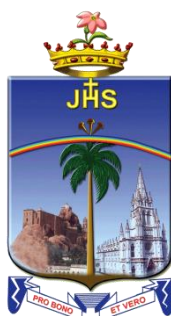


B.Sc. BOTANY
LOCF SYLLABUS – 2021

SCHOOLS OF EXCELLENCE
WITH CHOICE BASED CREDIT SYSTEM (CBCS)



DEPARTMENT OF BOTANY
SCHOOL OF BIOLOGICAL SCIENCES
ST. JOSEPH'S COLLEGE (AUTONOMOUS)

Special Heritage Status Awarded by UGC
Accredited at A⁺⁺ Grade (IV Cycle) by NAAC
College with Potential for Excellence by UGC
DBT-STAR & DST-FIST Sponsored College
Tiruchirappalli - 620 002, Tamil Nadu, India

SCHOOLS OF EXCELLENCE WITH CHOICE BASED CREDIT SYSTEM (CBCS) UNDERGRADUATE COURSES

St. Joseph's College (Autonomous), a pioneer in higher education in India, strives to maintain and uphold the academic excellence. In this regard, it has initiated the implementation of five "Schools of Excellence" from the academic year 2014 – 15, to meet and excel the challenges of the 21st century.

Each School integrates related disciplines under one roof. The school system enhances the optimal utilization of both human and infrastructural resources. It also enhances academic mobility and enriches employability. The School system preserves the identity, autonomy and uniqueness of every department and reinforces Student centric curriculum designing and skill imparting. These five schools adhere to achieve and accomplish the following objectives.

Optimal utilization of resources both human and material for the academic flexibility leading to excellence.

Students experience or enjoy their choice of courses and credits for their horizontal mobility.

The existing curricular structure as specified by TANSICHE and other higher educational institutions facilitate the Credit-Transfer Across the Disciplines (CTAD) - a uniqueness of the choice based credit system.

Human excellence in specialized areas

Thrust in internship and / or projects as a lead towards research and

The multi-discipline nature of the School System caters to the needs of stake-holders, especially the employers.

Credit system:

Weightage to a course is given in relation to the hours assigned for the course. Generally one hour per week has one credit. For viability and conformity to the guidelines credits are awarded irrespective of the teaching hours. The credits and hours of each course of a programme is given in the table of Programme Pattern. However, there could be some flexibility because of practical, field visits, tutorials and nature of project work.

For UG courses, a student must earn a minimum of 130 credits as mentioned in the programme pattern table. The total number of minimum courses offered by the Department is given in the Programme Structure.

OUTCOME-BASED EDUCATION (OBE)

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

OBE is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience, each student should have achieved the goal. There is no single specified style of teaching or assessment in OBE; instead, classes, opportunities and assessments should all help the students achieve the specific outcomes

Outcome Based Education, as the name suggests depends on Outcomes and not Inputs. The outcomes in OBE are expected to be measurable. In fact each Educational Institute can state its own outcomes. The ultimate goal is to ensure that there is a correlation between education and employability

Outcome –Based Education (OBE): is a student-centric teaching and learning methodology in which the course delivery, assessment are planned to achieve, stated objectives and outcomes. It focuses on measuring student performance i.e. outcomes at different levels.

Some important aspects of the Outcome Based Education

Course: is defined as a theory, practical or theory cum practical subject studied in a semester.

Course Outcomes (COs): are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.

Programme: is defined as the specialization or discipline of a Degree.

Programme Outcomes (POs): Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

Programme Specific Outcomes (PSOs):

PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

Programme Educational Objectives (PEOs): The PEOs of a programme are the statements that describe the expected achievement of graduates in their career, and also in particular, what the graduates are expected to perform and achieve during the first few years after Graduation.

Some important terminologies repeatedly used in LOCF.

Core Courses (CC)

A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.

Discipline Specific Elective Courses (DSE)

Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

DSE: Four courses are offered, two courses each in semester V and VI

Note: To offer **one DSE**, a minimum of two courses of equal importance / weightage is a must.

A department with two sections must offer two courses to the students.

One DSE Course may be offered as interdisciplinary course among the departments in a School (Common Core Course) at the PG level.

Generic Elective Courses

An elective course chosen generally from an **unrelated discipline/subject**, with an intention to seek exposure is called a Generic Elective.

Generic Elective courses are designed for the students of **other disciplines**. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

Two GE Courses are offered one each in semesters V and VI.

(open to the students of other Departments)

The Ability Enhancement Courses (AEC)

“AECC” are the courses based upon the content that leads to Knowledge enhancement; Communicative English, Environmental Science. These are mandatory for all disciplines.

AECC-1: Communicative English: It is a 4 credits compulsory course offered by the Department of English in the first semester of the Degree Programme, Classes are conducted outside the regular class hours.

AECC-2: Environmental Science: is a 2 credit course offered as a compulsory course during the second semester by the Department of Human Excellence.

Skill Enhancement Courses (SECs)

These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme.

These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

There are four courses under this category

SEC-1 is offered in semester **III as a course** Within the Department (**WD**) it is More of main discipline related skills.

SEC-2 is offered in semester **IV as a course** Between schools (**BS**) Offered to students of other schools (Except the school offering the course)

SEC-3 is offered in semester **V as a compulsory course** on Soft Skills offered by the Department of Human Excellence, common to all the students of UG programme.

SEC-4 is offered in semester **VI as a course** **Within School (WS)** Open to all the students within the same school (including the students of the parent department)

Self-paced Learning: It is a course for two credits. It is offered to promote the habit of independent/self learning of Students. Since it is a two credit course, syllabus is framed to complete within 45 hours. It is not taught in the regular working hours.

Field Study/Industrial Visit/Case Study: It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

Internship: Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

Comprehensive Examinations: A detailed syllabus consisting of five units to be chosen from the courses offered over the five semesters which are of immense importance and those portions which could not be accommodated in the regular syllabus.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL and etc.

Undergraduate Programme:

Programme Pattern:

The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French / Sanskrit)

Part-II : General English

Part-III : Core Course (Theory, Practicals, Discipline Specific Electives, Compulsory and Optional Allied courses, Project, Self paced courses, Internship , Comprehensive Examinations and field visit /industrial visit/Case Study)

Part-IV: Value Education, Ability Enhancement Courses, Skill Enhancement Courses/ Soft Skills , Generic Electives/ National Cadet Corps etc.

Part-V: Outreach Programme (SHEPHERD).

Ability Enhancement Courses (AEC): There are two Ability Enhancement courses viz AECC and SEC.

Value Education Courses:

There are four courses offered in the first four semesters for the First & Second UG Programme.

Course Coding

The following code system (11 alphanumeric characters) is adopted for Under Graduate courses:

21	UXX	N	N	XX	NN/NNX
Year of Revision	UG Department Code	Semester number	Part specification	Part Category	Running number/with choice

N:- Numeral X :- Alphabet

Part Category

GL - Languages (Tamil / Hindi / French / Sanskrit)

GE - General English

CC - Core Theory; CP- Core Practical

WS- Workshop

SP- Self Paced Learning

IS- Internship

FV- Field visit

CE- Comprehensive Examination

PW- Project Work& viva-voce

Electives Courses

ES – Department Specific Electives

EG- Generic Electives

Allied Courses

AC - Allied Compulsory

AO- Allied Optional

EC - Additional Core Courses for Extra Credits (If any)*

Ability Enhancement Courses

AE – Ability Enhancement Compulsory Courses; Bridge Course and Environment Science

SE – Skill Enhancement (WD), (BS), (WS) and Soft skills

VE - Value Education/ Social Ethics/Religious Doctrine

OR – Outreach SHEPHERD & Gender Studies (Outreach)

SU - AICUF / Nature Club / Fine Arts / NCC / NSS /etc. (Service Unit)

CIA AND SEMESTER EXAMINATION

Continuous Internal Assessment (CIA):

Distribution of CIA Marks	
Passing Minimum: 40 Marks	
Library Referencing	5
3 Components	35
Mid-Semester Test	30
End-Semester Test	30
Total CIA	100

MID-SEM & END – SEM TEST

Centralised – Conducted by the office of COE

1. Mid-Sem Test & End-Sem Test: (2 Hours each); will have Objective and Descriptive elements; with the below mentioned question pattern PART-A; PART-B; PART-C and PART D.

2. One of the CIA Component II/III for UG & PG will be of 15 marks and compulsorily a online objective multiple choice question type.

3. The online CIA Component must be conducted by the Department / faculty concerned at a suitable computer centre.

4. The 7 marks of PART-A of Mid-Sem and End-Sem Tests will comprise only: OBJECTIVE MULTIPLE CHOICE QUESTIONS.

5. The number of hours for the 5 marks allotted for Library Referencing/ work would be 30 hours per semester. The marks scored out of 5 will be given to all the courses (Courses) of the Semester.

6. English Composition once a fortnight will form one of the components for UG general English

Duration of Examination must be rational; proportional to teaching hours 90 minute-examination / 50 Marks for courses of 2/3 hours/week (all Part IV UG Courses) 3-hours examination for courses of 4-6 hours/week.

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No.	Level	Parameter	Description
1	K1	Knowledge/Remembering	It is the ability to remember the previously learned
2	K2	Comprehension/Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analysing	The learner distinguishes among different
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis /Creating	The learner creates a new product or point of view

WEIGHTAGE of K – LEVELS IN QUESTION PAPER

(Cognitive Level) K- LEVELS	Lower Order Thinking			Higher Order Thinking			Total %
	K1	K2	K3	K4	K5	K6	
SEMESTER EXAMINATIONS	15	20	35	30			100
MID / END Semester TESTS	12	20	35	33			100

QUESTION PATTERN FOR SEMESTER EXAMINATION

SECTION	MARKS
SECTION-A (No choice ,One Mark) THREE questions from each unit (15x1 =15)	15
SECTION-B (No choice ,2-Marks) TWO questions from each unit (10x2 =20)	20
SECTION-C (Either/or type) (7- Marks) ONE question from each unit (5x7 =35)	35
SECTION-D (3 out of 5) (10 Marks) ONE question from each unit (3x10 =30)	30
Total	100

BLUE PRINT OF QUESTION PAPER FOR SEMESTER EXAMINATION							
DURATION: 3. 00 Hours.				Max Mark : 100			
K- LEVELS	K1	K2	K3	K4	K5	K6	Total Marks
SECTIONS							
SECTION–A (One Mark, No choice) (15x1=15)	15						15
SECTION-B (2-Marks, No choice) (10x2=20)		10					20
SECTION-C (7- Marks) (Either/or type) (5x7=35)			5				35
SECTION-D (10 Marks) (3 out of 5) (3x10=30) Courses having only K4 levels				3			30
Courses having K4 and K5 levels One K5 level question is compulsory				2	1		
(Courses having all the 6 cognitive levels) One K5 and K6 level questions can be compulsory				1	1	1	
Total	15	20	35	30			100

QUESTION PATTERN FOR MID/END TEST		
SECTIONS		MARKS
SECTION–A (No choice, One Mark) (7x1 =7)		7
SECTION-B (No choice , 2-Marks) (6x2 =12)		12
SECTION-C (Either/or type) (7- Marks) (3x7 =21)		21
SECTION-D (2 out of 3) (10 Marks) (2x10=20)		20
Total		60

BLUE PRINT OF QUESTION PAPER FOR MID/END TEST							
DURATION: 2. 00 Hours.				Max Mark: 60.			
K- LEVELS	K1	K2	K3	K4	K5	K6	Total Marks
SECTIONS							
SECTION –A (One Mark, No choice) (7 x 1 = 7)	7						07
SECTION-B (2-Marks, No choice) (6 x 2 = 12)		6					12
SECTION-C (Either/or type) (7- Marks) (3 x 7 =21)			3				21
SECTION-D (2 out of 3) (10 Marks) (2x10=20) Courses having only K4 levels				2			20
Courses having K4 and K5 levels One K5 level question is compulsory				1	1		
Courses having all the 6 cognitive levels One K6 level question is compulsory					1	1	
Total Marks	07	12	21	20			60
Weightage for 100 %	12	20	35	33			100

Assessment pattern for two credit courses.

S. No.	Course Title	CIA	Semester Examination	Total Marks
1	Self Paced Learning Course	25 + 25 = 50	50 Marks (MCQ) (COE)	100
2	Comprehensive Examinations	25 +25 = 50	50 Marks (MCQ) (COE)	100
3	Internship	100	--	100
4	Field Visit	100	--	100
5	Ability Enhancement Course (AEC) for PG	50 (Three Components)	50 (COE) (Specific Question Pattern)	100
Assessment Pattern for Courses in Part - IV				
6	Value Education Courses and Environmental Studies	50	50 Marks (For 2.00 hours) (COE)	100
7	Skill Enhancement Courses(SECs)	50 marks (by Course in-charge) 50 Marks (by an External member from the Department)		100
8	SEC: SOFT SKILLS (For UG and PG)	100 (Fully Internal)		100

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) respectively. These two are calculated by the following formulae:

$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$	$\text{WAM (Weighted Average Marks)} = \frac{\sum_{i=1}^n C_i M_i}{\sum_{i=1}^n C_i}$
<p>Where,</p> <p>C_i is the Credit earned for the Course i G_i is the Grade Point obtained by the student for the Course i M_i is the marks obtained for the course i and n is the number of Courses Passed in that semester.</p>	

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

CLASSIFICATION OF FINAL RESULTS:

- i) For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
- ii) For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management/Literature as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Programme.
- iii) Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
- iv) A Pass in SHEPHERD will continue to be mandatory although the marks will not count for the calculation of the CGPA.
- v) Absence from an examination shall not be taken an attempt.

Table-1: Grading of the Courses

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above and below 90	9	A+
70 and above and below 80	8	A
60 and above and below 70	7	B+
50 and above and below 60	6	B
40 and above and below 50	5	C
Below 40	0	RA

Table-2: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appearance

Credit based weighted Mark System is adopted for the individual semesters and cumulative semesters in the column 'Marks secured' (for 100)

Declaration of Result

Mr./ MS. _____ has successfully completed the Under Graduate in _____ programme. The candidate's Cumulative Grade Point Average (CGPA) in Part – III is _____ and the class secured is _____ by completing the minimum of 130 credits. The candidate has acquired _____ (if any) more credits from SHEPHERD / AICUF/ FINE ARTS / SPORTS & GAMES / NCC / NSS / NATURE CLUB, ETC. The candidate has also acquired _____ (if any) extra credits by attending MOOC courses.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

The Programme Outcomes (POs)/Programme Specific Outcomes(PSOs) are the qualities that must be imbibed in the graduates by the time of completion of their programme. At the end of each programme the PO/PSO assessment is done from the CO attainment of all curriculum components. The POs/PSOs are framed based on the guidelines of LOCF. There are five POs UG programme and five POs for PG programme framed by the college. PSOs are framed by the departments and they are five in numbers.

For each Course, there are five Course Outcomes to be achieved at the end of the course. These Course outcomes are framed to achieve the POs/PSOs. All course outcomes shall have linkage to POs/PSOs in such a way that the strongest relation has the weight 3 and the weakest is 1. This relation is defined by using the following table.

Mapping	<40%	≥ 40% and < 70%	≥ 70%
Relation	Low Level	Medium Level	High Level
Scale	1	2	3

Mean Scores of COs = $\frac{\text{Sum of values}}{\text{Total No.of POs \& PSOs}}$		Mean Overall Score = $\frac{\text{Sum of Mean Scores}}{\text{Total No.of COs}}$	
Result	Mean Overall Score	< 1.2	# Low
		≥ 1.2 and < 2.2	# Medium
		≥ 2.2	# High

If the mean overall score is low then the course in charge has to redesign the particular course content so as to achieve high level mean overall score.

Vision

Forming globally competent, committed, compassionate and holistic persons, to be men and women for others, promoting a just society.

Mission

- Fostering learning environment to students of diverse background, developing their inherent skills and competencies through reflection, creation of knowledge and service.
- Nurturing comprehensive learning and best practices through innovative and value-driven pedagogy.
- Contributing significantly to Higher Education through Teaching, Learning, Research and Extension.

Programme Educational Objectives (PEOs)

- Graduates will be able to accomplish professional standards in the global environment.
- Graduates will be able to uphold integrity and human values.
- Graduates will be able to appreciate and promote pluralism and multiculturalism in working environment.

Programme Outcomes (POs)

1. Graduates will be able to apply the concepts learnt, in real life situations with analytical skills.
2. Graduates with acquired skills and enhanced knowledge will be employable/ become entrepreneurs or will pursue higher Education.
3. Graduates with acquired knowledge of modern tools and communicative skills will be able to contribute effectively as team members.
4. Graduates will be able to read the signs of the times analyze and provide practical solutions.
5. Graduates imbued with ethical values and social concern will be able to appreciate cultural diversity, promote social harmony and ensure sustainable environment.

Program Specific Objectives (PSOs)

1. Graduates will acquire the basic concepts to utilize them for lifelong learning, communicative skills and to imbibe ethical values to create a better world.
2. Will learn about the systematics, structure and functions of plants for effective management of cultivation practices for improved plant performance.
3. Will develop laboratory skills utilizing modern tools, techniques and protocols to collect and process data to design innovative scientific problems and solutions.
4. Will apply the skills for the benefit of the society through teamwork and project management practices for employability and entrepreneurship.
5. Will exploit the knowledge gained through various courses for sustainable environment and human welfare.

B.Sc. Botany						
PROGRAMME STRUCTURE						
Part	Sem.	Specification	No. of Courses	No. of Hours	Credits	Total Credits
I	I-IV	Languages (Tamil / Hindi / French / Sanskrit)	4	16	12	12
II	I-IV	General English	4	20	12	12
	I-VI	Core course : Theory	12	52	32	82
	I-VI	Core course : Practical	7	22	13	
	I-IV	Core course- Allied/(Practical)	4	16(8)	16	
	V-VI	Discipline Specific Elective	4	20	12	
	VI	Project Work	1		2	
	V	Self-paced learning	1	--	2	
	V	Field study/ Industrial visit/ Case study	1		1	
	V	Internship	1	-	2	
	VI	Comprehensive Exam	1	--	2	
	II,III,V	Extra Credit courses (MOOC)	(3)	--	(6)	
	V,VI	Generic Elective	2	8	6	6
IV	I	AECC-1 Communicative English	1	--	4	14
	II	AECC-2 Environmental studies	1	2	2	
	III	SEC -1 Within Dept. (WD)	1	2	1	
	IV	SEC -2 Between Schools (BS)	1	2	1	
	V	SEC -3 Soft skill	1	2	1	
	VI	SEC -4 within school (WS)	1	2	1	
	I-IV	Value Education	4	8	4	
V	1-V	Outreach Programme/NCC	-	-	-	4
		Total		180		130(6)

B.Sc. Botany								
PROGRAMME PATTERN								
Course Details						Scheme of Exams		
Sem	Part	Course Code	Course Title	Hrs	Cr	CIA	SE	Final
I	1	21UTA11GL01	General Tamil - I	4	3	100	100	100
		21UFR11GL01	French-I					
		21UHI11GL01	Hindi-I					
		21USA11GL01	Sanskrit-I					
	2	21UEN12GE01	General English-I	5	3	100	100	100
	3	21UBO13CC01	Algae and Bryophytes	5	3	100	100	100
	3	21UBO13CC02	Fungi, Plant Pathology and Lichens	5	3	100	100	100
	3	21UBO13CP01	Lab Course 1	3	2	100	100	100
	3	21UBO13AC01	Allied I: Zoology I: General Zoology	4	2	100	100	100
	3	21UBO13AP01	Allied I: Lab. Course: Zoology 1	2	2	100	100	100
	4	21UEN14AE01	AECC-1 : Communicative English	(6)	4	100	-	100
4	21UHE14VE01	Essentials of Humanity	2	1	50	50	50	
Total				30	23			
II	1	21UTA21GL02	General Tamil - II	4	3	100	100	100
		21UFR21GL02	French-II					
		21UHI21GL02	Hindi-II					
		21USA21GL02	Sanskrit-II					
	2	21UEN22GE02	General English-II	5	3	100	100	100
	3	21UBO23CC03	Pteridophytes, Gymnosperms and Paleobotany	4	3	100	100	100
	3	21UBO23CC04	Anatomy and Embryology	4	2	100	100	100
	3	21UBO23CP02	Lab Course 2	3	2	100	100	100
	3	21UBO23AC02	Allied I: Zoology II: Agricultural Entomology	4	2	100	100	100
	3	21UBO23AP02	Allied I: Lab. Course: Zoology II	2	2	100	100	100
	4	21UHE24AE02	AECC-2: Environmental studies	2	2	50	50	50
4	21UHE24VE02	Techniques of Social Analysis: Fundamentals of Human Rights	2	1	50	50	50	
		Extra Credit courses (MOOC)-1	-	(2)				
Total				30	20(2)			
III	1	21UTA31GL03	General Tamil - III	4	3	100	100	100
		21UFR31GL03	French-III					
		21UHI31GL03	Hindi-III					
		21USA31GL03	Sanskrit-III					
	2	21UEN32GE03	General English-III	5	3	100	100	100
	3	21UBO33CC05	Taxonomy of Angiosperms	5	3	100	100	100
	3	21UBO33CC06	Plant Breeding and Evolution	3	2	100	100	100
	3	21UBO33CP03	Lab Course 3	3	2	100	100	100
	3	21UBO33AO03A	Allied-II Optional: Chemistry for Biologists - I	4	3	100	100	100
		21UBO33AO03B	Allied-II Optional: Biometrics & Computer Applications I	4	2	100	100	100
	3	@	Allied-II Optional: Lab. Course 1 (Chemistry for Biologists)	2	-	-	-	-
		21UBO33AP03B	Allied-II Optional: Lab. Course 1 (Biometrics & Computer Applications)	2	2	100	100	100
	4	21UBO34SE01	SEC-1 (WD): Mushroom technology	2	1	100	-	100
4	21UHE34VE03A	Professional Ethics–I: Social Ethics - I	2	1	50	50	50	
4	21UHE34VE03B	Professional Ethics I:Religious Doctrine- I						
		Extra Credit courses (MOOC)-2		(2)				

			Total	30	18/19(2)			
IV	1	21UTA41GL04B	Scientific Tamil	4	3	100	100	100
		21UFR41GL04	French-IV					
		21UHI41GL04	Hindi-IV					
		21USA41GL04	Sanskrit-IV					
	2	21UEN42GE04	General English-IV	5	3	100	100	100
	3	21UBO43CC07	Cell Biology and Genetics	4	3	100	100	100
	3	21UBO43CC08	Ecology and Climate Change	4	2	100	100	100
	3	21UBO43CP04	Lab Course 4	3	2	100	100	100
	3	21UBO43AO04A	Allied-II Optional: Chemistry for Biologists - II	4	3	100	100	100
		21UBO43AO04B	Allied-II Optional: Biometrics & Computer Applications II	4	2	100	100	100
	3	21UBO43AP04A	Allied-II Optional: Lab Course 2 (Chemistry for Biologists)	2	2	100	100	100
		21UBO43AP04B	Allied-II Optional: Lab Course 2 (Biometrics & Computer Applications)	2	2	100	100	100
	4	21UBO44SE02	SEC-2 (BS): Mushroom Technology	2	1	100	-	100
	4	21UHE44VE04A	Professional Ethics II: Social Ethics-II	2	1	50	50	50
4	21UHE44VE04B	Professional Ethics II: Religious Doctrine-II						
			Total	30	19/20			
V	3	21UBO53CC09	Biophysics and Biostatistics	5	2	100	100	100
	3	21UBO53CC10	Microbiology & Immunology	5	3	100	100	100
	3	21UBO53CP05	Lab. Course 5	4	3	100	100	100
	3	21UBO53ES01A	DSE-1: Molecular Biology	5	3	100	100	100
	3	21UBO53ES01B	DSE-1: Bioinformatics & Bionanotechnology					
	3	21UBO53ES02A	DSE-2: Research Methodology	5	3	100	100	100
		21UBO53ES02B	DSE-2: Biopesticides					
	3	21UBO53IS01	Internship	-	2	100	-	100
	3	21UBO53SP01	Self-paced learning: Economic Botany	-	2	50	50	50
	3	21UBO53FV01	Field study/ Industrial visit/ Case Study	-	1	100	-	100
	3	21UBO54EG01	GE-1: Landscape designing	4	3	100	100	100
	4	21USS54SE03	SEC-3: Soft Skills	2	1	100	-	100
			Extra Credit courses (MOOC)-3		(2)			
			Total	30	23(2)			
VI	3	21UBO63CC11	Plant Physiology	4	3	100	100	100
	3	21UBO63CP06	Lab. Course 6	3	1	100	100	100
	3	21UBO63CC12	Genetic Engineering and Biotechnology	4	3	100	100	100
	3	21UBO63CP07	Lab. Course 7	3	1	100	100	100
	3	21UBO63ES03A	DSE-3: Biochemistry	5	3	100	100	100
	3	21UBO63ES03B	DSE-3: Agricultural Botany					
	3	21UBO63ES04A	DSE-4: Medicinal Botany	5	3	100	100	100
	3	21UBO63ES04B	DSE-4: Biological Techniques					
	3	21UBO63PW01	Project Work	-	2	100	100	100
	3	21UBO63CE01	Comprehensive Examination	-	2	50	50	50
	3	21UBO64EG02	GE-2: Solid Waste Management	4	3	100	100	100
	4	21UBO64SE04	SEC-4 (WS): Herbal Technology	2	1	100	-	100
			Total	30	22			
I-VI	5	21UCW65OR01	Outreach Programme		4			
			TOTAL (three years)	180	130(6)			

*The courses with a scheme of Exam 50 in CIA and SE will be converted to 100 for grading.

SEC-2: BETWEEN SCHOOL 4th Semester							
Between schools (BS)- Offered to students of other schools (Except the school offering the course)							
Course Details					Scheme of Exams		
Offering Department	Course Code	Course Title	Hr	Cr	CIA	SE	Final
SBS							
Botany	21UBO44SE02	Mushroom Technology	2	1	100	-	100
SCS							
Computer Science	21UCS44SE02	Data Analysis Using Spreadsheet	2	1	100	-	100
Mathematics	21UMA44SE02	Numerical Ability	2	1	100	-	100
Statistics	21UST44SE02	Quantitative Methods	2	1	100	-	100
Information Technology	21UBC44SE02	Digital Artwork	2	1	100	-	100
SLAC							
English	21UEN44SE02	English for Competitive Examinations	2	1	100	-	100
History	21UHS44SE02	Historical Monuments in Tiruchirappalli	2	1	100	-	100
Tamil	21UTA44SE02A	மேடைப் பேச்சுக்கலை	2	1	100	-	100
Tamil	21UTA44SE02	திரைப்படத் திறனாய்வும் குறும்பட உருவாக்கம்	2	1	100	-	100
SMS							
Commerce	21UCO44SE02A	Personal Finance Management	2	1	100	-	100
Commerce	21UCO44SE02B	Marketing Skills	2	1	100	-	100
Commerce	21UCO44SE02C	Event Planning and Management	2	1	100	-	100
Economics	21UEC44SE02	Financial Economics	2	1	100	-	100
BBA	21UBU44SE02A	Entrepreneurial Skills Enhancement	2	1	100	-	100
BBA	21UBU44SE02B	Practical Stock Trading	2	1	100	-	100
CommerceCA	21UCC44SE02	Practical Banking in India	2	1	100	-	100
SPS							
Chemistry	21UCH44SE02A	Health Chemistry	2	1	100	-	100
Chemistry	21UCH44SE02B	Industrial Chemistry	2	1	100	-	100
Physics	21UPH44SE02A	Weather Physics	2	1	100	-	100
Physics	21UPH44SE02B	Electrical Wiring	2	1	100	-	100
Electronics	21UEL44SE02	PC Assembling and Servicing	2	1	100	-	100

GENERIC ELECTIVE -1: 5th Semester

Generic Elective Courses are designed for the students of other disciplines.
(open to the students of other departments)

Course Details					Scheme of Exams		
Offering Department	Course Code	Course Title	Hrs	Cr	CIA	SE	Final
SBS							
Botany	21UBO54EG01	Landscape Designing	4	3	100	100	100
SCS							
Computer Science	21UCS54EG01	Ethical Hacking	4	3	100	100	100
Mathematics	21UMA54EG01	Mathematics for Competitive Examinations	4	3	100	100	100
Statistics	21UST54EG01	Actuarial Statistics	4	3	100	100	100
Information Technology	21UBC54EG01	Fundamentals Of Data Science	4	3	100	100	100
SLAC							
English	21UEN54GE01	Film Studies	4	3	100	100	100
History	21UHS54EG01	Tamil Heritage and Culture	4	3	100	100	100
Tamil	21UTA54EG01	தமிழிலயக்கத்தில் மனித உரிமைகள்	4	3	100	100	100
SMS							
Commerce	21UCO54EG01A	Computerised Accounting	4	3	100	100	100
Commerce	21UCO54EG01B	Basics of Excel	4	3	100	100	100
Commerce	21UCO54EG01C	Personal Investment Planning	4	3	100	100	100
Economics	21UEC54EG01	Principles of Economics	4	3	100	100	100
Commerce CA	21UCC54EG01	E-commerce and E Business Management	4	3	100	100	100
BBA	21UBU54EG01A	Global Supply Chain Management	4	3	100	100	100
BBA	21UBU54EG01B	Start – Ups and Small Business Management	4	3	100	100	100
SPS							
Chemistry	21UCH54EG01A	Chemistry for Competitive Examinations	4	3	100	100	100
Chemistry	21UCH54EG01B	Everyday Chemistry	4	3	100	100	100
Physics	21UPH54EG01A	Everyday Physics	4	3	100	100	100
Physics	21UPH54EG01B	Renewable Energy Physics	4	3	100	100	100
Electronics	21UEL54EG01A	Everyday Electronics	4	3	100	100	100
Electronics	21UEL54EG01B	Wireless Communication	4	3	100	100	100

GENERIC ELECTIVE -2: 6th Semester							
Generic Elective Courses are designed for the students of other disciplines. (open to the students of other departments)							
Course Details					Scheme of Exams		
Offering Department	Course Code	Course Title	Hrs	Cr	CIA	SE	Final
SBS							
Botany	21UBO64EG02	Solid Waste Management	4	3	100	100	100
SCS							
Computer Science	21UCS64EG02	3D Printing and Design	4	3	100	100	100
Mathematics	21UMA64EG02	Analytical Skill for Competitive Examinations	4	3	100	100	100
Statistics	21UST64EG02	Applied Statistics	4	3	100	100	100
Information Technology	21UBC64EG02	Industry 4.0	4	3	100	100	100
SLAC							
English	21UEN64EG02	English for the Media	4	3	100	100	100
History	21UHS64EG02	Intellectual Revivalism in Tamil Nadu	4	3	100	100	100
Tamil	21UTA64EG02	சித்த மருத்துவம்	4	3	100	100	100
SMS							
Commerce	21UCO64EG02A	Rural Marketing	4	3	100	100	100
Commerce	21UCO64EG02B	Entrepreneurship Development	4	3	100	100	100
Commerce	21UCO64EG02C	Digital Marketing	4	3	100	100	100
Economics	21UEC64EG02	Economics for Competitive Exams	4	3	100	100	100
CommerceCA	21UCC64EG02	Total Quality Management	4	3	100	100	100
BBA	21UBU64EG02A	Personality Development	4	3	100	100	100
BBA	21UBU64EG02B	NGO Management	4	3	100	100	100
SPS							
Chemistry	21UCH64EG02A	Food And Nutrition	4	3	100	100	100
Chemistry	21UCH64EG02B	Waste Management	4	3	100	100	100
Physics	21UPH64EG02A	Laser Technology and its Application	4	3	100	100	100
Physics	21UPH64EG02B	Physics of Earth	4	3	100	100	100
Electronics	21UEL64EG02A	CCTV and Smart Security System	4	3	100	100	100
Electronics	21UEL64EG02B	Entrepreneurial Electronics	4	3	100	100	100

Semester	Course Code	Title of the Course	Hours	Credits
I	21UTA11GL01	General Tamil - I	4	3

CO No.	CO-Statements	Cognitive Levels (K-Levels)
	இப்பாடத்தின் நிறைவில் மாணவர்கள்	
CO-1	இக்கால இலக்கிய வகைகளைக் கண்டறிவர்	K1
CO-2	எழுத்து, சொல் இலக்கணங்களின் அடிப்படைகளைக் கண்டறிவர்	K1
CO-3	அயலகக் கவிதை வடிவங்களை விளங்கிக் கொள்வர்	K2
CO-4	மொழிபெயர்ப்புக் கவிதைகளின் வாயிலாக மொழிபெயர்ப்புத் திறனை வளர்த்தெடுப்பர்	K3
CO-5	புதுக்கவிதை வாயிலாக வெளிப்படும் சமூக, அரசியல் விழுமியங்களை மதிப்பிடுவர்	K4

அலகு - 1

(12 மணிநேரம்)

- பாரதியார் கவிதைகள் - குயில்பாட்டு (குயில் தன் பூர்வ ஜன்மக் கதை உரைத்தல்)
- பாரதிதாசன் கவிதைகள் - சஞ்சீவி பர்வதத்தின் சாரல் உரைநடை - முதல் மூன்று கட்டுரைகள்

அலகு - 2

(12 மணிநேரம்)

- வெ.இராமலிங்கனார் - சொல், தமிழன் இதயம்
- முடியரசனார் - உயிர் வெல்லமோ, மனத்தாய்மை
- பெருஞ்சித்திரனார் - அஞ்சாதீர், மொழி இனம் நாடு, பட்டுக்கோட்டை
- கல்யாணசுந்தரனார் - வருங்காலம் உண்டு, உழைக்காமல் சேர்க்கும் பணம்.
- இலக்கணம் - எழுத்து
- இலக்கிய வரலாறு - மூன்றாம் பாகம் - தண்டமிழ்த் தொண்டர்கள்

அலகு - 3

(12 மணிநேரம்)

- சுரதா - நல்ல தீர்ப்பு
- கண்ணதாசன் - ஒரு பாணையின் கதை
- அப்துல் ரகுமான் - வீடு
- மேத்தா - ஒரே குரல்
- இலக்கிய வரலாறு - மூன்றாம் பாகம் - இருபதாம் நூற்றாண்டு
- இலக்கியவளர்ச்சி - முதல் ஐந்து சிறுகதைகள்
- சிறுகதை

அலகு - 4 : அரசியல் கவிதைகள்

(12 மணிநேரம்)

- ஈரோடு தமிழன்பன் - அகல் விளக்காக இரு
- ஆதவன் தீட்சண்யா - இன்னும் இருக்கும் சுவர்களின் பொருட்டு

சுகிர்தராணி	- என் கண்மணியே இசைப்பிரியா
சக்தி ஜோதி	- யுகாந்திர உறக்கம்
பழநிபாரதி	- வெள்ளைக்காகிதம்
லிவிங் ஸ்மைல் வித்யா	- நினைவில் பால்யம் அழுத்தம்
இலக்கணம்	- சொல்

அலகு - 5 அயலகக் கவிதைகள்

(12 மணிநேரம்)

ஓசே ரிசால்	- விடைகொடு என் தாய் மண்ணே
ஹைபுன் கவிதைகள்	- அறுவடை நாளின் மழை (மூன்று கவிதைகள்)
சிறுகதை	- ஆறு முதல் பத்து சிறுகதைகள்
உரைநடை	- நான்கு முதல் ஆறு கட்டுரைகள்

பாட நூல்கள்

1. பொதுத்தமிழ், செய்யுள் திரட்டு, தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, முதற்பதிப்பு, 2021
2. சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு, தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, பத்தாம் பதிப்பு, 2017
3. நற்றமிழ்க் கோவை (கட்டுரைத் தொகுப்பு). தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, முதற்பதிப்பு, 2021
4. சிறுகதைத் தொகுப்பு - ஒவ்வொரு கல்வியாண்டிற்கும் ஒவ்வொரு சிறுகதைத்தொகுப்பு
5. (2021-2022 கல்வியாண்டுக்கு மட்டும்): நல்லாசிரியர், சிறுகதைத் தொகுப்பு, - தமிழாய்வுத்துறை, நியூ செஞ்சரி புக் ஹவுஸ், சென்னை, முதற்பதிப்பு, 2021

Relationship matrix for Course outcomes, Programme outcomes / Programme Specific Outcomes

Semester	Course code	Title of the Course									Hours/ week	Credits
I	21UTA11GL01	General Tamil - I									4	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos	
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5		
CO-1	2	1	2	2	3	3	3	2	3	2	2.3	
CO-2	2	1	2	2	2	3	2	2	2	2	2.0	
CO-3	2	1	2	2	3	3	3	2	3	2	2.3	
CO-4	1	2	1	2	2	3	2	2	3	2	2.0	
CO-5	1	1	2	2	3	3	3	2	3	2	2.2	
Mean overall Score											2.16 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
I	21UFR11GL01	FRENCH – I	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO–1	recall and spell the alphabets, numbers, colours, days of the week and months in French.	K1
CO–2	compare the definite and indefinite articles and its usages.	K2
CO–3	construct simple phrases by using ‘er’ verbs in present tense.	K3
CO–4	make use of correct terminology and introduce oneself in French.	K3
CO–5	distinguish between affirmative and negative phrases and take part in role play - conversation.	K4

Unit – I (12 hours)

TITRE: BONJOUR CA VA?

GRAMMAIRE : Les pronoms personnels sujets, les articles définis et indéfinis, Etre et avoir (verbes auxiliaires)

LEXIQUE : Saluer, Entrer en contact, demander et dire comment ça va ?, L’alphabet, les couleurs, les pays et les nationalités, les animaux domestiques.

PRODUCTION ORALE : Epeler son nom et son prénom, Comprendre des personnes qui se saluent.

PRODUCTION ECRITE : Les formules de politesse

Unit – II (12 hours)

TITRE: SALUT ! JE M’APPELLE AGNES

GRAMMAIRE : La conjugaison du 1^{er} groupe, les adjectifs possessifs, la formation du féminin, la formation du pluriel.

LEXIQUE : Se présenter, Présenter quelqu’un, Remercier, Les jours de la semaine, les mois de l’année, les nombres de 0 à 69, la famille

PRODUCTION ORALE : Comprendre des informations essentielles

PRODUCTION ECRITE : Présentez –vous

Unit - III (12 hours)

TITRE: QUI EST-CE?

GRAMMAIRE : La phrase interrogative : Qu’est-ce que... ?/Qu’est-ce que c’est ?/Qui est-ce ?, quelques indicateurs du temps, la formation du féminin, les verbes aller et venir

LEXIQUE : Demander et répondre poliment, les professions

PRODUCTION ORALE : Parler de ses projets

PRODUCTION ECRITE : Ecrire de brefs messages

Unit - IV (12 hours)

TITRE: DANS MON SAC, J’AI?

GRAMMAIRE : la phrase négative, c’est/il est, les articles contractes, les pronoms personnels toniques

LEXIQUE : Demander des informations personnelles, Quelques objets, la fiche d’identité, les

nombres à partir de 70

PRODUCTION ORALE : Comprendre un message sur un répondeur téléphonique

PRODUCTION ECRITE : Remplir une fiche d'identité

Unit - V

(12 hours)

TITRE:IL EST COMMENT? / ALLO?

GRAMMAIRE : les adverbes interrogatifs, les prépositions de lieu, les verbes du deuxième groupe, le verbe faire

LEXIQUE : Parler au téléphone, décrire quelqu'un, l'aspect physique, le caractère

PRODUCTION ORALE : Un jeu de rôle – la conversation téléphonique

PRODUCTION ECRITE : Décrivez votre aspect physique et votre caractère en quelques lignes

Book for Study

P. Dauda, L.Giachino and C.Baracco, *Generation AI*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *Echo AI*, CLE International, 2^eedition, 2017
2. Régine Mérieux and Yves Loiseau, *Latitudes AI*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers,2011

Web Resources

1. <https://www.wikihow.com/Pronounce-the-Letters-of-the-French-Alphabet>
2. <https://français.lingolia.com/en/grammar/tenses/le-present>
3. <https://www.lawlessfrench.com/grammar/articles/>
4. <https://www.frenchpod101.com/french-vocabulary-lists/10-lines-you-need-for-introducing-yourself>
5. <https://www.tolearnfrench.com/exercices/exercise-french-2/exercise-french-3295.php>

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course code	Title of the Course					Hours	Credits			
I	21UFR11GL01	FRENCH – I					4	3			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	1	2	3	2	3	2	1	2	3	2.2
CO-2	3	3	3	2	2	2	1	2	2	3	2.3
CO-3	3	1	2	3	2	3	2	1	2	2	2.1
CO-4	2	2	3	2	1	3	2	1	2	3	2.1
CO-5	3	2	3	2	2	3	2	2	3	2	2.4
Mean overall Score											2.22 (High)

Semester	Course Code	Title of the Course	Hours	Credits
I	21UHI11GL01	HINDI- I	4	3

CO No.	CO-Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, students will be able to	
CO -1	list out the literary works in Hindi during the period of 12th century in India.	K1
CO -2	compare the vocabulary & expressions related to day-to-day conversation.	K2
CO -3	use simple Phrases from English to Hindi.	K3
CO -4	investigate the values of Indian society & summarize the duties of a citizen for his/her country.	K4
CO -5	identify the sentences in Hindi using basic grammar.	K4

Unit - I (12 Hours)

Dr. Abdul Kalam
Ling
Kabir Ke Dohe
Baathcheeth - Aspathal mein
Adhikal - Namakarn

Unit - II (12 Hours)

Vachan Badaliye
Thulasi ke Dohe
Adhikal - Samajik Paristhithiyam
Moun Hee Mantra Hai

Unit - III (12 Hours)

Sangya
Soordas ke Pad
Baathcheeth - Hotel mein
Adhikal - Sahithyik Paristhithiyam

Unit - IV (12 Hours)

Sarvanam
Rahim ke Dohe
Bathcheeth - Kaksha mein
Adhikal - Salient Features, Main Divisions

Unit - V**(12 Hours)**

Anuvad - 1
 Visheshan
 Bihari - Dohe
 Bathcheeth - Kariyalay mein
 Adhikal - Visheshathayem

Books for Study

1. M.kamathaprasad Gupth, *Hindi Vyakaran*, Anand Prakashan, Kolkatta,2020.
Unit-I Chapters 2 and 3
2. Viswanath Tripaty, *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd, New Delhi,2018.
Unit-II, III and IV Chapters 4 and 5
3. Dr. Sanjeev Kumar Jain, *Anuwad: Siddhant Evam Vyavhar*, Kailash Pustak Sadan, Madhya Pradesh 2019.
Unit-V Chapter 1

Books for Reference

1. Dr.A.P.J.Abdul Kalam, *Mere sapnom ka Bharath*, Prabath Prakashan, Noida, 2020,
2. Lakshman prasad singh, *Kavya ke sopan*, Bharathy Bhavan Prakashan, 2017.
3. Aravind Kumar, *Sampoorna Hindi Vyakaran our Rachana*, Lucent publisher, 2019.
4. Adhunik Hindi Vyakaran our Rachana, bharati bhawan publishers & distributors, 2018.
5. Acharya ramchandra shukla, *Hindi Sahitya Ka Itihas*, Prabhat Prakashan, 2021.

Web Resources

1. <https://youtu.be/LrdrcP2oiyU>
2. <https://youtu.be/Cib2FNv8KyA>
3. <https://youtu.be/aXARykpYCxA>
4. <https://youtu.be/RUDFis-tdg4>
5. <https://youtu.be/upivTmLTPQA>

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course									Hours	Credits
I	21UHI11GL01	HINDI - I									4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	3	2	3	1	3	1	3	3	2	2.3	
CO-2	2	2	3	3	1	3	2	3	3	2	2.4	
CO-3	3	2	2	1	2	3	2	3	2	3	2.3	
CO-4	3	2	1	3	2	3	2	3	3	2	2.4	
CO-5	2	3	3	2	3	2	3	3	3	1	2.5	
Mean Overall Score											2.38	
											(High)	

Semester	Course Code	Title of the Course	Hours	Credits
I	21USA11GL01	SANSKRIT - I	4	3

CO No.	CO-Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, the student will be able to	
CO-1	remember and Recall words relating to objects.	K1
CO-2	understand classified vocabulary.	K2
CO-3	apply nouns and verbs.	K3
CO-4	analyze different forms of names and verbs.	K4
CO-5	appreciate the good saying of Sanskrit Improve the self-values.	K5

Unit - I (12 Hours)

Samyakthakshatra pada paricaya

Unit - II (12 Hours)

Vartmanakala prayogaha

Unit - III (12 Hours)

Samskruta varathamanakalaha

Unit - IV (12 Hours)

Shadha priyoghaa aakaarnta ikaraantha ukarantha

Unit - V (12 Hours)

Subhashitani manoharani Dasaslakani

Book for Study

Shaptamanjari , K.M.,Saral Snakrit Balabodh , Bharathiya Vidya Bhavan , Munushimarg
Mumbai – 4000 007 2018, 2019

Books for Reference:

1. Kulapathy , K.M.,Saral Snakrit Balabodh , Bharathiya Vidya Bhavan , Munushimarg
Mumbai – 4000 007 2018
2. R.S.Vadhar & Sons , Book – Sellers and publishers , Kalpathi.Palgahat 678003, Kerala
South India , Shabdha Manjari 2019
3. Balasubramaniam R, Samskrita Akshatra Siksha , Vangals Publications, 14th Main road
JP Nagar , Bangalore – 78

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course									Hours	Credit
I	21USA11GL01	SANSKRIT- I									4	3
Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	1	1	3	2	3	2	3	2	2	2.2	
CO-2	2	2	3	3	1	2	2	3	3	2	2.3	
CO-3	3	2	2	2	2	2	2	3	3	2	2.3	
CO-4	3	2	2	3	2	3	3	3	2	2	2.3	
CO-5	3	2	3	2	3	2	2	3	3	3	2.6	
Mean Overall Score											2.34	
Result											# High	

Semester	Course Code	Title of the Course	Hours	Credits
I	21UEN12GE01	GENERAL ENGLISH - I	5	3

CO No.	CO-Statements	Cognitive Levels (K- Levels)
	On successful completion of this course, students will be able to	
CO-1	recall what they observe and experience	K1
CO-2	arrange different parts of a text in a coherent manner	K2
CO-3	examine the underlying meaning in a text	K3
CO-4	analyse and evaluate letters regarding the use of appropriate language and format	K4 & K5
CO-5	use conversational English to communicate with friends	K6

Unit-I

(15 Hours)

01. Personal Details
02. Positive Qualities
03. Listening to Positive Qualities
04. Relating and Grading Qualities
05. My Ambition
06. Abilities and Skills
07. Self-Improvement Word Grid
08. What am I Doing?
09. What was I Doing?
10. Unscramble the Past Actions
11. What did I Do Yesterday?

Unit-II

(15 Hours)

12. Body Parts
13. Actions and Body Parts
14. Value of Life
15. Describing Self
16. Home Word Grid
17. Unscramble Building Types
18. Plural Forms of Naming Words
19. Irregular Plural Forms
20. Plural Naming Words Practice
21. Whose Words?

Unit-III

(15 Hours)

22. Plural Forms of Action Words
23. Present Positive Actions
24. Present Negative Actions
25. Un/Countable Naming Words
26. Recognition of Vowel Sounds
27. Indefinite Articles
28. Un/Countable Practice

- 29. Match the Visual
- 30. Letter Spell-Check
- 31. Drafting a Letter

Unit-IV

(15 Hours)

- 32. Friendship Word Grid
- 33. Friends' Details
- 34. Guess the Favourites
- 35. Guess Your Friend
- 36. Friends as Guests
- 37. Introducing Friends
- 38. What are We Doing?
- 39. What is (S)He / are They Doing?
- 40. Yes / No Question
- 41. What was S/He Doing?
- 42. Names and Actions
- 43. True Friendship
- 44. Know Your Friends
- 45. Giving Advice/Suggestions
- 46. Discussion on Friendship
- 47. My Best Friend

Unit-V

(15 Hours)

- 48. Kinship Words
- 49. The Odd One Out
- 50. My Family Tree
- 51. Little Boy's Request
- 52. Occasions for Message
- 53. Words Denoting Place
- 54. Words Denoting Movement
- 55. Phrases for Giving Directions
- 56. Find the Destination
- 57. Giving Directions Practice
- 58. SMS Language
- 59. Converting SMS
- 60. Writing Short Messages
- 61. Sending SMS
- 62. The Family Debate
- 63. Family Today

Book for Study

Joy, J.L., and Peter, F.M. *Let's Communicate I*. New Delhi, Trinity P, 2014.

Books for Reference

1. Ahrens, Sönke. *How to Take Smart Notes: One Simple Technique to Boost Writing, Learning and Thinking*. New York: Create Space, 2017.
2. Aspinall, Tricia. *Test Your Listening*. London: Pearson, 2002.
3. Bailey, Stephen. *Academic Writing: A Practical Guide for Students*. New York: Routledge, 2004.
4. Fitikides, T.J. *Common Mistakes in English* (6th ed.). London: Longman, 2002.

5. Wainwright, Gordon. *How to Read Faster and Recall More: Learn the Art of Speed Reading with Maximum Recall* (3rd ed.). Oxford: How to Books, 2007.

Web Resources

1. <https://learnenglish.britishcouncil.org/>
2. <https://oneminuteenglish.org/en/best-websites-learn-english/>
3. <https://www.dailywritingtips.com/best-websites-to-learn-english/>

Relationship Matrix for Course Outcomes, Programme Outcomes, and Programmes Specific Outcomes

Semester	Course Code		Title of the Course								Hours	Credit
I	21UEN12GE01		GENERAL ENGLISH – I								5	3
Course Outcome (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO -1	2	3	2	2	3	2	3	2	3	2	2.4	
CO -2	2	2	3	2	3	3	2	3	2	2	2.3	
CO -3	2	3	2	3	2	2	3	2	3	2	2.4	
CO -4	2	2	3	2	3	3	2	3	2	3	2.5	
CO -5	2	2	2	3	2	2	2	3	2	2	2.2	
Mean Overall Score											2.36 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
I	21UBO13CC01	CORE-1: ALGAE AND BRYOPHYTES	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	acquire thorough knowledge on the salient features of Algae and Bryophytes.	K1
CO-2	learn the major classes, types, structure and reproduction of various genera.	K1
CO-3	conserve them in their natural environment.	K2
CO-4	acquire the basic knowledge of the evolutionary relationship between algae and bryophytes.	K3
CO-5	identify the economic importance of Algae and Bryophytes.	K4

Unit-I (15 Hours)

Algae: General characteristics of algae. Commonly found algae in India. Classification (F.E. Fritsch, 1945). Salient features of various classes as per Fritsch's system. Cell structure of prokaryotic algae (Cyanophyceae cell) and eukaryotic algae (Chlorophyceae cell).

Unit-II (15 Hours)

Thallus organization, mode of reproduction, algal life cycle patterns (haplontic, diplontic, haplo-diplontic and diplobiontic). Mass culture (spirulina), economic importance and BGA in *Azolla* as fodder and biofertilizer.

Unit-III (15 Hours)

Detailed study of the following genera: occurrence, distribution, common species, structure and reproduction of *Oscillatoria*, *Oedogonium*, *Caulerpa*, *Cyclotella*, *Sargassum* and *Polysiphonia* (developmental studies on sex organs not required).

Unit-IV (15 Hours)

Bryophytes: General characteristics of Bryophytes, Various natural habitats of Bryophytes, Classification (Rothmaler, 1951), vegetative reproduction and economic importance. Evolution of gametophytes and sporophytes among Bryophytes.

Unit-V (15 Hours)

Detailed study of the following genera: occurrence, distribution, common species, structure and reproduction of *Marchantia*, *Anthoceros* and *Funaria* (developmental studies on sex organs not required).

Books for Study

1. Pandey, BP. 2018. College Botany Volume I, 20/e, S. Chand and Company, New Delhi.
2. Pandey, BP. 2005. Simplified Course in Botany. S. Chand and Company, New Delhi.
3. Sharma, OP. 1992. Text Book of Algae. Tata McGraw Hill, New Delhi.

Books for Reference

1. Gangulee, HC. And Kar, AK. 1989. College Botany, Vol-II, Books & Allied Pvt. Ltd., Calcutta.
2. Prem Puri. 1981. Bryophytes - Morphology growth and differentiation. Atma Ram & Sons. Lucknow.
3. Smith, GM. 1955. Cryptogamic Botany Vol-1&II, McGraw Hill, New York.

Semester	Course Code	Title of the Course									Hours	Credits
I	21UBO13CC01	CORE-1: ALGAE AND BRYOPHYTES									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	3	3	2	1	1	3	3	2	2	1	2.1	
CO2	1	2	2	2	2	3	2	2	2	1	1.9	
CO3	3	3	3	3	3	2	3	3	3	2	2.8	
CO4	1	2	3	3	3	1	2	3	3	3	2.4	
CO5	3	2	3	3	3	3	2	1	3	3	2.6	
Mean overall score											2.36	
Result											HIGH	

Semester	Course Code	Title of the Course	Hours	Credits
I	21UBO13CC02	CORE-2: FUNGI, PLANT PATHOLOGY AND LICHENS	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	acquire thorough knowledge on the salient features of fungi and lichens.	K1
CO-2	learn the major classes, types, structure and reproduction of various genera.	K2
CO-3	attain basic skills on aetiology and control of various plant diseases.	K3
CO-4	understand the disease cycle caused by the pathogens.	K3
CO-5	identify the ecological importance and economic importance of fungi and lichens.	K4

Unit-I (15 Hours)

Fungi: General characteristics - range of thallus organization, cell wall composition, mode of nutrition and reproduction. Outline on the Classification of fungi (G. C Ainsworth, 1973; C. J Alexopoulos and C. W. Mims, 1979) and general characteristics of the Divisions and Classes in Fungi. Economic importance.

Unit II (15 Hours)

Fungi: detailed study of morphology and reproduction of the following: (a) Mastigomycotina- *Albugo*; (b) Zygomycotina- *Rhizopus*; (c) Ascomycotina- *Saccharomyces* and *Penicillium*; (d) Basidiomycotina- *Puccinia*; (e) Deuteromycotina- *Cercospora*.

Unit III (15 Hours)

Plant Pathology: Definition of terms used in plant pathology; plant diseases: concept and classification of plant diseases—methods of control of plant diseases: mechanical, chemical and biological. Defence mechanism in plants: structural, morphological and biochemical.

Unit IV (15 Hours)

Plant Pathology: Detailed study of the following plant diseases with reference to causes, symptoms, dissemination, control and preventive measures - Viral Diseases: Bunchy top of Banana, mosaic disease of tobacco; Bacterial diseases: Bacterial blight of paddy, Citrus canker, Fungal diseases: Late blight of potato, red rot of sugarcane, paddy blast; Mycoplasma disease: Little leaf of brinjal.

Unit V (15 Hours)

Lichens: occurrence, distribution, classification, structure, vegetative and sexual reproduction (with reference to fruticose lichen - *Usnea*). Economic importance and role in succession and pollution monitoring.

Books for Study

1. Singh V, Pande PC & Jain DK. 2020. A Text Book of Botany (5th ed), Rastogi Publication, Meerut.
2. Pandey, BP. 2018. College Botany Volume I, 20/e, S. Chand and Company, New Delhi.
3. Pandey, BP. 2005. Simplified Course in Botany. S. Chand and Company, New Delhi.

Books for Reference

1. Sharma OP 1989. Text Book of fungi. Tata McGraw Hill, New York.
2. Vasishta BR & Sinha AK. 2003. Botany for degree students Fungi. S Chand New Delhi.
3. Mehrotra R S 1991. Plant Pathology, Tata McGraw-Hill Publishing, New Delhi.
4. Hale ME, 1983 The Biology of Lichens, New Age International publishers, New Delhi.

Semester	Course Code	Title of the Course									Hours	Credits
1	21UBO130202	CORE-2: FUNGI, PLANT PATHOLOGY AND LICHENS									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	2	2	3	2	2	3	2	2.4	
CO-2	2	3	2	1	2	3	1	2	3	3	2.2	
CO-3	2	2	3	2	1	2	3	2	3	2	2.2	
CO-4	3	2	2	1	2	3	2	3	2	3	2.4	
CO-5	2	3	2	3	1	3	2	3	2	1	2.2	
Mean Overall Score											2.3	
Result											# Medium	

Semester	Course Code	Title of the Course	Hours	Credit
1	21UBO13CP01	LAB COURSE 1 (ALGAE, BRYOPHYTES, FUNGI, PLANT PATHOLOGY AND LICHEN)	3	2

Detailed study of the following genera:

Algae:

Oscillatoria, Oedogonium, Caulerpa, Cyclotella, Sargassum and Gracilaria.

Bryophytes:

Marchantia, Anthoceros and Funaria.

Fungi:

Plasmodiophora, Albugo, Peziza, Puccinia and Cercospora.

Plant Pathology:

Tobacco Mosaic Virus, Citrus Canker, Late Blight of Potato, Red Rot of Sugarcane, Bunchy Top of Banana, Little Leaf of Brinjal, Paddy Blast

Lichen:

Usnea

Semester	Course Code	Title of the Course	Hours	Credits
I	21UBO13AC01	ALLIED-I: ZOOLOGY I: GENERAL ZOOLOGY	4	2

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	acquire basic knowledge on animal organization.	K1
CO-2	understand the mode of action of various hormones.	K2
CO-3	understand the role of protozoan in human health.	K2
CO-4	identify the invertebrate and their role in human welfare.	K3
CO-5	study the physiology and functions of various organs in human.	K4, K5

Unit I (12 Hours)

Basic principles of zoological taxonomy and nomenclature. General classification of the animal kingdom (up to phylum with examples). Salient features of all phyla - Vertebrates (Classes: Pisces, Amphibia, Reptilia, Aves and Mammalia)

Unit II (12 Hours)

Type study of *Plasmodium vivax*, *Leucosolenia*, *Aurelia aurita*, *Taenia solium*, *Ascaris lumbricoides* and *Asterias rubens* – morphology and life history. General topics – human diseases caused by protozoans; canal system of sponges.

Unit III (12 Hours)

Principles of human physiology: Digestion - physiology of digestion, absorption and excretion of food – accessory glands and their role. Respiration: transport of oxygen and carbon dioxide, cellular oxidation. Excretion: structure of a nephron, physiology of urine formation, physical characteristics and chemical composition of urine.

Unit IV (12 Hours)

Circulation – structure and working of artery, vein and heart. Blood: haemopoiesis, types of blood cells, structure of haemoglobin; mechanism of blood clotting, functions of plasma proteins. Blood grouping, lymph and its functions. Muscles: contraction. Proteins involved and theories of contraction. Structure and functions of human eyes ears

Unit V (12 Hours)

Hormones: Types, control - and general mode of action of water soluble and steroid hormones. Reproduction – male and female reproductive organs and formation of gametes, Pregnancy and birth. Nervous control: Structure of neuron; Types of neurons; nerve impulse transmission, synaptic transmission.

Books

1. Agarwal, VK. 2011. Zoology for Degree Students. S. Chand and Company, New Delhi.
2. Rajan K. 2016. Manual of Zoology. Theory and Practicals, Dept. of Botany, St. Joseph's College, Tiruchirappalli.

Reference

1. Gerard, J. Tortord, R. L. Evans & Anagnostakos, NP. 1982. Principles of Human Physiology, Harpor Roul Publishers, New York.
2. Jordan, E. L. & Verma, P. S. 1976. Invertebrate Zoology, S. Chand& Co. Ltd., 6th e, New Delhi.
3. Kotpal, RL 1976. Modern text book of Zoology (Invertebrate), Rastogi Publications, Meerat.

Semester	Course Code	Title of the Course									Hours	Credits
I	21UBO13AC01	ALLIED-I: ZOOLOGY I: GENERAL ZOOLOGY									4	2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	2	3	2	2	2	2	2	3	2	2.2	
CO-2	2	3	2	1	2	2	3	2	2	3	2.2	
CO-3	2	2	3	2	2	1	3	2	3	2	2.2	
CO-4	1	2	2	2	2	2	3	2	3	2	2.1	
CO-5	1	2	2	3	2	3	3	2	2	2	2.2	
Mean Overall Score											2.18	
Result											High	

Semester	Course Code:	Title of the Course	Hours	Credits
I	21UBO13AP01	ALLIED I: LAB COURSE: ZOOLOGY 1	2	2

Earthworm: External features and dissection of digestive and nervous systems; Mounting of body and Penial setae, Ovary and Spermatheca

Representative animal for each class in vertebrate and invertebrate phyla.

Different tissues. Human blood cell identification.

Campus fauna identification.

Visit to a vermin-compost farm and submission of report.

Semester	Course Code	Title of the Course	Hours	Credits
I	21UHE14VE01	ESSENTIALS OF HUMANITY	2	1

CO No	CO – Statements	Cognitive Levels (K-Levels)
	On completion of this course, the graduates will be able to:	
CO-1	recall the prescribed values and their dimensions	K1
CO-2	examine themselves by learning the developmental changes happening in the course of their life time	K2
CO-3	apply the trained values in their day today life	K3
CO-4	analyze themselves as responsible men and women	K4
CO-5	create a constructive approach to life	K5 & K6

Unit-I Principles of Value Education (6 Hours)

Introduction to values - Characteristics and Roots of Values - Value Education & Value Clarification - Moral Characters - Kinds of Values - Objectives of Values.

Unit-II The Development of Human Personality (6 Hours)

Personality: Introduction, Theories, Integration & Factors influencing the development of personality - SEL Series - Discovering self - Defense Mechanism - Power of positive thinking - Why worry?

Unit-III The Dimensions of Human Development (6 Hours)

Areas of Development: Physical, Intellectual, Emotional, Social Development, Moral & Spiritual development

Unit-IV Responsible Parenthood (6 Hours)

Human sexuality - Marriage and Family - Sex and Love - Characteristics of Responsible parent - Causes of Marriage disharmony - Art of wise parenting.

Unit-V Gender Equality and Empowerment (6 Hours)

Historical perspective - Women in Independence struggle - Women in Independent India - Education & Economic development - Crimes against Women - Women rights - Time-line of Women Achievements in India

Books for Study

Department of Human Excellence. *Essentials of Humanity*, St. Joseph's College, Tiruchirappali-02, 2021.

Books for Reference:

1. Alphonse Xavier Dr SJ. *You Shall Overcome*, (6th Ed.) Chennai: ICRDCE Publication, 2012.
2. Alex K. *Soft Skills*, New Delhi: S. Chand, 2009.
3. Kalam Abdul APJ. *You Are Unique*, Bangalore: Punya Publishing, 2012.

Web Sources:

<http://livingvalues.net>. Accessed 05 Mar. 2021.

<https://www.apa.org/topics/personality#>. Accessed 05 Mar. 2021.

<https://www.peacecorps.gov/educators/resources/global-issues-gender-equality-and-womens-empowerment/>. Accessed 05 Mar. 2021.

Semester	Course Code	Title of the Course	Hours	Credits
II	21UTA21GL02	General Tamil - II	4	3

CO No.	CO- Statement	Cognitive Levels (K- levels)
இப்பாடத்தின் நிறைவில் மாணவர்கள்		
CO-1	தமிழிலக்கிய வரலாற்றில் சைவ, வைணவ இலக்கியங்கள் பெறும் இடத்தை அறிந்துகொள்வர்	K 1
CO-2	அகப்பொருள், புறப்பொருள் இலக்கணங்களின் அடிப்படை அறிவைப் பெறுவர்.	K 1
CO-3	காப்பியச் சுவையை மாணவர்கள் புரிந்துகொள்வர்	K 2
CO-4	இஸ்லாமிய இலக்கியச் சிந்தனைகளைப் பெறுவர்	K 3
CO-5	கிறித்தவ மதிப்பீடுகளைச் சிற்றிலக்கிய வகைகளின் வழியாகத் திறனாய்வர்.	K 4

அலகு - 1

(12 மணிநேரம்)

- சிலப்பதிகாரம் - கனாத்திறம் உரைத்த காதை
மணிமேகலை - ஆபுத்திரன் திறம் அறிவித்த காதை
இலக்கிய வரலாறு - சைவம் வளர்த்த தமிழ் முதல் புராணங்கள் முடிய.
இலக்கணம் - அகப்பொருள் இலக்கணம்

அலகு - 2

(12 மணிநேரம்)

- திருவாசகம் - திருச்சாழல்
சிவவாக்கியார் பாடல்கள் - 25 பாடல்கள் (04, 14, 16, 22, 27, 33, 34, 35, 36,37, 38, 47, 81, 91, 225, 237, 242, 495, 504, 520,522, 533, 534, 536, 548.)

அலகு - 3

(12 மணிநேரம்)

- நாலாயிர திவ்வியப் பிரபந்தம்- அமலானாதிபிரான் (10 பாடல்கள்)
- பெருமாள் திருமொழி (11 பாடல்கள்)
கம்பராமாயணம் - கைகேயி சூழ்வினைப்படலம்
உரைநடை - 7 முதல் 9 முடிய உள்ள கட்டுரைகள்

அலகு - 4

(12 மணிநேரம்)

- சீறாப்புராணம் - உடும்பு பேசிய படலம்
இலக்கணம் - புறப்பொருள் இலக்கணம்
இலக்கிய வரலாறு - தமிழ் இலக்கண நூல்கள் முதல் சிற்றிலக்கியங்கள் முடிய

அலகு - 5

(12 மணிநேரம்)

- திருக்காவலூர்க் கலம்பகம் - சமூக உல்லாசம்
உரைநடை - 10 முதல் 12 வரையிலான கட்டுரைகள்

பாடநூல்கள்:

1. பொதுத்தமிழ் - செய்யுள் திரட்டு, தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி. திருச்சிராப்பள்ளி, முதற்பதிப்பு, 2021
2. சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு, தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, பத்தாம் பதிப்பு, 2017
3. நற்றமிழ்க் கோவை (கட்டுரைத் தொகுப்பு). தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, முதற்பதிப்பு, 2021

Semester	Course Code	Title of the Course									Hours	Credit
II	21UTA21GL02	General Tamil - II									4	3
Course Outcomes (Cos)	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5		
CO-1	2	2	1	2	3	2	2	2	3	2	2.1	
CO-2	2	1	2	2	3	3	2	2	3	2	2.2	
CO-3	2	1	2	2	3	3	2	2	3	2	2.2	
CO-4	1	1	2	2	3	3	2	2	3	2	2.1	
CO-5	1	1	2	2	3	2	2	3	3	2	2.1	
Mean Overall Score											2.14 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
II	21UFR21GL02	FRENCH – II	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO–1	relate pronominal verbs in expressing one’s day today activity.	K1
CO–2	compare the different types of articles.	K2
CO–3	construct texts using pronouns – passages and dialogues.	K3
CO–4	discover the food habits of the French culture.	K4
CO–5	appraise the French fashion.	K5

Unit - I (12 hours)

TITRE:LES LOISIRS

GRAMMAIRE : les adjectifs interrogatifs, les nombres ordinaux, les verbes pronominaux

LEXIQUE : les différentes activités quotidiennes,les loisirs, les activités quotidiennes, les matières

PRODUCTION ORALE : parler sur votre passe-temps

PRODUCTION ECRITE : décrire sa journée

Unit -II (12 hours)

TITRE:LA ROUTINE

GRAMMAIRE : les pronoms personnels COD, les verbes du premier groupe en e/er/eler/eter, le verbe prendre

LEXIQUE : exprimer ses goûts et ses préférences, le temps, l’heure, la fréquence

PRODUCTION ORALE : savoir comment dire l’heure

PRODUCTION ECRITE : écrire vos préférences en quelques lignes

Unit - III (12 hours)

TITRE:OU FAIRE SES COURSES?

GRAMMAIRE : les articles partitifs, le pronom en (la quantité), très ou beaucoup

LEXIQUE : inviter et répondre à une invitation, les commerces et les commerçants, demander et dire le prix, les quantités

PRODUCTION ORALE : faire des courses pour une soirée

PRODUCTION ECRITE : écrire un message en acceptant l’invitation

Unit - IV (12 hours)

TITRE:DECOUVREZ ET DEGUSTEZ

GRAMMAIRE : l’impératif, il faut, les verbes devoir, pouvoir, savoir,vouloir

LEXIQUE : Commander et commenter sur un plat de la carte,les aliments, les services, les moyens de paiement

PRODUCTION ORALE : Jeu de rôle – au restaurant (entre vous et le garçon)

PRODUCTION ECRITE : faire une comparaison avec la carte française et indienne

Unit - V (12 hours)

TITRE:TOUT LE MONDE S’AMUSE/ LES ADOS AU QUOTIDIEN

GRAMMAIRE : les adjectifs démonstratifs, le pronom indéfini on, le futur proche, le passé composé, les verbes en –yer, voir et sortir

LEXIQUE : connaître les marques connues sur les vêtements, les sorties, situer dans le temps, les vêtements et les accessoires

PRODUCTION ORALE : décrire une tenue
 PRODUCTION ECRITE : écrire une lettre amicale, une carte postale

Book for Study

P.Dauda,L.Giachino and C.Baracco, *Generation AI*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *Echo AI*, CLE International, 2^eedition,2017
2. Régine Mérieux and Yves Loiseau, *Latitudes AI*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers, 2011

Web Resources

1. <https://www.frenchtoday.com/blog/french-verb-conjugation/french-reflexive-verbs-list-exercises/>
2. <https://www.fluentu.com/blog/french/french-subject-pronouns/>
3. <https://grammarist.com/french/french-partitive-article/>
4. <https://www.talkinfrench.com/guide-french-food-habits/>
5. <https://www.fluentu.com/blog/french/talking-about-clothes-in-french/>

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course code	Title of the Course									Hours	Credits
II	21UFR21GL02	FRENCH – II									4	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	3	3	3	1	3	1	2	2	2	2.2	
CO-2	2	1	2	3	2	3	1	2	2	2	2.0	
CO-3	3	2	3	2	2	3	3	1	3	2	2.4	
CO-4	3	2	2	1	3	3	3	1	1	3	2.2	
CO-5	2	1	2	2	3	3	3	2	2	2	2.2	
Mean overall Score											2.2 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
II	21UHI21GL02	HINDI - II	4	3

CO No.	CO-Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, students will be able to	
CO -1	Find out the Terms & Expressions related to letter writing	K1
CO -2	Explain the works of Hindi writers	K2
CO -3	Complete the sentences in Hindi using basic grammar	K3
CO -4	Analyze the social & political conditions of Devotional period in Hindi Literature	K4
CO -5	Justify the human values stressed on the works of the following authors “Premchand, Nirala, etc.”	K5

Unit - I (12 Hours)

Kafan
Letter Writing - Chutti Patra
Bakthikal - Namakarn
Sarkari kariyalayom ka naam

Unit - II (12 Hours)

Baathcheeth - Dookan mein
kriya
Letter Writing - Rishthedarom ko patra
Bakthikal - Samajik Paristhithiyam

Unit - III (12 Hours)

Vah Thodthi patthar
Adverb
Letter Writing - Naukari keliye Avedan Patra
Bakthikal - Sahithyik Paristhithiyam

Unit - IV (12 Hours)

Mukthi
Samas
Letter Writing - Kitab Maangne Keliye Patra
Bakthikal - Salient Features, Main Divisions

Unit - V**(12 Hours)**

Anuvad - 2

Sandhi

Letter writing - Nagarpalika ko Patra

Bakthikal - Visheshathayem

Books for Study

1. Viswanath Tripaty, *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd, New Delhi, 2018.
Unit-I Chapter 1
2. M.kamathaprasad Gupth, *Hindi Vyakaran*, Anand Prakashan, Kolkatta, 2020.
Unit-II, III and IV Chapter 2
3. Dr.Sadananth Bosalae, *kavya sarang*, Rajkamal Prakashan, New Delhi, 2020.
Unit-V Chapter 4

Books for Reference

1. Adhunik Hindi Vyakaran our Rachana, bharti bhawan publishers & distributors, 2018.
2. Acharya ramchandra shukla, Hindi Sahitya Ka Itihas, Prabhat Prakashan, 2021.
3. Krishnakumar Gosamy, Anuvad vigyan ki Bhumika, Rajkamal Prakashan, 2016.
4. Aravind Kumar, Sampoorna Hindi Vyakaran our Rachana, Lucent publisher, 2019.
5. Lakshman prasad singh, Kavya ke sopan, Bharathy Bhavan Prakashan, 2017.

Web Resources

1. <https://youtu.be/tE2RHQcqlbI>
2. <https://youtu.be/Xxvco3qa284>
3. <https://youtu.be/1z8x95IFGi4>
4. <https://youtu.be/CBMYf8NRLW4>
5. <https://youtu.be/h31tMLeFtHs>

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course									Hours	Credits
II	21UHI21GL02	HINDI - II									4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	3	3	2	2	3	3	3	2	2	2.5	
CO-2	1	3	1	2	2	3	3	3	2	3	2.3	
CO-3	3	2	3	2	2	3	2	3	2	2	2.4	
CO-4	2	3	3	1	3	2	3	2	1	2	2.2	
CO-5	3	2	2	2	3	2	3	2	3	2	2.4	
Mean Overall Score											2.36 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
II	21USA21GL02	SANSKRIT - II	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
CO-1	remembering names of different objects , remembering different verbal forms and sandhi.	K1
CO-2	contrast different verbal forms Explain good sayings , Relate good saying to life.	K2
CO-3	apply and build small sentences.	K3
CO-4	analyze different forms of Verbs and nouns.	K4
CO-5	appreciate subhashitas and Sanskrit poetry Expand Sanskrit vocabulary.	K5

Unit - I (12 Hours)

Asmath usmath tat kim (MFN)

Unit - II (12 Hours)

Sandhi Niyamaaha Abuyaasha (Guna , Visarga , Dirgha , Vrddhi)

Unit - III (12 Hours)

Lang lakaaraha Kriyapadaani

Unit - IV (12 Hours)

Raguvamsaha Pratama sargaha (1 –15)

Unit - V (12 Hours)

Suvachana Prayogha

Book for Study

SARALASAMKRITHAM SIKSHA, 2020 , K.M Saral sankrit Balabodh , Bharathiys Vidya Bhavan , Munshimarg Mumbai – 400007, 2018

Books for Reference

1. Paindrapuram Ashram , Srirangam – 620006 Gopalavimshanthi 2019
2. R.S.Vadhyar & Sons book Kulapthy , K.M Saral sankrit Balabodh , Bharathiys Vidya Bhavan , Munshimarg Mumbai – 400007, 2018

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course									Hours	Credit
II	21USA21GL02	SANSKRIT -II									4	2
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	1	3	2	2	2	3	3	2	1	2.1	
CO-2	3	2	3	2	2	3	2	3	3	2	2.5	
CO-3	2	2	3	2	2	2	2	3	3	1	2.1	
CO-4	3	2	3	3	1	2	3	3	3	1	2.4	
CO-5	3	2	2	2	3	2	2	3	3	1	2.3	
Mean Overall Score											2.28	
Result											# High	

Semester	Course Code	Title of the Course	Hours	Credits
II	21UEN22GE02	GENERAL ENGLISH - II	5	3

CO No.	CO-Statements	Cognitive Levels (K- Levels)
	On successful completion of this course, students will be able to	
CO-1	remember the use of suitable punctuation marks in appropriate places	K1
CO-2	describe their pictures with appropriate expressions	K2
CO-3	infer meaning from the given context	K3
CO-4	analyse real-life situations and ask open-ended questions	K4 & K5
CO-5	use polite expressions in appropriate ways	K6

Unit-I

(15 Hours)

01. Education Word Grid
02. Reading Problems and Solutions
03. Syllabification
04. Forms for Expressing Quality
05. Expressing Comparison
06. Monosyllabic Comparison
07. Di/polysyllabic Comparison
08. The Best Monosyllabic Comparison
09. The Best Di/Polysyllabic Comparison
10. Practising Quality Words

Unit –II

(15 Hours)

11. Wh Words
12. Yes/No Recollection
13. Unscramble Wh Questions
14. Wh Practice
15. Education and the Poor
16. Controlled Role Play
17. Debate on Education
18. Education in the Future
19. Entertainment Word Grid
20. Classify Entertainment Wordlist
21. Guess the Missing Letter
22. Proverb-Visual Description
23. Supply Wh Words
24. Rearrange Questions
25. Information Gap Questions

Unit-III

(15 Hours)

26. Asking Questions
27. More about Actions
28. More about Actions and Uses
29. Crime Puzzle
30. Possessive Quiz
31. Humorous News Report

32. Debate on Media and Politics
33. Best Entertainment Source

Unit-IV

(15 Hours)

34. Career Word Grid
35. Job-Related Wordlist
36. Who's Who?
37. People at Work
38. Humour at Workplace
39. Profession in Context
40. Functions and Expressions
41. Transition Fill-in
42. Transition Word Selection
43. Professional Qualities
44. Job Procedures
45. Preparing a Resume
46. Interview Questions
47. Job Cover Letter Format
48. Emailing an Application
49. Mock Interview

Unit-V

(15 Hours)

50. Society Word Grid
51. Classify Society Wordlist
52. Rearrange the Story
53. Storytelling
54. Story Cluster
55. Words Denoting Time
56. Expressing Time
57. What Can You Buy?
58. Noise Pollution
59. Positive News Headlines
60. Negative News Headlines
61. Matching Conditions
62. What Would You Do?
63. If I were Elected
64. My Dream Country

Book for Study

Joy, J.L. & Peter, F.M. *Let's Communicate 2*, New Delhi: Trinity Press, 2014.

Books for Reference

1. Ahrens, Sönke. *How to Take Smart Notes: One Simple Technique to Boost Writing, Learning and Thinking*. New York: CreateSpace, 2017.
2. Aspinall, Tricia. *Test Your Listening*. London: Pearson, 2002.
3. Bailey, Stephen. *Academic Writing: A Practical Guide for Students*. New York: Routledge, 2004'
4. Fitikides, T.J. *Common Mistakes in English* (6th ed.). London: Longman, 2002
5. Wainwright, Gordon. *How to Read Faster and Recall More: Learn the Art of Speed Reading with Maximum Recall* (3rd ed.). Oxford: How to Books, 2007.

Web Resources

1. <https://learnenglish.britishcouncil.org/>
2. <https://oneminuteenglish.org/en/best-websites-learn-english/>
3. <https://www.dailywritingtips.com/best-websites-to-learn-english/>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course									Hours	Credits
II	21UEN22GE02	GENERAL ENGLISH - II									5	3
Course Outcomes (COs)	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5		
CO-1	2	3	2	2	3	2	3	2	3	2	2.4	
CO-2	2	2	3	2	3	3	2	3	2	2	2.3	
CO-3	2	3	2	3	2	2	3	2	3	2	2.4	
CO-4	2	2	3	2	3	3	2	3	2	3	2.5	
CO-5	2	2	2	3	2	2	2	3	2	2	2.2	
Mean Overall Score											2.36 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
II	21UBO23CC03	CORE-3: PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY	4	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	learn the economic importance of Pteridophytes and gymnosperms.	K1
CO-2	acquire knowledge on fossils and fossilization process.	K1
CO-3	understand the salient features of Pteridophytes and Gymnosperms.	K2
CO-4	comprehend the relative similarities and differences between genera.	K3
CO-5	analyse the evolutionary relationship between Pteridophytes and Gymnosperms.	K4

Unit I (12 Hours)

Pteridophytes: general characteristics, classification (Reimer's System, 1954). General characteristics of major subdivisions: Psilopsida, Lycopsida, Sphenopsida and Pteropsida. Telome theory. Stejar evolution, homosporous, heterosporous, seed habit and economic importance.

Unit II (12 Hours)

Detailed study of morphology, anatomy and reproduction of *Lycopodium*, *Selaginella*, *Equisetum*, *Adiantum* and *Marsilea*.

Unit III (12 Hours)

Gymnosperms: general characteristics, distribution and classification (Sporne, 1965). Salient features of Pteridospermales, Bennettitales, Cycadales, Cordaitales, Coniferales and Gnetales. Economic importance.

Unit IV (12 Hours)

Gymnosperms: detailed study of morphology, anatomy, reproduction of the following genera: *Cycas*, *Pinus* and *Gnetum*.

Unit V (12 Hours)

Paleobotany: fossils, types (compression, impression, petrification, coal balls). Indian fossil flora – Rajmahal hill flora. Contribution of Birbal Sahnii to Indian Paleobotany. Geological time scale. Morphology, anatomy and reproduction in *Rhynia*, *Lepidodendron*, *Calamites* and *Medullosa*.

Books for Study

1. Sharma OP. 2017. Pteridophyta, McGraw Hill Education, New York.
2. Bhatnagar, S.P. and Alok Moitra. 2020. Gymnosperms, New Age International (P) Ltd., Publishers, Bengaluru.

Books for Reference

1. Rashid .A. 2007. An Introduction to Pteridophyta-Vikas publications, New Delhi.
2. Johri , RM, Lata S , Tyagi K (2005), A text book of Gymnosperms , Dominate pub and Distributer, New Delhi.
3. Vasista PC, Sinha AK and Anilkimar. 2005. Botany for degree students, Gymnosperms, S Chand, NewDelhi.

Semester	Course Code	Title of the Course	Hours	Credits
II	21UBO23CC03	CORE-3: PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY	4	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	1	2	2	3	2	2	2	2	2.1
CO-2	3	2	1	2	2	3	2	2	2	2	2.1
CO-3	3	2	1	2	2	2	3	2	1	2	2.0
CO-4	2	3	2	2	1	2	2	2	1	2	1.9
CO-5	2	3	1	3	2	2	3	2	2	1	2.1
Mean Overall Score											2.1
Result											Medium

Semester	Course Code	Title of the Course	Hours	Credits
II	21UBO23CC04	CORE-4: ANATOMY AND EMBRYOLOGY	4	2

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	acquire knowledge about the tissues of stem, root and leaves present in plants.	K1
CO-2	understand the primary and secondary structure of dicots and monocots with reference to root, stem and leaves.	K2
CO-3	acquire knowledge on the structure, properties and economic importance of wood.	K3
CO-4	attain basic knowledge of the structure and development of male and female gametophytes in plants.	K4
CO-5	understand the morphogenesis, endosperm development and polyembryony.	K5

Unit I (12 Hours)

Tissues - definition, types - simple tissue - parenchyma, collenchyma, sclerenchyma. Fibres and sclerieds - structure and functions. Complex tissues: xylem and phloem. Meristems - classifications. Vegetative shoot apex: and the theories: apical cell, and tunica-carpus. Root apex: Korper – Kappe theory. Concept of totipotency, differentiation, dedifferentiation and redifferentiation. Hydathodes, Lenticels and laticifers.

Unit II (12 Hours)

The stem - primary and secondary structure of dicotyledonous and monocotyledonous stems. Nodal anatomy: unilacunar, trilacunar and multilacunar. Leaf anatomy: monocot and dicot. The root: primary and secondary structure of dicotyledonous and monocotyledonous roots. Anomalous secondary growth.

Unit III (12 Hours)

Wood anatomy – component of secondary xylem. Physical and chemical properties of wood. Dendrochronology -Classification of wood. Commercial wood species of South India (teak wood, rose wood, sandal wood and red sanders wood).

Unit IV (12 Hours)

Microsporangium: microsporogenesis, development of male gametophyte. Megasporangium: megasporogenesis, development of female gametophyte. Monosporic (*Polygonum*), bisporic (*Allium*) and tetrasporic (*Peperomia*).

Unit V (12 Hours)

Fertilization. Double fertilization. Structure and types of ovules; Types of embryo sacs, Development of dicot embryo (*Capsella*) & development of monocot embryo (*Sagittaria*).Endosperm: structure, function and types. Apomixis and polyembryony – types and significance. Parthenogenesis and its significance.

Semester	Course Code	Title of the Course									Hours	Credits
II	21UBO23CC04	CORE-4: ANATOMY AND EMBRYOLOGY									4	2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	2	2	3	2	2	2	2	2.3	
CO-2	2	3	2	3	3	2	3	2	2	2	2.4	
CO-3	2	2	3	2	3	3	3	2	3	3	2.7.	
CO-4	3	3	2	1	2	3	2	3	1	2	2.3	
CO-5	2	3	2	2	3	2	3	2	2	3	2.6	
Mean Overall Score											2.5	
Result											High	

Semester	Course Code	Title of the Paper	Hours	Credit
II	21UBO23CP02	LAB COURSE 2 (PTERIDOPHYTES, GYMNOSPERMS, PALEOBOTANY, ANATOMY AND EMBRYOLOGY)	3	2

Pteridophytes:

Lycopodium, Selaginella, Adiantum and Marsilea.

Gymnosperms:

Cycas, Pinus and Gnetum.

Paleobotany (Fossils): Rhynia, Lepidodendron, Calamites and Medullosa.

Anatomy

Study of simple and complex tissue.

Internal structure of young and old dicot and monocot stem.

Internal structure of dicot and monocot root.

Anomalous secondary thickening in Aristolochia, Bignonia, Boerhaavia, Thunbergia and Dracaena.

Nodal anatomy: Uni, tri and multi lacunar.

Embryology

TS of mature anther. Types of ovule, dissection and isolation of developmental stages of dicot embryos.

Semester	Course Code	Title of the Course	Hours	Credits
II	21UBO23AC02	ALLIED-I: ZOOLOGY II: AGRICULTURAL ENTOMOLOGY	4	2

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	acquire knowledge on morphology and classification of insects.	K1
CO-2	identify beneficial and harmful insects.	K2
CO-3	understand the physiology of insects.	K3
CO-4	apply integrated pest management.	K3
CO-5	evaluate the economical important insects.	K4

Unit I (12 Hours)

General classification of insects. Morphology of insects: head, external structure. Mouth parts, tentorium, compound eye, types of antennae- thorax-tergum, sternum, pleuron. Wing structure, wing venation, Legs and their modification, Abdomen- abdominal appendages, Male and female external genitalia.

Unit II (12 Hours)

Physiology of digestive, respiratory, circulatory, nervous and reproductive systems, Immature stages of insects – metamorphosis, types and hormonal regulation.

Unit III (12 Hours)

Economically important insect (orders): Coleoptera, Dictyoptera, Diptera, Hemiptera, Hymenoptera, Isoptera and Lepidoptera. General characters and classification (up to Orders). Social behaviour/life of insects.

Unit IV (12 Hours)

Economic classification of insects: beneficial insects (predators, parasites, pollinators, weed killers and scavengers). Destructive insects, a general knowledge of apiculture, sericulture and lac culture. Insects' role in forensic science. Recent trends in Integrated Pest Management. Plant protection - physical, chemical and biological methods of pest control.

Unit V (12 Hours)

Pests of stored food materials (*Sitophilus oryzae*, *Rhizopertha dominica*, *Tribolium castaneum*) and their control, Study of Bionomics and control of pests of Paddy (*Tryporyza incertulas*, *Chilopoly charysa*, *Spodoptera amauritia*), Sugarcane (*Chilo infus catellus*, *C. sacchariphagas*, *Tryporyza nivella*), Cotton (*Aphis gossypii*, *Amaras cabiguttula*, *Thrips tabaci*), Coconut (*Oryctes rhinoceros*, *Rhynchophorus ferrugineus*) and Spices pests. Locust and their role in agriculture.

Books

1. Ambrose, PD. 2004. The Insect: Structure, function and biodiversity, First edition. Kalyani Publishers, New Delhi.

Reference

1. Rajan, K & McConnell, MS. 2006. Manual of agricultural entomology - theory and practicals, Dept. of Plant biology & Plant biotechnology, St. Joseph's College, Trichy.
2. Daly, HV, Doyen, JT. & Ehrlich, PR. 1998. Introduction to Insect Biology Diversity, First Edition, McGraw Hill Book, New York.
3. Vasantharaj D B & Kumaraswami, T. 1978. Elements of Economic Entomology, Popular Book Department, Chennai.
4. Nayar, KK., Ananthkrishnan, TN. & David, BV. 1976 General and Applied Entomology, Tata McGraw Hill, New Delhi.
5. Imms, AD. 1963. General Text Book of Entomology, Asia Publ House, New Delhi.

Semester	Course Code	Title of the Course	Hours	Credits
II	21UBO23AC02	ALLIED-I: ZOOLOGY II: AGRICULTURAL ENTOMOLOGY	4	2

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	3	2	2	2	2	2	3	2	2.2
CO-2	2	3	2	1	2	2	3	2	2	3	2.2
CO-3	2	2	3	2	1	2	3	2	2	2	2.1
CO-4	1	2	2	2	2	2	3	2	3	2	2.1
CO-5	1	2	2	3	2	2	3	2	2	3	2.2
Mean Overall Score											2.16
Result											High

Semester	Course Code	Title of the Course	Hours	Credits
II	21UBO23AP02	ALLIED I: LAB COURSE: ZOOLOGY II	2	2

Detailed study:

- * Study of distinguishing features of insects studied in theory and making sketches.
- * Field collection, identification and preservation of insects of agricultural importance, predators, pollinators, and weed killers – plant galls.
- * Study of different categories of insect pests and types of damage done by them in the field, go-down and warehouses.
- * Dissection of Cockroach to study the mouthparts, digestive, nervous and reproductive systems, Salivary gland, Haemocytes. Modification of Antenna, legs, mouth parts.
- * Light trap collection and identification.
- * Visit to a local sericulture center and submission of report.

Semester	Course Code	Title of the Course	Hours	Credits
II	21UHE24AE02	Environmental Studies	2	2

CO No.	CO - Statements	Cognitive Levels (K-Levels)
	On Completion of this course, the graduates will be able to:	
CO-1	identify the concepts related to the environmental global scenario	K1
CO-2	comprehend the natural resources and environmental organizations	K2
CO-3	apply the acquired knowledge to sensitize individuals and public about the environmental crisis	K3
CO-4	analyze the causes and changes in the structure of biodiversity	K4
CO-5	enhance their skills in the society by solving the environmental problems and preserving nature by the acquired knowledge	K5

Unit I Introduction to Environmental Studies (6 Hours)

Introduction – Scope and Importance – Subsystems of Earth – Various recycling Methods – Environmental Movements in India – Eco- Feminism – Public awareness – Suggestions to conserve environment

Unit II Natural Resources (6 Hours)

Food Resources – Land Resources – Forest resources – Mineral Resources – Water Resources – Energy Resources

Unit III Ecosystems, Biodiversity and Conservation (6 Hours)

General structure of ecosystem - Functions of Ecosystem - Energy flow and Ecological pyramids – Levels of Biodiversity - Hot spots of Biodiversity - Endangered and Endemic Species - Value of Biodiversity - Threats to Biodiversity - Conservation of Biodiversity

Unit IV Environmental Pollution (6 Hours)

Air Pollution – Water Pollution – Oil Pollution – Soil Pollution – Marine Pollution – Noise Pollution - Thermal Pollution – Radiation Pollution

Unit V Environmental Organizations and Treatise (6 Hours)

United Nations Environment Program (UNEP) - International treaties on Environmental protection - Ministry of Environment, Forest and Climate Change - Important National Environmental Acts and rules– Environmental Impact Assessment.

Books for Study:

1. Department of Human Excellence, *Environmental Studies*, St. Joseph's College, Tiruchirappali-02, 2021.

Books for Reference:

1. Rathor, V.S. and Rathor B. S. *Management of Natural Resources for Sustainable Development*. New Delhi: Daya Publishing House, 2013.
2. Sharma P.D, *Ecology and Environment*, 8 ed., Meerut: Rastogi Publications, 2010.
3. Agrawal, A and C.C. Gibson. *Introduction: The Role of Community in Natural Resource Conservation*. NJ: Rutgers University Press, 2001.

Web Sources:

<https://www.unep.org/>. Accessed 05 Mar. 2021.

<http://moef.gov.in/en/> Accessed 05 Mar. 2021.

<https://www.ipcc.ch/reports/>. Accessed 05 Mar.2021.

Semester	Course Code	Title of the Course	Hours	Credits
II	21UHE14VE02	TECHNIQUES OF SOCIAL ANALYSIS: FUNDAMENTALS OF HUMAN RIGHTS	2	1

CO No.	CO - Statements	Cognitive Levels (K-Levels)
	On completion of this course, the graduates will be able to:	
CO-1	identify the importance and the values of human rights	K1
CO-2	understand the historical background and the development of Human Rights and the related organizations	K2
CO-3	apply the provisions of National and International human rights to themselves and the society	K3
CO-4	analyse the violations of human rights to the marginalized section in the society	K4
CO-5	animate the people to involve in the struggles and activities of the human rights organizations	K5

Unit-I Human Rights - An Introduction (6-Hours)

Introduction- Classification of Human Rights- Scope of Human Rights-Characteristics of Human Rights-NHRC-SHRC- Challenges for Human Rights in the 21st Century.

Unit-II Historical Development of Human Rights (6-Hours)

Human Rights in Pre-World War Era- Human Rights in Post-World War Era- Evolution of International Human Rights Law - the General Assembly Proclamation- Institution Building, Implementation and the Post- Cold War Period. The ICC.

Unit-III India and Human Rights (6-Hours)

Introduction-Classification of Fundamental Rights-Salient Features of Fundamental Rights- and Fundamental Duties.

Unit-IV Human Rights of Women and Children (6-Hours)

Women's Human Rights- Issues related to women's rights - and Rights of Women's and Children

Unit-V Human Rights Violations and Organizations (6-Hours)

Human Rights Violations - Human Rights Violations in India - the Human Rights Watch Report, January 2012- Human Rights Organizations.

Books for Study:

1. The Department of Human Excellence, *Techniques of Social Analysis: Fundamentals of Human Rights*, St. Joseph's college, Tiruchirappalli -02, 2021.

Books for Reference:

1. Venkatachalem. Dr. *The Constitution of India*, Salem: Giri Law House, 2005.

2. NaikVarunand Mukesh Shany. *Human rights education and training*, New Delhi:crescent Publishing Corporation, 2011.
3. BhathokeNeera. *Human Rights content and extent*,New Delhi: swastika publications, 2011.

Web Sources:

<https://www.un.org/en/universal-declaration-human-rights/>. Accessed 05 Mar. 2021.

<https://www.ilo.org/global/lang--en/index.htm>. Accessed 05 Mar. 2021.

<https://www.amnesty.org/en/>. Accessed 05 Mar. 2021.

Semester	Course Code	Title of the Course	Hours	Credits
III	21UTA31GL03	General Tamil - III	4	3

CO No.	CO- Statement	Cognitive Level (K- level)
இப்பாடத்தின் நிறைவில் மாணவர்கள்		
CO-1	சங்க இலக்கிய வகைகளை நினைவுகூருவர்	K 1
CO-2	இலக்கியத்தினை நுட்பமாக அறிதலின் வழியாக ஆற்றுப்படுத்தும் திறன் பெறுவர்	K 2
CO-3	இலக்கிய அறநெறிகளைத் தற்கால வாழ்வியலில் பயன்படுத்தும் திறன் பெறுவர்	K 3
CO-4	அகம் மற்றும் புற இலக்கியத் திணை, துறைகளைப் பகுத்தாராய்வர்	K 4
CO-5	யாப்பு, அணி இலக்கண நுட்பங்களை இலக்கியங்களில் மதிப்பிடுவர்	K 5

அலகு - 1

(12 மணிநேரம்)

பொருநராற்றுப்படை (முழுமையும்)

அலகு - 2

(12 மணிநேரம்)

நற்றிணை - 5 பாடல்கள் - (1, 19, 21, 70, 148)

ஐங்குறுநூறு - அன்னாய் வாழிப்பத்து.

யாப்பிலக்கணம் - வெண்பா, ஆசிரியப்பா

அலகு - 3

(12 மணிநேரம்)

கலித்தொகை - (குறிஞ்சிக்கலி- 62, பாலைக்கலி -22, மருதக்கலி- 87, நெய்தற்கலி-149, முல்லைக்கலி - 116)

இலக்கிய வரலாறு - முதற்பாகம் ('தமிழ் மொழியின் தொன்மையும் சிறப்பும்' முதல் 'சங்க தொகை நூல்கள்' முடிய),

புதினம் - குடும்ப அட்டை (2022-2023)

அலகு - 4

(12 மணிநேரம்)

பதிற்றுப்பத்து - 3 பாடல்கள் (14, 32, 61)

புறநானூறு - 5 பாடல்கள் (95, 121, 130, 204, 279)

அணியிலக்கணம்

அலகு - 5

(12 மணிநேரம்)

திருக்குறள் - புறங்கூறாமை, பழமை, புலவி நுணுக்கம் ஆகிய அதிகாரங்கள்

திரிகடுகம் - 5 பாடல்கள் (2, 6, 12, 15, 42)

இலக்கிய வரலாறு - சங்க இலக்கியங்களின் தனித்தன்மைகள் முதல் இரட்டைக் காப்பியங்கள் முடிய

பாடநூல்கள் :

1. பொதுத்தமிழ் செய்யுள் திரட்டு, தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2, முதற்பதிப்பு, 2021
2. சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு, தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, பத்தாம் பதிப்பு, 2017
3. புதினம் (ஒவ்வொரு கல்வியாண்டிற்கும் ஒவ்வொரு புதினம்)
2022 – 2023 கல்வியாண்டுக்கு மட்டும் : வீ.செந்தில் குமார், குடும்ப அட்டை, தாமரை பப்ளிகேஷன்ஸ் பிரைவேட் லிமிடெட், சென்னை, முதற்பதிப்பு, 2009

Semester	Course Code	Title of the Course									Hours	Credit
III	21UTA31GL03	General Tamil - III									4	3
Course Outcomes (COs)	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5		
CO-1	3	2	2	3	2	3	2	3	3	2	2.5	
CO-2	2	2	2	3	3	2	2	3	3	2	2.4	
CO-3	3	3	2	3	3	2	2	3	3	3	2.7	
CO-4	3	2	2	3	2	3	2	3	2	3	2.5	
CO-5	2	3	2	3	2	3	2	3	2	3	2.5	
Mean Overall Score											2.52 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
III	21UFR31GL03	FRENCH – III	4	3

CO No.	CO-Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	relate colours, materials and shapes to the french clothing.	K1
CO-2	select appropriate prepositions in giving directions.	K2
CO-3	construct a text in present tense using different verbs.	K3
CO-4	examine the travel manners and celebrations of the French.	K4
CO-5	justify the usage of past tense in a biography.	K5

Unit – I (12 hours)

TITRE: VIVRE LA VILLE

GRAMMAIRE : la comparaison, les prépositions avec les noms géographiques, les pronoms personnels COI, le pronom y (le lieu)

LEXIQUE : se repérer sur un plan de ville, la ville, les lieux de la ville

PRODUCTION ORALE : demander et indiquer une direction dans un dialogue

PRODUCTION ECRITE : décrire votre ville natale, créez les affiches en appréciant votre ville

Unit - II (12 hours)

TITRE: VISITER UNE VILLE

GRAMMAIRE : la position des pronoms compléments, les verbes du premier groupe en – ger et – cer, les verbes ouvrir et accueillir

LEXIQUE : dire les informations sur une ville de votre choix, les transports, les points cardinaux, les prépositions de lieu

PRODUCTION ORALE : Indiquer le chemin

PRODUCTION ECRITE : Demander des renseignements touristiques

Unit - III (12 hours)

TITRE: ON VEND OU ON GARDE

GRAMMAIRE : la formation du pluriel, les adjectifs de couleurs, l'adjectif beau, nouveau, vieux

LEXIQUE : savoir comment s'habiller des grandes occasions, les couleurs, les formes, les matériaux

PRODUCTION ORALE : comprendre une présentation de catalogues vestimentaires en France

PRODUCTION ECRITE : adresser des souhaits à quelqu'un

Unit - IV (12 hours)

TITRE: VENTES D'AUTREFOIS, VENTES D'AUJOURD'HUI

GRAMMAIRE : les pronoms relatifs qui et que, l'imparfait, les verbes connaître, écrire, mettre et vendre, la question avec inversion

LEXIQUE : comprendre la description de personnes dans un extrait de roman, les mesures,

l'informatique

PRODUCTION ORALE : imaginez un dialogue avec un personnage célèbre. Utilisez l'inversion.

PRODUCTION ECRITE : écrire une biographie en utilisant les pronoms relatifs

Unit- V

(12 hours)

TITRE:FELICITATIONS ! / ON VOYAGE!

GRAMMAIRE : les pronoms démonstratifs, les articles : particularités, les pronoms interrogatifs variables : lequel, les adverbes de manières, les verbes recevoir et conduire

LEXIQUE : les moyens de transports, les voyages, les fêtes, l'aéroport et l'avion, la gare et le train, l'hôtel

PRODUCTION ORALE : Présenter ses vœux

PRODUCTION ECRITE : Faire une réservation

Book for Study

P.Dauda,L.Giachino and C.Baracco, *Generation A2*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *EchoA2*, CLE International, 2^eedition,2017
2. Régine Mérieux and Yves Loiseau, *Latitudes A2*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers, 2011

Web Resources

1. <https://francais.lingolia.com/en/grammar/prepositions>
2. <https://www.lawlessfrench.com/grammar/present-tense/>
3. <https://www.thoughtco.com/textures-french-adjectives-and-expressions-1368980>
4. <https://study.com/academy/lesson/past-tense-in-french.html>
5. <https://absolutely-french.eu/french-celebrations/?lang=en>

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course code	Title of the Course					Hours	Credits			
III	21UFR31GL03	FRENCH – III					4	3			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	1	2	2	3	2	3	1	2	3	2.1
CO-2	3	2	3	3	1	2	1	2	2	3	2.2
CO-3	2	1	3	2	2	3	1	3	2	2	2.1
CO-4	3	1	3	2	3	3	3	1	2	3	2.4
CO-5	3	2	3	2	2	3	3	2	2	1	2.3
Mean overall Score											2.22 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	21UHI31GL03	HINDI - III	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, students will be able to	
CO-1	find out the dialects of Hindi language.	K1
CO-2	compare the poems of Sumithra Nandanpanth, Prasad & Bachan in Context with their experience of life.	K2
CO-3	illustrate the importance given to family ethics by the youth in the modern period according to “Bahoo Ki vidha” One Act play.	K3
CO-4	categorize the poetics in some selective poems.	K4
CO-5	justify the social & political conditions of Devotional period in Hindi Literature.	K5

Unit - I (12 Hours)

Tera sneh na khoon
Samband Bodak
Reethikal - Namakarn
Tense

Unit - II (12 Hours)

Himadri Thung Sring Se
Paribakshik shabdavali
Samuchaya Bodak
Reethikal - Samajik Paristhithiyam

Unit - III (12 Hours)

Insan our Kuthae
Vismayadi Bodak
Reethikal - Sahithyik Paristhithiyam
Reethikal - Salient Features

Unit - IV (12 Hours)

Shokgeeth
Avikary shabdh
Reethikal - Main Divisions
Social media and modern world

Unit - V (12 Hours)

Reethikal - Visheshathayem
Anuvad – 3
Bahoo ki vidha (one act play)

Books for Study

1. Dr. Sanjeev Kumar Jain, Anuwad: Siddhant Evam Vyavhar, Kailash Pustak Sadan, Madhya Pradesh, 2019.
Unit-I Chapter 1
2. M. Kamathaprasad Gupt, *Hindi Vyakaran*, Anand Prakashan, Kolkatta, 2020.
Unit-II, III and IV Chapter 2
3. Dr. Sadanant Bosalae, *kavya sarang*, Rajkamal Prakashan, New Delhi, 2020.
Unit-V Chapter 4

Books for Reference

1. Ramdev, Vyakaran Pradeep, Hindi Bhavan, 2016.
2. Lakshman prasad singh, Kavya ke sopan, Bharathy Bhavan Prakashan, 2017.
3. Acharya ramchandra shukla, Hindi Sahitya Ka Itihas, Prabhat Prakashan, 2021.
4. Hindi Niband Sangrah, V&S Publishers, 2015.
5. Krishnakumar Gosamy, Anuvad vighyan ki Bhumika, Rajkamal Prakashan, 2016.

Web Resources

1. <https://youtu.be/Xxvco3qa284>
2. <https://youtu.be/e9wK-pYfVPc>
3. https://youtu.be/75tHr53f5_o
4. https://youtu.be/eFNM6y_cpjY
5. <https://youtu.be/jHWXWLMxJtw>

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course									Hours	Credits
III	21UHI31GL03	HINDI - III									4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	3	2	3	2	1	3	2	2.4	
CO-2	3	2	3	2	2	3	2	3	2	3	2.5	
CO-3	3	2	2	3	1	3	2	3	2	3	2.4	
CO-4	2	3	3	2	3	2	3	3	2	1	2.4	
CO-5	3	2	2	3	3	2	1	3	2	3	2.4	
Mean Overall Score											2.42 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
III	21USA31GL03	SANSKRIT - III	4	3

CO No.	CO-Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, the student will be able to	
CO-1	remember Characters and events of Ramayana.	K1
CO-2	understand social ethics and moral duties.	K2
CO-3	apply the values learnt , in day to day life.	K3
CO-4	analyzing the Vedic Philosophy.	K4
CO-5	evaluate and create new words with upasargas.	K5

Unit - I (12 Hours)

Romodantam , Balakandam (1-15)

Unit - II (12 Hours)

Romodantam , Balakandam (15-30)

Unit - III (12 Hours)

Vedas – Vedangas vivaranam

Unit - IV (12 Hours)

Puranas .Upanishands

Unit - V (12 Hours)

Upasargas , Bhavishyat Kaalah

Book for Study

VEDIC LITERATURE, 2019

Books for Reference

1. Parameshwara, Ramodantam, LIFCO Chennai 2018
2. R.S.Vadhyar & Sons , Book – sellers and publishers , Kalpathu ,Palghat – 678003 , Kerala , south India , History of Sanskrit Literature 2019
3. Kulapathy , K.M Saral Sanskrit Balabodh , Bharathita vidya bhavan , Munshimarg Mumbai – 400 007 2018

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course									Hours	Credit
III	21USA31GL03	SANSKRIT-III									4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	1	2	2	3	3	3	3	3	2	1	2.3	
CO-2	3	3	2	3	3	2	2	3	3	3	2.7	
CO-3	3	3	1	3	3	1	1	3	3	3	2.4	
CO-4	2	2	1	2	3	2	2	3	2	1	2.0	
CO-5	3	3	2	3	2	2	3	3	3	2	2.6	
Mean Overall Score											2.4	
Result											# High	

Semester	Course Code	Title of the Course	Hours	Credits
III	21UEN32GE03	GENERAL ENGLISH - III	5	3

CO No.	CO-Statements	Cognitive Levels (K-Levels)
	On successful completion of this course, students will be able to	
CO -1	recall the meaning of familiar words in different contexts	K1
CO-2	comprehend the complex written texts by guessing meaning of unfamiliar words using contextual clues	K2
CO-3	use tenses and punctuations appropriately in sentences	K3
CO-4	analyse formal and informal letters to rewrite them meaningfully	K4
CO-5	compare different genres of writing and construct paragraphs	K5 & K6

Unit-I (15 Hours)

1. Suggestions to Develop Your Reading Habit
2. General Writing Skill: Letter Writing – Informal
3. Grammar: Simple Present Tense

Unit-II (15 Hours)

4. The Secret of Success: An Anecdote
5. General Writing Skill: Letter Writing – Formal
6. Grammar: Present Continuous Tense

Unit-III (15 Hours)

7. The Impact of Liquor Consumption on the Society
8. General Writing Skill: Letter to Newspaper
9. Grammar: Simple Past Tense

Unit-IV (15 Hours)

10. Dr. A.P.J. Abdul Kalam: A Short Biography
11. General Writing Skill: Job Application Letter
12. Grammar: Past Continuous Tense

Unit-V (15 Hours)

13. Golden Rule: A Poem
14. General Writing Skill: Circular-Writing
15. Grammar: Simple Future Tense and Future Continuous Tense

Book for Study

Jayraj, S. Joseph Arul et al. *Trend-Setter: An Interactive General English Textbook for Undergraduate Students*. Trinity, 2016.

Books for Reference

1. Malkani, Neelam. *A comprehensive Guide on General English for Competitive Exams*. Agra: Oswal Publications, 2020.
2. Jain, B. B. *Compendium General English*. Agra: Upkar Prakashan, 2010.
3. Aggarwal, R.S. *Quick Learning Objective General English*. India: S Chand, 2006.

4. T. Ferrari, Bernard. *Power Listening: Mastering the Most Critical Business Skill of All*. USA: Penguin Publishers, 2012.
5. Barry, Marian. *Steps to Academic Writing*. USA: Cambridge University Press, 2011.

Web Resources

1. <https://www.nypl.org/events/classes/english>
2. https://www.waywordradio.org/listen/podcast-itunes/?gclid=EAAlaIQobChMIrbeRtbP12AIVCYZpCh0-XwnvEAAAYAiAAEgLcjd_BwE
3. <https://eltlearningjourneys.com/2015/05/19/websites-for-learning-english/>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course									Hours	Credits
III	21UEN32GE03	GENERAL ENGLISH - III									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5		
CO-1	2	3	2	2	3	2	3	2	3	2	2.4	
CO-2	2	2	3	2	3	3	2	3	2	2	2.3	
CO-3	2	3	2	3	2	2	3	2	3	2	2.4	
CO-4	2	2	3	2	3	3	2	3	2	3	2.5	
CO-5	2	2	2	3	2	2	2	3	2	2	2.2	
Mean Overall Score											2.36	
											(High)	

Semester	Course Code	Title of the Course	Hours	Credits
III	21UBO33CC05	CORE-5: TAXONOMY OF ANGIOSPERMS	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	perceive the codes of nomenclature and interdisciplinary approaches on classification of angiosperms.	K1
CO-2	comprehend scientific terms and recognise general range of variations in angiosperms.	K2
CO-3	demonstrate specific mastery in recognise, compare and contrast distinctive attributes among the major groups of angiosperms.	K3
CO-4	critique the importance of various plant parts for human health and social economics.	K4
CO-5	equip themselves with skills in writing short species description, illustration, field identification and scientific photography.	K5

Unit I (15 Hours)

History of plant taxonomy. Plant collection, Identification (herbaria and botanical gardens), documentation (keys and flora). Taxonomic hierarchy; Botanical nomenclature: ICN principles, scientific names, ranks, authorship, nomenclatural types, valid publication, rejection of names, priority of publication.

Unit II (15 Hours)

Classification: artificial (Carolus Linnaeus), natural (Bentham & Hooker) and phylogenetic (Engler & Prantle's) and Angiosperm Phylogeny Group (APG). Brief account of cytotaxonomy, chemotaxonomy, molecular taxonomy and numerical taxonomy.

Unit III (15 Hours)

Detailed study and economic importance of the following families (classification based on APG IV, 2016): Basal angiosperms: Nymphaeales - Nymphaeaceae; Magnoliids: Piperales - Aristolochiaceae, Magnoliales - Annonaceae; Monocots: Alismatales - Araceae, Liliales - Liliaceae, Asparagales - Orchidaceae, Commelinales - Pontederiaceae, Poales - Poaceae.

Unit IV (15 Hours)

Eudicots: Rosids: Fabales - Fabaceae, Rosales - Rosaceae, Moraceae, Cucurbitales - Cucurbitaceae; Malpighiales - Euphorbiaceae, Myrtales - Lythraceae, Myrtaceae, Sapindales - Anacardiaceae, Rutaceae, Meliaceae.

Unit V (15 Hours)

Eudicots cont.: Superasterids: Santalales - Loranthaceae, Caryophyllales - Amaranthaceae, Asterids: Ericales - Sapotaceae, Gentianales - Rubiaceae, Apocynaceae, Solanales - Solanaceae, Lamiales - Lamiaceae, Asterales - Asteraceae, Apiales - Apiaceae.

Books for Study

1. Michael G. Simpson 2019. Plant Systematics, 3rd ed., Academic Press, London, UK.
2. Sharma OP. 2009. Plant Taxonomy, Tata McGraw-Hill Education Pvt. Ltd., New Delhi.

Books for Reference

1. Sampamurthy AVSS. 2015. Taxonomy of Angiosperms, 2nd ed., I.K. International Pvt. Ltd., New Delhi.
2. Jeffrey C. 1982. An Introduction to Plant Taxonomy, 2nd ed., Cambridge University Press, New York, USA.

Semester	Course Code	Title of the Course									Hours	Credits
III	21UBO33CC05	CORE-5: TAXONOMY OF ANGIOSPERMS									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	3	2	2	2	2	3	2	3	2	2	2.3	
CO2	3	3	3	2	2	3	2	2	2	3	2.5	
CO3	3	3	3	2	2	3	3	3	2	2	2.6	
CO4	2	3	3	2	3	2	3	3	3	3	2.7	
CO5	3	3	3	2	3	3	3	3	3	3	2.9	
Mean Overall Score											2.6	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
III	21UBO33CC06	CORE-6: PLANT BREEDING AND EVOLUTION	3	2

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	acquire knowledge on objectives and various methods of plant breeding.	K1
CO-2	outline the process of evolution and various theories pertaining to biological evolution.	K2
CO-3	judge which plant breeding methods are appropriate for specific objectives.	K3
CO-4	analyse, evaluate and synthesize information relevant to plant breeding.	K4, K5
CO-5	formulate a plan for the application of plant breeding methods to achieve a specific objective.	K6

Unit I

(9 Hours)

Plant Breeding: History and objectives; genetic basis and important achievements in plant breeding; modes of reproduction in crop plants (asexual, sexual, apomictic)- advantages and limitations, Floral biology in relation to selfing and crossing techniques; Plant Introduction – types and procedures; Centres of origin and domestication of crop plants.

Unit II

(9 Hours)

Selection methods: Mass selection, pure line and clonal selection- merits and demerits; Hybridization: objectives, choice of parents and causes of failure; Incompatibility and male sterility - methods to overcome; Methods of handling segregation material for isolation of superior strains – bulk method and pedigree method of selection; Role of distant hybridization- in crop improvement.

Unit III

(9 Hours)

Inbreeding depression and heterosis: genetic basis and its applications; Steps in the production of single cross, double cross, three-way cross; Polyploidy: induced polyploidy, role of auto and allopolyploids; Mutation and crop improvement.

Unit IV

(9 Hours)

Back crossing: theory and procedure for transferring various types of character; Breeding for disease resistance and drought tolerance; Preservation and utilization of germplasm; Breeding techniques for rice, sugarcane, groundnut and maize; Limitations of conventional breeding; Aspects of molecular breeding.

Unit V

(9 Hours)

Evolution: origin of life, theories of evolution of life forms: Lamarckism and Darwinism. Variations – definition causes and types, mutation (principles of Hugo De Vries). Role of mutation in speciation. Evolution through ages: human evolution. Evidences for evolution.

Text Book

1. Chaudhari, H.K., (1995) Revised Ed., Elementary Principles of Plant Breeding, Oxford & IBH, New Delhi.
2. Chittaranjan K. (2006-07). Genome Mapping and Molecular Breeding in Plants. Vols. I-VII. Springer.

References

1. Chopra, V. L. (1994). Plant breeding- Theory and Practice. Oxford & IBH.
2. Sharma J. R. (1996). Principles and Practice of Plant Breeding, Tata McGraw Hill
3. Sinha, U. and Sinha, S. (1992). Cytogenetics, Plant Breeding and Evolution, Vikas Publishing House Pvt. Ltd, India.

Semester	Course Code	Title of the Course									Hours	Credits
III	21UBO33CC06	CORE-6: PLANT BREEDING AND EVOLUTION									3	2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	2	2	2	3	2	2	3	2	2	2.2	
CO-2	3	2	2	1	2	1	3	3	2	3	2.2	
CO-3	1	2	3	2	3	2	3	2	3	2	2.3	
CO-4	2	2	1	3	1	2	3	2	3	3	2.2	
CO-5	1	2	2	2	3	1	3	2	2	3	2.1	
Mean Overall Score											2.2	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
III	21UBO33CP03	LAB COURSE 3 (TAXONOMY OF ANGIOSPERMS AND PLANT BREEDING)	3	2

Detailed Study:

- Description of plant in technical terms.
- A detailed study of the range of vegetative and floral characters of plants belonging to the families mentioned in the theory part except Orchidaceae.
- Field trip to any place within or outside the state to study the plants in their natural habitats.
- Spot identification (Binomial, Family) of plants included in the theory.
- Field note-book and 5 herbarium sheets of common angiosperms are to be prepared and submitted at the time of Practical Examination.
- Breeding techniques: Emasculation, Layering and Grafting.

Semester	Course Code	Title of the Course	Hours	Credits
III	21UBO33AO03A	ALLIED-II: CHEMISTRY-I (For B.Sc Botany)	4	2

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	observe the chemistry of different types of soils and their utility.	K1
CO-2	understand the principles involved in periodicity and chemical bonding.	K2
CO-3	develop the knowledge about various reactions of organic chemistry	K2
CO-4	relate bioinorganic complex molecules with human life	K3
CO-5	apply the various analytical concepts in quantitative analysis.	K4

Unit-I Periodicity and Chemical Bonding

(12 Hours)

Periodicity: classification of elements, division of periodic table into blocks (*s*, *p*, *d*, *f*), atomic radius, ionic radius, ionization energy, electronegativity, electron affinity—trends within a group and periods. General electronic configurations and oxidation states of *s*, *p* and *d*- block element, inert pair effect.

Ionic Bond – definition, examples, condition for the formation of ionic bond, properties of ionic molecules.

Covalent bond – definition, examples, properties of covalent molecules, hybridization, types of hybridization, VSEPR theory: structures of BeCl₂, BF₃, NH₃ and H₂O.

Unit-II Organic Chemistry

(12 Hours)

Classification of organic compounds: (i) Hydrocarbons: aliphatic saturated / unsaturated, cyclic acyclic and aromatic compounds (ii) alkyl and aryl halides (iii) alcohols and ethers (iv) aldehydes, ketones and carboxylic acid and their derivative (v) amines and nitro compounds; nomenclature and examples upto five carbon atoms.

Unit-III Quantitative Analysis

(12 Hours)

Error Analysis: accuracy, precision, errors, determinate and indeterminate errors, eliminating and minimizing error, relative error, absolute error.

Concentration units: mole, molarity, molality, formality, normality, ppm, mole fraction. Primary standard and secondary standard solutions, principle of volumetric analysis, acid–base titration, redox titration, complexometric titration, precipitation titration and indicators.

Unit-IV Agricultural Chemistry

(12 Hours)

Soil types—red soil, black soil, alluvial soil, desert soil, red soil; role of humus: Manures and their importance. Chemical fertilizers: Natural and synthetic fertilizers: NPK fertilizers: manufacture of NPK fertilizers, mixed fertilizers; role of macronutrients and micronutrients: Pesticides: classification insecticides, herbicides and fungicides; Structure of important pesticides: DDT, BHC, 2, 4–D, 2, 4, 5–T; biomass and its utilization; triple revolution India (Green, Blue and White).

Unit-V Coordination and Bioinorganic Chemistry (12 Hours)

Coordinate bond – ligands, classification of ligands, nomenclature of complexes DMG, EDTA ligands and their importance. Structure of $[\text{Ag}(\text{NH}_3)_2]^+$ linear; $[\text{Cu}(\text{NH}_3)_4]^{2+}$ square planar; $[\text{Ni}(\text{Cl})_4]^{2-}$ Td; $[\text{Pt}(\text{CN})_4]^{2-}$ square planar.

Chemistry of haemoproteins, nature of hemoglobin and myoglobin, chemistry of chlorophyll, porphyrin unit and photosynthesis. Nitrogen fixation and carbon cycle.

Books for Study

1. Puri B R, Sharma L R and Kalia K K, *Principles of Inorganic Chemistry*, 33rd Edition, Vishal Publishing Co, Jalandhar Delhi, 2020.

Unit–I Chapter 2 and 5

Unit–V Chapter 26 and 37

Unit III Chapter 40

2. Arun Bahl and Bahl B S, *Advanced Organic Chemistry*, 22nd Edition, S. Chand, New Delhi, 2014.

Unit–II Chapter 4

3. Sharma B K, *Industrial Chemistry*, Goel Publishing Company, New Delhi, 2011.

Unit–IV Chapter 5

Books for Reference

1. Puri B R, Sharma L R and Pathania M S, *Principles of Physical Chemistry*, 23rd Edition, ShobanLal Nagin S, Chand, New Delhi. 1993.
2. Tewari K S and Vishnoi N K, *A Text Book of Organic Chemistry*, 3rd Edition, S. Chand and Company Pvt. Ltd., New Delhi, 2000.
3. Gopalan R, *Elements of Analytical Chemistry*, S. Chand, New Delhi, 1999.

Web Resources

1. https://bansal.ac.in/acc_sample_ioc.pdf
2. https://www.niser.ac.in/sps/sites/default/files/basic_page/Error%20Analysis_2015.pdf



Basics of Inorganic Chemistry



Error Analysis

Relationship matrix for Course outcomes, Programme outcomes and Programme Specific Outcomes

Semester	Course code	Title of the Course					Hours/ week	Credits			
III	21UBO33AO03A	ALLIED-II: CHEMISTRY-I (For B.Sc Botany)					4	2			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	1	2	3	2	3	1	2	3	2	2.1
CO-2	3	1	2	2	3	3	2	1	3	2	2.2
CO-3	2	2	1	3	2	2	1	2	3	2	2.0
CO-4	3	3	2	1	2	2	2	3	2	1	2.1
CO-5	3	2	2	3	3	2	3	2	2	3	2.5
Mean overall Score										2.2	
Result										High	

Semester	Course Code	Title of the Course	Hours	Credits
III	21UBO33AO03B	ALLIED-II: BIOMETRICS AND COMPUTER APPLICATIONS-I	4	2

CO No.	CO-Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	acquire the knowledge of Statistics in biological context	K1
CO-2	describe the concept of matrix	K2
CO-3	compute the system of equation.	K3
CO-4	utilize the statistical diagrams to represent real life problems.	K3
CO-5	analyse the univariate data.	K4

Unit I (12 Hours)

Types of measurements – Interval, ratio, rank order and categorical - Logarithm, Permutation and Combination

Unit II (12Hours)

Solving Equations: Solving a simple linear equation involving one variable and two variables. Matrices - Operation on matrices – Determinants – Inverse – Solving a system of equations of order 3x3 using Cramer’s rule and inverse method.

Unit III (12 Hours)

Mathematical modeling: Principle of least squares (concepts only) –Curvilinear regression, $y = ax^2 + bx + c$, $y = ab^x$ and $y = ae^{bx}$.

Unit IV (12 Hours)

Statistics –Introduction -Uses and limitations of Statistics – Collection and classification of data - Frequency table – Frequency graphs – Diagrammatic representation of data - Sampling-Census and sample method - Methods of sampling.

Unit V (12 Hours)

Measures of location: Mean, Median and Mode. **Measures of Dispersion:** Range, Mean deviation, Standard deviation and Coefficient of variation. Skewness and Kurtosis.

Books for Study

- Gupta S.P, Statistical Methods, Sultan Chand & Sons, New Delhi, 43rd Edition 2014
Unit –I - page no 1428-1430
- PA.Navanitham, Business Mathematics and Statistics ,Jai publishers 2015
Unit –II Chapter IV (sec 6,7,8,9,12)

3. Gupta S.P. & Kapoor V.K., Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi, 12th Edition 2020.
Unit III Chapter 11 (sec 11.2, 11.3)
4. Gupta S.P, Statistical Methods, Sultan Chand & Sons, New Delhi, 43rd Edition 2014
Unit –IV Chapter 1,2,3 & 4
Unit –V Chapter 7,8 & 9

Books for Reference

1. Nageswara Rao G.: Statistics for Agricultural Science, BS Publications, Third Edition, 2018
2. Olive Jean Dunn & Virginia A Clark: Basic Statistics: A primer for the Biomedical Sciences, A John Wiley & Sons, Inc., Publications, Fourth Edition, 2009.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Course Code	Title of the Course									Hours	Credit
III	21UBO33AO03B	ALLIED-II: BIOMETRICS AND COMPUTER APPLICATIONS-I									4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5		
CO-1	3	3	2	3	3	3	2	3	3	3	2.8	
CO-2	1	2	2	3	3	2	1	2	3	3	2.2	
CO-3	3	3	2	3	3	1	3	3	2	2	2.5	
CO-4	2	3	2	2	3	3	1	2	3	3	2.4	
CO-5	3	3	3	2	2	3	2	2	3	3	2.6	
Mean Overall Score											2.5 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
III	21UBO33AP03B	ALLIED-II: LAB COURSE-1: (BIOMETRICS AND COMPUTER APPLICATIONS I)	2	2

CO No.	CO– Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	find the solutions of the system of equations.	K 1
CO-2	predict the future value by fitting the appropriate curve.	K 2
CO-3	display the frequency table for the given data.	K 3
CO-4	sketch out the frequency curves.	K 3
CO-5	draw and explain the diagrams for the data under study.	K 4

Using the Excel packages the students are asked to solve the following exercises:

1. Solving a system of equations – Inverse Matrix, Cramer’s rule.
2. Curve fitting – Straight line, Regression line and second degree.
3. Construction of frequency table – Univariate, Bivariate and Cross tabs.
4. Drawing frequency graphs.
5. Pictorial presentation – Bar diagrams, Pie diagrams etc.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Course Code	Title of the Course									Hours	Credit
III	21UBO33AP03 B	ALLIED-II: LAB COURSE I (BIOMETRICS AND COMPUTER APPLICATIONS I)									2	2
Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5		
CO-1	3	2	1	2	3	3	3	2	1	1	2	
CO-2	2	3	2	3	3	3	2	1	2	3	2.4	
CO-3	3	2	3	3	2	1	3	2	1	2	2.2	
CO-4	2	3	2	1	3	1	2	3	2	3	2.2	
CO-5	1	2	3	2	1	2	3	1	1	2	1.8	
Mean Overall Score											2.12 (High)	

Semester	Course Code:	Title of the Course	Hours	Credits
III	21UBO34SE01	SEC-1 (WD): MUSHROOM TECHNOLOGY	2	1

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	identify various cultivable species of mushrooms.	K1
CO-2	design various recipe from mushrooms.	K2
CO-3	assess preservation and storage of mushrooms.	K3
CO-4	evaluate and explore the economic viability of mushrooms.	K4
CO-5	prepare the culture techniques of edible mushrooms.	K5

Unit I (6 Hours)

Introduction - Classification - Edible and Poisonous. Tests for identification - Nutritive value of mushrooms.

Unit II (6 Hours)

Characteristics of common edible mushrooms Paddy straw, Oyster and milky mushrooms. Life cycle of a common mushroom (Agaricus).

Unit III (6 Hours)

Culture Techniques – Preparation of spawn, preparation of compost – Spawn running – Harvesting and Marketing.

Unit IV (6 Hours)

Preservation and storage of mushrooms – Diseases and pests of mushrooms.

Unit V (6 Hours)

Delicious recipes of mushroom – Economic importance of mushrooms.

Book

1. Nita Bahl (1984). Handbook on Mushrooms, Oxford and IBH Publishing Company

Reference

1. Dubey, RC. (2001) A Textbook of Biotechnology, S.Chand & Co. Ltd.

Semester	Course Code	Title of the Course	Hours	Credits
III	21UBO34SE01	SEC-1 (WD): MUSHROOM TECHNOLOGY	2	1

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	1	2	3	2	2	3	2.3
CO-2	2	2	3	1	2	2	2	2	3	2	2.1
CO-3	1	3	3	2	3	1	2	3	2	3	2.3
CO-4	2	3	2	2	1	2	3	1	2	3	2.2
CO-5	1	3	3	2	1	2	3	2	1	3	2.1
Mean Overall Score											2.2
Result											Medium

Semester	Course Code	Title of the Course	Hours	Credits
III	21UHE24VE03A	PROFESSIONAL ETHICS–I: SOCIAL ETHICS - I	2	1

CO No.	Co- Statements	Cognitive Level
	On completion of this course the graduates will be able to:	
CO-1	know the responsibility of the educated youth.	K1
CO-2	understand the values prescribed under social ethics.	K2
CO-3	apply their minds critically to the various types of cyber crime.	K3
CO-4	analyse the various kinds of political systems.	K4
CO-5	analyse the behaviour of the elected representatives.	K4

Unit-I Introduction to Social Ethics (6-Hours)

Introduction to social ethics and social responsibility, important role of Social ethics on the various areas, religion influences social changes - secularism. Social ethics and corporate dynamics, forms of social ethics.

Unit-II The Economic and Political System of Today (6-Hours)

Planned economy and communism – market economy and capitalism- socialism - mixed economy -the emerging market economy - political system- totalitarian system- oligarchic system.

Unit-III Integrity in Public Life National Integration (6-Hours)

What is Integrity, Public Life, Integrity and Public Life, Integrity in a Democratic State, India as Democratic State, Behavior of a elected representative of India , Noticeable degradation acts of elected Representatives, Suggestions to stem this rot, Types of integrity, Transparency can be a guarantee for integrity.

Unit-IV Cyber Crime (6-Hours)

Business Ethics, Business ethics permeates the whole organization, Measuring business ethics , The Vital factors highlighting the importance of business ethics , Cyber crime, Strategies in committing Cyber Crimes, Factors aiding Cyber Crime, computer Hacking, Cyber Bullying, Telecommunications piracy, Counter Measures to Cyber Crime, Ethical Hacking.

Unit-V Social Integration (6-Hours)

Global challenges, The future is with the Educational Youth, Cost of the Sacrifice, Crusaders against corruption, Responsibility of the Educated Youth, Positive Global Scenario, Right to Education, Eradicating gender inequality, Sustainable Human Development , Social Integration, Elimination Crime, Integration with Global Market

Books for Study:

1. Department of Human Excellence, *Formation of Youth*, St Joseph’s College(Autonomous), Tiruchirappali -02, 2021

Books for Reference:

1. Ramesh K. Arora, *Ethics, Integrity and Values* by Public Service Paperback ,– 1 January 2014
2. Cunningham, D. *There's something happening here: The new left, the Klan, and FBI counterintelligence*. Berkeley: University of California Press, 2004.
3. Adv. Prashant Mali, *Cyber law & Cyber Crimes simplified* by Cyber Info media Paperback – 1 January 2017.
4. Matthew Richardson, *Cyber Crime: Law and Practice Hardcover – Import*, Wildy publications, 29 November 2019

Web Sources:

<https://cybercrime.gov.in/>

<https://open.lib.umn.edu/sociology/chapter/14-2-types-of-political-systems/>

<https://www.esv.org/resources/esv-global-study-bible/social-ethics/>

https://en.wikipedia.org/wiki/Political_system

Semester	Course Code	Title of the Course	Hours	Credits
III	21UHE34VE03B	PROFESSIONAL ETHICS I: RELIGIOUS DOCTRINE- I	2	1

CO.No.	Co – Statements	Cognitive Level
	On completion of this course, the graduates will be able to:	
CO-1	understand the history of the Catholic Church	K1
CO-2	examine and grasp the Sacraments of the Catholic Church	K2
CO-3	apply the Christian Prayer to their everyday life	K3
CO-4	analyze themselves in the light of Sacraments & Christian Prayer	K4
CO-5	create a harmonious society learning values from all religions	K5 & K6

Unit-I	God of salvation	(6 Hours)
Unit-II	Life & Mission of Jesus Christ	(6 Hours)
Unit-III	The Holy Spirit	(6 Hours)
Unit-IV	Biblical Values	(6 Hours)
Unit-V	Mother Mary	(6 Hours)

Books for Text

Department of Human Excellence, *Life in the Lord: Religious Doctrine*. St. Joseph's College, Trichirappalli-02, 2021.

Books for Reference:

1. *Compendium: Catechism of the Catholic Church*. Bengaluru: Theological Publications in India, 1994.
2. Holy Bible (NRSV).

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UTA41GL04B	Scientific Tamil (SBS, SPS,SCS)	4	3

CO No.	CO- Statements	Cognitive Level (K- level)
இப்பாடத்தின் நிறைவில் மாணவர்கள்		
CO-1	பண்டைத் தமிழர்களின் அறிவியலறிவை அறிந்துகொள்வர்.	K 1
CO-2	பண்டைத் தமிழிலக்கியங்களுள் காணலாகும் அறிவியல் சிந்தனைகளைப் புரிந்துகொள்வர்.	K 2
CO-3	தமிழரின் அறிவியல் மருத்துவத்தையும், நீர் மேலாண்மை அறிவையும் அறிந்துகொள்வர்.	K 3
CO-4	இக்கால இலக்கியங்களுள் அறிவியல்துறை பெற்றுள்ள செல்வாக்கை அறிந்துகொள்வர்.	K 4
CO-5	அறிவியல் கலைச்சொற்களைத் தமிழில் கற்றுக் கொண்டு அறிவியல் தமிழ் வளரத் துணைபுரிவர்.	K 5

அலகு - 1

(12 மணிநேரம்)

தொல்காப்பியம் :

நிலம் தீ நீர் வளி விசும்போடு (தொல்.பொருள் 635)

ஒன்றறிவதுவே (தொல்.பொருள் 571)

புறநானூறு

மண் திணிந்த நிலனும் (புறம்.2)

செஞ்ஞா யிற்றுச் செலவும் (புறம். 30)

அகநானூறு

அம்ம வாழி, தோழி (அகம்.141)

பதிற்றுப்பத்து

நிலம் நீர் வளி விசும்பு என்ற நான்கின் (பதிற்று.14)

நெடுவயின் ஒளிறு மின்னுப் பரந்தாங்கு (பதிற்று.24)

உரைநடைக்கட்டுரை : வியக்க வைக்கும் தமிழரின் அறிவியல்

அலகு- 2

(12 மணிநேரம்)

சித்தர் பாடல்கள்

பதார்த்த குண சிந்தாமணி

குளத்து சலந்தானே கொடிதான (27)

ஏரிசலம் வாதமிகு மதுவே (31)

அருவிநீர் மேக மகற்றுங் (39)

மேவிய சீவன் வடிவது சொல்லிடல் (திருமூலர்)

அணுவில் அணுவினை ஆதிபிராணை (திருமூலர்)

நட்டகல்லைத் தெய்வமென்று (சிவவாக்கியர்)

உரைநடைக்கட்டுரை: தமிழர்களின் மருத்துவ அறிவியல்

அலகு - 3

(12 மணிநேரம்)

திருக்குறள் (2 அதிகாரங்கள்)

வான் சிறப்பு, மருந்து

வலைப்பூக்கள் உருவாக்கல், பராமரித்தல்

புதிய அறிவியல் கலைச்சொல்லாக்கங்களை உருவாக்குதல்

உரைநடைக்கட்டுரை: தமிழ் இலக்கியங்களில் நீர் மேலாண்மையியல்

அலகு- 4

(12 மணிநேரம்)

புதினம்: சொர்க்கத்தீவு – சுஜாதா

நூல் - திறனாய்வு

அறிவியல் புனைவு ஆவணப்படம், திரைப்படம் - திறனாய்வு

உரைநடைக்கட்டுரை: தமிழில் அறிவியல் புனைவுகள்

அலகு - 5

(12 மணிநேரம்)

அறிவியல் கலைச்சொற்கள்

அன்றாட வாழ்வில் அறிவியல் பழமொழிகளைத் தொகுத்தல்

மூலிகைகள், கீரைகள் ஆகியவற்றின் முக்கியத்துவத்தைக் காட்சிப்படுத்துதல்.

தமிழர் அறிவியல் கண்காட்சி நடத்துதல்

உரைநடைக்கட்டுரை: அறிவியல் தமிழின் வளர்ச்சி நிலைகள்

பாட நூல்கள்

1. **அறிவியல் தமிழ்**, தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி,

திருச்சிராப்பள்ளி, முதற்பதிப்பு, 2022

2. சுஜாதா, **சொர்க்கத்தீவு**, விசா பப்ளிகேஷன்ஸ், சென்னை-17, ஒன்பதாம் பதிப்பு, 2009

3. மூர்த்தி அ.கி., **அறிவியல் அகராதி**, மணிவாசகர் பதிப்பகம், சென்னை, 2001

பார்வை நூல்கள்

1. குழந்தைசாமி.வா.செ., **அறிவியல்தமிழ்**, பாரதி பதிப்பகம், சென்னை-17,

6ஆம்பதிப்பு, 2001

2. நெடுஞ்செழியன், **இன்னும் மீதமிழ்நாடு நம்பிக்கை**, புவலகின் நண்பர்கள்

வெளியீடு, சென்னை, முதற்பதிப்பு, 2017

3. பரிமேலழகர்(உரை.), திருக்குறள், பாரதி பதிப்பகம், சென்னை-17, ஏழாவது பதிப்பு, 2000.
4. வையாபுரிப்பிள்ளை, பாட்டும் தொகையும், பாரி நிலையம், சென்னை, இரண்டாம் பதிப்பு, 1967.

Semester	Course Code	Title of the Paper									Hours	Credit
IV	21UTA41GL04B	Scientific Tamil (SBS, SPS,SCS)									4	3
Course Outcomes (COs)	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5		
CO-1	1	2	3	2	2	3	3	2	2	2	2.2	
CO-2	2	2	3	2	2	2	3	2	3	2	2.3	
CO-3	1	2	2	3	2	2	2	3	3	3	2.3	
CO-4	2	2	3	2	2	3	2	3	3	2	2.4	
CO-5	3	1	2	2	2	2	3	2	3	3	2.3	
Mean Overall Score											2.3 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UFR41GL04	FRENCH – IV	4	3

CO No.	CO-Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	recall the vocabulary pertaining to dwelling place.	K1
CO-2	outline crisis management in France.	K2
CO-3	develop a travel diary of your own.	K3
CO-4	simplify the French education system.	K4
CO-5	interpret past tenses in a text.	K5

Unit- I (12 hours)

TITRE:ON FAIT LE MELANGE!

GRAMMAIRE : le présent progressif, les pronoms possessifs, la phrase négative

LEXIQUE : décrire les étapes d'une action, la maison, les tâches ménagères

PRODUCTION ORALE : comprendre le récit d'un voyage

PRODUCTION ECRITE : raconter ses actions quotidiennes

Unit - II (12 hours)

TITRE:A PROPOS DE LOGEMENT

GRAMMAIRE : quelques adjectifs et pronoms indéfinis, les verbes lire, rompre et se plaindre

LEXIQUE : la localisation et le logement, les pièces, meubles et équipement

PRODUCTION ORALE : jeu de rôle –votre ami et vous s'installe dans un nouveau meuble

PRODUCTION ECRITE : décrire votre maison/appartement

Unit- III (12 hours)

TITRE:TOUS EN FORME!

GRAMMAIRE : le passé composé et l'imparfait, le passé récent, l'expression de la durée

LEXIQUE : un souvenir et les événements du passés, le corps humain : extérieur, le corps humain : intérieur

PRODUCTION ORALE : échanger sur ses projets de vacances

PRODUCTION ECRITE : raconter un souvenir

Unit - IV (12 hours)

TITRE:ACCIDENTS ET CATASTROPHES

GRAMMAIRE : les adjectifs et les pronoms indéfinis : rien/ personne/aucun, les verbes dire, courir et mourir

LEXIQUE : savoir les mots et les expressions des catastrophes naturelles, les maladies et les remèdes, les accidents, les catastrophes naturelles

PRODUCTION ORALE : comprendre des personnes qui expriment leur accord ou leur désaccord selon un thème donné

PRODUCTION ECRITE : écrivez sur une catastrophe naturelle en articulant la cause et la conséquence

Unit -V (12 hours)

TITRE:FAIRE SES ETUDES A L'ETRANGER/ BON VOYAGE/ LA METEO

GRAMMAIRE : les pronoms démonstratifs neutres, le futur simple, situer dans le temps, moi

aussi/non-plus – moi non/si, les verbes impersonnels, les verbes croire, suivre et pleuvoir
 LEXIQUE : savoir vivre en France, le système scolaire, les formalités pour partir à l'étranger.
 PRODUCTION ORALE : exprimer son opinion sur la météo/parler del'avenir
 PRODUCTION ECRITE: comparer le système scolaire français et indien

Book for Study

P.Dauda,L.Giachino and C.Baracco, *Generation A2*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *Echo A2*, CLE International, 2^eedition,2013
2. Régine Mérieux and Yves Loiseau, *Latitudes A2*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers,2011

Web Resources

1. <https://www.frenchcourses-paris.com/french-travel-journal/>
2. <http://www.saberfrances.com.ar/vocabulary/house.html>
3. <https://www.thoughtco.com/different-past-tenses-in-french-1368902>
4. <https://www.youtube.com/watch?v=JZdwJM7sEY8>
5. <https://www.scholaro.com/pro/Countries/France/Education-System>

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course code	Title of the Course									Hours	Credits
IV	21UFR41GL04	FRENCH – IV									4	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	1	3	2	2	3	2	1	2	2	2.1	
CO-2	3	1	2	3	3	3	2	1	3	1	2.2	
CO-3	3	2	3	2	2	3	2	1	3	2	2.3	
CO-4	3	1	2	2	3	3	3	1	3	3	2.4	
CO-5	2	2	3	3	1	3	1	2	3	2	2.2	
Mean overall Score											2.24 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UHI41GL04	HINDI - IV	4	3

CO No.	CO-Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, students will be able to	
CO-1	list out the social conditions prevailed in Modern Period which are depicted in Hindi Literature.	K1
CO-2	discuss the dialects of Hindi language.	K2
CO-3	illustrate the works of some eminent Hindi Writers related to society.	K3
CO-4	analyze the human values expressed in life and literature of Hindi Novelist “Mamatha Kaliyah”.	K4
CO-5	evaluate the film & Literary works in Hindi.	K5

Unit - I

(12 Hours)

Computer ka yug
Prathyay
Adhunik Kal - Namakarn
Namakaran

Unit - II

(12 Hours)

Vigyan hani/labdh
Paryayvachy Shabdh
Adhunik Kal - Samajik Paristhithiyam
Samanarthy Shabdh

Unit - III

(12 Hours)

Nari shiksha
Upasarg
Adhunik Kal – Sahithyik Paristhithiyam
Adhunik kal – Salient Features

Unit - IV

(12 Hours)

Review- Book/Film
Paryavaran Pradookshan
Adhunik Kal - Main Divisions
Adhunik Kal - Visheshathayem

Unit - V**(12 Hours)**

Sapnom Kee Home Delivery (Novel)
Anuvad - 4

Books for Study

1. Dr. Sadananth Bosalae, *kavya sarang*, Rajkamal Prakashan, New Delhi, 2020.
Unit-I Chapters 4
2. M. Kamathaprasad Gupt, *Hindi Vyakaran*, Anand Prakashan, Kolkatta, 2020.
Unit-II, III and IV Chapter 2
3. Dr. Sanjeev Kumar Jain, *Anuwad: Siddhant Evam Vyavhar*, Kailash Pustak Sadan, MadhyaPradesh, 2019 **Unit-V** Chapter 2

Books for Reference

1. Hindi Niband Sangrah, V&S Publishers, 2015.
2. Rajeswar Prasad Chaturvedi, Hindi vyakarana, Upakar prakashan, 2015.
3. Ramdev, Vyakaran Pradeep, Hindi Bhavan, 2016.
4. Krishnakumar Gosamy, Anuvad vigyan ki Bhumika, Rajkamal Prakashan, 2016.
5. Acharya ramchandra shukla, Hindi Sahitya Ka Itihas, Prabhat Prakashan, 2021.

Web Resources

1. <https://youtu.be/xmr-DaQ3LhA>
2. <https://youtu.be/xIm-VEmgEg0>
3. <https://youtu.be/ZHuqxWbMtas>
4. <https://youtu.be/HGS63OJuHto>
5. <https://youtu.be/r-i3autqPug>

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course									Hours	Credits
IV	21UHI41GL04	HINDI - IV									4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	3	2	3	3	2	3	2	3	1	2.4	
CO-2	3	2	3	3	2	3	2	3	1	2	2.4	
CO-3	3	2	2	3	2	2	1	3	2	3	2.3	
CO-4	3	2	3	1	3	3	2	3	3	2	2.5	
CO-5	3	2	2	3	3	2	3	2	3	3	2.6	
Mean Overall Score											2.44 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
IV	21USA41GL04	SANSKRIT - IV	4	3

CO No.	CO-Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, the student will be able to	
CO-1	remember and identifying Mahabharatha characters and events.	K1
CO-2	understand human behaviors by studying dramas.	K2
CO-3	apply the morals learnt in day to day life.	K3
CO-4	create new conversational sentences and to Improve self-character (Personality Development).	K4
CO-5	appreciate ancient Sanskrit dramas.	K5

Unit - I (12 Hours)

Sanskrita Vyavahara sahasri vakiya Prayogaha

Unit - II (12 Hours)

Lot Lakaarah , Prqayaogh Kartari Vaakyaani

Unit - III (12 Hours)

Naatakasya Itihaasah Vivaranam, Thuva and Tum Prathiyaha

Unit - IV (12 Hours)

Karnabhaaram , Naatakasya Visistyam

Unit - V (12 Hours)

Sanskrita Rachanani priyogaha

Book for Study

Karnabhavam & Literature Language, 2019 , K.M Saral Sanskrit Balabodh , Bharathita vidya bhavan , Munshimarg Mumbai – 400 007

Books for Reference

1. R.S.Vadhyar & Sons , Book – sellers and publishers , Kalpathu ,Palghat – 678003 , Kerala , south India , History of Sanskrit Literature 2019
2. Kulapathy , K.M Saral Sanskrit Balabodh , Bharathita vidya bhavan , Munshimarg Mumbai – 400 007 2018

3. Samskrita Bharathi , Aksharam 8 th cross , 2nd phase Giri nagar Bangalore Vadatu
sanskritam – Samaskara Binduhu 2019

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course									Hours	Credit
IV	21USA41GL04	SANSKRIT-IV									4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	2	2	3	2	3	2	3	3	2	2.5	
CO-2	2	2	3	2	3	3	3	3	3	2	2.4	
CO-3	3	3	2	3	2	1	1	3	3	3	2.4	
CO-4	2	3	3	3	2	1	3	3	3	2	2.5	
CO-5	2	2	3	2	3	3	3	3	2	3	2.6	
Mean Overall Score											2.48	
Result											# High	

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UEN42GE04	GENERAL ENGLISH - IV	5	3

CO No.	CO-Statements	Cognitive Levels (K- Levels)
	On successful completion of this course, students will be able to	
CO-1	identify different local and global issues in given passages	K1
CO-2	understand explicit and implicit information given in written texts	K2
CO-3	use appropriate words and punctuations in writing	K3
CO-4	analyse written texts and modify them for better clarity	K4
CO-5	assess the coherence and cohesion of written texts and rewrite them	K5 & K6

Unit-I (15 Hours)

1. Women through the Eyes of Media
2. General Writing Skill: Writing Minutes of a Meeting
3. Grammar: Present Perfect Tense

Unit-II (15 Hours)

4. Effects of Tobacco Smoking
5. General Writing Skill: Note-Taking
6. Grammar: Present Perfect Continuous Tense

Unit-III (15 Hours)

7. Short Message Service (SMS)
8. General Writing Skill: Note-Making
9. Grammar: Past Perfect Tense

Unit-IV (15 Hours)

10. An Engineer Kills Self as Crow Sat on his Head: A Newspaper Report
11. General Writing Skill: Précis Writing
12. Grammar: Past Perfect Continuous Tense

Unit-V (15 Hours)

13. Traffic Rules
14. General Writing Skill: Paragraph Writing
15. Grammar: Future Perfect Tense and Future Perfect Continuous Tense

Book for Study

Jayraj, S. Joseph Arul et al. *Trend-Setter: An Interactive General English Textbook for Under Graduate Students*. Trinity, 2016.

Books for Reference

1. Clark Peter, Roy. *Writing Tools: 50 Essential Strategies for Every writer*. USA: Little, Brown Spark Publishers, 2008.
2. Carnegie, Dale. *The Quick and Easy Way to Effective Speaking*. India: Fingerprint Publishers, 2018.

- Vaughn, Steck. *Reading Comprehension*. USA: Steck-Vaughn Co, 2014.
- Birkett, Julian. *Word Power: A Guide to Creative writing*. India: Bloomsburry Academic, 2016.
- Knight, Dudley. *Speaking with Skill: An Introduction to Knight-Thompson Speechwork*. USA: Methuen Drama, 2016.

Web Resources

- <https://blog.lingoda.com/en/10-news-sites-to-practice-your-english-reading-skills/>
- <https://www.espressoenglish.net/how-to-learn-english-for-free-50-websites-for-free-english-lessons/>
- <https://www.ef.com/wwen/english-resources/>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course									Hours	Credits
IV	21UEN42GE04	GENERAL ENGLISH - IV									5	3
Course Outcome (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	3	2	2	3	2	3	2	3	2	2.4	
CO-2	2	2	3	2	3	3	2	3	2	2	2.3	
CO-3	2	3	2	3	2	2	3	2	3	2	2.4	
CO-4	2	2	3	2	3	3	2	3	2	3	2.5	
CO-5	2	2	2	3	2	2	2	3	2	2	2.2	
Mean Overall Score											2.36 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UBO43CC07	CORE-7: CELL BIOLOGY AND GENETICS	4	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	understand the organization of cells.	K1
CO-2	acquire knowledge on the structure and organization of various cell organelles	K2
CO-3	learn cell cycle and methods of cell division	K2
CO-4	solving problems with relevance to the principles and applications of genetics.	K3
CO-5	acquire the basic knowledge on genomics and proteomics.	K4

Unit I (12 Hours)

Cell as a unit of structure and function; prokaryotic and eukaryotic; Endosymbiotic theory. Structure, organization and functions of nucleus, mitochondria, chloroplasts, ER, ribosomes, Golgi complex, lysosome and vacuole. Organisation of cytoskeleton.

Unit II (12 Hours)

Cytoplasmic membrane structure and functions. Cellular mechanisms in development and differentiation. Cell division (mitosis and meiosis), Cell cycle. Mutation – types, causes and detection. Mutant types – lethal, conditional, biochemical; germinal vs somatic mutants, insertional mutagenesis. Special types of chromosome – polytene and lampbrush.

Unit III (12 Hours)

Mendel's laws of heredity, Modified Mendelian ratios. Multiple alleles. Linkage and crossing over. Sex linked inheritance. Sex determination mechanism. Extra chromosomal inheritance.

Unit IV (12 Hours)

DNA is the genetic material: Griffith's, Avery et al., and Hershey and Chase. RNA as genetic material. Basic knowledge and applications of genomics and proteomics. Genomics: structural and functional genomics. Plant genome (*Arabidopsis* and *Oryza*), animal (*Homo sapiens*). Human Genome Project - objectives and controversies.

Unit V (12 Hours)

Population genetics: gene frequency, genepool, Hardy–Weinberg equilibrium. Genetic drift, Gene frequencies – conservation and changes. Selection - natural, artificial, ecological.

Books for Study

1. Verma, P. S. & V. K. Agarwal, 2003, Genetics. S. Chand & Co. Ltd., New Delhi.
2. Gupta, P.K. 2018. Genetics. 5th Edition, Rastogi Publications, Meerut.

Books for References

1. Sinnott, EW, Dunn, LL. & Dobzhansky, T. 1997. Principles of Genetics, Tata McGraw Hill, New Delhi.

2. Freifelder, D. 1993. Essentials of Molecular Biology, Jones & Bartlett, Boston.
3. Gardner, EJ, Simmons, MJ. & Snustad, D. 1991. Principles of Genetics, 8th Edn, John Wiley & Sons, New York.

Semester	Course Code	Title of the Course									Hours	Credits
IV	21UBO43CC07	CORE-7: CELL BIOLOGY AND GENETICS									4	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	2	2	3	2	2	2	2	2.3	
CO-2	2	3	2	3	3	2	3	2	2	2	2.4	
CO-3	2	2	3	2	3	3	3	2	3	3	2.7.	
CO-4	3	3	2	1	2	3	2	3	1	2	2.3	
CO-5	2	3	2	2	3	2	3	2	2	3	2.6	
Mean Overall Score											2.5	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UBO43CC08	CORE-8: ECOLOGY AND CLIMATE CHANGE	4	2

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	understand the fundamentals of ecology	K1
CO-2	acquire know on various ecosystems and their components	K2
CO-3	understand techniques of community studies	K2
CO-4	apply their skill to manage climate change	K3
CO-5	analyse the biogeochemical cycles and their significance	K4

Unit I (12 Hours)

Introduction to ecology and ecosystem. Ecological factors – physical, edaphic, topographic. Biogeochemical cycles - C, N & P. Plant succession: definition, primary and secondary succession, autogenic and allogenic succession, pioneers and climax communities. Mechanism of plant succession - xerosere.

Unit II (12 Hours)

Autecology and Synecology – definition. Population ecology –definition, size, density, age structure, dispersal and growth. Population interactions – negative and positive. Basic idea of biodiversity – species, genetic, ecosystem and habitat diversity.

Unit III (12 Hours)

Sampling techniques in plant community studies – quadrat and transect methods; species area curve – density, frequency, abundance, dominance of populations; importance value index – construction of phytographs. Phytogeographical zones of India.

Unit IV (12 Hours)

Centres of origin and distribution of species. Patterns of plant distribution - continuous and discontinuous. Continental drift - evidences and impact. Endemic distribution, theories on endemism, age and area hypothesis. Ecotone and edge effect.

Unit V (12 Hours)

Carbon emissions, global warming, climate change, carbon credit, carbon sequestration, blue carbon, alternative energy sources and green energy. Climate change conferences and the role of IPCC and UNFCCC. Anthropause effects on Environment during Covid – 19.

Books for Study

Kormondy, E.J. 2017. Concepts of Ecology. Prentice Hall, U.S.A. 4th edition

Books for References

Sharma, P.D. 2010. Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition

Eugene Odum, 2017. Fundamentals of Ecology 5th Ed. Cengage, Bengaluru.
 Trevor Letcher, 2015. Climate Change, 2nd Ed., Elsevier Publishing.
 Jason Smerdon, 2018. Climate Change: The Science of Global Warming and Our Energy Future, Columbia University Press, New York.

Semester	Course Code	Title of the Course									Hours	Credits
IV	21UBO43CC08	CORE-8: ECOLOGY AND CLIMATE CHANGE									4	2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	2	1	2	3	2	3	2	3	2	2.2	
CO-2	2	3	2	2	1	3	2	2	2	2	2.1	
CO-3	2	3	1	3	3	3	2	3	2	2	2.4	
CO-4	2	2	2	2	3	3	2	3	2	2	2.3	
CO-5	2	2	2	2	3	3	2	2	2	2	2.2	
Mean Overall Score											2.3	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UBO43CP04	LAB COURSE 4 (CELL BIOLOGY, GENETICS, ECOLOGY AND CLIMATE CHANGE)	3	2

Cell Biology and Genetics:

1. Ultra structure of cell organelles.
2. Study of mitosis in root tips
3. Study of meiosis in anthers
4. Inheritance Patterns – Mendelian and modified Mendelian ratios
5. Linkage Mapping.
6. Estimation of allele frequency in natural (random matting) populations.
7. Isolation and display of polytene chromosomes.
8. Extraction of human genomic DNA from saliva.
9. Estimation of DNA (Colorimetric).

Ecology and Climate Change

1. Chemical analysis of water and Soil –Total hardness, Carbonates and Bicarbonates and Dissolved oxygen.
2. Vegetation Analysis: Quadrat, Line transects, Species Density, abundance and richness. Basal area and relative dominance
3. Green auditing
4. Field trip

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UBO43AO04A	ALLIED-II: CHEMISTRY-II (For B.Sc Botany)	4	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	recognize the chemistry of natural products.	K1
CO-2	discuss the fundamental aspects of pharmaceutical chemistry.	K2
CO-3	understand the chemical kinetics and thermodynamic properties of the reaction.	K2
CO-4	apply the different types of chromatographic techniques to analyze and to identify the components.	K3
CO-5	classify the types of catalyst and their effects on the reactions.	K4

Unit – I Physical Chemistry (12 Hours)

Chemical Kinetics: rate, order, molecularity of reactions. Zero order and first order reaction, rate constant derivation, examples, Importance of kinetic study, activation energy, activated complex, Arrhenius equation, factors affecting rate of the reactions.

Thermodynamics: terms ΔE , ΔH , ΔS , ΔG , endothermic, exothermic reactions, conditions for spontaneity of reactions. Laws of thermodynamics (I, II, III definition only).

Unit – II Pharmaceutical Chemistry (12 Hours)

Classification of drugs: Definitions of: drug, pharmacophore, pharmacognony, pharmacy, harmaco kinetics, pharmaco dynamics, pharmacopoeia (IP, BP, USP). Antibiotics: Pencillin, chloramphenicol, (only the structural properties and SAR): Anaesthetics–general and local anaesthetics: Inhalation anaesthetics (N_2O , $CHCl_3$, haloethane, ethylchloride). Intravenous anaesthetics (thiopental sodium); Cardiovascular Drugs: classification and examples: cardiac glycosides, antihypertensive and anti–hypotensive drugs and sulphonamides –isolation of bioactive molecules from plants by soxhlet method.

Unit – III Chemistry of Natural Products (12 Hours)

Vitamins–type, sources and deficiency disorders of Vitamins A1 retinol, Vitamin B complex(thiamine–B1, riboflavin–B2, cyclocobalamine–B12), Vitamin C, Vitamin D and Vitamin E Alkaloids: occurrence, classification, physical properties and biological functions, uses of coniine, piperine, nicotine, morphine and quinine alkaloids – Terpenoids: classification, isolation, structure, properties and uses of camphor, citral and α -pinene.

Unit – IV Catalysis (12 Hours)

Types of catalyst–positive catalyst, negative catalyst and catalyst poison. types of catalysis–homogeneous catalysis, heterogeneous catalysis and autocatalysis – general characteristics of catalytic reactions, autocatalysis. Biocatalysis– enzyme catalyst, kinetics of enzyme catalysis, Michaelis – Menton constant, active sites, turn over number, factors affecting enzyme catalysis; concentration of substrate, temperature, pH and inhibitors.

Unit – V Separation and purification techniques

(12 Hours)

Types of Chromatographic Techniques– TLC – Column – HPLC: Principles, instrumentation, sampling and applications of paper, thin layer, column chromatography and electrophoresis– distillation – steam and vacuum distillation – recrystallization.

Books for Study

1. Puri B R, Sharma L R and Pathania M S, *Principles of Physical Chemistry*, 23rd Edition, New Delhi, Shoban Lal Nagin Chand and Co, 1993.

Unit – I Chapter 23 and 27

Unit–IV Chapter 31

2. Jayashree Ghosh, *A Text Book of Pharmaceutical Chemistry*, 3rd Edition, S. Chand and Company Pvt. Ltd., New Delhi, 2012.

Unit – II Chapter 11

3. Subramanian P S, Gopalan R and Rangarajan K, *Elements of Analytical Chemistry*, S. Chand New Delhi, 2003.

Unit – V Chapter 9

Books for Reference

1. Tewari K S and Vishnoi N K, *A Text Book of Organic Chemistry*, 3rd Edition, S. Chand and Company Pvt. Ltd., New Delhi, 2000.
2. Arun Bahl and Bahl B S, *Advanced Organic Chemistry*, 22nd Edition., S. Chand, New Delhi, 2014.

Web Resources

1. <https://www.youtube.com/watch?v=bYwq5oNZmq4>
2. <https://www.slideshare.net/Kamyaparashar/chemical-kinetics-presentation>



Electrophoresis



Chemical Kinetics

Relationship matrix for Course outcomes, Programme outcomes and Programme Specific Outcomes

Semester	Course code	Title of the Course									Hours/ week	Credits
IV	21UBO43AO04A	ALLIED-II: CHEMISTRY-II (For B.Sc Botany)									4	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos	
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5		
CO-1	3	2	2	3	3	2	3	2	2	3	2.5	
CO-2	2	2	1	3	2	2	1	2	3	2	2.0	
CO-3	3	1	2	2	3	3	2	1	3	2	2.2	
CO-4	3	3	2	1	2	2	2	3	2	1	2.1	
CO-5	2	1	2	3	2	3	1	2	3	2	2.1	
Mean overall Score											2.2	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UBO43AO04B	ALLIED-II: BIOMETRICS AND COMPUTER APPLICATIONS- II	4	2

CO No.	CO-Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	match the real life situations with probability concepts	K1
CO-2	describe the concept of test of significance	K2
CO-3	describe the concept of association of attributes	K2
CO-4	compute correlation and regression	K3
CO-5	analyse the nonparametric test	K4

Unit I (12 Hours)

Probability: Normal distribution – Definition – Properties – Areas under normal curve – Interpreting areas as probabilities – Importance of normal distributions. Confidence interval: Confidence interval for means – between two means, variance and proportion.

Unit II (12 Hours)

Testing of hypothesis: Null hypothesis – Two kinds of errors – Testing of hypothesis based on simple mean – difference between mean – Population proportion – Difference between the population proportion – Chi-square test – Goodness of fit – Test for independence – F-test: Equality of variances.

Unit III (12 Hours)

Correlation and regression: Correlation: Types of correlation – Scatter diagram – Pearson’s coefficient of correlation – Rank correlation. Simple regression: Meaning of regression lines – Regression equations y on x and x on y only – Regression coefficient – Simple problems.

Unit IV (12 Hours)

Theory of attributes: Introduction – Notations – Dichotomy – Classes and class frequencies – Consistency of data – Criteria of independence – Yule’s coefficient of association – Coefficient of colligation.

Unit V (12 Hours)

Non –Parametric tests: Introduction – Advantages - Sign test- Mann Whitney U test – One sample runs test – Kruskal – Wallis test and Run test for randomness.

Books for Study

1. Gupta S.P, Statistical Methods, Sultan Chand & Sons, New Delhi, 43rd Edition 2014

Unit 1 *Volume II Chapter 2*

Unit 2 *Volume II Chapter 3,*

Unit 3 *Volume I Chapter 10*

Unit 4 *Volume I Chapter 12*

Unit 5 *Volume II Chapter 11*

Books for Reference

1. Nageswara Rao G.: Statistics for Agricultural Science, BS Publications, Third Edition, 2018

2. Olive Jean Dunn & Virginia A Clark: Basic Statistics: A primer for the Biomedical Sciences,

A John Wiley & Sons, Inc., Publications, Fourth Edition, 2009.

Semester	Course Code	Title of the Course									Hours	Credit
IV	21UBO43AO04B	ALLIED-II: BIOMETRICS AND COMPUTER APPLICATIONS-II									4	2
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5		
CO-1	2	3	2	2	3	3	2	2	3	2	2.4	
CO-2	3	2	2	3	3	3	2	1	2	3	2.4	
CO-3	2	3	2	3	3	3	2	3	2	3	2.6	
CO-4	3	3	2	2	3	3	1	3	3	2	2.5	
CO-5	3	3	3	3	2	3	3	2	2	3	2.7	
Mean Overall Score											2.52 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UBO43AP04A	ALLIED-II: CHEMISTRY PRACTICALS (For B.Sc Botany)	2	2

CO No.	CO-Statement	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	know about the handling of chemicals and safety measures in the laboratory.	K1
CO-2	estimate the principle of volumetric analysis and various types of titration.	K2
CO-3	illustrate the theoretical aspects of organic analysis.	K2
CO-4	detect various elements present in the organic compounds.	K3
CO-5	demonstrate various techniques of volumetric analysis.	K4

Unit – I Safety Rules in the Laboratory (4 Hours)

Introduction – personal protection – nature of chemicals – toxic– corrosive–explosive– inflammable, carcinogenic–other hazardous chemicals– philosophy of lab safety – first–aid techniques – general work culture inside the chemistry lab – handling of chemicals and apparatus in the laboratory: storage and handling of chemicals – disposal of chemical wastes – glassware – handling of glassware – handling of different types of laboratory equipment’s like bunsen burner–centrifuge– Kipp’s apparatus.

Unit – II Volumetric Analysis (3 Hours)

Volumetric analysis – principle – standard solutions – normality and molarity – principles of titrations– primary standard and secondary standard solutions– acid–base titration– redox titration–complexometric titration– precipitation titration and example of each with indicators used.

Unit – III Theory of Organic Qualitative Analysis (3 Hours)

Qualitative analysis of organic substances: solubility test in NaHCO_3 – NaOH and HCl – test for saturation and unsaturation– aliphatic and aromatic– acidic– basic and neutral nature– elements test for N, S and halogens.

Unit –IV Volumetric Analysis (25 Hours)

1. Estimation of HCl (Std. oxalic acid x NaOH x HCl).
2. Estimation of NaOH (Std. Na_2CO_3 x HCl x NaOH).
3. Estimation of oxalic acid (Std. FAS x KMnO_4 x oxalic acid).
4. Estimation of FAS (Std. oxalic acid x KMnO_4 x FAS).
5. Estimation of KMnO_4 (Std. $\text{K}_2\text{Cr}_2\text{O}_7$ x FAS x KMnO_4).
6. Estimation of $\text{K}_2\text{Cr}_2\text{O}_7$ by Thio solution.
7. Estimation of Na_2CO_3 by HCl using a standard Na_2CO_3 solution.
8. Estimation of zinc (EDTA titration).

9. Estimation of magnesium (EDTA titration).
10. Estimation of hardness of water (EDTA titration).

Unit– V Organic Analysis

(25 Hours)

1. Identification of acidic, basic, phenolic and neutral organic substances.
2. Test for aliphatic and aromatic nature.
3. Test for saturation and unsaturation.
4. Preparation of sodium fusion extract.
5. Detection of N, S, and Cl.

Books for Study

1. Puri B R, Sharma L R and Kalia K K, *Principles of Inorganic Chemistry*, 23rd Edition, Shoban Lal, Nagin Chand and Co, New Delhi, 1993.

Unit–II Chapter 41

2. Gnanapragasam N S and Ramamurthy G, *Organic Chemistry Lab Manual*, 2nd Edition, S. Viswanathan Printers and Publishers (P) Ltd., Chennai, 2007.

Unit–III Part A

3. *Allied Practical Manual*, Department of Chemistry, St. Joseph's College, Tiruchirappalli, 2021. (Private circulation).

Books for Reference

1. Venkateswaran V, Veeraswamy R and Kulandaivelu A R, *Basic Principles of Practical Chemistry*, 2nd Edition, Sultan Chand and Sons, New Delhi, 1997.
2. Furniss B S, *Vogel's Textbook of Practical Organic Chemistry*, 7th Edition, ELBS Longman, London, 1984.

Web Resource

1. <https://www.youtube.com/watch?v=FUo428guKt0>
2. https://www.youtube.com/watch?v=G6_OEa1BjA



Detection of Elements



Acid– Base Titration

Note:

1. Mono–functional compounds are given for organic analysis.
2. Each student is expected to practice the analysis of at least 10 different organic substances.

3. Apart from the TWO CIA tests, one MODEL TEST comprising both volumetric and organic analysis is to be conducted to enable the students ready for semester examination.

Scheme of Valuation

ALLIED-II: CHEMISTRY PRACTICALS

(For B.Sc Botany)

Continuous Internal Assessment (100 marks)

- | | |
|-------------------------------|--|
| 1. Regular Practical Sessions | 50 (Based on his observation and record notes) |
| 2. CIA I + CIA II tests | 50 (conducted for 100 marks each and converted to 25 each) |

Scheme for CIA tests I and II (100 mark each)

I. Analysis 40 marks

- | | |
|--------------------------------------|----------|
| 1. Acid/base/neutral | 5 marks |
| 2. Aliphatic/aromatic | 10 marks |
| 3. Saturated/unsaturated | 10 marks |
| 4. Elements test | |
| a) Test for N present/absent | 5 marks |
| b) Tests for S present/absent | 5 marks |
| c) Tests for halogens present/absent | 5 marks |

II. Volumetric analysis 50 marks

- | | |
|---------------|----------|
| Error upto 2% | 50 marks |
| 1.1–3.0 % | 45 marks |
| 3.1–4.0 % | 40 marks |
| >4.0 % | 20 marks |

III. Observation and Record note–book 10 marks

Scheme for Semester examination 100 marks

I. Analysis 40 marks

- | | |
|--------------------------------------|----------|
| 1. Acid/base/neutral | 5 marks |
| 2. Aliphatic/aromatic | 5 marks |
| 3. Saturated/unsaturated | 5 marks |
| 4. Tests for elements | |
| a) Test for N present/absent | 5 marks |
| c) Tests for S present/absent | 5 marks |
| d) Tests for halogens present/absent | 5 marks |
| 3. Correct procedure | 10 marks |

II. Volumetric analysis 50 marks

- | | |
|---------------|----------|
| Error upto 2% | 50 marks |
| 2.1–3.0 % | 45 marks |
| 3.1–4.0 % | 40 marks |
| 5.0 % | 30 marks |
| >5.0% | 20 marks |

III. Theory behind practical

10 marks

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UBO43AP04B	ALLIED-II: LAB COURSE-II (BIOMETRICS AND COMPUTER APPLICATIONS II)	2	2

CO No.	CO- Statements	Cognitive Levels (K-Levels)
	On successful completion of this course, students will be able to	
CO-1	acquire the knowledge of basic statistical test	K1
CO-2	understand the t-test, F-test and -test	K2
CO-3	compute correlation and rank correlation	K3
CO-4	utilize statistical hypothesis testing to draw inferences	K3
CO-5	analyse non- parametric test	K4

Using the SPSS software the students are asked to solve the following exercises:

1. Finding Mean and Variance.
2. Finding correlation coefficient, Rank Correlation.
3. T- test
4. F-test
5. Chi-square test
6. Non-parametric tests.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Course Code	Title of the Course									Hours	Credit
IV	21UBO43AP04B	Allied: LAB COURSE 2 (Biometrics and Computer Applications II)									2	2
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs	
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5		
CO-1	2	1	2	3	2	1	2	2	3	2	2	
CO-2	3	2	3	2	3	2	2	3	1	2	2.3	
CO-3	2	2	3	2	2	3	3	2	1	3	2.3	
CO-4	3	2	2	2	3	1	2	3	1	3	2.2	
CO-5	1	3	2	2	1	3	2	1	3	2	2	
Mean Overall Score											2.16 (High)	

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UBO44SE02	SEC-2 (BS): MUSHROOM TECHNOLOGY	2	1

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	identify various cultivable species of mushrooms.	K1, K2
CO-2	design various recipes from mushrooms.	K3
CO-3	assess preservation and storage of mushrooms.	K4
CO-4	evaluate and explore the economic viability of mushrooms.	K5
CO-5	prepare the culture techniques of edible mushrooms.	K6

Unit I

Introduction - Classification - Edible and Poisonous. Tests for identification - Nutritive value of mushrooms.

Unit II

Characteristics of common edible mushrooms Paddy straw, Oyster and milky mushrooms. Life cycle of a common mushroom (Agaricus).

Unit III

Culture Techniques – Preparation of spawn, preparation of compost. Spawn running – Harvesting and Marketing.

Unit IV

Preservation and storage of mushrooms – Diseases and pests of mushrooms.

Unit V

Delicious recipes of mushroom – Economic importance of mushrooms.

Book

1. Nita Bahl (1984). Handbook on Mushrooms, Oxford and IBH Publishing Company

Reference

1. Dubey, RC. (2001) A Textbook of Biotechnology, S. Chand & Co. Ltd.

Semester	Course Code	Title of the Course									Hours	Credits
IV	21UBO44SE02	SEC-2 (BS): MUSHROOM TECHNOLOGY									2	1
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	2	1	2	3	2	2	3	2.3	
CO-2	2	2	3	1	2	2	2	2	3	2	2.1	
CO-3	1	3	3	2	3	1	2	3	2	3	2.3	
CO-4	2	3	2	2	1	2	3	1	2	3	2.2	
CO-5	1	3	3	2	1	2	3	2	1	3	2.1	
Mean Overall Score											2.2	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UHE44VE04A	PROFESSIONAL ETHICS–II: SOCIAL ETHICS - II	2	1

CO No.	CO-Statements	Cognitive Level
	On completion of this course the graduates will be able to:	
CO-1	know the value of natural resources and to live in a harmony with nature.	K1
CO-2	comprehend the importance of a healthy life.	K2
CO-3	apply the plans of disaster management in the society.	K3
CO-4	analyse the importance and differences of science and religion.	K3
CO-5	apply counseling skills and solve their problems.	K4

Unit-I Harmony with Nature

(6-Hours)

What is environment, Why should we think of harmony, Principles to conserve environmental resources, Causes of disharmony, The fruits of harmony with nature, Natural Resources, Fruits of disharmony, Economic values and growth, Environmental Ethics, Guidelines to live in harmony with nature, Towards life-centered system for better quality of life. Harmony with animal kingdom.

Unit-II Issues Dealing with Science and Religion (6-Hours)

What is Science, Science and Religion, Social Relevance of Science and Technology, Science and technology for social justice, Difference caused by Science and Technology, Need for indigenous technology, Science and Technology Innovation Policy of India.

Unit-III Public Health (6-Hours)

Health related issues, Health Care in India vs Developed Countries, Health and Heredity, Public Health - Objectives of public health in India, Public Health System in India, Failure on the public health front, Role of the central government, Hospitals Services in India, Health and Abortion, Drug Addiction and Drug abuse

Unit-IV Disaster Management (6-Hours)

Disaster Management, Types of disaster, Plans of disaster management, Technology to manage natural disasters and catastrophes, Rehabilitation and Reconstruction, Human-induced disaster, First Aid, The importance of First-aid.

Unit-V Counselling for Adolescents (6-Hours)

High Risk Behaviours, Developmental Changes in Adolescents, Key Issues of the Adolescents, Need for Counselling, Nature of Counselling, Counselling Goals, Does helping help? The Good and the Bad news. Importance of Career Guidance Counselling.

Books for Study:

1. Department of Human Excellence, *Formation of Youth*, St Joseph's College (Autonomous), Tiruchirappali 02, 2021.

Books for Reference:

1. Albert, D. and Steinberg, L, *Judgment and decision making in adolescence*: Journal of Research on Adolescence, page no: 211-224. 2011
2. Larry R. Collins, *Disaster Management and Preparedness*, Lewis Publications, 22 November 2000.
3. Elizabeth B. Hurlock, *Developmental Psychology: A: Life-Span Approach*, New Delhi: Tata McGraw-Hill, 1981, 5th Edition, August 18, 2001.
4. Sangha, Kamaljit. *Ways to Live in Harmony with Nature: Living Sustainably and Working with Passion*. Australia, Woodslane Pty Limited, 2015.

Web Sources:

https://en.wikipedia.org/wiki/Disaster_management_in_India

<https://ndma.gov.in/>

<https://talkitover.in/services/child-adolescent-counselling/>

<https://www.nipccd.nic.in/schemes/adolescent-guidance-centre-19#gsc.tab=0>

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UHE44VE04B	PROFESSIONAL ETHICS II: RELIGIOUS DOCTRINE - II	2	1

CO.No.	CO-Statements	Cognitive Level
	On completion of this course, the graduates will be able to:	
CO-1	Understand the history of the Catholic Church	K1
CO-2	Examine and grasp the Sacraments of the Catholic Church	K2
CO-3	Apply the Christian Prayer to their everyday life	K3
CO-4	Analyze themselves in the light of Sacraments & Christian Prayer	K4
CO-5	Create a harmonious society learning values from all religions	K5 & K6

Unit-I	The Catholic Church	(6 Hours)
Unit-II	Sacraments of Initiation	(6 Hours)
Unit-III	Sacraments of Healing & at the Service of Community	(6 Hours)
Unit-IV	Christian Prayer	(6 Hours)
Unit-V	Harmony of Religions	(6 Hours)

Books for Text

Department of Human Excellence, *Life in the Lord: Religious Doctrine*. St. Joseph's College, Trichirappalli 02, 2021.

Books for Reference:

1. *Compendium: Catechism of the Catholic Church*. Bengaluru: Theological Publications in India, 1994.
2. Holy Bible (NRSV).

Semester	Course Code	Title of the Course	Hours	Credits
V	21UBO53CC09	CORE-9: BIOPHYSICS AND BIOSTATISTICS	5	2

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	understand the field of biophysics with reference to bioenergetics	K1
CO-2	understand the principles of statistics and know the method of calculation	K2
CO-3	learn to apply physical principles to biological systems	K3
CO-4	apply the statistical principles to solve the biological problems	K3
CO-5	analyse the measures of central value and standard deviation	K4

Unit I (15 Hours)

Biophysics: Photobiology - electromagnetic spectrum, visible range of spectrum, solar energy and photosynthesis. Influence of light on Phytochrome and its effect on root growth. Phototropin, its significance in plant growth. Fluorescence. Bioluminescence. Phosphorescence.

Unit II (15 Hours)

Bioenergetics - energy and work. Laws of thermodynamics – concept of entropy and enthalpy. Gibb's free energy – energy transduction in biological systems. High-energy compounds – ATP bioenergetics and energy coupled reactions. Radioactivity - structure of an atom, isotopes, types of radiations, application of radioactive isotopes in biological studies, detection of radiation, autoradiography.

Unit III (15 Hours)

Biostatistics: Data - primary & secondary; variable - discrete & continuous. Population and sample, sampling techniques, classification of data, frequency distribution - discrete, continuous and cumulative; parts of a statistical table – advantages of classification of data. Presentation of data - histogram, frequency polygon, frequency curve, Ogive curve, bar charts - simple, multiple, subdivided, pie diagram.

Unit IV (15 Hours)

Measures of central values: mean, median, mode. Measures of dispersion: range, mean deviation, standard deviation, coefficient of variation – Skewness. Correlation - definition – types – methods of studying correlation: scatter diagram method and Karl Pearson's coefficient of correlation for simple and linear data. Regression: definition – regression lines.

Unit V (15 Hours)

Probability - definition, binomial, poisson and normal distributions. Tests of significance. General procedure – large sample testing & small sample testing: t-Test, Chi-square test and F test.

Books for Study

1. Cleri Fabrizio. 2016. The physics of living systems. Springer International Publishing.

Books for References

1. Mishra, S. R. 2010. Textbook of Photobiology. Discovery Publishing Pvt. Ltd. New Delhi.

2. S.P. Gupta, 2008. Elementary Statistical Methods, Sultan Chand & Sons, New Delhi

Semester	Course Code	Title of the Course									Hours	Credits
V	21UBO53CC09	CORE-9: BIOPHYSICS AND BIOSTATISTICS									5	2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	2	2	2	3	2	2	1	2	2.2	
CO-2	2	3	1	2	3	3	2	2	2	2	2.2	
CO-3	2	3	1	2	2	2	2	2	1	2	1.9	
CO-4	2	2	2	2	1	2	2	2	1	2	1.8	
CO-5	2	2	1	3	3	2	3	2	2	2	2.3	
Mean Overall Score											2.1	
Result											Medium	

Semester	Course Code	Title of the Course	Hours	Credits
V	21UBO53CC10	CORE-10: MICROBIOLOGY AND IMMUNOLOGY	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	understand the various types of microbes in an environment and their importance.	K1
CO-2	comprehend the structure and function of immune system in humans.	K2
CO-3	demonstrate the role of microorganisms in food processing and spoilage, soil fertility and sewage disposal	K3
CO-4	identify the defense mechanism against infection in humans.	K4
CO-5	assess role of microorganisms in industrial processing of microbial products	K5

Unit I (15 Hours)

Microbiology: History, Development and Classification (Outline). Whittaker's five kingdom concept, Bergey's Manual of Systematic Bacteriology (outline). Morphology, cell structure, cell wall chemistry, growth, nutrition and reproduction of bacteria. Viruses: structure, classification and reproduction - lytic and lysogenic cycle. A brief account on Rickettsias, Chlamydia, Mycoplasmas, Viroids and Prions.

Unit II (15 Hours)

Culture of microorganisms: Pure cultures, batch and continuous cultures. Methods of Preservation of microorganisms. Microorganisms and Human diseases: Food borne (Botulism), water borne (Cholera), air borne (Tuberculosis), vector borne (malaria) and contact diseases (AIDS) and SARS. Control of microorganisms – physical, chemical and biological methods.

Unit III (15 Hours)

Soil Microbes and Their Roles, Improvements in Soil Fertility, Nitrogen Fixing Bacteria and Their Role in Nitrogen Cycle, Phosphate Solubilization. Mycorrhizae. Plant-Microbes Interactions: Ectomycorrhizae and Endomycorrhizae. Food microbiology: Types of food spoilage and methods of food preservation. Dairy microbiology: Fermented dairy products. Industrial microbiology: Fermentation and Industrial production of alcohol and antibiotics.

Unit IV (15 Hours)

Immunology: Immune system - adaptive, innate, humoral and cellular immunity. Origin, structure and immunological role of primary lymphoid organs (bone marrow and thymus) and Secondary lymphoid organs (Spleen, lymph nodes, Payer's patches, tonsils and appendix).

Unit V (15 Hours)

Origin and role of immune cells (Leucocytes and lymphocytes). Lymph: composition and functions. Antibody types, study of IgG, its structure and immunological role. Virus encounter human system.

Books for Study

1. Pelczar J Chan ECS and Krieg, R. 1999. Microbiology, Tata McGraw Hill, New Delhi.
2. Sullia SB and Shantharam S 2005. General microbiology. Oxford & IBH

Books for References

1. Dubey RC and Maheshwari DK. 2004. A text book of microbiology.S.Chand New Delhi.
2. Casida LE, 2005. Industrial Microbiology.New Age International.

Semester	Course Code	Title of the Course									Hours	Credits
V	21UBO53CC10	CORE-10: MICROBIOLOGY AND IMMUNOLOGY									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	2	2	3	2	2	2	2	2.3	
CO-2	2	3	2	2	1	2	3	2	2	2	2.1	
CO-3	2	2	3	2	2	3	3	2	3	1	2.3	
CO-4	3	3	2	1	1	3	2	2	1	2	2.1	
CO-5	2	3	2	2	3	1	3	2	1	3	2.4	
Mean Overall Score											2.2	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
V	21UBO53CP05	LAB COURSE 5 (BIOPHYSICS, BIOSTATISTICS, MICROBIOLOGY AND IMMUNOLOGY)	4	3

Biophysics

1. Separation of cell and tissue components by centrifugation
2. Separation of pigments by Paper chromatography
3. Absorption spectrum of macromolecules and pigments – UV, FTIR

Biostatistics

1. Sampling by Random Number Table
2. Data Collection
3. Classification of Data: Discrete, continuous and cumulative.
4. Statistical diagrams: Histogram, Frequency curve, Bar chart and Ogive curve
5. Measures of Central Values: Mean, Median and Mode
6. Measures of Dispersion: Range, Mean Deviation and Standard Deviation.

Microbiology

1. Preparation of common media (Nutrient agar & Potato dextrose agar).
2. Staining of Bacteria (Simple & Grams staining).
3. Isolation and enumeration of microbes in soil and water (serial dilution).
4. Study of motility by Hanging Drop.
5. Pure cultures of bacteria – Streak plate, Pour plate and Spread plate.
6. Microbiology of milk (Phosphatase and MBRT)
7. Antibiosis - Kirby Baur method

Immunology

1. Blood grouping
2. WIDAL- test for typhoid
3. RPR- test for syphilis
4. RF- test for rheumatoid arthritis
5. Immunoelectrophoresis – Demo
6. ELISA – Demo

Semester	Course Code	Title of the Course	Hours	Credits
V	21UBO53ES01A	DSE-1: MOLECULAR BIOLOGY	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	understand the structural, organization and function of prokaryotic and eukaryotic genome.	K1
CO-2	acquire knowledge on mechanism and influences on genetic code and its perpetuation.	K1
CO-3	comprehend the basic cellular and molecular events.	K2
CO-4	apply the knowledge acquired to study the molecular mechanisms.	K3
CO-5	analyse the principles of gene regulation.	K4

Unit I (15 Hours)

Organisation of genome – prokaryotic and eukaryotic. Linear and circular DNA molecules. Mutations – types, causes and detection. Mutant types – lethal, conditional, biochemical, germinal vs somatic mutants, insertional mutagenesis. Basic idea about mobile genetic elements - IS elements and transposons.

Unit II (15 Hours)

DNA replication: General features, enzymology, detailed mechanism (initiation, elongation and termination). DNA damage: damages caused by alkylation, UV, gamma and X-rays. DNA repair: excision, double-strand break, mismatch and SOS mechanisms.

Unit III (15 Hours)

Transcription: The Central Dogma, Genetic code, RNA polymerase, promoters, enhancers, silencers, general transcription factors and the mechanism of transcription (initiation, elongation and termination) in prokaryotes and eukaryotes. Post-transcriptional events (splicing, capping and polyadenylation).

Unit IV (15 Hours)

Translation: Organization of mRNA, genetic code and its characterization, ribosome and rRNA, amino acyl synthetase, tRNA and amino acid activation. Mechanism of initiation elongation and termination. Translation factors, post-translation processing.

Unit V (15 Hours)

Gene regulation: Basic principles of transcriptional regulation- positive and negative; inducible and repressible; activators and repressors. The lac operon (positive and negative control), the trp operon (repression-derepression and attenuation), riboswitches, mRNA stability, RNA interference, microRNAs.

Books for Study

1. Freifelder, D.1993. Essentials of Molecular Biology, Jones & Bartlett, Boston.
2. Gupta PK 2005. Molecular Biology and Genetic Engineering, Rastogi Publications, Meerut.

Books for References

1. De Robertis & De Robertis. 1990. Cell and Molecular Biology, Saunders College, Philadelphia, USA.
2. Elliott WH & Elliott DC. 2005. Biochemistry and Molecular Biology, 3rd Ed. Oxford University, Oxford.

Semester	Course Code	Title of the Course									Hours	Credits
V	21UBO53ES01A	DSE-1: MOLECULAR BIOLOGY									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	2	2	3	2	2	3	2	2.4	
CO-2	2	3	2	1	2	3	1	2	3	3	2.2	
CO-3	2	2	2	3	1	2	2	3	2	2	2.1	
CO-4	3	2	2	1	3	3	1	3	2	3	2.4	
CO-5	2	3	2	3	1	3	2	3	2	1	2.2	
Mean Overall Score											2.3	
Result											Medium	

Semester	Course Code	Title of the Course	Hours	Credits
V	21UBO53ES01B	DSE-1: BIOINFORMATICS AND BIONANOTECHNOLOGY	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	study the basic elements of interface, concepts between biology and nanotechnology.	K1
CO-2	outline the basics of sequence alignment and analysis.	K2
CO-3	classify different types of biological databases.	K3
CO-4	explain the synthesis approaches for nanomaterial and its characterization.	K4
CO-5	construct various types of nanomaterial for application and evaluate the impact on environment.	K5, K6

Unit I (15 Hours)

Bioinformatics: Introduction, Aim, Scope and Research areas of Bioinformatics. Branches of Bioinformatics. Biological Databases, Classification format of Biological Databases, Biological Database Retrieval System - NCBI, PUBMED, EBI, EMBL, gene bank etc.

Unit II (15 Hours)

Database searches for homology using BLAST and FASTA and interpretation of the results to derive biological significance of the queried DNA/protein sequences. Alignment of protein and DNA sequences using algorithm software to deduce homology and interpretation of data.

Unit III (15 Hours)

Nanotechnology: Origin, scope and importance. Nanoparticles – definition. Principles: quantization effects - inverse relationship between size and reactive surface area. Properties: surface effects, the effects of size, shape, surface and bulk composition, and solubility and persistence.

Unit IV (15 Hours)

Essentials of nanostructure generation: top-down vs. bottom-up. Chemical and physical self assembly. Physical, chemical and biogenic synthesis of nanomaterials – biomimetics, green plants, and microorganisms. Role of biomolecules - reducing and/or capping agents: proteins, viruses and carbohydrates, Preparation and characterization of nanoparticles (UV, FTIR, SEM, DLS and zeta potential, X-ray diffraction).

Unit V (15 Hours)

Targeted nanoparticles: active and passive targeting. Application: medicine, manufacturing & materials, delivery vehicles, cancer therapy, tissue engineering, fluorescent biological labels, biological assays, nano-imaging, biosensors, micromanipulation techniques, metabolic engineering and gene therapy, environmental management; nanotechnology in agriculture; Interactions of nanoparticles, uptake, transport and toxicity.

Books for Study

1. Sharon, M. & Sharon, M 2012. Bio-Nanotechnology - Concepts and Applications, CRC Press.
2. Rastogi, S.C., Medirattta, N. and Rastogi. P. (2004). Bioinformatics, methods and applications, genomics, proteomics and drug discovery, Prentice Hall of India, pvt. Ltd., New Delhi.

Books for References

1. Attwood, T. K. and Parry-Smith, D. J. (2001). Introduction to Bioinformatics Delhi.Pearson Education (Singapore) Ptd. Ltd.
2. Jain K.K. Nanobiotechnology molecular diagnostics: Current techniques and application (Horizon Bioscience) 2006 Taylor & Francis 1st edition.
3. Volker Mailander and Katharina Landfester 2009 Interaction of nanoparticles with cells. *Biomacromolecules*, 10 (9): 2379 – 2400. DOI:10.1021/bm900266r.

Online Resources

- 1) <http://ieet.org/index.php/IEET/more/bionanotechnology20141007> Institute of Ethics & Emerging Technologies
- 2) <https://phys.org/news/2014-10-endless-possibilities-bio-nanotechnology.html>
- 3) <http://www.particle-works.com/applications/controlled-drug-release/Applications>
- 4) <https://jnanobiotechnology.biomedcentral.com/articles/10.1186/1477-3155-2-3> DOI: 10.1186/1477-3155-2-3
- 5) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3865110/>
- 6) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC419715/>

Semester	Course Code	Title of the Course									Hours	Credits
V	21UBO53ES01B	DSE-1: BIOINFORMATICS AND BIONANOTECHNOLOGY									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	3	2	1	2	2	3	2	1	2	2.1	
CO-2	2	3	2	2	2	2	3	2	2	3	2.3	
CO-3	2	2	3	2	1	2	2	3	2	2	2.1	
CO-4	1	2	2	3	2	2	3	2	3	2	2.2	
CO-5	1	2	2	3	2	2	3	2	1	3	2.1	
Mean Overall Score											2.2	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
V	21UBO53ES02A	DSE-2: RESEARCH METHODOLOGY	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	obtain knowledge on basic concepts in research.	K1
CO-2	understand the objective of research.	K2
CO-3	evaluate the significance of databases and citation index.	K3
CO-4	plan basic research and the research process.	K4
CO-5	acquire skill in writing research articles and formatting the papers.	K5

Unit I (15 Hours)

Foundations of Research: Meaning, Objectives, Motivation, Utility. Characteristics of scientific method. Understanding the language of research – Concept, Construct, Definition, Variable. Research Process.

Unit II (15 Hours)

Structure of thesis and research article. Literature collection: Books, Research articles and e-resources. Manuscript for publication and proof correction. Structure and components of research proposal, National and International funding sources.

Unit III (15 Hours)

Bibliometrics: definition and relevance; Bibliometrics databases, h-index, SNIP, Page Rank, Impact Factor and evaluation. The use of bibliometrics in research: Citation Research, Science Citation Index. Plagiarism, Tailored Research and Retraction. Indian Patent Act.

Unit IV (15 Hours)

Research Design: Concept and Importance in Research. Features of a good research design. Experimental Design: Concept of Independent and group research.

Unit V (15 Hours)

Interpretation of Data and Paper Writing, Layout of a Research Paper, Journals in Life Science, Impact factor of Journals, Ethical issues related to publishing.

Books for Study

1. Kothari, C. R. 2014. Research Methodology-Methods & Techniques. WishwaPrakashan
2. Misra, R. P, 2000. Research Methodology - A Handbook, Concept Pub. Company, New Delhi.
3. Pillai and Bagavathi, 2008 Statistics, S. Chand & Company Ltd, New Delhi

Books for Reference

1. Gupta, SP. 1990. Statistical Methods, Sultan Chand & Sons, New Delhi.
2. NageswaraRao, G. 1983. Statistics for Agricultural Science Oxford & IBH, New Delhi
3. Gupta, SC. 2013. Fundamentals of statistics, Himalaya Publishers, Mumbai.

Semester	Course Code	Title of the Course	Hours	Credits
V	21UBO53ES02A	DSE-2: RESEARCH METHODOLOGY	5	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	2	3	2	2	3	2	2.4
CO-2	2	3	2	3	2	2	3	2	2	1	2.2
CO-3	2	2	3	2	1	3	3	2	3	1	2.2
CO-4	3	3	2	3	1	3	3	2	3	1	2.4
CO-5	2	2	2	2	1	2	2	2	2	1	1.8
Mean Overall Score											2.2
Result											High

Semester	Course Code	Title of the Course	Hours	Credits
V	21UBO53ES02B	DSE-2: BIOPESTICIDES	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	study the importance of appropriate control measures for managing insect pests in crops.	K1
CO-2	acquire knowledge on present use of biopesticides as part of integrated pest management.	K2
CO-3	illustrate the mass production techniques of microbial biopesticides.	K3
CO-4	analyze how to use the variable biopesticide methods for managing different kinds of pests.	K4
CO-5	design various types of biopesticide formulations.	K5

Unit I

(15 Hours)

Biological control of insect pests: scope and principles, factors affecting biological control. Biopesticides: introduction, importance and classification– living creatures to control pests – weeds for controlling pest. Pest Control in Organic Farming. Application methods of biopesticides.

Unit II

(15 Hours)

Botanical pesticides: present status and future prospects; opportunities for botanical pesticides in crop rotation; multiple cropping for controlling pests, Trap Crops. Plants as a source of natural pesticides: Neem, Chrysanthemum, Pongamia, Garlic, Turmeric, Tobacco and Citronella.

Unit III

(15 Hours)

Biocontrol agents: Isolation, identification, mode of action and mass production of Pseudomonas fluorescence (bacterial agent), Trichoderma viride (fungal agent).

Unit IV

(15 Hours)

Biological pesticides: isolation, identification. Bacterium as biopesticide (Bacillus thuringiensis) - production and field applications. Fungus as biopesticide (Entomophagous - Beauveria bassiana). Insect as biopesticide (Reduviid predators - Rhynocoris kumarii, R. fuscipes, R. marginatus). Trichogramma. Virus as biopesticide (Baculovirus - NPV). Virulence, pathogenicity and symptoms of entomopathogenic nematodes.

Unit V

(15 Hours)

Production methods of biopesticides: liquid culture fermentation and solid state fermentation – Types of biopesticide formulations: dry inoculum, granules, pellets, capsules, wettable powder and liquid formulations. Impediments and limitation in production and use of biopesticide.

Books for Study

1. Ghosh GK, 2000, Biopesticide and Integrated pest Management, A P H Publishing Corporation, New Delhi.
2. Bhattacharyya P. and Purohit SS, 2008. Organic Farming: Biocontrol and Biopesticide Technology, Agro House, Jodhpur, Rajasthan. ISBN: 978-81-7754-369-8.
3. Saleem F and Shakoori AR (2012) Development of Bioinsecticide, Lap Lambert Academic Publishing.

Books for References

1. Krishna Chandra, Greep and Srivathsa, 2005, Bio Control Agents & Biopesticides,
2. D. Dent, 2000, Insect Pest Management 2nd Ed, ABI Publishers, UK

Semester	Course Code:	Title of the Course									Hours	Credits
V	21UBO53ES02B	DSE-2: BIOPESTICIDES									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	2	3	2	2	2	2	2	3	2	2.2	
CO-2	2	3	2	1	2	2	3	2	2	3	2.2	
CO-3	2	2	3	2	1	2	3	2	2	2	2.1	
CO-4	1	2	2	2	2	2	3	2	3	2	2.1	
CO-5	1	2	2	3	2	2	3	2	1	3	2.1	
Mean Overall Score											2.14	
Result											High	

Semester	Course Code:	Title of the Course	Hours	Credits
V	21UBO53SP01	SELF PACED LEARNING: ECONOMIC BOTANY	-	2

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	learn the origin and history of various crop plants.	K1
CO-2	understand the cultivation of various economically important crops.	K2
CO-3	acquire knowledge on the binomial nomenclature and morphology of economic crops.	K3
CO-4	acquire the skill for preparation plant-based products.	K4
CO-5	produce beverages and narcotics from specific plants.	K5

Unit I: Cereals and Legumes (15 Hours)

Origin and History, Botanical description, Cultivation, Harvesting and uses of Cereals and Legumes: Wheat, Rice, Maize, Black gram, Redgram, Chick pea and Pigeon pea.

Unit II: Vegetables and Fruits (15 Hours)

Origin and History, Botanical description and economic importance of Vegetables and Fruits: Apple, Banana, Mango, Brinjal, Tomato and Potato.

Unit III: Spices and Condiments (15 Hours)

Origin and History, Botanical description, Cultivation and uses of Spices and Condiments: Pepper, Cardamom, Clove, Chilly, Coriander and Turmeric.

Unit IV: Beverages Plants, Fibres and Timber (15 Hours)

Origin and History, Botanical description, Cultivation, Processing and uses of Beverages plants: Tea, Coffee and Cocoa. Fibers and Timber: Cotton and Jute, Teak, Rosewood, and Mahogany.

Unit V: Oil Yielding Plants (15 Hours)

Origin and History, Botanical description, Harvesting, Extraction and uses of Fatty oils and Vegetable Fats: Sun flower, Soya bean, Coconut and Gingelly. Medicinal Plants: Rauwolfia, Chinchona and Digitalis.

Books for Study

1. Kochhar, SL. 2012. Economic Botany in Tropics. MacMillan & Co. New Delhi, India.
2. Panday, BP. 2000. Economic Botany. S Chand Publishing Company. New Delhi. India

Books for References

1. Wickens, GE. 2001. Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.
2. Chrispeels, MJ. And Sadava, DE. 2003. Plants, Genes and Agriculture. Jones & Bartlett Publish

Semester	Course Code:	Title of the Course									Hours	Credits
V	21UBO53SP01	SELF PACED LEARNING: ECONOMIC BOTANY									-	2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	2	2	3	2	2	3	2	2.4	
CO-2	2	3	2	1	2	3	1	2	3	3	2.2	
CO-3	2	2	2	3	1	2	2	3	2	2	2.1	
CO-4	3	2	2	1	3	3	1	3	2	3	2.4	
CO-5	2	3	2	3	1	3	2	3	2	1	2.2	
Mean Overall Score											2.3	
Result											Medium	

Semester	Course Code	Title of the Course	Hours	Credits
V	21UBO53EG01	GENERIC ELECTIVE-1: LANDSCAPE DESIGNING	4	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	know about the brief history, divisions, classification and structure of horticultural plants.	K1, K2
CO-2	acquire knowledge on plant growth processes and stages of plant growth.	K3
CO-3	develop practical skills in micro propagation techniques.	K4
CO-4	apply techniques of flower decoration and importance of economic cultivation crops as self-employment.	K5
CO-5	design propagation methods and propagation through various specialized underground structures.	K6

Unit I (12 Hours)

Importance of scope of horticulture – Divisions of horticulture famous gardens in world & India; Tools & Implements used in horticulture. Vegetative Propagation: Cutting, Layering, Grafting and Budding, advantages and disadvantages of vegetative propagation.

Unit II (12 Hours)

Nursery: definition, objectives and scope, Preparation of Nursery beds. Transplantation – steps and Methods. Bonsai – Training, Terrarium, Mulching and Topiary techniques. Lawn making and maintenance, water garden, glass house, rockery, hanging baskets. Parks: components, types. Xeriscaping.

Unit III (12 Hours)

Gardening; definition, objectives and scope. Designing outdoor garden – hedges, edges, fences, terrace garden/roof garden, Fruit garden, Vegetable garden: Tomato, brinjal, and snake guard, Medicinal plant: Layout model outdoor college garden. Designing Indoor gardening – Foliage plants, flowering plants. Layout model indoor kitchen garden.

Unit IV (12 Hours)

Horticultural Crops - Conservation and Management. Varieties and cultivars of various horticultural crops. IPR issues. National, International and Professional Societies. Sources of Information on Horticulture. Post-Harvest Management of Horticultural Crops. Field Visit; Horticultural Department.

Unit V (12 Hours)

Floriculture: Cultivation of commercial flower crops – Rose, Jasmine and Chrysanthemum. Flower decoration – Dry and wet decoration. Fruit crops: Induction of flowering, flower thinning, fruit setting, fruit development. Cultivation of important fruit crops - Mango, Grapes, Sapota and Guava. Economics of cultivation Crops: Cardamom, pepper, ginger, turmeric and clove.

Books for Study

1. Acquaah, G. 2002. Horticulture: Principles and Practices. Pearson Education, Singapore.
2. Bose, TK., Maiti, RG., Dhua, RS. and Das, P. 1999. Floriculture and Landscaping. NayaProkash, Calcutta.

Books for Reference

1. Ashman, M. A. and Puri, G. 2002. Essential soil science- A clear and concise introduction to soil science. Blackwell scientific publishers, London.
2. SubbaRao, N. S. 1997. Biofertilizers in Agriculture and Forestry. India Book House Limited, Oxford and IBH publishing Co. Pvt. Ltd, New Delhi.
3. Tolanus, S. 2006. Soil fertility, Fertilizer and Integrated Nutrient management. International Book Distributory Co.

Semester	Course Code	Title of the Course									Hours	Credits
V	21UBO53EG01	GENERIC ELECTIVE-1: LANDSCAPE DESIGNING									4	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	2	2	3	2	3	3	2	2.5	
CO-2	2	3	2	3	2	2	3	2	3	3	2.5	
CO-3	2	3	2	3	2	3	2	2	3	2	2.4	
CO-4	3	3	3	3	2	3	2	3	2	2	2.6	
CO-5	2	2	3	2	3	3	2	3	2	3	2.5	
Mean Overall Score											2.5	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
V	21USS54SE03	SEC-3: SOFT SKILLS	2	1

POs (Programme outcomes)

- To provide a focused training on soft skills for students in colleges for better job prospects
- To create and interface between industries and educational institutions in order to match the expectations of employers and abilities of the employees
- To bring a transformation in interpersonal and societal living guided by value laden principals
- To explore and analyze personal attributes that enhance the individual's Interactions, Job Performance and Career Prospects
- To foster teamwork (synergy) that increases productivity and brings benefits to the individuals and the society

PSOs (Programme Specific Outcomes)

After the successful completion of the course, students will learn:

- the various concepts of communication skills as job seekers
- to write a Professional resume as required by the employers
- to demonstrate interview skills and actively participate in GD preparations and presentations in peer groups
- to discover various aspects of self and set short term and long term goals for successful career and creates a congenial atmosphere
- to have access to solve simple and day to day Arithmetic problems and Verbal and Non- verbal reasoning formulas

Cos (Course Outcomes)

Upon completion of the course, Students will:

- be keen on developing and sustaining Soft Skills required of an educated youth
- be trained to present the best of themselves as job seekers to deal with any problem and conflict situations
- be able to transfer the skills learnt for concrete outcomes and increased productivity of companies
- be able to develop people skills, life skills that are required to be a good human in the long run and set a living standard
- be embedded with Employability skills such as "communication", "teamwork", "initiative", "enterprise", the attributes of "reliability", "balance between work -life", "commitment" and continuous learning

Module 1: Effective Communication

Definition of communication, Barriers of Communication, Verbal and Non-verbal Communication; Self introduction matrix, Conversation Techniques, Good manners and Etiquettes, Introduction to Professional Communication, Professional Grooming and Presentation Skills and exercises

Module II: Resume Writing & Interview skills

Resume Writing: Basic Resume Formats. Types of Resume - Chronological, Functional and Mixed Resume, Steps in preparation of Resume, Sample objectives, Model Resumes.
Interview Skills: Preparation for interview, Common interview questions, Attitude, Body Language, Mock interviews and Practicum, Figuring out common interview questions and answers

Module III: **Group Discussion:** Definition of GD. The salient features of GD, Factors that influence GD, Outcome of GD, Tips for success in GD, Parameters of GD, Essential Points for GD preparation, GD Topics, Model GD and Practicum.

Module IV: **Personal Effectiveness:** Self Discovery: Personality, Traits of Personality; Personality Tests; Intelligence and Skill Assessment Form. **Goal Setting:** Goal setting Process, Questionnaires & Presentations

Module V: **Numerical Ability:** Average, Percentage; Profit and Loss, Area, Volume and Surface Area. (Simple Interest, Compound Interest; Time and Work, Pipes and Cisterns; Time and Distance, Problems on Trains, Illustrations, Boats and Streams; Illustrations-Optional)

Module VI: **Test of Reasoning - Verbal Reasoning:** Series Completion, Analogy. **Non-Verbal Reasoning**

Text Book

Melchias G, Balaiah John, John Love Joy (Eds), 2018. Straight from the Traits: Securing Soft Skills, SJC, Trichy.

References

Aggarwal, R.S. 2010. *A Modern Approach to Verbal and Non Verbal Reasoning*. S.Chand, New Delhi. Covey, Stephen. 2004. *7 Habits of Highly effective people*, Free Press. Egan, Gerard. (1994).

The Skilled Helper (5th Ed). Pacific Grove, Brooks/Cole.

Khera ,Shiv 2003. *You Can Win*. Macmillan Books , Revised Edition.

Melchias G, Balaiah John, John Love Joy (Eds), 2018. *Winners in the Making: A primer on soft skills*. SJC, Trichy.

Other books

Murphy, Raymond. 1998. *Essential English Grammar*. 2nd ed., Cambridge University Press. Sankaran, K., & Kumar, M. *Group Discussion and Public Speaking*. M.I. Pub, Agra, 5th ed., Adams, Media.

Trishna's 2006. *How to do well in GDs & Interviews*, Trishna Knowledge Systems.

Yate, Martin. 2005. *Hiring the Best: A Manager's Guide to Effective Interviewing and Recruiting**

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UBO63CC11	CORE-11: PLANT PHYSIOLOGY	4	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	compile the underlying principles of various physiological processes of plants.	K1
CO-2	discuss various mineral nutrients in plants.	K2
CO-3	assess the mechanism of photosynthesis and respiration.	K3
CO-4	evaluate the various plant growth substances and their physiological effects.	K4
CO-5	predict the seed dormancy and photoperiodism.	K5

Unit I (12 Hours)

Water, Mineral and Solute: Uptake and Transport. Molecular Structure and properties of water. Diffusion and osmosis – osmotic pressure, turgor pressure and significance of osmosis. Plasmolysis and its importance. Mechanism of absorption of water – passive and active absorption. Ascent of sap – theories on absorption. Absorption, mechanism and transport of mineral salts. Transpiration – types, mechanism, significance and factors affecting transpiration.

Unit II (12 Hours)

Mineral nutrition: plant nutrients – essential and non-essential elements – micro and macro nutrients. Source, physiological role and deficiency symptoms of minerals. Hydroponics and aeroponics. Nitrogen metabolism: importance of nitrogen to plants. Sources of nitrogen, nitrogen cycle, nitrogen, ammonium assimilation and transamination.

Unit-III (12 Hours)

Photosynthesis: Photosynthetic apparatus and pigment system, Emerson Enhancement Effect and two pigment systems, Antenna complexes and reaction centers, Photosynthetic electron transport system and its mechanism, photophosphorylation and types – cyclic, non-cyclic and pseudocyclic pathway of carbon, CO₂ fixation - C₃, C₄ and CAM plants.

Unit IV (12 Hours)

Respiration: Definition, types of respiration: Glycolysis (EMP pathway), Krebs cycle, Terminal oxidation, Electron transport chain (modern view) and oxidative phosphorylation. ATP synthesis, Photorespiratory carbon, Oxidative cycle, Pentose Phosphate pathway: its significance, Respiratory Quotient.

Unit V (12 Hours)

Plant Growth: Plant growth substance: discovery and physiological effects of Auxin, Gibberellins and cytokinins. Growth inhibitor hormone: Ethylene and Abscisic acid. Physiology of flowering: Photoperiodism and Phytochrome, Vernalisation: techniques and mechanism. Seed dormancy and germination: physiological and biochemical changes.

Books for Study

1. Verma V. 2007. Text book of Plant Physiology, Ane Books India, New Delhi
2. Jain V.K. 2006. Fundamentals of Plant Physiology, 18th ed. Chand & Co.
3. Pandey, SN & Sinha, BK. 2006. Plant Physiology, 4th Ed. Vikas Publishing House Ltd.

Books for References

1. Noggle and Fritz, 1976. Introductory Plant Physiology, Prentice Hall, New Delhi.
2. Bajjal BD & Ravisharma, 1981. A Textbook of Plant Physiology, Shiva Lal Agarwal
3. Salisbury, F.B. & Ross, CN. 1995. Plant Physiology. CBS Publishers, New Delhi

Semester	Course Code	Title of the Course									Hours	Credits
VI	21UBO63CC11	CORE-11: PLANT PHYSIOLOGY									4	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	2	2	1	2	3	1	2	3	2.1	
CO-2	2	2	3	1	2	3	2	2	3	2	2.2	
CO-3	1	3	2	2	3	1	2	3	2	3	2.2	
CO-4	2	3	2	3	1	2	3	1	2	3	2.3	
CO-5	1	3	3	2	2	2	3	2	1	3	2.2	
Mean Overall Score											2.2	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UBO63CP06	LAB. COURSE 6: PLANT PHYSIOLOGY	3	1

Detailed Study:

1. Effect of temperature on membrane permeability.
2. Osmosis – Thistle funnel, potato osmoscope.
3. Determination of water potential and solute potential.
4. Determination of root pressure and sap exudation.
5. Effect of environmental factors on the rate of transpiration.
6. Extraction and separation of leaf pigments.
7. Effect of light and CO₂ on photosynthesis.
8. Aerobic respiration – Ganong's respiroscope.
9. Ascent of sap – Balsam plant experiment.
10. Measurement of lipase activity.
11. Demonstration experiments:
 - i. Phototropism,
 - ii. Geotropism,
 - iii. Arc Auxanometer,
 - iv. Dialatometer
 - v. Hydroponics

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UBO63CC12	CORE-12: GENETIC ENGINEERING AND BIOTECHNOLOGY	4	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	define the principles and application of intellectual property rights.	K1
CO-2	understand the principles of genetic engineering.	K2
CO-3	learn the types and application of cloning vectors.	K3
CO-4	study and analyze different types of gene transfer methods.	K4
CO-5	design protocol for plant tissue culture.	K5

Unit I (12 Hours)

Basic principle and important steps in recombinant DNA Technology. *Agrobacterium*-mediated gene transfer and Crown gall disease. Steps in Methods to generate desired foreign genes: isolation of prokaryotic gene by restriction enzymes and of eukaryotic gene by cDNA synthesis. Joining DNA molecules: ligases, linkers and homopolymers.

Unit II (12 Hours)

Cloning vectors: natural vectors - *E. coli* plasmids; *in vitro* vectors – pBR; cosmids; single-stranded DNA vectors - M13; and shuttle vectors - *E. coli*; Yeast shuttle vector. Selectable markers. Gene cloning strategies: cDNA library and genomic library.

Unit III (12 Hours)

Methods of gene transfer to bacteria, plants and animals: Ca-transfection, microinjection, electroporation, shotgun, lipofection, somatic cell nuclear transfer, and embryonic stem cells.

Unit IV (12 Hours)

Various methods of Plant Tissue Culture and Applications. Protoplast fusion technology. Applications of plant tissue culture in agriculture and forestry. Transgenic plants against herbicide, insects, drought and salinity. Genetic Use Restriction Technology. Anti-sense RNA technology and the FlavrSavr tomato.

Unit V (12 Hours)

Production technology of plantibodies and monoclonal antibodies by hybridoma technology. Gene therapy. Cloning animals (therapeutic and reproductive). Xenografting. Release of GMOs: *Bt*brinjal in India. Concerns of genetic engineering. IPRs – meaning, types (IP, Copyrights & Patents). Arguments for and against patenting genes and life forms.

Books for Study

- Bernard R Glick and Jack J Pasternak. 2001. Molecular biotechnology-principles and applications of recombinant DNA, (2nd Edition), ASM Press, Washington, D.C.
- Old, RW and Primrose, SB. 2001. Principles of Gene Manipulation-an introduction to genetic engineering, Black Well Science Ltd., New York.

Books for References

1. Gamborg, OL andPhillips, GC. 1995. Plant cell, Tissue and Organ culture, Narosa publishing House, New Delhi.
2. George, EF and Sherrington, PD. 1984. Plant propagation by Tissue culture, Exegetics Limited, London.
4. JD Watson, M Gilman, J Witkowski and M Zoller 1992. Recombinant DNA (2nd Edition), WH Freeman Co., New York.

Semester	Course Code	Title of the Course									Hours	Credits
VI	21UBO63CC12	CORE-12: GENETIC ENGINEERING AND BIOTECHNOLOGY									4	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	2	2	3	3	2	3	2	2.5	
CO-2	2	3	2	3	2	2	3	2	2	3	2.4	
CO-3	2	2	3	2	3	3	3	2	3	1	2.4	
CO-4	3	3	3	3	1	3	3	3	3	1	2.6	
CO-5	1	2	2	2	3	1	2	2	2	3	2.0	
Mean Overall Score											2.38	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UBO63CP07	LAB. COURSE 7 (GENETIC ENGINEERING, BIOTECHNOLOGY AND BIOCHEMISTRY)	3	1

Detailed Study:

Genetic Engineering, Biotechnology

1. Culture media and sterilization techniques
2. Generation of In vitro plants
3. Embryo culture
4. Callus induction and differentiation
5. Somatic embryogenesis.
6. Micropropagation and Synthetic seeds

Biochemistry

7. Qualitative estimation of sugars.
8. Estimation of total lipids (gravimetric).
9. Estimation of amino acids.
10. Determination of strength of amino acids.
11. Quantitative estimation of total protein.
12. Effect of pH/temperature on enzyme activity
13. Estimation of total phenolics

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UBO63ES03A	DSE-3: BIOCHEMISTRY	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	acquire knowledge about chemical and molecular foundations of life.	K1
CO-2	compile the structure, properties and roles of carbohydrates, proteins and lipids.	K2
CO-3	analyze the structure, function and acid base properties of amino acids.	K3
CO-4	critique the role of vitamins and enzymes in biological systems.	K4
CO-5	evaluate the importance of secondary metabolites to mankind.	K5

Unit I (15 Hours)

Carbohydrates: Classification of carbohydrates; Stereochemistry of simple sugars; α , β -glycosidic linkages, Structure and properties of monosaccharide (glucose, fructose, mannose), disaccharide (maltose, lactose, sucrose) and oligosaccharides; Polysaccharides: Chemical structure and functions of starch, glycogen, plant cell wall and bacterial cell wall.

Unit II (15 Hours)

Lipids: Classification, structure, properties and synthesis of lipids; Saturated and Unsaturated fatty acids; Structure and function of phospholipids, glycolipids; cholesterol-biological importance; Membranes and fluid mosaic model.

Unit III (15 Hours)

Amino acids: Structure & properties, Non-protein amino acids and their functions; Proteins: classification, peptide bond, structure- primary, secondary, tertiary (collagen), quaternary and the forces stabilizing protein structure.

Unit IV (15 Hours)

Enzymes: biocatalysts – definition and characteristics, IUB classification; principles of catalysis, activation energy, transition state, active site and Michaelis-Menten equation; Mode of action - Lock & Key and Induced Fit models; Factors affecting enzyme action – pH, temperature, substrate & enzyme concentration; Enzyme regulation by inhibition: competitive, non-competitive & feedback.

Unit V (15 Hours)

Secondary metabolites and their functions in plants: Terpenoids: N- containing metabolites (alkaloids), Phenolics: classification, properties and significance; Shikimic acid and mevalonic acid pathway; Synthesis of alkaloids from amino acids.

Books for Study

1. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN: 13: 978-1-4641-0962-1 / ISBN: 10:1-4292-3414-8.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.

Semester	Course Code	Title of the Course									Hours	Credits
VI	21UBO63ES03A	DSE-3: BIOCHEMISTRY									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	2	2	3	1	3	3	2	2	2	2.2	
CO-2	3	2	2	1	2	2	3	1	2	3	2.1	
CO-3	1	2	3	2	3	2	3	2	3	2	2.3	
CO-4	1	2	2	3	1	2	3	2	2	3	2.1	
CO-5	2	2	1	2	3	2	3	2	2	3	2.2	
Mean Overall Score											2.2	
Result											# High	

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UBO63ES03B	DSE-3: AGRICULTURAL BOTANY	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	understand the scope and importance of various branches of agriculture.	K1
CO-2	gain knowledge in agricultural development at global level.	K2
CO-3	acquire skills of various crops cultivation in india.	K3
CO-4	classify various agricultural operational procedures of various crops.	K4
CO-5	prioritize various harvesting procedures.	K5

Unit I: Introduction to Agriculture (15 Hours)

Agriculture – Definition – Importance and scope - Branches of agriculture- Agronomy – Definition – Meaning and scope. National and International Agricultural Research Institutes. Indian economy – National income.

Unit II: History of Agriculture Development (15 Hours)

Evolution of human beings and agriculture – Era of civilization- Importance of Neolithic civilization - History of Agricultural development in world and India – Agriculture in ancient India – Development of scientific Agriculture - Stages of agriculture development - Chronological agricultural technology development in India.

Unit III: Crop Classification and Crop Production (15 Hours)

Crops and their classification–Major crops of India and TamilNadu-Economic importance. Major soil types of India and Tamil Nadu. Factors affecting crop production – climate - edaphic- biotic - physiographic and socioeconomic factors - Agricultural seasons of India and Tamil Nadu. Tillage – Definition - Types- Objectives - Modern concepts of tillage.

Unit IV: Basic Agricultural Operations (15 Hours)

Seed treatment. Nursery. Sowing methods. Germination – Factors affecting germination. Plant population and geometry - effect on growth and yield. After cultivation – Thinning - Gap filling. Weeds – Definition – Beneficial and Harmful effects of weed. Irrigation and its role on plant growth. Manures and fertilizers – Time and methods of application.

Unit V: Harvesting and Storage (15 Hours)

Maturity symptoms of field crops – methods of harvesting – Cleaning and drying -methods of storage. Current stream of developments

Books

1. Sudhagar Rao, G.B., M. Thirupathi., C.Ravikumar and K.P.Senthilkumar, 2015.Basic Agronomy, Manibharathi Publications, Chidambaram.
2. Chandrasekaran, B., K. Annadurai and E. Somasundaram. 2010. A Textbook of Agronomy. New Age International Publishers, New Delhi.

REFERENCES

1. Balasubramanian, P. and SP.Palaniappan. 2010. Principles and Practices of Agronomy. Agrobios.Jodhpur - 342 002.
4. ICAR. 2011. Handbook of Agriculture. Indian Council of Agricultural Research, New Delhi.
5. Panda, S.C. 2010. Agronomy. Agro bios (India), Jodhpur - 342 002.
6. Yellamananda Reddy, T. and SankaraReddi, G.H. 2010. Principles of Agronomy. Kalyani Publishers, New Delhi.

E-RESOURCES

1. http://www.dphu.org/uploads/attachements/books/books_2248_0.pdf
2. <https://www.scribd.com/doc/119183030/principles-of-agronomy-and-agrometerology>
3. <http://www.newagepublishers.com/samplechapter/001757.pdf>
4. [http://www.sun.worldcat.org/title/principles of agronomy/oclc/689265](http://www.sun.worldcat.org/title/principles%20of%20agronomy/oclc/689265)

Semester	Course Code	Title of the Course									Hours	Credits
VI	21UBO63ES03B	DSE-3: AGRICULTURAL BOTANY									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	2	2	3	2	2	3	2	2.4	
CO-2	2	3	2	3	2	2	3	2	2	1	2.2	
CO-3	2	2	3	2	3	3	3	2	3	2	2.4	
CO-4	3	3	2	3	1	3	3	2	3	1	2.4	
CO-5	2	2	1	2	1	2	2	1	2	1	1.6	
Mean Overall Score											2.2	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UBO63ES04A	DSE-4: MEDICINAL BOTANY	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	acquire the knowledge about understanding of principle and efficacy of various Indian systems of medicines.	K1
CO-2	learn the identification, pharmacological importance and processing of medicinal plants based on their classification and characterization.	K2
CO-3	analyze the suitable conservation method for medicinal plants using modern biotechnology tools to ensure the sustainable utilization.	K3
CO-4	evaluate the medicinal plants based drug efficacy and its various applications for different ailments	K4
CO-5	create new methods for identification and characterization of drug adulteration and formulations for the human welfare.	K5

Unit I

Medicinal Plants: History, Scope and Importance. Traditional medicinal systems: Ayurvedha, Siddha, Naturopathy, Aromatherapy and Acupuncture. Definition of drug classification of natural drugs: Alphabetical, Morphological, Taxonomical, Chemical and pharmacological.

Unit II

Ethnobotany: definition, major tribes of South India and their ethno botanical heritage. Ethnobotany and conservation of plants with special reference to India. Mythology and conservation of ecosystems (sacred groves). Role of ethnic groups in conservation of medicinal plant genetic resources. Endangered taxa and forest management.

Unit III

Cultivation, collection and preparation of natural drugs macroscopic (physical and organoleptic characters), therapeutic and pharmaceutical characterization of the following medicinal plants: *Adathoda vasica*, *Aloe vera*, *Centella asiatica*, *Piper nigrum*, *Allium sativum*, *Curcuma longa*, *Ocimum sanctum* and *Catharanthes roseus*. Conservation of endangered and endemic medicinal plants using Plant Tissue Culture.

Unit IV

Drugs from leaves (Eucalyptus), flower (Eugenia), fruits and seeds (Coriander), roots (Withania), underground stem (Ginger), bark (Cinchona) and wood (Ephedra). Cultivation and utilization of selected medicinal plants *Bacop amonniari*, *Cassia senna*, *Andrographis paniculata*, *Gloriosa superba*, *Phyllanthus amarus* and *Rauwolfia serpentina*.

Unit V

Drug adulteration and types. Drug evaluation: physical, chemical and biological. Quality control of herbal drugs. Role of NMPB, AYUSH and CDRI.

Books for Study

- Gokhale, S.B., Kokate, C.K. and Purohit, A.P. (2003). Pharmacognosy. NiraliPrakashan, Pune.

Books for References

1. Bhattacharjee, S.K. 2004. Hand Book of Medicinal plants. Pointer Publishers, Jaipur.
2. Harbourne, J. B. (1998). Phytochemical methods: A Guide to Modern Techniques of Plant Analysis (3rd edition). Chapman and Hill Co., New York.
3. Joshi, S.G. (2001). Medicinal plants. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Herbal plants and Drugs Agnes Arber, 1999. Mangal Deep Publications.

Semester	Course Code	Title of the Course									Hours	Credits
VI	21UBO63ES04A	DSE-4: MEDICINAL BOTANY									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	1	3	3	3	1	2	2	2.3	
CO-2	2	2	3	2	2	1	3	3	2	3	2.3	
CO-3	3	3	3	2	3	1	3	3	2	3	2.6	
CO-4	3	1	3	2	3	2	3	1	2	2	2.2	
CO-5	2	3	2	2	3	1	1	2	3	3	2.2	
Mean Overall Score											2.32	
Result											High	

Semester	Course Code:	Title of the Course	Hours	Credits
VI	21UBO63ES04B	DSE-4: BIOLOGICAL TECHNIQUES	5	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	understand the various micro techniques in biology.	K1
CO-2	learn the principles and applications of microscopy.	K2
CO-3	construct immunological techniques and applications.	K3
CO-4	distinguish and identify techniques used to preserve organisms in museum.	K4
CO-5	prepare biofertilizers and animal rearing.	K5

Unit I (15 Hours)

Microtechniques - selection of material, fixation, fixation images- acid and basic. Preparation of permanent slide-Dehydration process, Infiltration of wax, embedding, sectioning (microtome), mounting. Leaf clearing, smear and squash techniques.

Unit II (15 Hours)

Stains: Classification- single, double, triple staining. Florescent image processing Nuclear, cytoplasmic, cell wall stains and their rationale. Herbarium – collection, drying, pasting of plant specimen, Protection of Herbarium- importance.

Unit III (15 Hours)

Techniques of the preparation of vertebrate skeletons and transparency preparations (Alizarian red) cartilage staining, museum techniques: dry and wet preparation. Taxidermy Arthropod squash. Blood grouping ABO and Rh, blood smear preparation. Haemocytometer.

Unit IV (15 Hours)

Earthworm and its types. Preparatory methods of vermiculture techniques. Vermin compost – panchakavia; fish extract, Economic and ecological importance of vermicompost. Biofertilizers-Cultivation of Spirulina and Scenedesmus. Animal rearing: albino rats, rabbits and fruit fly.

Unit V (15 Hours)

PCR - principles, technique and applications- Types of PCR –Reverse Transcriptase (RT) Blotting techniques-Northern. DNA finger printing and barcoding. Immunological test - WIDAL, RPR, RF and ELISA.

Books for Study

1. Yadav, P.R. 2006. Biological Techniques, Discovery Publishing House, New Delhi.
2. Swargiary, A. 2017. Biological Tools & Techniques, Kalyani Publishers, New Delhi.

Books for Reference

1. Ramakrishnan, S. 2012. Manual of Medical Laboratory Techniques, Jaypee Brothers Medical Publishers, New Delhi.

Semester	Course Code	Title of the Course									Hours	Credits
VI	21UBO63ES04B	DSE-4: BIOLOGICAL TECHNIQUES									5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	3	2	1	2	2	3	2	1	2	2.1	
CO-2	2	3	2	2	3	2	3	2	2	1	2.2	
CO-3	2	2	3	2	1	2	2	3	2	2	2.1	
CO-4	1	2	2	3	2	1	3	2	3	2	2.1	
CO-5	1	2	2	3	2	2	3	2	2	3	2.2	
Mean Overall Score											2.1	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UBO63EG02	GENERIC ELECTIVE-2: SOLID WASTE MANAGEMENT	4	3

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	Understand the types of solid waste and their importance.	K1
CO-2	Acquire knowledge on decomposition of organic matters.	K2
CO-3	Learn the technology of vermicomposting and their applications.	K3
CO-4	Learn the Mushroom cultivation technique and their medicinal values.	K4, K5
CO-5	Know the methods of composting and their importance.	K6

Unit-I

(12 Hours)

Definition-scope and importance of solid waste management-Types of solid wastes: garbage, rubbish, agricultural, hospital and domestic wastes. Collection-transport and processing of solid wastes.

Unit-II

(12 Hours)

Composting techniques: Types of composting, anaerobic and aerobic composting, Factors affecting aerobic composting, Techniques for effective aerobic composting, Salient features of selected small-scale aerobic composting techniques-Role of microbes in composting

Unit-III

(12 Hours)

Solid waste management - methods of solid waste management - open dumping, land filling, incineration, pyrolysis Biogas production-mechanism of methane gas formation. Factors affecting methane formation Utilization of Biogas.

Unit-IV

(12 Hours)

Vermicomposting-Earthworm and its characteristics-internal anatomy-digestive, excretory, respiratory and reproductive systems. Preparatory methods of vermiculture. Economic and ecological importance of vermicompost and vermi wash.

Unit-V

(12 Hours)

Mushroom culture - Characteristics of common edible mushrooms - Nutritive value of mushrooms. Culture techniques-preparation of spawn - Preparation compost-spawn running and harvesting. Preservation and storage. Recipes of mushroom.

Books for Study

1. Dubey, RC. 2009. A Text book of microbiology, S. Chand & Co. Ltd, New Delhi.

Books for Reference

1. NIIR Board. 2004. The Complete Technology Book on Biofertilizers and Organic Farming, National Institute of Industrial Research.
2. David, SV. and Kumaraswamy, T. 1998. Elements of Economic Entomology. Popular Book Depo, Chennai.

3. Mohoney, R. 1966. Lab Techniques in Zoology. Butterworth, UK.

Semester	Course Code	Title of the Course									Hours	Credits
VI	21UBO63EG02	GENERIC ELECTIVE-2: SOLID WASTE MANAGEMENT									4	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	3	2	1	2	2	3	2	2	2	2.3	
CO-2	2	3	2	2	3	2	3	2	2	1	2.2	
CO-3	2	2	3	2	2	3	2	3	2	2	2.3	
CO-4	1	3	2	3	2	1	3	2	3	2	2.2	
CO-5	1	2	2	3	2	3	3	2	2	3	2.3	
Mean Overall Score											2.3	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UBO64SE04	SEC-4 (WS): HERBAL TECHNOLOGY	2	1

CO No.	CO-Statements	Cognitive Levels (K-levels)
On successful completion of this course, students will be able to		
CO-1	Obtain the knowledge about understanding of Preparation of Herbal based remedies using various types of medicinal plant raw materials.	K1
CO-2	Learn the current trade status and role of medicinal plants in socio economic growth.	K2
CO-3	Study and Investigate the disease curing ability medicinal plants in various ailments.	K3
CO-4	Evaluate and Analyze the market value of herbal based formulations and products in pharmaceutical industries.	K4
CO-5	Create new drug formulations using therapeutically valuable plant materials for the healthy life of society.	K5, K6

Unit-I

(6 Hours)

Herbal decoction preparation: *Andrographis paniculata*, *Tinospora cordifolia*, *Alpinia officinarum*, *Hygrophila auriculata* and *Adhathoda vasica*.

Unit-II

(6 Hours)

Herbal powder preparation: *Withania somnifera*, *Cyanodon dactylon*, Anti diabetic FTN Sooranam, *Kaphasura kudineer* Sooranam.

Unit-III

(6 Hours)

Herbal massage oil preparation: *Pindathylam*, Herbal bath conditioner preparation: *Nalankumavu*, *Panchakarbam*. Preparation of Herbal Face pack.

Unit-IV

(6 Hours)

Herbal hair oil preparation: *Neelibirikathi*. Herbal cream preparation: *Mathanthylam*. Herbal health drinks preparation: *Mathulaimanabaku* (*Punica granatum* and *Hibiscus Rose Milk*).

Unit-V

(6 Hours)

Preparation of herbal tea, herbal soup, herbal sweet and herbal cosmetics. Preparation of Herbal Mosquito Repellent. Flowers Salad.

Semester	Course Code	Title of the Course									Hours	Credits
VI	21UBO64SE04	SEC-4 (WS): HERBAL TECHNOLOGY									2	1
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	3	2	3	1	3	3	3	1	2	2	2.3	
CO-2	3	2	3	3	3	1	2	3	3	2	2.5	
CO-3	3	3	3	2	3	2	3	3	2	3	2.7	
CO-4	3	1	3	2	3	2	3	1	2	2	2.2	
CO-5	2	3	2	2	3	1	2	2	3	3	2.3	
Mean Overall Score											2.40	
Result											High	

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UBO63CE01	COMPREHENSIVE EXAMINATION	-	2

Unit-I:

Classification, structure and reproduction of Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms, Plant diseases and defense mechanism. Ecology and Evolutionary trends. Binomial nomenclature, Numerical Taxonomy and Chemotaxonomy, Tissues, totipotency, properties of wood; Microsporogenesis, megasporogenesis, double fertilization and polyembryony.

Unit-II:

Cell Biology - Cell as a unit structure and function, Cell division: Mitosis and Meiosis Chromosomal behaviour and their cytological significance; Mendelian Genetics- linkage and crossing over, Chromosome mapping, Human genome project; Protein synthesis and gene expression, DNA replication; Polyploidy and mutations in crop improvement. Heterosis and Inbreeding Depression; theories of evolution and variations in speciation

Unit-III:

Photosynthesis: mechanism and importance, Nitrogen Metabolism. Physiology of seed dormancy and germination, Plant growth Regulator, Phytochrome and its role. Biopolymers- carbohydrates, proteins and lipids; Enzyme kinetics and Mode of enzyme action. Secondary metabolites- Alkaloids, phenolics and terpenoids. Bioenergetics, redox potential and coupled reaction, photobiology.

Unit-IV:

Whittaker's five kingdom concept, food spoilage and preservation, Role of microbes in waste water treatment, Biofertilizer, protoplast culture, Somatic hybrid and Cybrids. Synthetic seeds and their application, Vectors in gene cloning – Plasmids, Cosmids, Bacteriophages, fermentation as a biochemical process, Microbial Single Cell Protein (SCP) production, humoral and cellular immunity, Antibody types and immunological role.

Unit-V:

Sampling techniques, Central values (mean, mode, median), T-test, Chi square Test; Concept of Ecosystem, Method of studying plant communities, Vegetation types of India, Biotic interactions – Succession and its types, Biogeochemical cycles. Ethnobotany- scope and Tribes of Tamil Nadu, Conservation – in situ and ex situ conservation.