcane (*Tryporiza novella* & *Pyrilla perpusilla*), coconut (*Oryctes rhinoceros* & *Rhynchophorous ferrugineus*), vegetables (*Epilachna vigintioctopunctata* & *Leucinodes orbonalis*) and stored products (*Tribolium casteneum* & *Sitophilus oryzae*) – their life cycle and control.

Extra Reading/Key words: *Biological control of pest*

UNIT V **(12 hrs)**

GENETICS

Blood group inheritance A, B, AB, O & Rh.

Sex-determination and sex linked inheritance in man - haemophilia and colour blindness. Inborn errors of metabolism – phenylketonuria,

Chromosomal abnormalities –Syndromes in man- Down‟s, Klinefelter, Turner‟s & Cri-du-chat.

Genetic counseling – amniocentesis.

Extra Reading/Key words: *Prenatal Diagnosis*

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	Choose the appropriate culture method for different commercially important animals	PSO1&2	U
CO-2	Identify the causative organism, symptoms and treatment of bacterial, viral, protozoan and helminth diseases of man	PSO 3	U
CO-3	Describe the cells and organs of immune system and evaluate the vaccination schedule of children.	PSO 4	U
CO-4	Discuss the important agricultural pests and methods of their control.	PSO 4	Ap
CO-5	Predict errors in pregnancy and justify the need for genetic counseling.	PSO 5	Ap

Books for Reference:

Chandler, A.(2007). Introduction to Parasitology. John Wiley & SonsPublications, 10th Edition

Ekambaranatha Ayyar. M. and Ananthakrishnan. T. N. (1988) Outlines of Zoology (for B.Sc. Ancillary) Vishwanathan Printers and Publishers Private Limited, Chennai. Gardener, A. and Davies, T. (2010). Human Genetics (2nd edition). Viva Books Private limited.

Jawaid, A. and Subhas ,P. S. (2000). A hand book on Economic Zoology, 5th edition.. S.Chand
Publications.
Jhingaran,V.G.(2009). Fish and Fisheries of India. Second Edition, Hindustan Publishing Corporation (India).
John.B.Walter (2015). An Introduction to the Principles of Disease, second edition, Elsevier Health Sciences publisher,
Kuby, J. (2006) Immunology. (Sixth edition) W.H.Freeman and company, New York.
Manju Yada, 2010. Economic Zoology, Discovery Publishing House, New Delhi
Paul.A.Ketchuns (1984) Microbiology. John Wiley and Sons, New York.
Rajesh,,K. and Ajit, D.(2012). Medical Parasitology, third ediion, Books & Allied (P) Ltd. Kolkata
Ramakrishnan Ayyar (1992) Handbook of Economic Entomology For South India. Narendra Publishing House
Shukla & .Upadhyaya, S. (2014). Economic Zoology, Rastogi Publications.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2
PG & RESEARCH DEPARTMENT OF ZOOLOGY (For the candidates admitted from 2015 onwards) **Second Year - Semester IV**

Course Title	**ALLIED ZOOLOGY 6 – PRACTICAL (Compulsory for Botany students)**
Total Hours	**60**
Hours/Week	**4**
Code	**U15ZO4ACP06**
Course Type	**Practical**
Credits	**3**
Marks	**100**

General Objective:
Student learns the skills of performing experiments and virtual dissections, analyzing the results and discussing the economic importance and observations pertaining to various animal specimens and products studied.

Course Objectives:
The student will be able to

CO 1	understand, apply and analyze the anatomy and functional aspects of animal systems
CO 2	understand and apply the genetic aspects like inheritance and syndromes
CO 3	understand, apply and analyze the biological importance of animal specimens
CO 4	apply and analyze the economic importance of animal products, ornamental and edible fishes
CO 5	understand and apply the significance of endoparasites and the stages of meiosis

1. Anatomy of cockroach/ Earthworm- Digestive system and Nervous system-Virtual class study.
2. Prawn - Appendages
3. Temporary mounting of Pediculus/mosquito.
4. Buccal Smear – Barr body
5. Bacteria - Gram Staining, Antibiotic Sensitivity
6. Frog– Digestive system and reproductive system – Virtual class
7. Measurement of blood pressure.
8. Blood group identification.
9. Qualitative tests for free sugar and albumin in urine.
10. Study of Mendelian traits
11. Pedigree analysis (Autosomal dominant, recessive and Sex linked)
12. Syndromes – Down, Turner & Klinefelter

Protozoa - Entamoeba
Coelenterata - Aurelia, Corals
Platyhelminthes - Taenia
Annelida - Leech
Arthropoda - Prawn and any two insect pests of crops
Mollusca - Pila

Echinodermata - Starfish
Prochordata - Amphioxus
Chordata - Naja naja, Pigeon, Mammal

Animal products of economic importance – honey and silk thread.
Ornamental fishes (any 3) Edible fishes (any 3)
Slides of Endoparasites (any 5) Meiosis in Grasshopper Testis.

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Identify and distinguish anatomical systems and structures of specific animals and relate them to their functions	PSO 1, 3	Ap, An
CO-2	Interpret pedigrees and identify genetic abnormalities and inheritance patterns	PSO 1,2, 3	Ap, E
CO-3	Examine and identify the Gram positive and negative bacteria, blood groups and interpret qualitative biochemical analyses	PSO 1, 3, 4	An, Ap, E
CO-4	Discover the biological and economic importance of animals belonging to major taxa	PSO 1, 3	An
CO-5	Extend the significance of endo-parasites and distinguish the stages of meiosis	PSO 1, 2, 3	U, An

A record of the work done is to be submitted at the time of the examination.

(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: U15VE4LVB02**

CREDIT : 1 **MARKS : 100**

OBJECTIVE:

x 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 :

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

UNIT – II: JUDGES AND KINGS

x Judges: Deborah (Judges 4); Samson (Judges 6-8); Gideon (Judges 13-16)
x 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

x Amos
x Jonah
x Micah
x Nahum
x Habakkuk

UNIT – IV: MAJOR PROPHETS

Brief Life History and teachings of

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

UNIT – V: WOMEN IN THE BIBLE

Women in the Old Testament

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

(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 **CODE : U15VE4LVC02**

CREDIT : 1 **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.Diax 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), 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 Whats app

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 Upretti, 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,”

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY B.Sc.
ZOOLOGY (With Specialization in Biotechnology) (For the candidates admitted from 2015 onwards)
THIRD YEAR - SEMESTER V

Course Title	**MAJOR CORE-7 DEVELOPMENTAL BIOLOGY & EVOLUTION**
Total Hours	**75**
Hours/Week	**5**
Code	**U15ZO5MCT07**
Course Type	**Theory**
Credits	**5**
Marks	**100**

General Objective:

To enable the students to understand the fertilization and development of the individual organism and emergence of evolutionary thoughts.

Course Objectives:

The student will be able to

CO 1	understand and apply the concepts of developmental process.
CO 2	understand and analyse the development of organs in chordates.
CO 3	understand, apply and analyse the post embryonic development and regeneration in invertebrates and vertebrates.
CO 4	understand and analyse the evolutionary concepts.
CO 5	apply and analyse the molecular evolution.

UNIT I **(15hrs)**

Fertilization: Physico-chemical aspects of fertilization and its significance.
Parthenogenesis: Natural and artificial – significance.
C**leavage:** Types (Holoblastic& meroblastic) and patterns of cleavage (radial, spiral, bilateral, rotational, determinate and indeterminate cleavage).
Gastrulation: Fate map, morphogenetic movements – Gastrulation in frog, chick and mammals.
Extra Reading/Key words: *Fertilization in sea urchin, Parthenogenesis in insects.*

UNIT II (15hrs) Organogenesis - Ectodermal derivatives – Development of brain and eye of frog. Mesodermal derivatives – Heart and Kidney of mammals.

Extra embryonic membranes in chick.
Placentation in mammals – Types and functions
Nuclear transplantation in Amphibia.
Extra Reading/Key words: *Development of ear, fetal membranes in mammals.*

UNIT III **(15hrs)**

Organiser – Spemann‟s embryonic induction and chain of induction
Post embryonic developments -insects and amphibians.
Regeneration - invertebrates and vertebrates. Development of immune system in vertebrates.

Aging – concepts and Models.
Extra Reading/Key words: *Metamorphosis, Asexual reproduction.*

UNIT IV **(15hrs)**

Emergence of Evolutionary thoughts: Lamarckism & Neo- Lamarckism. Darwinism & Neo – Darwinism. Mutation theory – Mutation and their role in evolution.
Animal colouration and Mimicry. Isolating mechanisms.
Modes of speciation. Adaptive radiation in reptiles, Golden ages of reptiles and mammals.
Origin of prokaryotic and eukaryotic cells.
Extra Reading/Key words: *Synthetic evolution, Polymorphism, Neoteny.*

UNIT V **(15hrs)**

Molecular Evolution: Stages of primate evolution, Human evolution, Future of human.
Concepts of neutral evolution, molecular divergence and molecular clocks.
Fossils – fossil formation, types of fossils- Dating of fossils.
Indian fossils. Living Fossils. Extinction – extinct animals, types of extinction, rates, causes and significance of extinction.
Extra Reading/Key words: *Patterns of animal distribution, extinct animals in India.*

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	Illustrate the events that occur during fertilization.	PSO 4	U
CO-2	Outline the types and patterns of cleavage.	PSO 4	U
CO-3	Summarize the ectodermal and mesodermal derivatives.	PSO 4	U
CO-4	Analyse the Spemann‟s embryonic induction.	PSO 4, 6	An
CO-5	Compare the evolutionary thoughts.	PSO 2, 3	U
CO-6	Explain the mutation in evolution.	PSO 2	U
CO-7	Describe human evolution	PSO 2	U
CO-8	Analyse living and extinct fossils.	PSO 2, 6	An

DEVELOPMENTAL BIOLOGY

Text Book:

Arumugam, N. (1988) A Text Book of Embryology. Saras Publication, Nagercoil.

Books for Reference:

Balinsky, B.I. (1970) An Introduction to Embryology. Saunders Press, Phil. 3rd Edn.
Berril, N.C. (1971) Developmental Biology, McGraw Hill, New York.
Berril, R. (1979) Developmental Processes in Higher Vertebrates. Logos Press.
Bodmer, (1978) Modern Embryology. HR & W. New York.
Nelson.O.E.(1953) Comparative Embryology of the Vertebrates.McGrawHill,New York.
Scott, F & Gilbert F.S (1988) Developmental Biology. Sinauer associates Inc.Publishers.

Sunderland Massachusetts.
Subramaniam, T. (2002) Developmental Biology, Narosa Publishing House, New Delhi.

EVOLUTION

Books for Reference:

Darwin,C (1990).The origin of species. 6e.oup. Desmond MorrisCrownPub.Co., London.
EarnstMayr (1966). Animal species and Evolution. The Belknap Press of Harvard University Press, Cambridge, Massachusetts.
Theodore H. Eaton Jr. (1970). Evolution. Thomas Nelson and Sons Ltd, Trinidad
Theodosius Dobzhansky (1967). Evolutionary Biology. Appleton- Century – Crofts, Division of Meredith Publishing Company, New York.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY B.Sc.
ZOOLOGY (With Specialization in Biotechnology) (For the candidates admitted from 2015 onwards)

Third Year - Semester V

Course Title	MAJOR CORE: 8 -FUNDAMENTALS OF BIOTECHNOLOGY
Total Hours	75
Hours/Week	5
Code	U15ZO5MCT08
Course Type	Theory
Credits	4
Marks	100

General Objective

Students understand the methods in genetic engineering such as isolation of genes, gene transfer, selection and screening, plant, animal and stem cell culture and learn the principles of blotting techniques and DNA sequencing.

Course Objectives:

The student will be able to

CO 1	Remembers, understands and applies the basic tools and techniques of gene cloning.
CO 2	Remembers the gene transfer technique, host cell and selection strategy to synthesize a gene clone and understands, applies, evaluates and creates an appropriate vector to produce multiple copies.
CO 3	Remembers and understands the principle of blotting, gene sequencing, micro array techniques, gene knockout and DNA fingerprinting
CO 4	Understand and demonstrate the plant tissue culture techniques and cryopreservation
CO 5	Understand and demonstrate animal tissue culture techniques and describe the biosafety and IPR

UNIT I (15hrs) Definition and scope of biotechnology

Introduction and techniques in genetic engineering**.** Isolation of DNA – shot gun technique, cDNA, artificial gene.PCR amplification – types and their application.c-DNA and genomic DNA libraries
Molecular tools-Restriction enzymes – discovery, nomenclature, types and uses DNA ligase, DNA polymerases, Reverse transcriptase, terminal transferases, T_4 polynucleotide kinases, methylases, Dnases, Ribonucleases, alkaline phosphatases, S1 nucleases.
Linking of recombinant DNA with vector – linkers, adapters and homopolymer tails, terminal dinucleotides.
Extra Reading/Key words: *DNA Markers and protein engineering*

UNIT II **(15hrs)**

Vectors: plasmid- Col E1, pBR322; bacteriophage- M13 and λ phage, cosmid, phagmid, YAC, BAC, animal and plant viruses as vectors, shuttle vector, cloning and expression vectors.
Host: *E. coli, Bacillus***,** yeast and mammalian cells

Gene transfer techniques: Bacterial transformation, calcium phosphate co-transformation, transduction, protoplast fusion, electroporation and microinjection.
Selection and screening; Insertional inactivation, Immunological screening, DNA hybridization, reporter gene. Concept of fusion protein.
Extra Reading/Key words: *DNA & RNA labeling by radioactive and non-radioactive methods.*

UNIT III **(15hrs)**
Principles of blotting techniques: Immuno blot, Southern, Northern and Western, dot blot; PCR – Principle and applications
DNA sequencing: DNA sequencing methods-Maxim Gilbert and Sanger‟s method and next generation sequencing.
Human genome project- Salient features of human genome.
DNA microarray: Principle and applications.
Gene knockout technique and its significance.
DNA Finger printing: principle and applications
Extra Reading/Key words: *RACE PCR, Techniques in HGP, DNA foot printing*

UNIT IV **(15hrs)**
Plant tissue culture and preservation: Culture media. Methods-cell culture, suspension culture, organ culture, callus culture, embryo culture. Organogenesis – Somatic embryogenesis and Synthetic seeds. Somatic Hybridization – Protoplast isolation, fusion, regeneration of hybrids. Cybridization, Somaclonal Variation. Haploid production – anther culture – pollen culture.
Application of plant tissue culture. Gene Bank – Germplasm and Cryopreservation.
Extra Reading/Key words: *International Rice Genome Sequencing Project*

UNIT V
Animal cell culture
Requirements for Animal Cell culture – glass ware, laboratory media and applications
Primary and secondary culture, continuous cell lines-preparations and maintenance
Applications of Cell culture
Stem cell – types and its applications; Stem cell bank; Molecular taxonomy
Safety in Biotechnology
Intellectual property rights and patenting
Extra Reading/Key words: *Human stem cell cloning*

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Apply the basic tools and techniques of gene cloning in new innovative strategies.	PSO 1, 5	Ap
CO-2	Interpret and predict the appropriate vector for a gene transfer	PSO 1, 5	E,C
CO-3	Decide a gene transfer technique, host cell and selection strategy to synthesize a gene clone and to produce multiple copies.	PSO 1, 5	E
CO-4	Relate the principle of blotting, gene sequencing and micro array techniques with genome analysis.	PSO 1, 5	U
CO-5	Explain the DNA finger printing and Gene knockout	PSO 1, 5	E

	techniques		
CO-6	Demonstrate the plant tissue culture techniques	PSO 1, 5	C
CO-7	Demonstrate animal tissue culture techniques.	PSO 1, 5	C
CO-8	Discuss the concept of bio-safety and IPR	PSO 1, 5	C

Text Book:

Dubey, P.C. (2014) Text Book of Biotechnology Revised 5th Ed, Chand and Co., New Delhi.

Books for Reference:

Gupta, P.K. (2004) Elements of Biotechnology, Rastogi Publication, Meerut

Irfan Ali Khan and AthiyaKhanum (2004) Fundamentals of Molecular biology, Genetic engineering and Biotechnology, Ukaaz Publication, Hyderabad

Old R.W. and Primrose. S.B. (1989) Principles of Gene Manipulation, BlackwellScientific Publications.

Primrose. S.B. and R.M. Twyman (2006) Principles of Gene Manipulation and Genomics Blackwell Publishing, UK.

Satyanarayana (2006) Biotechnology, Books and Allied (P) Ltd., Lolkata.

Smith John.E. (1988) Biotechnology, Edward Arnold, London.

Walker, J.M. and Gingold, E.D. (Eds) (1992) Molecular Biology and Biotechnology, Panima Educational Book Agency. New Delhi.

Watson, J.D., Michael G., Tam Witkowski and Mark Zollew (1999) Recombinant DNA, Scientific American Books, New Delhi

Stewart Sell 2003(Ed) Stem Cells Handbook, Humana Press, NY

Freshney. R.I. (2000), Culture of Animal cells: Manual of Basic technique, 4th edition. John Wiley Publications.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
B. Sc. ZOOLOGY (With Specialization in Biotechnology)
(For the candidates admitted from 2015 onwards)
Third Year - Semester V

Course Title	MAJOR CORE 9 – BIOLOGICAL TECHNIQUES
Total Hours	75
Hours/Week	5
Code	U15ZO5MCT09
Course Type	Theory
Credits	4
Marks	100

General Objective:

The student will be able to understand the basic principles and analyze the applications of units of measurement, microscopy, spectrophotometers, centrifugation, chromatography& electrophoresis, radioactivity & nanobiology.

Course Objectives:

The student will be able to

CO No.	Course Objectives
CO 1	Apply the knowledge of measurements and microtechniques in the preparation of solutions and histological slides respectively.
CO 2	Understand and analyze the principle and applications of different types of microscopy and pH metry.
CO 3	Understand the principles and analyze the applications of spectrophotometry and radioactivity.
CO 4	Acquire knowledge on the principle, types and applications of centrifugation and chromatography.
CO 5	Analyze and apply the different electrophoretic techniques and nanobiology.

UNIT I **(15hrs)**

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

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: *Interpretation of histological sections taking one as example*

UNIT II **(15hrs)**

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

pH meter- principle and application.

Extra Reading/Key words: *Repair and rectification of microscope*

UNIT III (15hrs) Spectrophotometery

Electromagnetic spectrum and its properties.
Principle and applications of Colorimeter; Spectrophotometer; Flow cytometer
and Nuclear magnetic resonance
Radioactivity- Detection and measurement of radioactivity: autoradiography; Geiger Muller and Scintillation counter.
Extra Reading/Key words: *Interpretation of spectrophotometric results*

UNIT IV **(15 hrs)**
Centrifugation –concepts of relative centrifugal force and sedimentation coefficient.
Principle and applications of Preparative Centrifuge –Differential and Gradient centrifugation; Analytical centrifuges- Ultra centrifuge.
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: *Hierarchy of chromatography and their applications, taking a case study*

UNIT V **(15 hrs)**
Electrophoresis – Principle and applications of Paper, Polyacrylamide gel electrophoresis - PAGE and SDS – PAGE, Agarose gel electrophoresis (AGE) Immunoelectrophoresis and Isoelectricfocussing.
Introduction to Nanobiology.
Extra Reading/Key words: *Nanoparticle synthesis*

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	Experiment with different types of solutions.	PSO 4	Ap
CO-2	Classify and compare the types of microscopes and pH meters.	PSO 4	An, E
CO-3	Explain the principle and applications of spectrophotometer and also discover on radioactivity.	PSO 4	U
CO-4	Illustrate the process of centrifugation and chromatography	PSO 4	U
CO-5	Classify and distinguish the types of electrophoresis	PSO 4	An
CO-6	Discover nanobiology and its applications in various fields	PSO 5	An

Books for Reference:

Upadhyay, A., Upadhayay, K. and Nirmalendu, N. (2002), Biophysical Chemistry. Himalayan Publishing House, Mumbai.

Casey, E. J., (1962). Biophysics - Concepts and Mechanisms. East West Press Pvt., Ltd., New Delhi.
Daniel, M., (2005). Basic Biophysics for Biologist. Agro Botanical Publishers, Bihaner, India.
Narayanan, P., (2007). Essentials of Biophysics. New Age International (P) Ltd. Publishers.
Plummer T. D., (1978). An introduction to Practical Biochemistry. Tata McGraw Hill Publishing Company Limited, New Delhi.
Skoog, A. D. and James, J. L. (1992). Principles of Instrumental Analysis. Saunders Golden Sunberst Series
Vasanthan, P. andGautham, N. (2002). Biophysics. Narosa Publishing House, New Delhi.
Veeralakumari, l., (2006). Bioinstrumentation. MJP Publishers, Chennai.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY B.Sc.
ZOOLOGY (With Specialization in Biotechnology) (For the candidates admitted from 2015 onwards)
Third Year - Semester V

Course Title	**Major Core 10: Practical III-(DEVELOPMENTAL BIOLOGY, EVOLUTION, MICROBIOLOGY, BIOTECHNOLOGY & BIOINFORMATICS**)
Total Hours	**75**
Hours/Week	**5**
Code	**U15ZO5MCP10**
Course Type	**Practical**
Credits	**4**
Marks	**100**

General objective:

Student will learn the skills of performing experiments, analyse results and discuss the observations

Course Objectives:
The student will be able to

CO 1	Understand, Observe and Evaluate Sperm suspension, developmental stages, Regeneration and Placentation.
CO 2	Analyse Variation, Mimicry and Adaptive Radiation.
CO 3	Apply and evaluate the various Microbiological technique like Staining, Fermentation, Water potability test and sensitivity assay
CO 4	Understand and Apply DNA isolation techniques, immobilization of enzymes and animal cell culture techniques.
CO 5	Retrieve, Analyse and Align Protein and nucleotides using Bioinformatics tools.

Developmental biology

Preparation and observation Sperm suspension
Observation of slides pertaining to development of frog and chick.
Artificial parthenogenesis
Regeneration in amphibians.
Placenta in mammals.

Evolution

Variation – Homologous and Analogous organs.
Mimicry.
Adaptive Radiation.

Microbiology

Microscopic observations of bacterial types and Gram staining
Culturing – agar slant and stab and observation of bacterial colonies
Observation of Antibiotic sensitivity test.
Serial dilution technique.
Observation of fermentation in grapes

Milk quality test-methylene blue reductase test, phosphatase test.
LPCB mount- fungal staining
Water potability test-MPN test

Biotechnology

Isolation of Genomic DNA (Individual Work)
Agarose gel electrophoresis to show DNA (Individual work)
Blotting techniques –Southern, and Western (Group Work)
Immobilization of enzymes (Individual Work)
Demonstration of PCR
Preparation of cell culture media- Balanced salt solution and sterilization
Preparation of Primary cell culture
Cell viability and cyto-toxicity assays
Identification of stem cell types (Spotters)

Bioinformatics

Retrieving the sequence using Fasta
Protein sequence analysis – SwissProt
Pairwise sequence alignment – BLAST
Nucleotide sequence analysis – MEGA/GenBank
Multiple sequence alignment –CLUSTALW and Phylogenetic analysis, ORF prediction

Biological Techniques

Preparation of Standard solutions - Molarity, Normality, Percentage, Calculation of Moles & ppm

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Differentiate healthy, abnormal sperm, identify various developmental stages in frog,chick, regeneration.	PSO 2, 3	An
CO-2	Differentiate homologous analogous organs and examine the biological importance in variation, mimicry and adaptive radiation.	PSO 2, 3	An
CO-3	Differentiate gram positive and gram negative bacteria,identify the sensitivity of a microbe to given antibiotic ,examine the quality of milk and examine with grapes for fermentation.	PSO 3, 4	An
CO-4	Isolate DNA and immobilize enzyme.	PSO 3	E
CO-5	Prepare and differentiate the media for animal cell cultures, test the viability of animal cells	PSO 3	E
CO-6	Retrieve and examine sequence using various bioinformatics tools.	PSO 3	An

A record of the laboratory work should be maintained and submitted at the time of external practical the examination

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
B.Sc. ZOOLOGY (With Specialization in Biotechnology)
(For the candidates admitted from 2015 onwards)
Third Year - Semester – V

Course Title	MAJOR ELECTIVE 2: Microbiology and Bioinformatics
Total Hours	75
Hours/Week	5
Code	U15ZO5MET03
Course Type	Theory
Credits	4
Marks	100

General Objectives:
Microbiology: To enable the student to classify microorganisms and learns the structure with emphasis on the culture methods and impacts of microbes in soil, water, dairy, medicinal industries**.**
Bioinformatics: The student learns the structure and functional relationship of genes and proteins related to trace the phylogenetic relationship between the organisms.

Course objectives:
The student will be able to

CO 1	Remember and understand the classification and culturing of microorganisms
CO 2	Understand and analyse the role of microorganism in environment and Industry
CO 3	Understand and analyse how pathogen cause infectious disease and its control measures.
CO 4	Remember and understand the fundamental concepts of database and gene Organization.
CO 5	Understand and evaluate the data analysis technique to solve biological problem.

MICROBIOLOGY

UNIT I **(15 hrs)**

Microbes and Bacterial culture methods

Whittaker‟s classification of microorganisms and scope of microbiology.
Structure of Bacteria, Actinomycetes and Viruses – T4 phage and HIV.
Nutritional requirements, types of culture media; culture and growth characteristics.
Methods in microbial culture – sterilization, inoculation and incubation; preparation of pure culture and maintenance.
Extra Reading/Key words: *Atomic force microscope, Confocal Microscope, Virus culture*

UNIT II **(15 hrs)**

Environmental and Industrial microbiology

Common air and soil microbes
Food microbiology: Microbial food spoilage, food poisoning, physic-chemical methods in food preservation.
Water microbiology: Common pathogenic microbes in water.
Basic design of fermenter, industrial fermentation of ethanol, penicillin and enzymes.
Dairy microbiology: Pasteurization, fermented milk products (Curd and Cheese).

Extra Reading/Key words: *Bioterrorism, Biopigments*

UNIT III

Medical microbiology **(15 hrs)**

Study of common bacterial and viral diseases in man: causative organisms, mode of transmission, pathogenicity, symptoms and preventive measures.
Diseases of Gastro-enteric system: Cholera, Typhoid and Viral hepatitis.
Respiratory system: Influenza, Pneumonia and Tuberculosis.
Nervous system: Meningitis, Leprosy, Tetanus, Polio, Rabies and Herpes.
Genital system: Gonorrhea, Syphilis and Candidiasis and AIDS.
Extra Reading/Key words: *Epidemic disease, Pandemic diseases.*

BIOINFORMATICS

UNIT IV

Proteomics and Genomics **(15 hrs)**

History, Scope and application of Bioinformatics. Accessing bioinformatics resources from databases: Sequence databases –. Nucleotide sequence databases – NCBI, PubMed, EMBL, Genbank, DDBJ. Protein sequence databases – SWISS-PROT, TrEMBL and PIR.
Structure of DNA, RNA. ORF, Genetic code. Structure and organization of genomes- Prokaryotes (E.coli), Eukaryotes (Yeast and Human).
Extra Reading/Key words: *Cyber-crime, cyber security*

UNIT V

Protein structure, sequence analysis and phylogenetic analysis **(15 hrs)**

Protein structure prediction and homology modeling. Pairwise alignment and its significance.
Multiple sequence alignment and its application. Phylogenetic tree: clustering and cladistic methods.
Computer assisted drug design- outline of methods and tools employed.
Extra Reading/Key words: *Metabolomics, Transcriptomics*

Note: Texts given in the *Extra Reading/Keywords* must be tested only through Assignment and seminars.

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Outline, classify and asses the structure, growth requirements and maintenance of different microorganisms.	PSO-5	U
CO-2	Explain and identify the role of pathogen in water and food spoilage and to assess various food preservation methods.	PSO-5,6	U
CO-3	Acquire, design and apply the principles of fermenter in fermented food and industrial products.	PSO-4,5	Ap
CO-4	Explain, examine and discuss the etiological agent causing infectious diseases and its clinical manifestations.	PSO-4	U
CO-5	Apply, analyze and determine the different sequence databases, finally construct and organize the gene structure according to its functions.	PSO-5	Ap, An

CO-6	Organize and examine the protein prediction and its alignment to formulate drug designing tools.	PSO5,6	An, C

MICROBIOLOGY

Text Book:

Mani, A., Narayanan, L.M., Selvaraj, A.M., amdArumugam, N (1996). Microbiology, Saras Publication, Kanyakumari.

Books for Reference:

Anathanarayanan, R and JeyaramPanikar, C.K (1990). Text book of Microbiology, Orient Longman.

Deb, W.C (1982). Microbes and Diseases of Man. Text book of Microbiology (including parasitology) CBS publishers and Distributors, New Delhi.

Kalaichelven, P.T (2005). Microbiology and Biotechnology – A Laboratory Manual, MJP Publishers, Chennai.

Ketchuns, P.A (1984). Microbiology, John Wiky and Sons, New York.

Pelzer, M.J AND Reid, R.D (1965). Microbiology, McGraw Hill Book Company, New Delhi.

Sharma, P (1995). Microbiology, Rastogi and Company, MEERUT, India.

Sullila, S.B and Shantharm, S (1998). General Microbiology, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.

BIOINFORMATICS

Text Book:

Arthur M. Lesk (2003). Introduction to Bioinformatics, Oxford Univerity Press.

Books for Reference:

Irfan A, Khan and Atiya A Khanum (2003). Recent Advances in Bioinformatics, Ukaaz publishers, Hyderabad.

Mani K and VijayarajN(2003). Bioinformatics for Beginners, KalaikathirAchagam, Tamilnadu.

Murthy C.S.V (2003). Bioinformatics, Himalaya Publishing House, Mumbai.

Subramanian C (2004). A Textbook of Bioinformatics. Dominant Publishers and Distributors – New Delhi.

Westhead, D.R., Parish, J.H., and Twyman, R.M (2003)- Instant notes- Bioinformatics, Viva Books Private Limited, New Delhi. 7

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
B. Sc. ZOOLOGY (Specialization in Biotechnology)
(For the candidates admitted from 2015 onwards)
Third Year - Semester – V

Course Title	MAJOR ELECTIVE 2: APPLIED ENTOMOLOGY
Total Hours	75
Hours/Week	5
Code	U15ZO5MET04
Course Type	Theory
Credits	4
Marks	100

General Objective:

The student will acquire knowledge of entomology, the uses and menace of insects to man, and the application of insects in apiculture and sericulture.

Course objectives:
The student will be able to

CO 1	understand the general organization and applications of insects
CO 2	analyse the beneficial uses of insects to man
CO 3	analyse the harmful effects of insects
CO 4	apply the beneficial role of insects in apiculture, sericulture
CO 5	understand and evaluates the measures of control of insects

Unit I **(15hrs)**

Introduction to Entomology

Mention Agricultural entomology, Forest entomology, Veterinary entomology, Medical entomology, Forensic entomology, Industrial entomology, Nutritional entomology, Cultural entomology. Classification of Class Insecta down to orders, General organization of an insect.

Extra Reading/Key words: *Characters of Arthropods*

Unit II **(15hrs)**

Useful products, Useful body, Galls, Pollinators, Destroyers of insect pests,
Serve as food for animals and even man, Destroyers of weeds, Improve soil fertility, Act as scavengers, Aid in scientific research, Aesthetic and entertainment value, Use in medicine, Pollution indicators, Arrow poisons, Cold light, Insects in forensic science, Utility of insect pheromones and hormones

Extra Reading/Key words: *Biological Control Agents*

Unit III **(15hrs)**

Insects as enemies of Man

Morphology, damages caused and control measures of the following:

Pests of coconut: *Oryctes rhinoceros*, *Rhyncophorus ferrugineus*, *Nephantis serinopa*, eriophid mite (*Aceria guerreronis*),

Pest of paddy: *Leptocorisa acuta*, *Spodoptera mauritia*, Rice stem borer (*Scirpophaga incertulas, Nilaparvata lugens)*
Pest of stored food products: *Trogoderma granarium, Tribolium castaneum, Sitophilus oryzae*
Extra Reading/Key words: *Evaluate the pests in the kitchen*

Unit IV (15hrs) Productive Insects

Honey bee: Apiculture and its scope; Different species, Social organization, structure of worker bee, life history and communication; Bee products: Honey and Bee wax, Composition and Uses, Bee diseases.
Silk moth: Different types of silkworms, life cycle; Sericulture, moriculture, Processing and extraction of silk, Diseases of silk worms, composition and uses of silk.
Lac insect: Different strains of Lac insects; cultivation, inoculation and harvesting, propagation of lac ; composition and uses of lac, enemies of lac insects.
Extra Reading/Key words: *Visit to sericulture unit*

Unit V **(15hrs)**
Control Measures: a) Natural control (b) Applied control or Artificial control: Prophylactic and Curative methods [cultural, mechanical, legal methods (brief account), biological and chemical methods].
Biological control: History; Ecological, biological and economic dimensions of biological pest control methods, Mention any 3 important biological control project undertaken in India. Merits and demerits
Chemical control: Classification, Insecticides of plant origin; Insecticides, Mention insecticide residue, resistance and resurgence of insect pests; Pesticide appliances (Hand compression sprayer, Knapsack sprayer and Rocker sprayer); Precautions in handling insecticides.
Modern methods of Pest control: Autocidal and Pheromonal control
Integrated Pest Management (IPM): Features, advantages
Extra Reading/Key words: *Parasitoids*

Course Outcomes:

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	List and summarize the various fields of application of entomology	PSO 5	R,U
CO-2	Define the general structure of insects and classify them up to orders	PSO 5,6	R,U
CO-3	Identify and examine the benefits of insects to man	PSO 4,5	R, Ap
CO-4	Identify and examine the insect pests	PSO 4	R,U
CO-5	List the species of honeybees, silkworms and lac insects and their diseases	PSO-5	Ap, An
CO-6	Outline and model the life cycle of honeybees, silkworms and lac insects and list their products and the uses	PSO5,6	An,C
CO-7	Summarize and criticize the control measures	PSO 4	E

Books for References:

Atwal, A.S and Dhaliwa, G.S.(2008) Agricultural Pests of south Asia and their Management. Kalyani Publishers.

Bhaskaran, K.K and Francy, C. F (2010) Elements of Applied Entomology, Manjusha Publications.

Dhaliwal, G.S. *et al*., (2008) Essentials of Agricultural Entomology, Kalyani

Publishers Metcalf, C.L. & Flint, W.P. (1973) Destructive and Useful Insects, USTMH

Nair, M.R.G.K. (1989) A Monograph on Crop pests of Kerala and their control. KAU Publ., Vellanikkara.

Ramakrishna Ayyar, T.V. Maras, 1963. Handbook of Economic Entomology for South India,

Srivastava,K. P. A (1988) Text book of Applied Entomology , Vol. I & Vol. II, Kalyani Publishers, Ludhiana, New Delhi, Noida.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY (For candidates admitted from 2015 onwards) Third Year - Semester V

Course Title	NON-MAJOR ELECTIVE: 1 - ORNAMENTAL FISH CULTURE
Total Hours	30
Hours/Week	2
Code	U15ZO5NMT01
Course Type	Theory
Credits	2
Marks	100

General objective

Student will learn the importance of ornamental fish culture, maintain an aquarium, know the common ornamental fishes and explore the self employment opportunities.

Course Objectives:
The student will be able to

CO 1	Evaluate the present status of world aquarium and apply knowledge on construction of aquarium and transportation methods of fishes.
CO 2	Analyze the major marine and fresh water ornamental fishes in India and evaluate the compatible group of fishes for home aquarium.
CO 3	Apply different methods to prepare artificial fish feed.
CO 4	Analyze the diseases of ornamental fishes and apply different treatment methods and apply knowledge on breeding of aquarium fishes for commercial purposes.
CO 5	Apply knowledge and create new steps for maintenance of aquarium in the lab.

UNIT I **(7 hrs)**

Importance of ornamental fish culture – World Aquarium trade and present status.

Design and setting up of fish tank - Construction and maintenance of home aquarium, requirements and design for the commercial production units of ornamental fishes and transportation methods. Aquarium plants and their uses.

Extra Reading/Key words: *List of fishes banned for trading, Identification of local demand of ornamental fishes.*

UNIT II **(8 hrs)**

Major marine ornamental fish resources of India.

Popular tropical fresh water ornamental fishes and their characteristics- Live bearers- guppy, molly, platy and swordtail - any two. Egg layers- fighter, gourami, angelfish, red tailed shark and gold fish. – any two. A compatible group of fishes for home aquarium.

Extra Reading/Key words: *Identification of fishes that can withstand in sub-tropical Indian climate, Taxonomy of important fresh water and marine ornamental fishes.*

UNIT III **(7 hrs)**

Different kinds of feeds- culture of fish food organisms, preparation of artificial feeds, feeding methods and vacational feed.

Extra Reading/Key words: *Preparation of Alternate food for regular breeding of fishes.*

UNIT IV **(8hrs)**

Diseases and treatment methods in brief- ectoparasite- anchor worm and argulus, white spot, fin rot, mouth fungus, dropsy and velvet disease.

Breeding of aquarium fishes for commercial purpose

Extra Reading/Key words: *Identification of general diseases in fish and guidelines for their better upkeep.*

UNIT V

Maintenance of Aquarium in the lab (Lab work)

Note: The students maintain an aquarium in the lab and document the observations.

Extra Reading/Key words: *Steps to avoid harsh conditions of ornamental fishes in Lab. aquarium.*

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	Construct an aquarium and organize the interior of aquarium with equipments.	PSO 2, 6	E, Ap
CO-2	Evaluate the compatible group of fishes for home aquarium.	PSO 2, 6	E, Ap
CO-3	Develop different methods to prepare artificial fish feed.	PSO 6	Ap
CO-4	Categorize the diseases of ornamental fishes and its treatment methods.	PSO 2, 6	An, Ap
CO-5	Plan new methods for breeding of aquarium fishes for commercial purposes.	PSO 6	C

Text Books:

Ahilan. B, Felix. N and Santhanam.R., 2008. Text book of Aquariculture. Daya Publishing House, New Delhi. p.157.

Ramanathan et al., (2000), Tropical freshwater ornamental fish culture, Department of fisheries farm management, Veterinary and animal sciences university, Tamil Nadu.

Book for Reference:

Dey,V.K., (1995), Hand book of aqua forming. MPEDA India.

Jameson, J.D., Srinivasan.A and Venkataramanujam. (1995) Ornamental fish culture technology, TANUVAS publication Chennai.

Jameson, J.D.and Santhanam,R., (1996), Manual of ornamental fishes and farming technologies. Peejay, Thoothukkudi.

HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2
PG & RESEARCH DEPARTMENT OF ZOOLOGY (for candidates admitted 2017 onwards)
THIRD YEAR - SEMESTER V

Course Title	**SBE – 4 ANIMAL SCIENCE SKILLS FOR CHEMISTRY STUDENTS (Theory cum Lab)**
Total Hours	**30**
Hours/Week	**2**
Code	**U17ZO5SBP04**
Course Type	**Theory cum Lab**
Credits	**2**
Marks	**100**

General Objective:

To enable the students to learn the skills of performing experiments, analyzing the results and discussing the observations interlinking the information of biology to Chemistry.

Course Objectives:
The learner will be able to

CO 1	understand, apply and evaluate the chemical changes within the body due to the biological adaptations of selected examples in invertebrates and chordates.
CO 2	remembers and understands the different types of cells involved in functioning of the biological systems and how chemical molecules influence
CO 3	apply, analyse and evaluate the knowledge of Cell Biology through selected techniques
CO 4	evaluate the techniques relating to the Physiology of organs and organ systems, and how they work within the body to respond to challenges
CO 5	understand and apply the concepts of heredity and inheritance in Genetics

Unit I: Biological adaptation in invertebrate and chordate **(6hrs)**

Sponge Gemmule, Physalia

Taenia scolex, Leech (Triradiate bite), Honey- bee and Hornet, Pila Radula, Water vascular system in starfishes

Swimming adaptation in fishes, Poison apparatus in snakes, Flight adaptation in birds.

Extra Reading/Key words: *Structural adaptations changes the actual shape of an organism*

Unit: II Biological Systems **(6hrs)**

Observation of different types of animal cells

Preparation of blood smear and identification of WBC and RBC

Observation of Barr body

Pregnancy test

Extra Reading/Key words: *How small molecules affect biological systems.*

Unit III: Cell Biology **(6hrs)**

Study of mitotic stage in onion root tip

Differentiation of Normal and abnormal cells

Observation of sperm suspension.
Study of abnormal sperm.
Isolation of DNA from Human buccal wash

Extra Reading/Key words: *The smallest particle of an element that still retains its distinctive* chemical *properties*

Unit IV: Physiology

Measurement of their own Blood Pressure (**6hrs)**
Determination of Bleeding time & Clotting time
Determination / Estimation of Heamoglobin in Blood.
Preparation of Haemin crystals from human blood.
Normal and abnormal constituents of urine- Test for presence of urea, creatinine and sugar in urine

Extra Reading/Key words: Chemistry *explains how the cells function*

Unit V: Genetics **(6hrs)**

Survey of Mendelian Traits
Pedigree analysis
Syndrome and their Karyotypes
Analyzing their Blood Groups

Extra Reading/Key words: *The phenotype is disturbed not by introduction of mutations, but by exposure to small molecule.*

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Describes the structural adaptation of the organism to continue their mode of living.	PSO 2	R
CO-2	Learns the skill of identifying the cells and its role	PSO 1, 2	U
CO-3	Identifies the genetic role of the cell.	PSO 1, 2,4	R
CO-4	Learns the skill of finding the physiology of cells.	PSO 1, 4	E
CO-5	Analyse the genetics and the inheritance pattern.	PSO 2, 4	An

Books for Reference:

Ekambaranatha Iyer, M. & Ananthakrishnan, T.N. (1990) Outlines of Zoology (Viswanathan Publishers) Vol. I & II.
Verma P.S. & Agarwal V.K. (1998). Cell Biology, S.Chand and Company Ltd, New Delhi.
Mariakuttikan, A and Arumugam, N. (2007). Animal Physiology, Saras Publication, TamilNadu.
Alice Marcus (2009) Genetics, MJP Publishers, Chennai.
Halliday Resnick W, 2001. Fundamentals of Physics, VI Edition, John Wiley and Sons Inc.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY B.Sc.
ZOOLOGY (With Specialization in Biotechnology) (For the candidates admitted from 2015 onwards)
Third Year - Semester – VI

Course Title	Major Core-11 : ANIMAL PHYSIOLOGY
Total Hours	90
Hours/Week	6
Code	U15ZO6MCT11
Course Type	Theory
Credits	5
Marks	100

General Objective:

To enable the students to understand the homeostasis, physiology and functions of organs in animals

Course Objectives:

The learner will be able to

CO 1	understand and analyse the principles of homeostasis in invertebrates and vertebrates
CO 2	remember, understand and analyse the physiology of circulation, respiration and excretion
CO 3	understand and analyse the physiology of effectors, receptors and neuronal conduction
CO 4	understand and analyse the physiology of endocrine glands and animal behavior
CO 5	understand and analyse the physiology of reproductive organs and apply the ART techniques for infertility

UNIT I **(18hrs)**

Introduction to Animal Physiology, scope of physiology

Principles of Homeostasis:

Osmo- ionic regulation in crustaceans and fishes.

Thermoregulations in poikilotherms and homeotherms.

Digestion: Digestion of food and absorption (in mouth, stomach, duodenum and intestine).

Extra Reading/Key words: *osmoregulation in reptiles and mammals.*

UNIT II **(18 hrs)**

Circulation: Composition of blood, blood-clotting mechanisms, heartbeat – origin, conduction; cardiac cycle, blood pressure.

Respiration: Respiratory pigments; structure of haemoglobin; transport of respiratory gases-O_2 dissociation curve, CO_2 transport; Haemoglobin as a buffer.

Excretion: Biosynthesis of nitrogenous waste products – ammonia, urea, uric acid; physiology of urine formation, acid -base balance.

Extra Reading/Key words: *Ischemic heart disease, ECG, Dialyzer.*

UNIT III **(18 hrs)**

Muscle Contraction: Structure and molecular organization of skeletal muscle; mechanism and chemistry of muscle contraction; Cori cycle, energetics of muscle contraction.
Neural conduction: Resting potential, conduction of nerve impulse, synaptic transmission, neuromuscular junction, reflexes.
Receptor Mechanisms: Photoreception – structure of retina – visual pigments, photochemistry; **Chemoreception** – gustatory, olfactory;
Mechanoreception– Pacinian corpuscle; **Phonoreception.**
Extra Reading/Key words: *Kymograph, autonomic nervous system.*

UNIT IV **(18hrs)**

Mode of action of hormones – G protein coupled receptor.
Endocrine glands I: Hypothalamus, Pituitary, pineal, thyroid, parathyroid, pancreas and thymus.
Endocrine glands II: Adrenal cortex and medulla, ovary and testis- structure, hormones and their functions.
Animal Behaviour: Kinesis, taxis, instinctive behaviour, learned behaviour. Biological clock- circadian, lunar and circannual rhythms.
Extra Reading/Key words: *Endocrine disorders, Social behavior, Defensive behavior*

UNIT V **(18hrs)**

Reproduction: Anatomy of reproductive system in Human; Menstrual cycle and contraception.
Hormonal Controlof implantation, gestation, parturition; Infertility.
Assisted Reproductive technologies (ART) – Artificial insemination, surrogate motherhood, IVF, GIFT, ZIFT and ICSI ; Oocyte banking and donation.
Extra Reading/Key words: *Estrous cycle, Ethics of ART.*

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	Explain the principles of homeostasis.	PSO 1, 3	U
CO-2	Describe the digestion and absorption of food.	PSO 3	U
CO-3	Summarize the clotting mechanism and cardiac cycle.	PSO1, 3	U
CO-4	Analyze the transport of respiratory gases.	PSO 3, 6	An
CO-5	Explain the mechanism of muscle contraction and its energetics.	PSO 3	U
CO-6	Evaluate neural conduction and receptor mechanisms.	PSO 3, 6	E
CO-7	Explain the endocrine glands and hormones.	PSO 3	U
CO-8	Enumerate the various assisted reproductive technologies.	PSO 3, 6	R

Text Book:

Mariakuttikan, A. and Arumugam, N. (2007). Animal Physiology, Saras Publication, Tamilnadu.

Books for Reference:

Hoar, S.W. (1987). General and Comparative Physiology. Prentice Hall.
Knut Schmidt Nielson, (1985). Animal Physiology. Adaptation and Environment, Cambridge, University Press.

Murray, R.K., Mayes, P.A. Granner, D.K. and Rodwell, V.W. (1990). Harpers‟ Biochemistry, Tweny Second edition, Prentice Hall Internation Inc.
Parameswaran, R., Ananthakrishnan, T.N., Anantha Subramanian, K.S (1998) Outlines of Animal Physiology, S. Visuwanathan Pvt. Ltd, Chennai.
Philips, P. and Murray Mooyoung (1989). Animal Biotechnology, Pergamm Press, Oxford

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY B. Sc. ZOOLOGY
(With Specialization in Biotechnology) (For the candidates admitted from 2015 onwards)

Third Year - Semester – VI

Course Title	MAJOR CORE12- APPLIED BIOTECHNOLOGY
Total Hours	90
Hours/Week	6
Code	U15ZO6MCT12
Course Type	Theory
Credits	5
Marks	100

General Objective:

To enable the students to understand the applications of biotechnological principles for the improvement of industrial production, medical products for treatment and prevention of diseases, for waste disposal, environmental cleanup, agricultural technologies and fish and livestock farming.

Course Outcomes:

The student will be able to

CO 1	Remember, understand and apply the principle of transgenic plants.
CO 2	Remember the sericulture techniques, transgenic fishes, ethics on GMO‟s and policies of ELSI
CO 3	Remember, understand and evaluate the role of a microorganism in health care and environmental protection
CO 4	Remember and understand the role of Biotechnology in diagnosis, vaccine production and therapy for disorders
CO 5	Remember, understand and apply the strategies of biodegradation of the wastes and pollutants and the concept of bioremediation using microbes

UNIT I

Plant Biotechnology (18hrs)

Transgenic plants – Agro bacterium-mediated transformation, Principles in the production of golden rice, flavr savr tomato, insect-resistant and disease-resistant plants. Concept of biofuel-types and applications.

Extra Reading/Key words: *International Rice Genome Sequencing Project, intergeneric cytoplasmic hybridization in Radish and Grape*

UNIT II

Animal Biotechnology (18 hrs) Sericulture- Definition, Silk production. Seri- Biotechnology. Potential, strengths and challenges of sericulture industry in India.

Ploidy induction in fish; Transgenic fishes- principles and applications and transgenic live stock- production and application.

GMO- regulations - risk assessment; Bioethics- ELSI

Extra Reading/Key words: *Role of Modified ruminant microorganisms on livestock, Molecular Pharming*

UNIT III

Microbial Biotechnology (18hrs)

Microbial enzymes- types and applications.Immobilization of enzymes.Industrial scale production of enzyme-protease.

Concept of bio-pesticides and bio-fertilizers.

Single cell protein- production and applications.

Extra Reading/Key words: *Recombinant therapeutic proteins from transgenic microbes.*

UNIT IV

Medical Biotechnology (18 hrs)

Production of humulin. Recombinant growth hormone. Recombinant vaccines: r-subunit vaccine, r-live vaccines, Anti-idiotypic, edible vaccines, HIV, Malarial vaccine.

Monoclonal antibodies- applications

Gene therapy – types, Ex Vivo and in Vivo methods, treatment of genetic disorders. Principle and protocol for ADA deficiency- future prospects

Extra Reading/Key words: *The program for appropriate technology in health (PATH), Nanotechnology as diagnostic tool.*

UNIT V

Environmental Biotechnology (18 hrs)

Biotechnology of sewage treatment and effluent treatment for tannery, textile and paper;

Concept of bio-monitoring, biofilters, biosensors, bioscrubbers, eDNA.

Bioremediation of heavy metal and oil - super bug;

Concept of biopolymers.

Extra Reading/Key words: *Biopulping and Bioplastics*

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Interpret and apply the principle of transgenic plants in the production of new transgenic plant.	PSO 1, 5	U,AP
CO-2	Describe sericulture techniques, transgenic fishes	PSO 1, 5	E
CO-3	Spell out the ethics on GMO‟s and policies of ELSI.	PSO 1	R
CO-4	Determine the role of a microorganism in health care and environmental protection	PSO 1, 5	E
CO-5	Explain the role of Biotechnology in diagnosis, vaccine production	PSO 1, 5	E
CO-6	List the disorders and select specific therapy for specific disorders	PSO 1, 5	An
CO-7	Apply the strategies of biodegradation of the wastes and pollutants using microbes to evolve a new strategy	PSO 1, 5	Ap
CO-8	Construct a new bioremediation using microbes	PSO 1, 5	C

Text Book

Dubey and Maheswari (2006) Text Book of Biotechnology, Chand and Company, New Delhi

Books for Reference:

Annual Report of Central Sericultural Research and Training Institute (2014). Central Silk Board, Mysore.

Babiuk, L.A., J.P.Philips and M.M.Young (1989) Animal Biotechnology, Pergamaness, Oxford.

Balasubramanianet al.(1996) Concepts in Biotechnology. Universities Press, Hyderabad.

Chrispeels. M.J. and Sadava, D.E (1994) Plants, Genes and Agriculture . Jones and Bartelett Publishers, Boston.

Ganga, G. and SulochanaChetty, J. (1997).An Introduction to Sericulture. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi

Gupta, P.K. (2004) Elements of Biotechnology, Rastogi Publication, Meerut.

Old R.W. and Primrose. S.B.(1989) Principles of Gene Manipulation, Blackwell Scientific Publications.

Primrose, S.B. and R.M. Twyman (2006) Principles of Gene Manipulation and Genomics, Blackwell Publishing, UK.

Sathyanarayana, U. (2006) Biotechnology, Books and Allied (P) Ltd Kolkota, India

Watson, J.D., M.Gilman, J.Witkowski and M. Zoller (1999).Recombinant DNA.ScientificAmerican Books. W.H. Freeman and Company, New York.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
B. Sc. ZOOLOGY (With Specialization in Biotechnology)
(For the candidates admitted from 2015 onwards)
Third Year - Semester – VI

Course Title	Major Core 13 – Practical IV- Animal Physiology, Environmental Biology and Immunology
Total Hours	90
Hours/Week	6
Code	U15ZO6MCP13
Course Type	Practical
Credits	5
Marks	100

General objective:

The Students will acquire the skill to perform experiments, analyze results and discuss the observations.

Course Objective:
The learner will be able to

CO No.	Course Objectives
CO 1	Analyze the oxygen consumption and Q10 in fishes: nitrogenous excretory products in animals, consumption of blood in man and ECG recordings.
CO 2	Construct ecological pyramids, analyze different fauna
CO 3	Analyze the water samples and animal association
CO 4	Understand the organization of the immune system
CO 5	Evaluate haemagglutination and immunodiffusion.

ANIMAL PHYSIOLOGY

1. Oxygen consumption in an aquatic animal – fish
2. Determination of Q_{10} in fish
3. Analysis of excretory products in animals of different habitats (ammonia, urea and uric acid)
4. Analysis of ECG recording
5. Differential count of WBC
6. Total count of RBC
7. Total count of WBC and Platelets
8. Measurement of human blood pressure
9. Estimation of Haemoglobin content – Sahli‟s method.

ENVIRONMENTAL BIOLOGY

1. Construction of ecological pyramid to study the structural and functional relationship of different tropic levels
2. Analysis of the fauna and their adaptations to the respective habitat - rocky shore, sandy shore, muddy shore and deep sea

3. Analysis of marine and freshwater plankton
4. Analysis of water samples for pH, O_2, salinity, carbonates and bicarbonates
5. Estimation of primary productivity of a pond
6. Animal associations (symbiosis, mutualism, commensalism and parasitism)
7. Live feed culture (*Artemia)*

IMMUNOLOGY

1. Organs of immune system
2. Histology of spleen, lymph node and thymus
3. Haemagglutination test (Individual work)
4. Immunodiffusion (Individual work)

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO 1	Experiment on oxygen consumption and Q10 in fishes.	PSO 3, 4	Ap
CO 2	Analyze and compare different types of excretory products in animals of different habitats, ECG recording and blood composition of human.	PSO 3	An
CO 3	Assess the haemoglobin content, measure the blood pressure	PSO 3	E
CO 4	Construct ecological pyramid of different trophic levels; analyze the marine and fresh water planktons; animal association and adaptations of different fauna	PSO 2, 3	E
CO 5	Estimate primary productivity of a pond and analyse of water samples for pH, O_2, salinity, carbonates and bicarbonates.	PSO 3, 4	An
CO 6	Compare immune system and histology of different organs	PSO 3, 4	An
CO 7	Evaluate haemagglutination and immunodiffusion test	PSO 3, 4	E

A record of the laboratory work should be maintained and submitted at the time of external practical the examination.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
B. Sc. ZOOLOGY (With Specialization in Biotechnology)
(For the candidates admitted from 2015 onwards)
Third Year - Semester – VI

Course Title	**MAJOR ELECTIVE: 3 –IMMUNOLOGY**
Total Hours	**75 hours**
Hours/Week	**5**
Code	**U15ZO6MET05**
Course Type	**Theory**
Credits	**5**
Marks	**100**

General Objective

Student learns about the types of immunity, organization of immune system, antigens, vaccines, immunoglobulins, humoral and cell mediated immune responses, Major histocompatibility complexes, Organ transplantation, and immunological techniques.

Course Objectives:

The student will be able to

CO 1	understand the structure and functions of lymphoid organs, Lymphoid Cells and Types of Immunity.
CO 2	understand the Structures, types and properties of antigens and immunoglobulins and analyse the types of vaccine & its schedule.
CO 3	explain the process and mechanism of Humoral and Cell mediated immune response and Complement pathways
CO 4	understand and analyse the structure and function of MHC, its significance in Organ transplantation and understand the concept of autoimmunity.
CO 5	exemplify hypersensitivity reactions, antigen –antibody reactions, immunological techniques in clinical diagnosis and understand the concept of immunotherapy.

UNIT I **(15 hrs)**

Scope of Immunology - Types of Immunity

Lymphoid system - Organs – Structure and Functions

Lymphoid Cells – Types – Haematopoietic stem cells – Significance -Origin and differentiation of lymphocytes.

Extra Reading/Key words: *Application of Haematopoietic stem cells*

UNIT II **(15 hrs)**

Antigens : Structure – Properties, Factors affecting antigenecity.

Vaccine – Types, Vaccination Schedule.

Immunoglobulins: Structure, types, distribution and biological functions.

Extra Reading/Key words: *New vaccine in clinical trial, revised vaccination schedule*

UNIT III **(15 hrs)**

Immune response: Humoral response-antigen processing and presentation, clonal proliferation, cell-cell interaction, antibody secretion; Primary and secondary immune response.
Cell mediated immune response- Mechanism and target cell lysis.
Complements – Classical and Alternative pathways, role in immunity.
Extra Reading/Key words: *Type of immune response in microbial infection*

UNIT IV **(15 hrs)**

Introduction to HLA – HLA complex-Structure and Function of molecules.
Organ transplantation- types of graft, mechanism of allograft rejection.
Immunosuppression (Basic concepts).
Autoimmune Diseases –Concept and types (Graves‟s disease and Rheumatoid arthritis).
Extra Reading/Key words: *Case study of Organ transplantation and autoimmune disease.*

UNIT V **(15 hrs)**

Hypersensitivity –Types with example.
Immunological Techniques in Clinical Diagnosis:Antigen – antibody reactions – agglutination, precipitation and immunodiffusion. Widal test – Pregnancy test – ELISA
Introduction to Immunotherapy.
Extra Reading/Key words: *Visit to immunology laboratory to study the applications of immunotechniques*

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	Explain the scope of Immunology, types of Immunity and structure and function of lymphoid organs and Lymphoid Cells.	PSO 4, 6	U
CO-2	Explain the structures, types and properties of antigens and immunoglobulins.	PSO 4, 6	U
CO-3	Compares the types of vaccine & Vaccination schedule.	PSO 4, 6	U
CO-4	Explain Humoral, Cell mediated immune response and Complement pathway.	PSO 4, 6	U
CO-5	Describe the structure and function of MHC	PSO1, 4, 6	U, An
CO-6	Explain and analyse the immune reactions in Organ transplantation and autoimmunity.	PSO 4, 6	U, An
CO-7	Describe the types of hypersensitivity reaction with suitable examples.	PSO 4, 6	U, An
CO-8	Explain antigen – antibody reactions and its clinical application.	PSO1, 4, 6	An, E

Text Book:

Nandhini, S. (1994). Immunology- Introductory Text Book. New Age Int. (P) Ltd. Publication, New Delhi
Kuby, J. (2007) Immunology. (Sixth edition) W.H.Freeman and company, New York.

Books for Reference:

Kuby, J. (2007) Immunology. (Sixth edition) W.H.Freeman and company, New York.
Roitt, I. (1987) Essential Immunology. P.G. Publishing PVT. Ltd., New Delhi.
Sell,S.(1987) Basic Immunology. Elsevier Science Publishing Company.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
B. Sc. ZOOLOGY (With Specialization in Biotechnology)
(For the candidates admitted from 2015 onwards)
Third Year - Semester VI

Course Title	MAJOR ELECTIVE: 3 – ENVIRONMENTAL SCIENCE
Total Hours	75
Hours/Week	5
Code	U15ZO6MET06
Course Type	Theory
Credits	5
Marks	100

General Objectives:

The student will be able understand the different types of habitats, community, characteristics of community, pollution, disasters and measures to control environment.

Course objectives:

The student will be able to

CO 1	Analyze the components of environment, and different types of habitat
CO 2	Understand the characteristics of population and community.
CO 3	Analyze and evaluates the impacts of different types of pollution.
CO 4	Analyze the impact of fragile environment and different types of disasters.
CO 5	Understand the laws for the conservation of environment.

UNIT-I **(15 hrs)**

Physical Environment and Habitat

Definition and Scope of Environmental Science – **Environment:** Physical environment – Light, temperature, soil and water. Basic concepts of limiting factors - Leibig‟s law of minimum and Shelford's law of tolerance. **Habitat: Fresh water habitat** - lentic and lotic habitat. **Marine habitat**- Pelagic, benthic and deep sea. **Estuarine habitat** - characteristics and adaptations. **Terrestrial habitat-** characteristics. **Biomes** - Forest and desert biomes. Grass land ecosystem.

Extra Reading/Key words: *Fauna in the different habitat*

UNIT-II **(15 hrs)**

Population and Community

Population - Characteristics of population, regulation of population- density dependent and density independent factors, age structure of populations. **Biotic community -** Community structure and characteristics, Ecotone and edge effect, ecological niche. **Biotic environment -** Inter specific interactions - symbiosis, commensalisms and antagonism.

Extra Reading/Key words: *Population explosion*

UNIT-III

Environmental Pollution (15 hrs)

Water pollution – Eutrophication, Minamata episode, Post gulf war (1990) effect, Bombay high oil slick (1993), WHO standard for drinking water. **Airpollution –** Global warming, stone leprosy and Tajmahal, Bhopal tragedy, Emission standard and control measures. **Radiation pollution episodes -** Hiroshima and Nagasaki, Chernobyl, Fukushima. **Pesticide pollution -** Biomagnification, biological control, biopesticides, integrated pest management.

Extra Reading/Key words: *Biological control agents, biosensors*

UNIT- IV (15 hrs) Environmental Disaster and Fragile Ecosystems

Environmental Disaster: Definition, **Earth Quake -** Kashmir Earth quake 2005, **Tsunami-**Case study India - 2004, **Cyclones and Anticyclones, Floods, Drought. Natural disaster management.**
Fragile Ecosystem: Coral reef ecosystem, Mangroves, Wetlands, Mountain environment.
Extra Reading/Key words: *Endangered coral reefs, alayathi kadugal*

UNIT-V (15 hrs) Environmental Institutions, International Co-operation and Law

International Union for Conservation of Nature and Natural Resources (IUCN), World Wildlife Fund (WWF), US Environmental Protection Agency (EPA), **Indian Environmental Institutions –** Ministry of Environment, Forest and Wildlife (Government of India). Central Pollution Control Board (CPCB). **Environmental Laws/Acts –** Indian Forest Act, Forest Conservation Act, Wildlife Act, Air Act, Water Act. **Environmental Movement in India –** Chipko Movement, Silent Valley Movement

Extra Reading/Key words: *Visit to Pollution control boards*

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	Compare the different zones in marine environment.	PSO 2	An
CO-2	Distinguish Biome and Ecosystem.	PSO 2	An
CO-3	List out the characters of population.	PSO 2	R, U
CO-4	Distinguish symbiosis and Commensalism.	PSO 2	R, U
CO-5	Evaluate the effect of water pollution in environment.	PSO 4, 6	E, Ap
CO-6	Analyze the effect of Tsunami on the environment.	PSO 4, 6	An, Ap
CO-7	Analyze and Appraise the effects of Chipko movement and Silent Valley movement.	PSO 4, 6	An, E
CO-8	List out the environmental laws in India for conservation of environment.	PSO 2, 6	R, Ap

Text book:

Veer Bala Rastogy and Jayaraj, M. S.(1980).Animal Ecology and Distribution of Animals, Kendar Nath Ram Nath, Meerut, Delhi

Books for Reference:

Odum, E.P. and Barrett, G.W.(2005).Fundamental of Ecology. Latest Ed., Cengage Learning India. New Delhi.

Peter, J.R., Stephan, L.W., Paule, H., Ceche, S. and Bevlerly, (2008).M. Ecology. Cengage learning India. New Delhi.
Rana, S.V. S. (2007).Essentials of Ecology and Environmental Science, Latest Ed. Prentice –Hall of India Pvt. Ltd. New Delhi.
Smith, T.M. and Smith, R.L.(2008). Elements of Ecology. Latest Ed., Pearson Education. New Delhi.
Wright, R.T.(2008).Environmental Science. Latest Ed., Pearson Education. New Delhi.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
B.A/ B.Sc./ B.Com/ B.C.A/B.R.Sc./BBA Degree Course
(For the candidates admitted from 2015 onwards)
Third Year - Semester – VI

Course Title	**NON-MAJOR ELECTIVE: 2 – FIRST AID AND HOME NURSING**
Total Hours	**30**
Hours/Week	**2**
Code	**U15ZO6NMT02**
Course Type	**Theory**
Credits	**2**
Marks	**100**

General Objective:

The student will be able to understand and analyze the principles of first aid, home nursing, trauma first aid, advanced first aid, basic home nursing and apply at the time of emergency, illness and trauma.

Course Objective:

The student will be able to

CO 1	Understand and analyze the principles of first aid, human anatomy and first aid kits.
CO 2	Understand, analyze and apply the first aid for injuries including electric shock, facial, head and spine, abdominal and epilepsy
CO 3	Understand, analyze and apply the advanced levels of first aid which includes CPR, EAR, oxygen administration, analgesic administration and also on the topics accidents and injuries.
CO 4	Understand and apply the principles of home nursing in normal day to day life.
CO 5	Understand, analyze and apply the first aid techniques for both adult and children in the emergency conditions.

UNIT I **(6 hrs)**

Introduction to First – Aid

Principles of First- Aid - An outline of human Anatomy, Carrying Posture at emergency - First - aid Kit; Emergency centers.

Extra Reading/Key words: *Emergency contact numbers in Tamil Nadu*

UNIT II **(6 hrs)**

Trauma First – Aid.

Bleeding (External and Internal); Electric shock – Facial injuries (Ear injuries, Eye injuries, Tooth injuries); Head injuries ; Spinal injuries; Chest injuries; Abdominal injuries; Epilepsy/Convulsions – Cuts, Incisions and Abrasions .

Extra Reading/Key words: *Seizure, cerebral death*

UNIT III **(6 hrs)**

Advanced First – Aid

Sprains and fractures-Bandages and slings

Expired Air Resuscitation (EAR) – Cardiopulmonary Resuscitation (CPR) - Oxygen administration – Analgesic administration; road traffic accidents; fire accidents; Burns and scales, Common minor sports injuries; back injuries.

Extra Reading/Key words: *Emergency contact numbers of leading hospitals and medical centers*

UNIT IV **(6 hrs)**

Introduction to Home Nursing

Principles of Home Nursing –Room maintenance, temperature taking, Care of the hair and skin, administration of medicines, bed making, bed pan, hot water bottle, ice cap and inhalation.

Home Remedies for general ailment.

Extra Reading/Key words: *Hair loss, dry skin, herbal remedies*

UNIT V **(6 hrs)**

Childhood and adult illnesses care. Vomiting, diarrhoea and dehydration; anaphylaxis - asthma – common cold, cough and fever; hyperventilation; fainting, stroke (Paralysis); diabetes; Blood pressure; Heart attack; Choking; Poisoning: Food, Drug Overdose; Drowning; Snake and Insect stings.

Extra Reading/Key words: *Poisonous snakes, ORS, 1st Golden Rule*

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	Analyze the principles of first aid	PSO 4, 5	An
CO 2	Explain the structures of human anatomy	PSO 3	U
CO 3	Demonstrate different types of first aid given for emergency	PSO 4, 5, 6	U
CO 4	Apply the home remedies for daily life	PSO 5	Ap
CO 5	Analyze and categorize the first aid techniques for child and adult illness	PSO 5	An

Books for Reference:

Bhave,V. N., Deodhar, N.S., Bhave, S.V. and Sathe R. V. (1983) You and Your Health, Vol.I, National Book Trust , India.

First Aid to the injured. (2009) St.John Ambulance, 5th edition

Harold, S and Hubert, O.S. Your health and You, 1970.Vol I &II . The Stanborough Press Ltd, Alma Park, Grantham, Lincolnshire England.

Muthu, Era. Su. (2004) First - Aid, Sura Books (Pvt) Ltd, Chennai, Bangalore & Kolkata.

Subramanian, R. (2005). First – aid and Home – Nursing, Sindmayam Publishing,Tirunelveli.

HOLY CROSS COLLEGE (AUTONOMOUS), TRICHIRAPPALLI-2
PG & RESEARCH DEPARTMENT OF ZOOLOGY
B. Sc. ZOOLOGY (With Specialization in Biotechnology)
(For the candidates admitted from 2019 onwards)
Third Year - Semester – VI

Course Title	**SKILL BASED ELECTIVE – 5: COMPUTER LITERACY FOR ZOOLOGY**
Total Hours	**30**
Hours/Week	**2**
Code	**U19ZO6SBT05**
Course Type	Theory
Credits	**2**
Marks	**100**

General Objective:

The student will gain understanding and skills in office packages, online transactions, cyber security,tele-health technology and digital library resources.

Course Objectives:
The student will be able to

CO 1	apply the office packages to gain a better understanding of the computer.
CO 2	understand the functions of smart devices and online transactions
CO 3	Analyse the purpose of social networking and cyber security in the e-world
CO 4	Know the process of translating the function from biology to human and telemedical technology.
CO 5	To Create a sense of competition to learn digital resources and publish their scientific finding in journals.

Unit I: Office Packages: (6hrs)

MS- Word : Creation of Documents (letters, Bio- data, etc).Creation of Tables, Formatting Tables (Time table, Calendar, etc).Working with Mail Merge(Circular letters).

MS – Excel: Creation of Worksheet (Mark Sheet, Pay Slip, PF Contribution list, etc). Excel Function (Date, Time, Statistical, Mathematical, Financial Functions). Creating charts (Line, Pie, Bar, etc).

MS- Power Point : Creation of Presentations(Duplicate and New slides, Layouts, View, Slide show, etc.,). Working with objects (Movie, Sound, Word, Excel, etc.,) Working with Transition and Animation effects(Text, Object, Pictures)

Extra Reading/Key words: *Units of Data Storage.*

Unit II : Smart Devices and Online Transactions: (6hrs)

Smart phone – Types : Tablet PC , Smart TV, Smart Camera, Smart Watch and Smart Oven.Operating system for Smart phones- Apple iOS, Android, Windows 10, Blackberry, Synbian and Bada. Benefits of Smart Phones.

E-Commerce and M-Commerce: Components of E-Commerce- history, types, and benefits of each (B2B, B2C, C2B, C2C). Business to Government E-Commerce. M-Commerce-History, customers

point of view and the provider point of view. Applications of M-Commerce- Mobile ticketing, mobile money transfer, mobile banking, mobile marketing and advertising. Payment methods in M-Commerce- Premium rate telephone numbers, Direct mobile dealing, Macro, Micro payment services and mobile wallets.

Extra Reading/Key words: *Google play for Android Phones.*

Unit III: Social Networking and Cyber Security (6hrs)

Social Networking Sites: Characteristics of Social Networking Website- Examples of Social Networking Services (Facebook, SnapChat, Instagram, Whatsapp, Pinterest, Tumblr, Linkedin, Twitter, Quora and Patreon). Advantages and Disadvantages of Social Network

Cyber law: Evolution and Historical events in cyber law. Case studies- Article taken from Media. Building blocks of cyber law (Netizens, Cyber space and Technology). Cyber Crime, Electronic and Digital devices, Intellectual Property, Data Protection and Privacy. Merits and Demerits of Cyber crime.

Extra Reading/Key words: *How to stay out of trouble from Social Network.*

Unit IV: Biomimetics and Telehealth Technology (6hrs)

Biomimetics: Introduction, Biodiscovery, Biodesign, Biocontrol, Bioadhesion, Bioscaling, Biomotion and Bioanimation.

Telehealth technology: Telemedicine system, benefits and limitations, Confidentiality and data protection, telesurgery, telepathology, e-health and Cyber medicine.

Extra Reading/Key words: *Applications of biomimetics in regenerative medicine, tissue engineering and drug delivery.*

Unit V: Digital Knowledge (6hrs)

Digital Knowledge library - data mining Website related to the field of biology, Academic services – INFLIBNET, NICNET, BRNET, Web of Science, Bio piracy, plagiarism, Multimedia in biology, Global Positioning System(GPS), ZIMS in Husbandry, predicting human behavior with Big data.

Extra Reading/Key words: *learning in a technology-rich environment, online tools and softwares*

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Demonstrate basic understanding of computer office packages	PSO 6	Ap
CO-2	Recognize and classify various benefits of smart devices, discuss and apply diverse types of Ecommerce and M commerce.	PSO 6	Ap
CO-3	Apply and utilize web technologies in social networking.	PSO 6	Ap
CO-4	Acquire, design and apply the mimetics technology and learn the telehealth technology.	PSO 4, 6	U
CO-5	Explain and utilize the digital resources in various field of Life Science.	PSO 5, 6	Ap

Books for Reference:

1. Mastering Ms-Office by Bittu Kumar

2. https://www.webopedia.com/DidYouKnow/Hardware_Software/mobile-operating-systems-mobile-os-explained.html
3. https://makeawebsitehub.com/social-media-sites/
4. https://www.tutorialspoint.com/information_security_cyber_law/information_security_cyber_law_tutorial.pdf
5. https://www.tutorialspoint.com/information_security_cyber_law/information_security_cyber_law_tutorial.pdf
6. https://www.irjet.net/archives/V4/i6/IRJET-V4I6303.pdf
7. Norris A C, ―Essentials of Telemedicine and Telecare, John Wiley, New York, 2002.
8. Yoseph Bar-Cohen- Biomimetics: Biologically Inspired Technologies Hardcover – Import, CRC Press; 1 edition ,USA,2005
9. Ramesh Pandita/Shivendra Singh - Information Literacy and Plagiarism, CBS Publishers & Distributors; First Edition edition (2018).
10. Olga Ferrer Roca, Marcelo Sosa Iudicissa, ―Handbook of Telemedicine, IOS Press, Netherland, 2002.
11. Khandpur R S, ―Handbook of Biomedical Instrumentation, Tata McGraw Hill, New Delhi, 2003.
12. Keith J Dreyer, Amit Mehta, James H Thrall, ―Pacs: A Guide to the Digital Revolution, Springer, New York, 2002.
13. Jain V.K- Introduction to multimedia and its Applications, Khanna Book Publishing; 1 edition,2012

(For candidates admitted from 2015 onwards)

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2 SEMESTER VI

Course Title	SKILL BASED ELECTIVE 6 : RESEARCH METHODOLOGY
Total Hours	30
Hours/Week	2
Code	U15DS6SBT06
Course Type	(Theory cum Project)
Credits	2
Marks	100

General Objective:

Students get introduced to concept of research and to carry out research projects.

Course Objective:

The student will be able to

1. understand the different types of research.
2. analyze the research objectives and frames the hypothesis
3. understand the structure of dissertation.
4. evaluate their research work.

Unit I 6Hrs

Introduction to research: Concept of research – types of research – introduction to research literature base – collection of research information from different sources; maintenance of information.

Extra reading / Key Words: *Primary data, Secondary data collection*

Unit II 6Hrs

Research focusing: identifying research area – drawing objectives\ hypothesis – designing the work – data collection – analysis.

Extra reading / Key Words: *Test of Hypothesis and Levels of significance.*

Unit III 6Hrs

Preparation of dissertation: Structure of dissertation – editing – bibliography.

Extra reading / Key Words: *Summarizing any Two research article.*

Unit IV Project work **12Hrs**

Note: 1.Extra reading/Key words are only for internal testing(Seminar/Assignment)

2. The students will be evaluated internally by a test for 50 marks. The Project will be evaluated by an external evaluator and a viva- voce will be conducted for 50 marks. The students can carry out their projects individually or in groups.

REFERENCES:

Blaxter, L., Hughes, C. aned Tight (1999) How to research? Viva Book private Limited

Kothari, C.R. (2004) research Methodology- Methods and Technioques, New Age International Publishers, India

Lal, B.(2002) Research Methodology, ABD Publishers. India

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 **CODE: U15VE6LVB03**

CREDIT : 1 **MARKS : 100**

OBJECTIVE:

x To prepare the students to practice Christian principles in family, church and society as young women

UNIT – I: ESSENTIALS OF CHRISTIAN FAITH

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

UNIT – II: MARRIAGE AND FAMILY LIFE

- x Finding the God‟s Will - Issac (Gen 24)
- x Man and woman as Partners – Abraham and Sarah (Gen 16-18,22), Aquila and Priscilla (Acts 18: 1-3,26)
- x Evils to be avoided – Premarital Sex, Extramarital Sex, Homosexuality, Abortion(Heb 13: 4, Psalm 127 : 4)
- x Ideal Wife – Sarah (I Peter 3: 1-6), Ruth,(Eph 5)

UNIT – III: CHRISTIAN HOME

- x 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)
- x Caring for the Aged (I Sam 2: 31,32)

UNIT – IV: CHRISTIAN ETHICS

- x Holiness – Joseph (Gen 39:9) Levi 11: 45, Ecc 12
- x Obedience to God - Abraham (Gen 12) ; St.Paul (Acts 9)
- x Freedom and Accountability
- x Justice and Love
- x Choices in Life – Making Decisions (Studies, job, life Partner)
- x Model to follow – Who is your model? (John 15: 1-17)
- x 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 Scuddar (Vellore)
- Devasagayam (Nagercoil)
- St. John De Britto (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
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.

Documents of Vatican II – St. Paul‟s Publications, Bombay 1966.

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.