

B.Sc. BOTANY

LOCF SYLLABUS 2026



Department of Botany

School of Life Sciences

St. Xavier's College (Autonomous) Palayamkottai

Tirunelveli – 627 002, Tamil Nadu, India

Vision

To mould young men and women as leaders in all walks of life so that they may serve the people, especially the poor and the oppressed of our nation in truth, justice and love.

Mission

To achieve a synthesis of academic excellence and the formation of character.

To ensure social justice through equity and access

To include the excluded for empowerment

To equip students with global competencies

To engage in relevant research activities.

To promote Lab to Land through the Outreach Programme – Student Training and Action for Neighbourhood Development (STAND)

SCHOOLS OF EXCELLENCE WITH CHOICE-BASED CREDIT SYSTEM (CBCS)

Undergraduate Courses

While the Tamil Nadu State Council of Higher Education (TANSCHÉ) came forward to introduce CBCS in all the affiliated colleges in Tamil Nadu in June 2008, St. Xavier's College had already introduced CBCS as early as June 2002 for UG courses and in June 2003 for PG courses. The aim of the Choice-Based Credit System is to provide ample choice of subjects to students, based on the weighted credit point system. This system offers the learners a chance to match their aptitude and interest with the subjects of their choice and learn at their own pace. Thus St. Xavier's College gives every student an opportunity to study his / her discipline - specific courses and pursue other courses from any other department simultaneously.

Essential Features of CBCS

Standardisation of degree courses to internationally accepted levels

Focus on skill-based curriculum

Emphasis on value education

Institution - Industry collaboration

Provision for earning more credits

Development of communication skills

Credit system

The credit system at St. Xavier's College (Autonomous) assigns weightage to courses based on the hours allocated to each course. Typically, one credit is equivalent to one hour of instruction per week. However, credits are awarded regardless of actual teaching hours to ensure consistency and adherence to guidelines. The credits and hours allotted to each course within a programme are detailed in the Programme Pattern table. While the table provides a framework, there may be some flexibility due to practical sessions, field visits, tutorials, and the nature of project work. For undergraduate (UG) courses, students are required to accumulate a minimum of 150 credits, as stipulated in the programme pattern table. The total number of courses offered by the department is outlined in the Programme Structure.

OUTCOME-BASED EDUCATION (OBE)

Outcome-Based Education (OBE) is a student-centric teaching and learning methodology that focuses on measuring student performance through clearly defined outcomes. For St. Xavier's College, with its

commitment to excellence and NAAC/NBA accreditation requirements, OBE is not just a regulatory expectation but a pathway to academic quality, global competitiveness, and improved employability of graduates.

We prepare students to meet future industry requirements and reinforce St. Xavier's College, Palayamkottai, as a leader in quality higher education. St. Xavier's College introduced OBE in 2018, and for the Attainment Calculation, we developed our own method in 2018. From the academic year 2025-26 onwards, in examinations, for each question we mark Course Outcome (CO), Competency and Performance Indicator, Programme Outcome / Programme Specific Outcome, Bloom's Revised Cognitive Level and we follow the OBE procedure for the calculation of the Attainment of Outcome for each student, course, semester, programme.

EVALUATION PATTERN (UG)

Continuous Internal Assessment

There is no internal minimum for any paper. However, Continuous Internal Assessment (CIA) is a mandatory requirement for all students. A student must take at least one CIA test out of two tests and must fulfil at least one mode of assessment among assignments, quiz, seminars, etc., otherwise he/she will not be permitted to write the semester examination.

S.No	Component	Marks Allotted
1	I CIA Test	50
2	II CIA Test	50
	Total	100

The total CIA marks of 100 will be converted to 70 marks. An additional 30 marks will be awarded through other internal assessment components.

The Continuous Internal Assessment (CIA) consists of two component tests, each carrying 15 marks (15 + 15).

The final internal assessment marks will be calculated out of 100 (70 + 30). The obtained marks will be **converted to 50 marks**.

Semester (External) Examination

- The External Semester Examination will be conducted for **100 marks**.
- The obtained marks will be **converted to 50 marks**.

Question Pattern

UG Semester Examinations Part- I & II & III (3 Hours)

PART	TYPE	Mark Distribution	Total Marks
A	MCQ	20X1	20
B	ALL	5X3	15
C	Either/or	5X7	35
D	3 out of 5	3X10	30
		Total	100

UG Semester Examinations Part- IV (2 Hours)

PART	TYPE	Mark Distribution	Total Marks
A	MCQ	5X1	5
B	ALL	5X2	10
C	Either/or	5X5	25
D	1 out of 2	1X10	10
		Total	50

UG Internal Examinations Part- I & II & III (1.30 Hours)

PART	TYPE	Mark Distribution	Total Marks
A	MCQ	6X1	6
B	ALL	3X3	9
C	Either/or	3X5	15
D	2 out of 3	2X10	20
		Total	50

UG Internal Examinations Part- IV (1.00 Hour)

PART	TYPE	Mark Distribution	Total Marks
A	MCQ	5X1	5
B	ALL	5X3	15
C	2 out of 3	2X7.5	15
		Total	35

Grading System

Range of Marks	Letter Grade	Grade Point	Description
90-100	A+	9.0-10.0	Outstanding
80-89	A	8.0-8.9	Excellent
70-79	B+	7.0-7.9	Very Good
60-69	B	6.0-6.9	Good
50-59	C	5.0-5.9	Above Average
40-49	D	4.0-4.9	Average
00-39	U	0	Reappear

PROGRAMME OUTCOMES (PO) FOR UG PROGRAMMES

Students of all Undergraduate Degree Programmes at the time of graduation will be able to attain the following:

PO1. Critical Thinking: Acquire the knowledge in the respective field and take informed actions.

PO2. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO3. Social Interaction: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.

PO4. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO5. Ethics: Recognize different value systems and apply ethical principles and commit to professional ethics and responsibilities and norms of different value systems.

PO6. Environment and Sustainability: Demonstrate the issues of environmental contexts and sustainable development.

PO7. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to complex activities with an understanding of the limitations.

PO8. Self-directed and Life-long Learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of socio-technological changes.

Programme: B.Sc. Botany

Programme Code: UBO

The B.Sc. Botany program is designed to achieve the following objectives (Programme Outcomes PO)

1. Apply the knowledge of science and technology fundamentals for finding solutions to complex problems.
2. To provide up-to-date theoretical knowledge on various forms of plants, their interactions with biotic and abiotic entities in the ecosystem and relevant practical skills.
3. To comprehend and interpret various facets of Botany including the importance and judicious utilisation of plant sources.
4. Exploration of diverse plant life-forms and to nurture the conservation of biodiversity.
5. To understand the principles and applications of various traditional and modern techniques used in Botany.
6. To disseminate knowledge on the design and execution of experiments in Botany with emphasis on the operation of relevant sophisticated instruments.
7. To impart knowledge on the economic importance of plant/microbial resources and their products and to promote entrepreneurship skills.
8. To promote proficiency in designing research problems, review of literature, laboratory experiments, data analyses and preparation of reports with professional ethics.
9. To motivate the students to take up innovative and cutting-edge research in frontier areas of Botany and related biology subjects
10. To enable the students to take up various qualifying examinations concerning Botany and to face the challenges in career opportunities

Program Specific Outcomes (PSO)

On successful completion of the B.Sc. Botany program, the students are expected to

1. Implement the concept of science and technology to foster the traditional and modern techniques for solving the complex problems in Plant Biology and Plant Biotechnology.
2. Ensure the use of contemporary tools and techniques in understanding the scope and significance of Botany
3. Develop the scientific problem-solving skills during experimentation, research projects, analysis and interpretation of data
4. Design scientific experiments independently and to generate useful information to address various issues in Botany.
5. Enhanced capacity to think critically; ability to design and execute experiments independently and/or team under multidisciplinary settings
6. Design and standardise protocols for public health and safety, and cultural, societal, and environmental considerations
7. Apply appropriate techniques, resources, and modern ICT tools for understanding

plant resources.

8. Demonstrate the contextual knowledge in sustainable exploitation of medicinal, economically important and endangered plants as per the National Biodiversity Act.
9. Follow the concept of professional ethics and bioethics norms for practising the value of the plant kingdom.
10. Communicate proficiently with various stakeholders and society, to comprehend and to write and present reports effectively.

Upon graduation, Botany majors should have mastered a set of fundamental skills which would be useful to function effectively as professionals and to their continued development and learning within the field of Botany. These skills include the following:

1. Field and Laboratory Research Skills: Botany majors should be competent observers and experimentalists, whether such research takes place in the field or in the laboratory.

2. Critical Thinking Skills: Botany majors should be able to engage in the following aspects of critical thinking: (i) differentiate between fact and opinion, (ii) develop inferential skills, (iii) recognise logical fallacies and faulty reasoning, and (iv) make decisions and judgments by drawing logical conclusions using sound quantitative or statistically-based reasoning. Critical thinking does not exclude imaginative and speculative thinking as it applies to science in general and botany specifically. To the extent that critical thinking skills are discipline-specific, students should understand that science and its methodology are a way of knowing.

3. Problem-Solving Skills: Botany majors should be competent problem-solvers. They should be able to assess the elements of a problem and develop and test a solution based on logic and the best possible information.

4. Communication Skills: Botany graduates will be required to demonstrate competence in communication, both written and oral.

5. Computer Skills: Botany graduates should be competent users of computer software including, but not limited to, word processing, spreadsheet, graphing, and web-search programs. Such skills are also imperative for organising their required portfolios.

6. Information-Seeking Skills: For success in college and for lifelong learning, graduates must be able to: recognise when information is needed; to identify appropriate types of information; and to locate, evaluate, and use information effectively, ethically, and legally.

7. Cooperation/Social Responsibility Skills: Graduates ought to understand and appreciate the value of cooperating and working effectively with peers and be able to demonstrate a commitment to the process of developing such skills.

8. Self-Assessment Skills: Graduates should be able to demonstrate progress in the development of their ability to make a realistic appraisal of growth in all three domains of learning (cognitive, conative, and affective). They should be able to identify, evaluate and explain major, if not pivotal, influences in their development as a botanist.

Upon graduation, Botany majors should demonstrate significant value-added progress in developing the following values:

1. *Appreciation* of the *diversity* of cultures and intellectual points of view.
2. *Understanding* of *ethical issues* and responsibilities such as the environmental costs of excessive consumerism, impacts of technology upon society, etc.
3. *Commitment* to the development of cultural perspectives that do not disparage others solely based on an individual's or group's ethnicity, caste, gender, religion, sexual orientation, marital status, age or disability.
4. *Appreciation* that Botany follows the *Liberal Arts* tradition which is based upon the notion that, in a world of ideas, a person is not free or liberated from the bonds of ignorance if s/he makes decisions based upon closed-minded habits, prejudices, or unconscious emotions that preclude critical thinking. Additionally, graduates will need to demonstrate growth in their social obligation to communicate with the public on scientific and technical issues.
5. *Appreciation* of the *aesthetic* attributes of nature, whether their studies are primarily in the field where entire ecosystems or biomes are investigated or in the laboratory where the microscope and biochemical techniques are used as tools for observing nature.

All students who are exposed to Botany courses should understand and appreciate, in addition to the core knowledge of Botany, the nature of science, how science is applied to everyday problems, and significant botanical achievements.

COURSE STRUCTURE FOR B.Sc. BOTANY (2026-2027)

Sem	Part	Status	Course Code	Title of the Course	Hours	Credit
I	I	Language	26UGTL11	General Tamil-I	6	3
			26UGFL11	French-I		
			26UGHL11	Hindi-I		
	II	Language	26UGEL11	General English-I	6	3
	III	Core-T1	26UBOC11	Plant Diversity I – Algae, Fungi, Lichens and Bryophytes	5	5
	III	Core-P1	26UBOC12	Plant Diversity I – Algae, Fungi, Lichens and Bryophytes - Practical I	3	3
	III	EC-T1	26UCHE11	Allied - I: Chemistry - I	4	3
	III	EC-P1	26UCHE12	Allied - I: Chemistry- I Practical	2	2
	IV	SEC-1	26UBON11	Gardening and Landscaping	2	2
	IV	FC	26UHER11 /26UHEE11	Catholic Doctrine / Ethics	2	2
Sub-Total					30	23
II	I	Language	26UGTL21	General Tamil-II	6	3
			26UGFL21	French-II		
			26UGHL21	Hindi-II		
	II	Language	26UGEL21	Communicative English-II	6	3
	III	Core-T2	26UBOC21	Plant Anatomy & Embryology	5	5
	III	Core-P2	26UBOC22	Plant Anatomy & Embryology - Practical II	3	3
	III	EC-T2	26UCHE21	Allied – II: Chemistry- II	4	3
	III	EC-P2	26UCHE22	Allied – II: Chemistry- II - Practical	2	2
	IV	SEC2	26UBON21	Herbal Technology	2	2
	IV	SEC3	26UHEI21	Integrated Personality Development	2	2
Sub-Total					30	23
III	I	Language	26UGTL31	General Tamil-III	6	3
			26UGFL31	French-III		
			26UGHL31	Hindi-III		
	II	Language	26UGEL31	English-III	6	3
	III	Core -T3	26UBOC31	Plant Diversity II – Pteridophytes, Gymnosperms & Paleobotany	5	5
	III	Core -P3	26UBOC32	Plant Diversity II – Pteridophytes, Gymnosperms & Paleobotany – Practical III	3	3

	III	EC-T3	26UZOE31	Allied – III: Zoology- I	4	3
	III	EC-P3	26UZOE32	Allied – III: Zoology – I - Practical	2	2
	IV	SEC-4	26UHEL31	Life Issues &Entrepreneurial Skill Development	2	2
	IV	SEC-5	26UBOS31	Mushroom Cultivation	2	2
	Sub-Total				30	23
IV	I	Language	26UGTL41	General Tamil-IV	6	3
			26UGFL41	French-IV		
			26UGHL41	Hindi-IV		
	II	Language	26UGEL41	Communicative English-IV	6	3
	III	Core-T4	26UBOC41	Taxonomy of Angiosperms and Economic Botany	5	5
	III	Core-P4	26UBOC42	Taxonomy of Angiosperms and Economic Botany – Practical IV	3	3
	III	EC-T4	26UZOE41	Allied IV: Zoology – II	4	3
	III	EC-P4	26 UZOE42	Allied IV: Zoology - II Practical	2	2
	IV	EC-T5	26UBOE41	Global Climate change	2	2
	IV	EVS	26UEVS41	Environmental studies	2	2
	V	Extension	STAND			1
	Sub-Total				30	24
V	III	Core-T5	26UBOC51	Microbiology & Plant Pathology	5	4
	III	Core-T6	26UBOC52	Cell Biology, Genetics & Evolution	5	4
	III	Core-P5	26UBOC53	Microbiology & Plant Pathology - Practical-V	3	2
	III	Core-P6	26UBOC54	Cell Biology, Genetics & Evolution – Practical VI	3	2
	III	EC-T6	26UBOE51	Ecology	5	4
	III	EC-P5	26UBOE52	Ecology – Practical VII	3	2
	III	EC-T7	26UBOE53	Biological Techniques/ Bioinformatics and Biostatistics	4	3
	IV	VE	26UVEH51	Human Rights and social analysis	2	2
	IV	Internship	26UBOI51	Carried out during the summer vacation at the end of II year	-	2
	Sub-Total				30	25
VI	III	Core-T7	26UBOC61	Plant Physiology	5	4
	III	Core-T8	26UBOC62	Biochemistry & Biophysics	5	4
	III	Core-T9	26UBOC63	Plant Biotechnology and Molecular Biology	5	4
	III	Core-P7	26UBOC64	Plant Physiology Practical - VIII	2	2

	III	Core-P8	26UBOC65	Biochemistry & Biophysics – Practical – IX	2	2
	III	Cor	26UBOC67	Project with Viva Voce	5	2
	III	EC-T8	26UBOE61	1. Horticulture 2. Organic Farming	4	2
	III	SEC-6	26UBOS61	Plant Biotechnology and Molecular Biology – Practical X	2	2
				Sub-Total	30	22
					180	140
				Additional Compulsory Courses		
				I Year (Add-On Course)		2
				II (Value Added Course)		2
				III Year (Extra Credit Course)		2
				Field Visits / Industrial Visits		1
				MOOC / SSC		2
				Co- Curricular / Extracurricular activities		1
				Total	180	150

EC-Elective Course **FC** – Foundation Course **VE** – Value Education **SEC** – Skill Enhancement course

The following courses will be handled by the Department of Human Excellence

- | | |
|----------------------|--|
| 1. 26UHER11/26UHEE11 | Foundation Course: Religion: Catholic Doctrine/ Ethics |
| 2. 26UHEI21 | Integrated Personality Development |
| 3. 26UHEL31 | Life Issues & Entrepreneurial Skill Development |
| 4. 26UEVS41 | Environmental Studies |
| 5. 26UHEH51 | Human Rights & Social Analysis |

Add-on Courses (AOC)

Semester	Course Code	Title of the Course	Credits	Eligibility
I	26UBOAO1	Environmental Biotechnology	2	+ 2 passed students
II	26UBOAO2	Forensic Botany	2	+ 2 passed students

Value added / Certificate Courses (VAC)

Semester	Course Code	Title of the Course	Credits	Eligibility
III	26UBOCC1	Mushroom Cultivation	2	+ 2 passed students
IV	26UBOCC2	Nursery and Gardening	2	+ 2 passed students

Extra Credit Courses (ECC)

Semester	Course Code	Title of the Course	Credits	Eligibility
V	26UBOEC3	Aquatic Botany	2	+ 2 passed students
VI	26UBOEC6	Fermentation Technology	2	+ 2 passed students

Self-Study Courses (SSC)

Semester	Course Code	Title of the Course	Credits	Eligibility
V	26UBOSS4	Organic Manures and Biopesticides	2	+ 2 passed students
VI	26UBOSS2	Herbal Medicine	2	+ 2 passed students

பொதுத்தமிழ் - I
26UGTL11

Sem	Course Code	Course Category	Hours	Credit	MARK FOR EVALUATION		
					CIA	ESE	TOTAL
I	26UGTL11	GT	6 Hrs	3	100	100	100
COURSE TITLE		பொதுத்தமிழ் - I					

COURSE OUTCOMES: (பயன்கள்)

CO1	பாரதியார் காலந்தொட்டுத்தற்காலப் புதுக்கவிதைகள் வரையிலானகவிதைகளை அறிமுகப்படுத்துவதால் படைப்பாற்றல் திறன் பெறுதல் (K1, K2)
CO2	புதுக்கவிதைவரலாற்றினை அறிந்துகொள்ளுதல்.(K2)
CO3	இக்கால இலக்கியவகையினைக் கற்பதன் மூலம் படைப்பாக்கத்திறனைப்பெறுதல்.(K4)
CO4	மொழிஅறிவோடுசிந்தனைத் திறன் அதிகரிக்கச் செய்தல்.(K3)
CO5	தமிழ்மொழியைப் பிழையின்றிஎழுதவும்,புதியகலைச்சொற்களைஉருவாக்கவும் அறிந்து கொள்ளுதல்.(K4)
CO6	காலந்தோறும் சமூகச் சிந்தனைகள் மாறுவதை இலக்கியவரலாற்றின் மூலம் புரிந்துகொள்ளுதல்.(K6)

UNITS	SYLLABUS CONTENTS	HOURS
I	மரபுக் கவிதை 1. பெ.சுந்தரனார் - தமிழ்த்தெய்வவணக்கம் 2. இராமலிங்கஅடிகளார் - வள்ளலார் பாடல்கள் 3. பாரதியார் - பாரத ஜனங்களின் தற்கால நிலைமை 4. பாரதிதாசன் - சிறுத்தையே வெளியில் வா 5. மு.நல்லசுவாமிபண்டிதர் - சிலுவைத் தியானமாலை - மரியாத் புலம்பல் 6. கவிமணிதேசிகவிநாயகம்பிள்ளை -புத்தரும் ஏழைச்சிறுவனும் 7. முடியரசன் - மொழிஉணர்ச்சி 8. கண்ணதாசன் - ஆட்டனத்திஆதிமந்தி – ஆதிமந்திபுலம்பல் 9. கல்யாணசுந்தரம் - பட்டுக்கோட்டையார் பாடல் புதுக்கவிதை 1. கவிக்கோஅப்துல் ரகுமான் - வீட்டுக்கொருமரம் வளர்ப்போம் 2. சிற்பி— கவிதைமுடியவில்லை 3. மு.மேத்தா— வாழைமரத்தின் சபதம் 4. வைரமுத்து— புத்தகப்புராணம் 5. ஞானக்கூத்தன் - அம்மாவின் பொய்கள் 6. அறிவுமதி—வள்ளுவம் பத்து 7. நா.முத்துக்குமார் - ஆனந்தயாழை மீட்டுகிறாய் 8. சுகிர்தாராணி— சபிக்கப்பட்டமுத்தம் 9. அபிமானி - தலித்தியக்கவிதைகள் - 10. வைகைச் செல்வி – அம்மி 11. நாட்டுப்புறப்பாடல்	30

II	சிறுகதைகள் 1. புதுமைப்பித்தன் - கடவுளும் கந்தசாமிப் பிள்ளையும் 2. கு.ப.ராஜ கோபாலன் - விடியுமா? 3. கி.ராஜநாராயணன் - கதவு 4. வண்ணதாசன் - ஒருசிறுஇசை 5. உமாமகேஷ்வரி - மரப்பாச்சி உரைநடை 1. இலக்கியத்தின் உயிர்- இரா.மோகன் 2. இருபதாம் நூற்றாண்டுக்கவிதைகளில் தொழிலாளர் நிலை- இரா.மோகன் 3. எண்பதுகளில் புதுக்கவிதைப் போக்குகள் - இரா.மோகன் 4. தமிழ்ச் சிறுகதைகளில் முன்னிலைஉத்தி- இரா.மோகன் 5. வளமுடன் வாழ - அருள்முனைவர் ச.இன்னாசிமுத்து.சே.ச.	15
III	தமிழ் இலக்கியவரலாறு (இக்கால இலக்கியம்)	15
IV	இலக்கணம் - எழுத்து 1. தொல்காப்பியத்தின் எழுத்துவகை 2. முதல் எழுத்துக்கள் 3. சார்பெழுத்துக்கள் 4. மொழிமுதல் எழுத்துக்கள் 5. மொழி இறுதிஎழுத்துக்கள் 6. மொழி இடைஎழுத்துக்கள் 7. போலி 8. பதவிலக்கணம் 9. புணர்ச்சி இலக்கணம்	15
V	பிழையின்றிஎழுதுவோம் 1. பிழைப்பட எழுதும் சொற்களும், திருத்தங்களும் 2. சொற்பொருள் வேறுபாடு 3. பிழையான வாக்கியங்களும், திருத்தங்களும் 4. நிறுத்தற்குறிகள் 5. மரபு 6. வல்லெழுத்து (க்,ச்,த்,ப்) மிகுமிடங்கள் 7. வல்லெழுத்துமிகா இடங்கள் 8. வாக்கியம் :வகைகளும்,மாற்றங்களும் 9. வழ(ழு)க்குத் தமிழ் 10.உவமைகள் - பழமொழிகள் - மரபுத் தொடர்கள்	15
TEXT BOOKS (பாடநூல்கள்)		
- தமிழ்த்துறை வெளியீடு- தூய சவேரியார் கல்லூரி,(தன்னாட்சி)பாளையங்கோட்டை. - வகைமைநோக்கில் தமிழ் இலக்கியவரலாறு- பாக்கியமேரி		
REFERENCE BOOKS (பார்வைநூல்கள்)		
- தமிழ் இலக்கியவரலாறு- சிற்பிபாலசுப்பிரமணியன் - புதியநோக்கில் தமிழ் இலக்கியவரலாறு- தமிழண்ணல் - தமிழ் இலக்கியவரலாறு- சேதுராமன்		
WEB SOURCES(இணையதளங்கள்)		
- Tamil Heritage Foundation – www.tamilheritage.org<http://www.tamilheritage.org> - Tamil Virtual University Library – www.tamilvu.org/library http://www.virtualvu.org/library - Project Madurai – www.projectmadurai.org - Chennai Library – www.chennailibrary.com<http://www.chennailibrary.com> - Tamil University Library – www.ulib.prg<http://www.ulib.prg> - Tamil E-books downloads – tamilebooksdownloads.blogspot.com - Tamil Books online – books.tamilcube.com - Catalogue of the Tamil Books in the library of British congress archive.org		

பொதுத்தமிழ் - II
26UGTL21

Sem	Course Code	Course Category	Hours	Credit	MARK FOR EVALUATION		
					CIA	ESE	TOTAL
II	26UGTL21	GT	6 Hrs	3	100	100	100
COURSE TITLE		பொதுத்தமிழ் - II					

COURSE OUTCOMES (பயன்கள்)

CO1	பக்தி இலக்கியத்தின்தோற்றம்,வளர்ச்சி சிற்றிலக்கியத்தின் தோற்றம்,வளர்ச்சி குறித்து அறிந்துகொள்வர்.(K1)
CO2	பக்தி இலக்கியங்கள் ,சிற்றிலக்கியங்கள் முதலியவற்றின் இலக்கண மற்றும் இலக்கிய அமைப்பை விளங்கிக் கொள்வர் (K2)
CO3	பக்தி இலக்கியப் பாடல்களில் காணப்படும் தெய்வவழி பாட்டுணர்வு, சிற்றிலக்கியங்களில் காணலாகும் சமூகநீதிக் கருத்துகளை, இன்றைய வாழ்வோடு தொடர்புபடுத்தி நோக்குவர் (K3)
CO4	பக்தி இலக்கியம் சிற்றிலக்கியங்களின் வழி இலக்கண இலக்கியச்சிறப்புகளை ஒப்பிட்டுப் பேதங்களைக் காண்பர். (K3)
CO5	பக்கி இலக்கிய, சிற்றிலக்கியங்களின் வழி தமிழ்மொழி, பண்பாடு, மதம், தத்துவம் ஆகியவற்றினை மதிப்பிட்டுச் சீர்தூக்கிப் பார்ப்பர் (K5)
CO6	கற்ற இலக்கியங்களை அடிப்படையாகக் கொண்டு,சிறுபக்திக் கவிதைகள் அல்லது சிற்றிலக்கிய மரபில் பாடல் இயற்றும் திறன் பெறுவர்.,(K6)

UNITS	SYLLABUS CONTENTS	HOURS
I	பக்தி இலக்கியம் -1 1. திருஞானசம்பந்தர் - திருக்கோடிக்கா 2. திருநாவுக்கரசர் - திருப்பாதிரிப்புலியூர் 3. திருப்பாவை - ஆண்டாள் 4. குலசேகரஆழ்வார் - 5 ஆம் பதிகம் 5. சித்தர் பாடல்கள் - அழகணிசித்தர் (தேர்ந்தெடுக்கப்பட்டபாடல்கள்) சிற்றிலக்கியம்: 2 1 கலிங்கத்துப்பரணி - களம் பாடியது 2. திருக்குற்றாலக் குறவஞ்சி - மலைவளம் 3. திருக்காவலூர்க்கலம்பகம் - சமூகஉல்லாசம் 4. முக்கூடற்பள்ளு-நாட்டு வளம் 5. தமிழ்விடுதூது - தூதுக்கானகாரணம்	30
II	ஊரைநடை 1. இறைநம்பிக்கையும் மனிதவாழ்வும் 2. இயேசுபிரான் குறிப்பிடும் எண்வகைமனிதர்கள் 3. நபிகள் நாயகத்தின் வாழ்வியல் நெறிகள் 4. திருமூலர் காட்டும் இறைநெறி 5. வள்ளலார் கூறும் வாழ்வியல் நாவல் - கருப்பாயி என்கிற நூர்ஜஹான் -அன்வர் பாலசிங்கம்	15
III	தமிழ் இலக்கியவரலாறு (பக்திஇலக்கியம்,சிற்றிலக்கியம் தொடர்பானபகுதிகள்)	15
IV	இலக்கணம் சொல்லின் இலக்கணம்-பெயர் ,வினை, இடை,உரிச்சொற்கள் பிறமொழிச் சொற்களைத் தமிழில் வழங்கும் முறை	15

V	மொழிபெயர்ப்பு ஆட்சிச் சொல்லகராதி - மரபுத் தொடர்கள் -பழமொழிகள் - திருக்குறள்	15
TEXT BOOKS (பாடநூல்கள்)		
1. தமிழ்த்துறைவெளியீடு - தூயசவேரியார் தன்னாட்சிக் கல்லூரி,பாளையங்கோட்டை. 2. வகைமைநோக்கில் தமிழ் இலக்கியவரலாறு - முனைவர்பாக்கியமேரி 3. கருப்பாயின்கிறநூர்ஜஹான் -அன்வர் பாலசிங்கம்		
REFERENCE BOOKS (பார்வைநூல்கள்)		
• தமிழ் இலக்கியவரலாறு - சிற்பி. பாலசுப்பிரமணியன் • புதியநோக்கில் தமிழ் இலக்கியவரலாறு - தமிழண்ணல் • தமிழ் இலக்கியவரலாறு- சேதுராமன்		
WEB SOURCES (இணையதளங்கள்)		
• Tamil Heritage Foundation- www.tamilheritage.org • Tamil virtual University Library- www.tamilvu.org/ library http://www.virtualvu.org/library • Project Madurai - www.projectmadurai.org. • Chennai Library- www.chennailibrary.com . • Tamil Universal Digital Library- www.ulib.prg . • Tamil E-Books Downloads- tamilebooksdownloads..blogspot.com		

பொதுத்தமிழ் - III
26UGTL31

Sem	Course Code	Course Category	Hours	Credit	MARK FOR EVALUATION		
					CIA	ESE	TOTAL
III	26UGTL31	GT	6 Hrs	3	100	100	100
COURSE TITLE		பொதுத்தமிழ் - III					

COURSE OUTCOMES (பயன்கள்)

CO1	மாணவர்கள் காப்பியம், உரைநடை, ஊடகத்தமிழ், இலக்கணம், யாப்பு ஆகியவற்றின் அடிப்படைக் கருத்துக்கள்,பண்புகள், வரலாற்றுப் பின்னணிகளை அறிதல். (K1)
CO2	மாணவர்கள் தமிழ் இலக்கியவடிவங்கள் (காப்பியம்,உரைநடை) மற்றும் இலக்கணக் கூறுகளைப் (எழுத்து,சொல்,பொருள்,யாப்பு) புரிந்துகொண்டு அவற்றின் தனித்துவங்களைவிளங்கிக் கொள்ளல். (K2)
CO3	மாணவர்கள் கற்ற இலக்கணவிதிகள் மற்றும் யாப்புமுறைகளைப் பயன்படுத்தி சரியான தமிழ் வாக்கியங்களையும் செய்யுள்களையும் உருவாக்கப் பயிற்சியளித்தல். (K3)
CO4	மாணவர்கள் காப்பியங்கள் மற்றும் உரைநடைப் படைப்புகளைப் பகுத்து, ஆய்வுசெய்து,அதன் கருத்து,கட்டமைப்பு, இலக்கியநயம் ஆகியவற்றை ஆராய்தல். (K4)
CO5	மாணவர்கள் இலக்கியப் படைப்புகளைதரம்,மொழிநடை, இலக்கணஅமைப்பு ஆகியவற்றைவிமர்சனமுறையில் மதிப்பீடுதல், (K5)
CO6	மாணவர்கள் தமிழ் இலக்கணம் மற்றும் யாப்புஅடிப்படையில் சுயமாக செய்யுள்,கட்டுரை,உரைநடைப் படைப்புகளைஉருவாக்கப் பயிற்சியளித்தல்;(K6)

UNITS	SYLLABUS CONTENTS	HOURS
I	1. சிலப்பதிகாரம் - வழக்குரைக் காதை. 2. மணிமேகலை- ஆபுத்திரன் திறம் அறிவித்தகாதை. 3. சீவகசிந்தாமணி- பதுமையர் இலம்பகம். 4. கம்பராமாயணம் - மந்தரைச் சூழ்ச்சிப் படலம்.	30
	1. சூளாமணி 2. உதயணகுமாரகாவியம் 3. இயேசுகாவியம் 4. மருமக்கள் வழி மான்மியம்	
II	ஊரைநடை 1. காளத்திவேடனும் கங்கைவேடனும். 2. தீமையை இயற்றும் தன்மையினர் கூனி இயாகோ. 3. சிலம்புகாட்டும் சீர்மிகு சிந்தனைகள். 4. மணிமேகலை காப்பியத்தில் மானுட விழுமியங்கள். நாடகம் - வேலைக்காரி - அறிஞர் அண்ணா.	15
III	தமிழ் இலக்கிய வரலாறு (காப்பியங்கள்)	15
IV	இலக்கணம் - யாப்பு,எழுத்து, அசை. சீர்,தளை, அடி,தொடை,பா வகைகள்	15

V	ஊடகத்தமிழ் - விளக்கம், வகைகள்,செயல்பாடுகள் 1.இதழ்கள் 2.வானொலி 3.தொலைக்காட்சி 4.திரைப்படம்	15
TEXT BOOKS (பாடநூல்கள்)		
- தமிழ்த்துறைவெளியீடு-தூயசவேரியார்க் கல்லூரி,(தன்னாட்சி) பாளையங்கோட்டை. - வகைமைநோக்கில் தமிழ் இலக்கியவரலாறு-பாக்கியமேரி		
REFERENCE BOOKS (பார்வைநூல்கள்)		
- தமிழ் இலக்கியவரலாறு-சிற்பிபாலசுப்பிரமணியன் - புதியநோக்கில் தமிழ் இலக்கியவரலாறு-தமிழண்ணல் - தமிழ் இலக்கியவரலாறு-சேதுராமன்		
WEB SOURCES (இணையதளங்கள்)		
- Tamil Heritage Foundation – www.tamilheritage.org<http://www.tamilheritage.org> - Tamil Virtual University Library – www.tamilvu.org/library http://www.virtualvu.org/library - Project Madurai – www.projectmadurai.org - Chennai Library – www.chennailibrary.com<http://www.chennailibrary.com - Tamil University Library – www.ulib.prg<http://www.ulib.prg> - Tamil E-books downloads – tamilebooksdownloads.blogspot.com - Tamil Books online – books.tamilcube.com - Catalogue of the Tamil Books in the library of British congress archive.org		

பொதுத்தமிழ் - IV
26UGTL41

Sem	Course Code	Course Category	Hours	Credit	MARK FOR EVALUATION		
					CIA	ESE	TOTAL
IV	26UGTL41	GT-IV	6 Hrs	3	100	100	100
COURSE TITLE		பொதுத்தமிழ்- IV					
COURSE OUTCOMES (பயன்கள்)							
CO1:	பழந்தமிழ் இலக்கியவரலாற்றறிவைப் பெறுதல் (K1, K2)						
CO2:	சங்க இலக்கிய அறிமுகங்களின் ஊடாகத் தமிழர் வாழ்வியல் நெறிகளை உணர்தல். (K2,K3)						
CO3:	தமிழ் இலக்கியங்களின் செய்யுள் உருவம்,உள்ளடக்கம், படைப்பியல் கொள்கைகளைப் புரிந்துகொள்ளுதல். (K4)						
CO4:	அகத்திணை,புறத்திணைவாழ்வியல் நெறிப்பாடுகளின் ஊடாகத் தமிழர்ப்பண்பாட்டு அடிப்படைகளை மதிப்பிடும் திறன் பெறுதல். (K2,K3)						
CO5:	மொழித்திறன்,படைப்புத்திறன் பெறுதல். (K3,K4)						
CO6:	நாடக இலக்கியஅனுபவத்தின் வழியாகதமிழ்ச் சமூகநிலைகளை இலக்கியமாக்கும் நுட்பங்களைப் பெறுதல். (K2,K6)						

UNITS	SYLLABUS CONTENTS	HOURS
I	செய்யுள் பகுதி 1 1. நற்றிணை (5பாடல்கள்) 2. குறுந்தொகை (5பாடல்கள்) 3. அகநானூறு (2பாடல்கள்) 4. புறநானூறு (5பாடல்கள்)	30
	செய்யுள் பகுதி 2 1. நெடுநல்வாடை முழுமையும் 2. திருக்குறள் (விருந்தோம்பல், நட்பாராய்தல், குறிப்பறிதல்) 3. நாலடியார் (கல்வி)	
II	உரைநடைக் கட்டுரைகள் 1. ஊரும் பேரும் - ரா.பி. சேதுபிள்ளை 2. தமிழர் பண்பாடும்அதன் சிறப்பியல்புகளும் - தனிநாயகம் அடிகளார் 3. இலக்கியஉருவாக்கமும் பயனும் - சேதுமணிமணியன் பயண இலக்கியம் 1. மண் புதிது - சுப்ரபாரதிமணியன்	15
III	தமிழ் இலக்கியவரலாறு 1. சங்ககாலம் 2. சங்கம் மருவியகாலம்	15
IV	இலக்கணம் -பொருள் 1. அகப்பொருள் 2. புறப்பொருள் 3. அணியிலக்கணம் (உவமை,உருவகம்,பிறிதுமொழிதல்,வஞ்சப்புகழ்ச்சி,தற்குறிப்பேற்ற அணி)	15
V	மொழிப்பயிற்சி 1. ஒப்பும் மறுப்பும் (ஒருகருத்தினை வெட்டி,ஒட்டி எழுதும் பயிற்சி) 2. விண்ணப்பம் எழுதுதல் (பயிற்சி) 3. தமிழில் தன்விவரக் குறிப்புவரைதல் (பயிற்சி) 4. மேடைப்பேச்சு நுட்பங்கள் (நேர்முகப் பயிற்சிமற்றும் மதிப்பீடு)	15

TEXT BOOKS (பாடநூல்கள்)	
1. பொதுத்தமிழ் பாடநூல், தமிழ்த்துறை வெளியீடு ,தூய சுவேரியார் கல்லூரி,பாளையங்கோட்டை.	
2. பாக்கியமேரி,தமிழ் இலக்கியவரலாறு,பதினொன்றாம் பதிப்பு - 2025 ,பூவேந்தன் பதிப்பகம்,மயிலாப்பூர்,சென்னை.	
3. சுப்பரபாரதிமணியன்இமண் புதிது,முதல் பதிப்பு 2018 அறிவுப்பதிப்பகம்,சென்னை.	
REFERENCE BOOKS (பார்வைநூல்கள்)	
பார்வை நூல்கள்	
1. மது.ச.விமலானந்தம்தமிழ் இலக்கியவரலாறு,	
2. மு. வரதராசனார்,தமிழ் இலக்கியவரலாறு,	
3. தமிழண்ணல்,புதியநோக்கில் தமிழ் இலக்கியவரலாறு.	
WEB SOURCES (இணையதளங்கள்)	
• Tamil Heritage Foundation – www.tamilheritage.org<http://www.tamilheritage.org> • Tamil Virtual University Library – www.tamilvu.org/library http://www.virtualvu.org/library • Project Madurai – www.projectmadurai.org • Chennai Library – www.chennailibrary.com<http://www.chennailibrary.com> • Tamil University Library – www.ulib.prg<http://www.ulib.prg> • Tamil E-books downloads – tamilbooksdownloads.blogspot.com • Tamil Books online – books.tamilcube.com • Catalogue of the Tamil Books in the library of British congress archive.org	

HINDI

SEMESTER 1

UNIT I: GRAMMAR

- Swar(स्वर),
- Vyanjan(व्यंजन),
- Barah Khadi(बारहखड़ी),
- Shabd aur Vakya Rachna (शब्द और वाक्य रचना)

UNIT II: SUBODH HINDI RACHNA

- Binna binna arth(भिन्न भिन्न अर्थ),
- Numbers (गिनती1-100),
- Vaakyong mein Prayag kijiye (वाक्यों में प्रयोग कीजिये)
- Rishto ke Naam (रिश्तों के नाम)
- Gharelu padartho ke Naam (घरेलू पदार्थों के नाम)

UNIT III: PROSE

- Sadharan Vakya aur Sangya (संज्ञा),
- Sarvanaam(सर्वनाम)
- Visheshan(विशेषण)
- Kriya (क्रिया)

UNIT IV: SHORT STORIES

- Bacho ki Kahaniya

UNIT V: COMPREHENSION

- Sant Tiruvalluvar, संत तिरुवल्लुवर,
- Hamara desh, (हमारा देश,)
- Paryavaran Sanrakshan, (पर्यावरण संरक्षण)
- Naari Sashaktikaran, (नारी सशक्तिकरण)
- Rastriya janvar(राष्ट्रीय जानवर)

Reference Books

Hindi sentences - Chaturbhuj Sahay
Subodh Hindi Grammar - Phoolchand Jain
Sankshipt Hindi Grammar - Kamta Prasad
Practical Hindi - Nagappa
Abhinav Hindi Grammar – Nagappa
Saral Hindi Grammar - Shyamchandra Kapur
Grammar Pradeep - Ramdev
Laghu Bal Kathaye - Ramashankar
Captivating Stories - Premchand
CONCISE GRAMMAR OF THE HINDI LANGUAGE - H.C Scholberg
Hindi Grammar - Edwin Greaves

SEMESTER II

UNIT I: Hindi Ekankiya

- Sooryodhaya(सूर्योदय),
- Mayoppiya (मायोपिया),
- Udhayan (उदयन),
- Upendranath Ashk – Lakshmi ka Swagat

Characters: (Tippani)

- Nirjarani (निर्झरणी),
- Sudhi(सुधी)
- Thathagath(तथागत),
- Udhayan (उदयन),

UNIT II: Hindi Kahaniya

- Premchand – Bade Ghar ki Beti
- Malathi Joshi – Vo Tera Ghar Yah Mera Ghar
- Gyanranjan - Pita

UNIT III: ANCIENT POETRY

- Pathya Chayanika– KabeerDhoha–Saaki (साखी) 1 to 10.

UNIT IV: Vyakaran

- Kriya Visheshan (क्रियाविशेषण),
- Sambandh Bodhak (संबंधबोधक),
- Samuchay Bodhak (समुच्चयबोधक)
- Vismayadi Bodhak (विस्मयादिबोधक) aadi shabdo ka prayog

UNIT V:

Pratiyogi Pariksha par aadharit Nimnalikhit Vishayo se sambandhit Prashikshan Karya

- Tamil Bhasha: Mahakavi Bharatiyar
- Sanket Vikas dwara Lekhan kala aur Kahani Lekhan ka Vikas
- Gadyansh dekhkar sahi Shirshak chunna
- Pathit Vyakaran par aadharit Vakya rachna
- Vibhinna Pratiyogi parikshao ke bare mein suchna pradan dena

Reference Books

- Sooryodaya (Dakshin Bharat Hindi Pracharsabha publications)
- Aath Ekanki Natak - Ed. Dr. Ramkumar Verma
- Das Ekanki

SEMESTER III

Niji Patra – Arth aur Bhed, Pitaji/Mataji ke naam patra, Mitra, Bhai aadi ke naam patra

UNIT I: Niji Patra Lekhan

- Niji Patra - Arth aur Bhed
- Pitaji/Mataji ke naam patra
- Mitra, Bhai aadi ke naam patra
- Paribhashik Shabdawali - 20 words

Unit II

- Samajik Patra Lekhan
- Aavedan Patra - Noukri, Chutti aadi
- Dak Adhikari ke naam patra
- Paribhashik shabdawali - 20 words

Unit III

- Vyavasayik Patra Lekhan
- Vyavasayik Patra - Arth aur Bhed
- Prakashak ke naam patra
- Shikayathi
- Paribhashik shabdawali - 20 words

Unit IV

- Samanya Parichay
- Sarkari Patra
- Ardh-Sarkari Patra
- Gyapan, Paripatra
- Anusmarak
- Paribhashik Shabdawali - 20 words

Unit V

- Precis Writing And Applied Grammar (Ling, Vachan and Karak)
- Karak (कारक)
- Vachan badaliye(वचन बदलिए),
- Ling badaliye(लिंग बदलिए)

Reference Books

- Viyavaharik Hindi, Hindi Prachar press, T.Nagar, Madras-600 017
- Alekhan aur Tippan - Prof. Viraj
- Alekhan Kichlu

SEMESTER IV

UNIT I: STORIES (दक्षिणी कथाएं)

- Meri pathni(मेरी पत्नी),
- Thotha aur Mynah(तोता और मैना),
- Noorunisha(नूरनिशा),
- Mruthudhand (मृत्यु दंड),
- Karmaveer(कर्मवीर) and their Characters.

UNIT II: Proudlyogiki aur Hindi

- Unicode
- Dewanagari Lipi
- Hindi ki Vibhinna Website - Ek Parichay

UNIT III: POETRY (काव्यशास्त्र)

Ras :

- Kavyaras (काव्यरस),
- Veer ras (वीररस),

Sandh:

- Chowpayi (चौपाई),
- Rola(रोला),

Alankar:

- Yamakalankar (यमकअलंकार),
- Upmaalankar (उपमाअलंकार).

UNIT IV:

AUTOBIOGRAPHY (Sathya ka Swar–Gandhiji ki Jeevani)

- Ma, bap aur Janma(मां, बाप और जन्म)
- Ladakpan (लड़कपन)
- High school mein (हाई स्कूल में)
- Vivah aur Mamsabhakshan(विवाह और मांस भक्षण)
- Ankhen Kuli (आंखें खुली)

Unit V :Pratiyogi priksha par aadharit Computer sambandhit prashikshan Karya

- Hindi mein Powerpoint banana
- Hindi mein Google Document taiyar karna
- Hindi mein Google form taiyar karna
- Vibhinna pratiyogi pariksha ke bare mein suchna pradan karna

Reference Books

- Social Networking: Naye Samay ka Samvad – Ed. Sanjay Dwivedi
- Jansanchar aur Maas Culture - Jagdeeshwar
- Media: Bhumandalikaran aur Samaj - Ed. Sanjay Dwivedi
- Naye Jamane ki Patrakarita - Sourabh Shukla
- Patrakarita se Media tak - Manoj Kumar

French semester-I

UNIT. I

Communication:	Decrire la salle de classe et le professeur.
Grammaire :	Les articles indifinis et defines, les verbes reguliers et irreguliers.
Culture:	Les symbols de la France.
Projet:	Desiner les objets dans le sac et dans la trousse.

UNIT. II

Communication:	Parler de la journee.
Grammaire :	Les verbes pronominux,Affirmatif Negatif et interrogatif
Culture:	Les Frontieres de la France.
Projet:	Faire un rapport sur la journee des parents.

UNIT. III

Communication:	se presenter, parler de la nationlite, dire son numero de telephone.
Grammaire :	Les prepositions , Accord adjective nom, verbes aller venir.
Culture:	Les fete en France trditions et multi culturralisme.
Projet:	faire une liste des camardes et noter leurs numeros de telephone a haute voix et demander a un ami de verifier.

UNIT. IV

Communication:	parler de la nourriture et des repas simples et sains.Decrire les repas.
Grammaire :	L'impertif, Les articles partitifs,
Culture:	Les plats francais.
Projet:	Dessiner et decrire l nourriture que les gens mangent dans leur pays,

UNIT. V

Communication:	Exprimer ses gouts.
Grammaire :	Les adjectifs qulificatifs, les adjectifs possessifs, La negation.
Culture:	La France et ses regions.
Projet:	qu'est-ce que tu aimes faire pendant ton temps libre?

- Lecon 1.** La vie scolaire de luc
- Lecon 2.** La vie quotidienne de luc
- Lecon 3.** Le monde multiculturel
- Lecon 4.** La bonne nourriture
- Lecon 5.** Parlons de nos preferences

Ref.Avenir method de francais 3

French
Semester-II

UNIT. I

Communication:	Demander et donner les directions , Situer un endroit (sur la carte)
Grammaire :	Les prepositions L'interrogation.
Culture:	Les vêtements français.
Projet:	Faire une carte de la ville imaginaire.

UNIT. II

Communication:	Parler de la semaine ,Parler des activités faites pendant la semaine.
Grammaire :	Les articles contractes,Les adjectifs démonstratifs, les expressions avec les verbes Faire et Avoir.
Culture:	Les villes connues en France.
Projet:	Preparer un emploi du temps avec des activités faites pendant la semaine.

UNIT. III

Communication:	Parler du passé, Raconter le week end dernier.
Grammaire :	Le passé composé avec l'auxiliaire avoir, La formation du participe passé.
Culture:	Noël
Projet:	Faire un petit dossier sur les activités faites pendant les vacances d'été.coller les photos de ces activités faites.

UNIT. IV

Communication:	Parler du passé, Raconter les vacances dernières
Grammaire :	Le passé composé avec l'auxiliaire être.
Culture:	Les montagnes en France.
Projet:	Preparer un dossier sur la fête favorite célébrée l'année dernière.

UNIT. V

Communication:	Parler de la ville de demain , Exprimer des projets et des prédictions.
Grammaire :	Le futur proche, Le futur simple.
Culture:	Les monuments en France.
Projet:	Imaginer et présenter la ville du futur

Leçon 6. Sara cherche son chemin

Leçon 7. Ma semaine en action

Leçon 8. Mon week end dernier

Leçon 9. Mon séjour à Annecy

Leçon 10. La ville du futur

Ref.Avenir method de français 3

French
semester-III

UNIT. I

- Communication:** Decrier ce que les Francais aiment faire , Parler de la vie des Francais.
- Grammaire :** Les articles indefinis et defins ,Les articles partitifs,Les articles contractes.
- Culture:** La France dans le Coeur des Francais.
- Projet:** Preparer un dossier sur ce que les gens du pays aiment faire.

UNIT. II

- Communication:** Comparer la vie des adolescents d'autrefois et d'aujourd'hui.
- Grammaire :** Le negation,Les articles.
- Culture:** Les sous cultures adolescents.
- Projet:** Decrivez la vie des adolescents d'hier et d'aujourd'hui.

UNIT. III

- Communication:** Parler d'un sport.
- Grammaire :** L'imperatif,L'interrogation questions/reponses,Lesconjonctins.
- Culture:** Le sport en France.
- Projet:** Parler du sport favort.

UNIT. IV

- Communication:** Decriver les vacances,Racontredes experiences,Envoyerles mails.
- Grammaire :** Le passe compose.
- Culture:** La France ,une destination touristique.
- Projet:** Dessiner ou coller les images de l'anniversaire fete l'annee derniere, rediger un petit texte pour raconter ce jour.

UNIT. V

- Communication:** Parler d'une sortie scolaire,Ecrire un e-mail.
- Grammaire :** Le passe recent, le futur proche .
- Culture:** Les penitures celebres du muse du Louvre.
- Projet:** Ecris sur une visite au muse.

- Lecon 1.** Esprit Francais.
- Lecon 2.** Les ados modernes
- Lecon 3.** Une grande aventure a velo
- Lecon 4.** Un sejour a nice
- Lecon 5.** La sortie au muse scientifique

Ref.Avenir method de francais 4

French Semester-IV

UNIT. I

Communication:	Parler de l'automobile
Grammaire :	Les adjectifs les verbes .
Culture:	Les automobiles en France.
Projet:	Faire un dossier sur ta voiture .Coller une photo de cette voiture et decire cette voiture.

UNIT. II

Communication	Reflechir aux villes a venir,Parler des projets d'avenir.
Grammaire :	Le futur simple ,le futur proche.
Culture:	Les projets d'avenir en France
Projet:	preparer un dossier sur les changements attendus dans la ville

UNIT. III

Communication:	partager la recette , Parler de la nourriture.
Grammaire :	Les adverbs de quantite,l'adjectif indefini.
Cultur	les fetes et les traditions.
Projet:	Preparerun dossier sur un dessert prefereet parle de son origine.

UNIT. IV

Communication:	Discuter les avantages d'internet,Ecrire un blog.
Grammaire :	Les adjectifs demonstratifs , Les adjectifs possessifs ,Les prepositions.
Culture:	Les principaux medias francais.
Projet:	Faire un rapport sur les avantages et les inconvenients d'internet.

UNIT. V

Communication:	Rediger des invitations , Ecrire des .messages les consignes, Repondre a une invitation.
Grammaire :	Les verbes pronominaux , les verbes pronominaux a l'impertif.
Culture:	Les arts du spectacle en France.
Projet:	Rediger une belle invitation pour feter l'anniversaire d'un grand parent.

Lecon 6. Le monde des automobiles

Lecon 7. La vie en 2050

Lecon 8. L'epiphanie en France

Lecon 9. La vie en ligne

Lecon 10. On fait quoi ce week-end?

Ref.Avenir method de francais 4

GENERAL ENGLISH

DEPARTMENT OF ENGLISH

UG – PART II - GENERAL ENGLISH

(The Seven-Tier Pattern recommended by UGC Curriculum Development Centre and Identified as Best Practice by NAAC)

	Stream A (For learners of high entry level proficiency)	Stream B (For learners of average entry level proficiency)	Stream C (For learners of low entry level proficiency)
Courses in Semester I	IV 26UGEL14	III 26UGEL13	I 26UGEL11
Courses in Semester II	V 26UGEL25	IV 26UGEL24	II 26UGEL22
Courses in Semester III	VI 26UGEL36	V 26UGEL35	III 26UGEL33
Courses in Semester IV	VII 26UGEL47	VI 26UGEL46	IV 26UGEL44

GENERAL COURSE OUTCOMES

CO1 Acquire the four language skills (Listening, Speaking, Reading, and Writing)

CO2 Develop the skill of independent reading and interpreting of graded texts

CO3 Expand and consolidate active and passive vocabulary

CO4 Acquire the skills needed to participate in a conversation that builds knowledge collaboratively

CO5 Acquire a clear understanding of English Grammar to facilitate the accuracy of communication.

CO6 Develop the skills of formal written communication to be used in academic and career-related contexts

TEXTS

Course I – *SPARK I: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course II - *SPARK II: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course III - *SPARK III: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course IV - *SPARK IV: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course V - *SPARK V: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course VI – *SPARK VI: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course VII - *SPARK VII: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

EXTERNAL EXAMINATION

❖ External Examination has two components:

1) Written Examination and 2) Spoken English Viva Voce

❖ A three-hour written examination will be conducted for 100 marks for all General English papers and the scores will be converted to 40 marks, with a pass minimum of 16 marks.

❖ At the end of every semester, Spoken English Viva Voce will be conducted for all the students for 100 marks (four components) and the scores will be converted to 10 marks, with a required pass minimum of 4 marks.

❖ To pass in any General English paper, a student must secure the pass minimum of 40 out of 100 (16/40 in Written Examination and 4/10 in Spoken English Viva Voce Examination).

Distribution of marks: **Written Exam** (100 marks) Converted to 40 marks
 Spoken English Viva voce (100 marks) Converted to 10 marks
 TOTAL (40+10) = 50 marks

INTERNAL ASSESSMENT

❖ Two Internal Examinations shall be conducted for 50 marks each along with the Continuous Internal Assessments for 30 marks.

❖ The internal assessment for the courses may include skill-based activities such as seminar presentation/spoken English /critical podcast/ video essay/ creating a 5–8 slides on a topic/ composing a poem/ submitting a relevant photo with description etc.

In both the Internal Examinations and Semester Written Examination, 40% of the mark is allotted for literature-based questions, and 60% of the mark is allotted for grammar and composition exercises.

General English Evaluation Procedure

Internal Examination			Converted to	Total
CIA 1 (Written)	50	Converted to 70	50	100
CIA 2 (Written)	50			
Two Classroom Assessments (Spoken/Skill-based Activities) 2x 15	30	30		
External Examination			Converted to	
Semester Exam (Written)	100	Converted to 40/ (Pass Min. 16)	50	
Semester Viva Voce 4x25 (Spoken)	100	Converted to 10/ (Pass Min. 4)		

Course I

Hours: 6

Course Code: 26UGEL11

Credits: 3

LEARNING OUTCOMES

LO1 To provide an ambience to acquire the basic language skills, listening, speaking, reading, and writing

LO2 To make the learners learn the basic elements of grammar

LO3 To enable them to involve in basic communicative activities

LO4 To develop basic vocabulary

LO5 To help the learners comprehend and respond in English

LO6 To build confidence in using English to communicate

UNIT – I POETRY (READING AND WRITING SKILLS)

1. Sarojini Naidu- “Indian Weavers”
2. Robert Burns – “My Love is like a Red Red Rose”

UNIT – II SHORT STORIES (READING AND WRITING SKILLS)

1. W. Somerset Maugham – “The Ant and the Grasshopper”
2. Guy De Maupassant – “The Necklace”

UNIT –III GRAMMAR AND VOCABULARY SKILLS

1. Use of Verbs: Verb Grid (Positive, Negative & Question), Regular Verbs, Irregular Verbs & Modal
2. Tenses: Active Voice Tenses & Passive Voice Tenses
3. Use of Nouns: Forms of Personal Pronouns, Use of Nouns as Subject, Object, Complement and Object of the Preposition
4. Sentence Patterns: SV, SVO, SVC, SVA, SVOA, SVIODO
5. Punctuation and Capitalisation
6. Reading Comprehension (5 Anecdotes and 5 Wisdom Stories)

UNIT – IV LISTENING AND SPEAKING SKILLS

1. Listening Practice –Listen and Do exercises: Listening to English songs, simple Indian short stories, homonyms/homophones
2. Pronunciation Practice: Vegetables, Fruits, Flowers, Trees, Spices, Eatables
3. Introducing Oneself
4. Introducing Others

UNIT –V LISTENING AND SPEAKING SKILLS

1. Greetings
2. Making Request
3. Reading Aloud (From the text)
4. Describing a place / a picture (With hints)

COURSE OUTCOMES

Learners will be able to

CO1 Use grammatical structures in meaningful constructions

CO2 Use oral communication for day-to-day activities

CO3 Use simple sentences for oral and written communication

CO4 Use punctuation and capitalisation accurately

CO5 Comprehend what they listen to, and respond to it at the primary level

CO6 Read and appreciate simple stories and anecdotes

TEXT BOOKS

- *SPARK I: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 2019.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-2.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*, India: Trinity Press, 2017
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION

Marks

PART A - MCQs (7 from each of the Units I, II & 6 from Unit III)

20

PART B - Compulsory - Units I, II & III (5X3)

15

- Unit I - Short answer/ ERC
- Unit II - Short answer/ ERC
- Verb Grid (be verb)
- Verb Grid (possessive)
- Verb Grid (action/passive)

PART C – Compulsory- Unit III (5x7)

35

- Use of Verbs: Verb Grid
- Tenses
- Use of Nouns
- Sentence Patterns
- Punctuation and Capitalisation

PART D - (3x10)

30

- Essay (250 words) Unit I (Either/or)

- Essay (250 words) Unit II (Either/or)
- Compulsory -Comprehension

TOTAL 100

INTERNAL EXAMINATIONS Marks

PART A - MCQs 6X1(2 from each of the Units I, II & III) 6

PART B- Compulsory - one question from each of the Units I, II & III

1 Short answer/ 1 ERC / Grammar (3X3) 9

PART C –Compulsory (Unit III) (3X5) 15

PART D- (2X10) 20

- Essay - Either /or Units – I & II 250 words

- Compulsory- Grammar/ Composition

TOTAL 50

INTERNAL ASSESSMENTS Marks

Skill-based activity - 2x15 30

(Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/ Composing a poem/ Submitting a relevant photo with description, etc.)

TOTAL 30

Viva Voce Components: 100 Marks

1. Introducing Oneself / Others (25)
2. Reading Aloud (From the text) (25)
3. Describing a place / a picture (With hints) (25)
4. Conversation with the examiner (Greetings/ Making Request) (25)

COURSE II

Hours: 6

Course Code: 26UGEL22

Credits: 3

LEARNING OUTCOMES

LO1 To provide an ambience to acquire the basic language skills, listening, speaking, reading, and writing

LO2 To make the learners frame questions and answers

LO3 To enable them to involve in basic communicative activities

LO4 To develop a comprehensible use of adjectives

LO5 To help the learners comprehend and respond in English

LO6 To develop oral communication for day-to-day activities

UNIT – I POETRY (READING AND WRITING SKILLS)

1. Rabindranath Tagore – “Leave this Chanting and Singing”
2. Gerard Manley Hopkins- “God’s Grandeur”

UNIT – II SHORT STORIES (READING AND WRITING SKILLS)

1. Sister Nivedita - “The Judgement Seat of Vikramaditya”
2. Stephen Leacock - “With the Photographer”

UNIT – III GRAMMAR AND VOCABULARY SKILLS

1. Use of Adjectives
2. Use of Conditional ‘If’ (Probable & Improbable Conditions)
3. Use of ‘who’, ‘which’, ‘where’ & ‘that’ in combining sentences
4. Framing questions – ‘Wh –’ & ‘Yes’ / ‘No’ Questions
5. Prefixes and Suffixes
6. Developing Hints into a Paragraph

UNIT – IV LISTENING AND SPEAKING SKILLS

1. Listening Practice – Listen and Do exercises: Sound patterns and words ending ‘s’ endings and ‘d’ endings, and Listening to English songs and Indian short stories
2. Pronunciation Practice: Medical Terms/ Names of Ailments/People /Currency/ Countries and Capitals/World-famous Cities
3. Making Requests
4. Offering help

UNIT – V LISTENING AND SPEAKING SKILLS

1. Seeking Permission
2. Expressing Gratitude
3. Reading Aloud (from the Prescribed Text)
4. Narrating a Story (from Hints)

COURSE OUTCOMES

Learners will be able to

CO1 Use grammatical structures in meaningful contexts

CO2 Use oral communication for day-to-day activities

CO3 Use simple sentences for oral and written communication

CO4 Use enhanced vocabulary

CO5 Comprehend and respond to what they listen to at the secondary level
CO6 Read and appreciate simple pieces of fiction and non-fiction

TEXT BOOKS

- *SPARK II: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 2019.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*, India: Trinity Press, 2017.
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION

Marks

PART A – MCQs (7 from each of the Units I, II, and 6 from Unit III)	20
PART B – Compulsory Units I, II & III - Short answers/ ERC/Grammar (5X3)	15
• Unit I - Short answer/ ERC • Unit II - Short answer/ ERC • Prefixes • Suffixes • Adjectives	
PART C – Compulsory Unit III (5x7)	35
• Adjectives • Use of 'who' & 'where' in combining sentences • Use of 'which' & 'that' in combining sentences • Framing questions – 'Wh –' & 'Yes' / 'No' Questions • Developing Hints into a Paragraph	
PART D – (3x10)	30
• Essay (250 words) Unit I (Either/or) • Essay (250 words) Unit II (Either/or) • Compulsory -Use of Conditional 'If' (Probable & Improbable Conditions)	

TOTAL

100

INTERNAL EXAMINATIONS	Marks
PART A - MCQs 6X1(2 from each of the Units I, II & Unit III)	6
PART B- Compulsory-one question from each of the Units I, II & III	
1 Short answer/ 1 ERC/ Grammar (3X3)	9
PART C –Compulsory (Unit III) (3X5)	15
PART D – (2X10)	20
• Essay - Either /or Units – I & II 250 words • Compulsory - Grammar/ Composition	
TOTAL	50

INTERNAL ASSESSMENTS	Marks
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Skill based activity – 2x15	30
(Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/ Composing a poem/ Submitting a relevant photo with description, etc.)	
TOTAL	30

Viva-Voce Components: 100 Marks

1. Pronunciation: Medical Terms/ Names of Ailments/People /Currency/ Countries and Capitals/ World famous Cities (25)
2. Conversation: Making Requests/Offering help/Seeking Permission /Expressing Gratitude (25)
3. Reading Aloud (from the Prescribed Text) (25)
4. Narrating a Story (from Hints) (25)

COURSE III

Hours: 6

Course Code: 26UGEL13, 26UGEL33

Credits: 3

LEARNING OUTCOMES

LO1 To involve the learners in reading and interpreting English in poetry and prose (Fiction and Non-fiction)

LO2 To enable learners to write about prescribed literature

LO3 To help learners learn the appropriate use of articles, prepositions and adverbs

LO4 To help learners develop vocabulary register through homonyms, homophones and homographs

LO5 To facilitate in learners, the ability to create a narration based on hints

LO6 To build confidence in the learners to speak English for specific purposes

UNIT – I POETRY (READING AND WRITING SKILLS)

1. William Shakespeare – “All the World’s a Stage”
2. P. B. Shelley – “Ozymandias”
3. Oliver Goldsmith – “The Village Schoolmaster”

UNIT – II SHORT STORIES/ PROSE (READING AND WRITING SKILLS)

1. O. Henry – “The Gift of the Magi”
2. Katherine Mansfield – “A Cup of Tea”
3. Mark Twain – “A Day at Niagara”

UNIT – III GRAMMAR AND VOCABULARY SKILLS

1. Articles
2. Prepositions
3. Adverbs
4. Spotting Errors (Articles/ Prepositions / Adverbs)
5. Homonyms, Homophones, Homographs
6. Constructing a story using hints

UNIT –IV LISTENING AND SPEAKING SKILLS

1. Listening Practice: Listen and Do exercises: Listening to short passages , short stories (Indian and British) , English songs, *Mind your Language* (Episodes:1-2)
2. Pronunciation Practice : Words related to professions
3. Words generally mispronounced
4. Telephonic Conversation
5. Making Suggestions

UNIT – V LISTENING AND SPEAKING SKILLS

1. Complimenting / Congratulating
2. Expressing Sympathy
3. Reading aloud
4. Describing a picture/ Describing a process
5. Personal Conversation (Habits, Hobbies, Future Plan)

COURSE OUTCOMES

Learners will be able to

CO1 Read and understand English in poetry and prose (Fiction and Non-Fiction)

CO2 Write coherent essays about the prescribed literature

CO3 Use articles, prepositions and adverbs appropriately

CO4 Use homonyms, homophones, and homographs appropriately, ensuring clarity and precision in their spoken and written English

CO5 Create a narration from hints

CO6 Speak English confidently in a descriptive as well as expository style

TEXT BOOKS

- *SPARK III: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 2019.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-2.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*, India: Trinity Press, 2017.
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION

Marks

PART A - MCQs (7 from each of the Units I, II, and 6 from Unit III)

20

PART B - Compulsory - Units I, II & III (5X3)

15

- Unit I - Short answer/ ERC
- Unit II - Short answer/ ERC
- Articles
- Prepositions
- Adverbs

PART C – Compulsory - Unit III (5x7)

35

- Articles
- Prepositions
- Adverbs
- Homonyms, Homophones, Homographs
- Constructing a story using hints

PART D - (3x10)

30

- Essay (250 words) Unit I (Either/or)

- Essay (250 words) Unit II (Either/or)
- Compulsory -Spotting Errors (Articles/ Prepositions / Adverbs)

TOTAL **100**

INTERNAL EXAMINATIONS

Marks

PART A - MCQs 6X1(2 from each of the Units I, II &Unit III)

6

PART B- Compulsory one question from each of the Units I, II & III

1 Short answer/ 1 ERC/ Grammar (3X3)

9

PART C – Compulsory- (Unit III) (3X5)

15

PART D- (2X10)

20

- Essay - Either /or Units – I & II 250 words

- Compulsory- Grammar/ Composition

TOTAL

50

INTERNAL ASSESSMENTS Marks

Skill based activity – 2x15

30

(Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/
Composing a poem/ Submitting a relevant photo with description etc.)

TOTAL 30

Viva-Voce Components: 100 Marks

1. Pronunciation: Words related to professions /Words generally mispronounced (25)
2. Conversation: Making Suggestions /Complimenting / Congratulating /Expressing Sympathy /
Habits, Hobbies, Future Plan (25)
3. Reading aloud (25)
4. Describing a picture/ Describing a process (25)

COURSE IV

Hours: 6

Course Code: 26UGEL14, 26UGEL24, 26UGEL44

Credits: 3

LEARNING OUTCOMES

LO1 To make learners read and understand intermediate level poetry and prose

LO2 To encourage learners to continue building a vocabulary register as the students interpret, speak, and write about prescribed literature

LO3 To make learners use tenses and concord in meaningful constructions

LO4 To enable learners to employ appropriate synonyms and antonyms in written and spoken communication

LO5 To help learners learn the different types of letters, resumes and the art of composing e-mails and the use of appropriate language

LO6 To build confidence in students to speak English naturally and clearly, moving from basic sounds and reading practice to advanced conversations about books and real-world issues

UNIT – I POETRY (READING AND WRITING SKILLS)

1. John Milton – “On His Blindness”
2. Lewis Carroll – “The Walrus and the Carpenter”
3. Rudyard Kipling – “If”

UNIT – II SHORT STORIES /DRAMA (READING AND WRITING SKILLS)

1. Rabindranath Tagore – “The Postmaster”
2. Ernest Hemingway– “Cat in the Rain”
3. Fritz Karinthy – “The Refund”

UNIT – III GRAMMAR AND VOCABULARY SKILLS

1. Tenses
2. Concord
3. Spotting Errors (Tenses and Concord)
4. Describing a thing / a place / an event
5. Synonyms and Antonyms (Bhatnagar)
6. Letter Writing (Formal & Informal), Resumes and Composing emails

UNIT – IV LISTENING AND SPEAKING SKILLS

1. Listening Practice: Listen and Do exercises: Listening to conversations, announcements, interviews of popular personalities, and *Mind your Language* (Episodes: 3-4)
2. Complaining
3. Apologising
4. Offering encouragement and responding to them
5. Warning Someone

UNIT –V LISTENING AND SPEAKING SKILLS

1. Pronunciation Practice: Vowels and Diphthongs & Strong and Weak forms of words
2. Reading Aloud
3. Issue-based conversation

4. Speaking about prescribed literature
5. Speaking on a given topic

COURSE OUTCOMES

Learners will be able to

CO1 Read, interpret, and analyse intermediate level of English in poetry, prose, and fiction

CO2 Write coherent essays on prescribed literature

CO3 Use the various tense forms accurately with proper subject - verb agreement

CO4 Compose logically organized descriptive paragraphs, formal letters, professional resumes and emails

CO5 Use synonyms and antonyms appropriately, allowing for more expressive, varied, and accurate communication

CO6 Speak English fluently with confidence in an expository as well as analytical style

TEXTBOOKS

- *SPARK IV: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 1999.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-2.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*. India: Trinity Press, 2017.
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION	Marks
PART A - MCQs (7 from each of the Units I, II, and 6 from Unit III)	20
PART B- Compulsory- Units I, II & III (5X3)	15
• Unit I - Short answers/ ERC • Unit II - Short answers/ ERC • Tenses • Concord • Spotting Errors (Tenses and Concord)	
PART C – Compulsory- Unit III (5x7)	35
• Tenses	

- Concord
- Spotting Errors (Tenses and Concord)
- Describing a thing / a place / an event
- Synonyms(4) and Antonyms(3)

PART D - (3x10) 30

- Essay (250 words) Unit I (Either/or)
- Essay (250 words) Unit II (Either/or)
- Compulsory- Letter Writing/Resumes/ Composing emails

TOTAL 100

INTERNAL EXAMINATIONS

Marks

PART A - MCQs 6X1(2 from each of the Units I, II & Unit III)

6

PART B- Compulsory one question from each of the Units I, II & III

1 Short answers/ 1 ERC/ Grammar (3X3)

9

PART C –Compulsory (Unit III) (3X5)

15

PART D- (2X10)

20

- Essay - Either /or Units – I & II 250 words
- Compulsory- Grammar/ Letter writing/ Composition

TOTAL 50

INTERNAL ASSESSMENTS Marks

Skill based activity – 2x15 30

(Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/ Composing a poem/ Submitting a relevant photo with description, etc.)

TOTAL 30

Viva-Voce Components: 100 Marks

1. Reading Aloud (25)
2. Issue-based conversation (25)
3. Speaking about prescribed literature (25)
4. Speaking on a given topic (25)

COURSE V

Hours: 6

Course Code: 26UGEL25, 26UGEL35

Credits: 3

LEARNING OUTCOMES

LO1 To introduce learners to the intermediate level of English through prescribed literature

LO2 To make learners read, interpret, and write about prescribed pieces of literature

LO3 To make learners learn complex language structures, the appropriate use of conjunctions and voice forms

LO4 To help learners become familiar with the accurate use of language with an awareness of common errors in language use

LO5 To make learners understand the logical sequence of ideas within a paragraph

LO6 To make learners speak English fluently with confidence, argue both sides of a topic with confidence, and discuss difficult modern issues with logic and ease

UNIT – I POETRY (READING AND WRITING SKILLS)

1. William Wordsworth – “The Solitary Reaper”
2. H.W. Longfellow – “A Slave’s Dream”
3. Robert Frost – “The Road Not Taken”

UNIT – II PROSE/ DRAMA (READING AND WRITING SKILLS)

1. Oscar Wilde - “The Model Millionaire”
2. A. A. Milne – “The Boy Comes Home”
3. Francis Bacon – “Of Friendship”

UNIT – III GRAMMAR SKILLS

1. Synthesis and Transformation of Sentences (Simple, Compound & Complex)
2. Conjunctions
3. Active – Passive Voice
4. Spotting Errors (Simple, Compound & Complex sentences/ Conjunctions/ Active – Passive Voice)

UNIT – IV ADVANCED WRITING/ VOCABULARY AND ANALYTICAL SKILLS

1. Expansion of Ideas / Proverbs
2. Dialogue Writing
3. Words often confused (Bhatnagar)
4. Sentence Arrangement

UNIT – V LISTENING AND SPEAKING SKILLS

1. Listening Practice - Listen and Do exercises: Listening to news reading, directions, stories in American English, and watching movies
2. Pronouncing Words ending with common Inflections (like – ‘logy’ ‘-graphy’ ‘-ation’ etc.), Pronouncing ‘R’ in different positions

3. Reading and Interpreting
4. Turncoat
5. Expand a Proverb
6. Issue-Based Conversation

COURSE OUTCOMES

Learners will be able to

CO1 Read, interpret and analyse poetic English to understand open possibility of inferences

CO2 Write logically planned essays to address specific questions concerning prescribed literature

CO3 Understand the forms and structural differences in different types of sentences and their specific purposes

CO4 Use complex language structures with appropriate conjunctions and voice forms

CO5 Use vocabulary actively with an awareness of words often confused

CO6 Use Spoken English fluently with confidence and accuracy for specific purposes such as analytical, argumentative, and expository talks

TEXT BOOKS

- *SPARK V: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 1999.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-2.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*. India: Trinity Press, 2017.
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION

Marks

PART A - MCQs (8 from Unit I, 7 from Unit II, and 5 from Unit III)	20
PART B- Compulsory Units I & II – 3 Short answers/ 2 ERC (5X3)	15
PART C – Compulsory - Unit III & IV (5x7)	35

- Synthesis and Transformation of Sentences (Simple, Compound & Complex)
- Conjunctions
- Active – Passive Voice

- Expansion of Ideas / Proverbs
- Words often confused

PART D - (3x10)	30
• Essay (250 words) Unit I & II (Either/or) • a) Dialogue Writing (5) b) Sentence Arrangement (5) • Compulsory -Spotting Errors (Simple, Compound & Complex sentences/ Conjunctions/ Active – Passive Voice)	
TOTAL	100

INTERNAL EXAMINATIONS Marks

PART A - MCQs 6X1(1 from Units I & II , 5 from Units III & IV)	6
PART B- Units I & II – 2 Short answers/ 1 ERC (3X3)	9
PART C –Compulsory (Units III & IV) (3X5)	15
PART D- (2X10)	20
• Essay - Either /or Units – I & II 250 words • Compulsory -Grammar/ Letter writing/ Composition	
TOTAL	50

INTERNAL ASSESSMENTS Marks

Skill based activity – 2x15	30
(Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/ Composing a poem/ Submitting a relevant photo with description, etc.)	
TOTAL	30

Viva-Voce Components: 100 Marks

1. Reading and Interpreting (25)
2. Turncoat (25)
3. Expand a Proverb (25)
4. Issue-Based Conversation (25)

COURSE VI

Hours: 6

Course Code: 26UGEL36, 26UGEL46

Credits: 3

LEARNING OUTCOMES

LO1 To introduce learners to the advanced level of poetic English through representative pieces, to make them understand the oblique use of language

LO2 To make them read and understand classical English novel

LO3 To familiarise them with advanced language structures and the use of idioms and phrasal verbs

LO4 To make them understand and use different degrees for comparison, and use language for reporting speech

LO5 To acquaint them with the skills of expanding or developing, condensing ideas and responding to advertisements

LO6 To make them organize their professional knowledge into clear speeches, and discuss important world issues with confidence and logic

UNIT –I POETRY (READING AND WRITING SKILLS)

1. John Keats – “La Belle Dame Sans Merci”
2. John Donne – “Death Be Not Proud”
3. Walt Whitman – “O Captain! My Captain!”

UNIT - II FICTION (READING AND WRITING SKILLS)

George Orwell –*Animal Farm*

UNIT – III GRAMMAR AND VOCABULARY SKILLS

1. Degrees of Comparison
2. Direct- Indirect Speech
3. Spotting Errors/Correcting Errors (Comprehensive)
4. Idioms and Phrasal Verbs (Bhatnagar)

UNIT – IV ADVANCED WRITING AND ANALYTICAL SKILLS

1. Précis Writing
2. Essay Writing
3. Responding to the given advertisement
4. Cloze Test

UNIT – V LISTENING AND SPEAKING SKILLS

1. Listening Practice - Listen and Do exercises: Listening to famous speeches, poetry renditions, sports commentary, and TED Talks
2. Pronunciation Practice: Words generally often mispronounced
3. Reading and Interpretation
4. Issue-Based Conversation
5. Public speaking on a subject topic
6. Extempore

COURSE OUTCOMES

Learners will be able to

- CO1** Read and interpret the oblique language of poetry and write appreciative essays on the prescribed literature
- CO2** Read, interpret, and write analytical essays about prescribed literature
- CO3** Use advanced grammar structures to report speech and use the three degrees of comparison for intended emphasis
- CO4** Use advanced nuances of language such as idioms and phrasal verbs
- CO5** Write reflective, descriptive, expository and imaginative essays with appropriate content, and condense material to a précis
- CO6** Use English fluently and accurately for public speaking, extempore and other specific purposes

TEXT BOOKS

- *SPARK VI: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- Orwell, George. *Animal Farm*. Maple Classics, 2013.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 1999.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-2.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*. India: Trinity Press, 2017.
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION

	Marks
PART A - MCQs (7 from Unit I, 8 from Unit II, and 5 from Unit III)	20
PART B – Compulsory -2 ERC from Unit I / 3 Short answers from Units II	15
PART C – Compulsory- Unit III & IV (5x7)	35
• Degrees of Comparison • Direct- Indirect Speech • Précis Writing • Essay Writing • Responding to the given advertisement	
PART D - (3x10)	30
• Essay (250 words) Unit I & II (Either/or) • Compulsory- Spotting Errors (5) Correcting Errors(5) (Comprehensive) • Compulsory- a) Idioms and Phrasal verbs (5) b) Cloze Test (5)	
TOTAL	100

INTERNAL EXAMINATIONS	Marks
PART A - MCQs 6X1(1 from Units – I & II , 5 from Units III)	6
PART B- Compulsory Units I & II	
1 ERC from Unit I /2 Short answers from Units I & II (3X3)	9
PART C –Compulsory (Unit III & IV) (3X5)	15
PART D- (2X10)	20
• Essay - Either /or Units – I & II 250 words • Compulsory- Grammar/ Composition	
TOTAL	50

INTERNAL ASSESSMENTS Marks

Skill based activity - 2x15 30
 (Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/
 Composing a poem/ Submitting a relevant photo with description, etc.)
TOTAL 30

Viva-Voce Components: 100 Marks

1. Reading and Interpretation (25)
2. Issue Based Conversation (25)
3. Public speaking on subject related topic (25)
4. Extempore (25)

COURSE – VII

Hours: 6

Course Code: 26UGEL47

Credits: 3

LEARNING OBJECTIVES

LO1 To facilitate learners' reading advanced English through representative pieces of Literature

LO2 To help learners infer and interpret prescribed literature and write coherent, analytical essays

LO3 To help learners analyse a selected dramatic scene to identify how dialogue and stage directions reveal character motivation and advance the central conflict

LO4 To encourage learners in using English skillfully and creatively to discuss, brainstorm or debate a topic, through active practice

LO5 To equip learners with the soft skills necessary for employability

LO6 To help learners to produce structured reports, engaging blogs and original creative pieces by adapting their writing style to suit different purposes and audiences

UNIT –I DRAMA (READING AND WRITING SKILLS)

1. *Julius Caesar* – Act III, Scene I
2. *Othello* – Act V, Scene II
3. *Hamlet*- Act I, Scene III

UNIT –II FICTIONS (READING AND WRITING SKILLS)

H. G. Wells –*Time Machine*

UNIT –III SOFT SKILLS AND SPEAKING SKILLS (Theory and Practice)

1. Interview Skills*
2. Group Discussion*
3. Debate*
4. Interpersonal Skills*

(* Included for Spoken English Viva Voce and Internal Assessments)

UNIT –IV SOFT SKILLS

1. Time Management
2. Problem-Solving Techniques
3. Teamwork
4. Leadership

UNIT –V ADVANCED WRITING SKILLS

1. Report Writing
2. Blog writing
3. Creative Writing (poem/short story)

COURSE OUTCOMES

Learners will be able to

CO1 Read and understand advanced forms of English in Literature

CO2 Interpret and write analytical essays on topics concerning prescribed pieces of literature

CO3 Speak English fluently and accurately in professional contexts

CO4 Use English effectively and creatively for interviews, group discussions, etc.

CO5 Behave, react, and handle situations connected to employability, using the acquired knowledge of soft skills

CO6 Demonstrate versatility in written communication by producing structured technical reports, engaging digital content for blogs, and original creative works that employ evocative language and narrative techniques

TEXT BOOKS

- *SPARK VII: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- Wells, H. G. *Time Machine*. Oxford University Press, 2017 Ed.
- Alphonse S. J., Xavier. *We Shall Overcome: A Textbook on Life Coping Skills*. ICRDDCE Publication, 2004.

REFERENCE

- Sijwalii B.S. and Indu Sijwali, *General Interview Skills for Both Government and Private Sectors*. Arihant Publications, 2023.
- Soman, Ashok M, *Graduates and Postgraduates Entering the Corporate World*. Himalaya Publishing House, 2023.
- Patnaik, Priyadarshi, *Communication, Logical Thinking, and Public Speaking*. Cambridge University Press, India, 2016.

QUESTION PATTERN

SEMESTER EXAMINATION

Marks

PART A - MCQs (5 from each of the Units I, II, III & IV)

20

PART B- Compulsory - (5X3)

15

ERC from Unit I/ Short answers from Units II, III & IV

- Unit I
- Unit II
- Units III
- Units IV
- Units III/ IV

PART C –Compulsory- Units I, II, III, IV & V (5x7)

35

- Short Essay (200 words)/ Annotation Unit I
- Short Essay Unit II (200 words)
- Short Essay Unit III (200 words)
- Short Essay Unit IV (200 words)
- Creative Writing (poem/short story)

PART D - (3x10)

30

- Essay (250 words) Unit I & II (Either/or)
- Compulsory -Report writing (250 words)
- Compulsory - Blog writing (250 words)

TOTAL

100

INTERNAL EXAMINATIONS		Marks
PART A - MCQs 6X1 (1 from Units I & II , 5 from Units III & IV)		6
PART B- Units I & II – 2 Short answers from Units I & II/ 1 ERC from Unit I (3X3)		9
PART C –Compulsory (Unit III & IV) (3X5)		15
PART D- (2X10)		20
1. Essay - Either /or Units – I & II 250 words		
2. Compulsory - Report writing / Blog writing/ Creative Writing (Unit V)		
TOTAL		50

INTERNAL ASSESSMENTS Marks

Skill based activity – 2x15 30
 (Seminar presentation/ Video Essay/ Creating a 5–8 slide on a topic/ writing a poem, short story/Mock Interview /Group Discussion/Debate etc.)

TOTAL 30

Viva-Voce Components: 100 Marks

1. Interview Skills: Mock Interview (25)
2. Group Discussion (25)
3. Debate (25)
4. Interpersonal Skills: Conversation (25)

DEPARTMENT OF HUMAN EXCELLENCE
St. Xavier's College (Autonomous), Palayamkottai
Courses Offered

Semester	Category	Course Code	Course Title
I	FC	26UHER11/ 26UHEE11	Religion: Catholic Doctrine / Ethics
II	SEC3	26UHEI21	Integrated Personality Development
III	SEC4	26UHEL31	Life Coping and Entrepreneurial Skills Management
IV	EVS	26UEVS41	Environmental Studies
V	VE	26UVEH51	Human Rights and Social Analysis

NME

Semester	Category	Course Code	Course Title
I	Library	26ULBN11	Foundations of Library Science
I	XRF	26UXRN11	Traditional Knowledge of Indian Medicinal Systems
II	Library	26ULBN21	Information Resources
II	STAND	25USTN21	Rural Development Studies
II	XRF	26UXRN21	Indian Traditional Medicinal Foods
III	XRF	26UXRN31	Food Microbiology
IV	XRF	26UXRN41	Herbal Resources and Their Conservation
IV	MAX Forum	26UMXN41	Society, Economy and Politics in Contemporary India

Common Question Pattern

Internal Test

Part A	Answer ALL the questions in one or two lines	5 x 2 = 10
Part B	Answer ALL the questions, each in a paragraph	3 x 5 = 15
Part C	Write an essay on the following	1 x 10 = 10

Semester Exam

Part A	Answer ALL the questions in one or two lines	10 x 3 = 30
Part B	Answer ALL the questions, each in a paragraph	5 x 8 = 40
Part C	Write an essay on each the following	2 x 15 = 30

RELIGION: CATHOLIC DOCTRINE
(26UHER11)

SEMESTER:I	VE	HOURS:2	CREDITS: 2	TOTALHOURS:30
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Course Outcomes:

Upon completion of the course the students will be able to

- CO1:** Recite the Sacraments (K1)
- CO2:** Identify the challenges of the present day church (K1)
- CO3:** Associate Old and New testaments of the bible (K2)
- CO4:** Explain the Church history (K2)
- CO5:** Discuss the Marian worship (K2)
- CO6:** Summarize the catholic social teachings (K2)

Unit I: Introduction to Bible (6 Hours)

Bible as a Word of God, its inspiration, the Canon - Old and New Testaments and their interconnectedness - Traditional and modern interpretations

Unit II: Jesus and His Teachings (6 Hours)

Parables of Jesus – Important Teachings of Jesus: Kingdom of God – God’s Mercy – Trust in Providence – Two Commandments of love – Be committed – No condemnation of wealth – No condemnation of sinners – Love of enemies; Prayer: Jesus’ Prayer – Types of Prayer; Jesus the Healer – Types of Miracles of Jesus – Jesus the Liberator

Unit III: A Brief History of the Church & Changes and Challenges of the Modern World

(6 Hours)

The beginnings of the Church - Medieval period and its challenges - The importance of the Second Vatican Council and their decrees – Synodality; Casteism – Ecumenical unity and Inter Religious harmony – Digital world and Religious Faith - Catholic Social Teachings

Unit IV: Introduction to the Sacraments and Trinity (6 Hours)

The origin of the seven sacraments - Their practices and meanings – Trinity: The Father – The Son and the Holy Spirit

Unit V: Introduction to Mariology (6 Hours)

Mary, Mother of God and Jesus - Mary, our Mother and in the Gospels - Mariology in the history of the Church – Mary as a Prophet of revolution

REFERENCES:

- “Faith Matters” material prepared by the Department of Human Excellence.
- Second Vatican Council Documents.

ETHICS
(26UHEE11)

SEMESTER:I	VE	HOURS:2	CREDITS: 2	TOTALHOURS:30
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Course Outcomes

After completing this course, the learner will be able to know/understand: Cognitive Level (K-Level)

CO-1 Describe the Ethical foundations and human values (K2)

CO-2 Identify Ethics and its relationship with religions (K1)

CO-3 Evaluate the personal ethical codes in day-to-day life (K5)

CO-4 Associate ethics in family and society (K3)

CO-5 Apply moral, professional, and personal ethics in academic, workplace, and daily life situations. (K3)

CO-6 Analyse the modern ethical issue (K4)

Unit-I Introduction to Ethics and Human Interface (6 Hours)

Meaning, Nature and Scope of Ethics-Challenges and Importance of ethics-Basic ethical foundations-Human values: Tolerance, Compassion, Rationality, Objectivity. Scientific Attitude, Integrity, Respecting Conscience and Empathy. Mahatma Gandhi and Ethical practices: Non violence, Truth, Non-hatred and love for all, concern for the poorest, objectivity nationalism and Education for man making relation between ends and means.

Unit-II Ethics and Major religions and civilizations (6 Hours)

Ethics and its relationship with Religions- Ten Commandments: Christianity and Judaism tradition-Hinduism- Dharma and Mokhya (out of 4 goals of life Dharma, Artha, Kama and Mokhya),concept of Purusartha, Nisakama Karma (work without attachment to results), Concept of Basudev Kutumba and Peace(Whole including all animals, plants, inanimate beings and human form one world)-Islamic Ethics: Justice, Goodness, Kindness, Forgiveness, Honesty, Purity and piety- Buddhism - Arya AstangikaMarg: Right view, Thought , Speed, Action, Livelihood, Efforts, Attention and Concentration.

Unit-III Personal and Professional ethics (6 Hours)

Moral percepts -Dynamics of personal morality-Moral Conscience-Ethical aspects of Thirukural-Evils of corruption- Professional ethics- Nature, Characteristics, scope, type. Professional Value: Trusteeship, Inclusiveness, Commitment, Sustainability, Accountability, Transparency, Impartiality.

Unit-IV Governance, Family and Social Ethics (6 Hours)

Concept of Good Governance-Principles: Transparency, Accountability, Rule of Law-Ethical Leadership and Public Responsibility-Corruption and Integrity in Public Life-Role of Family in ethical formulations-Respecting persons-Peace and Justice-Human Duties-Respecting Persons and Human Dignity-Equality, Justice and Fairness -Peace, Non-violence and Social Harmony-Tolerance, Pluralism and Social Inclusion.

Unit- V Judicious Use of Technology (6 Hours)

Judicious use of Mobile Phones, Electrical machines, Plastics, Television, Computers and their harmful effects. Ethics and Use of Digital Technology: Cyber ethics-, Ethics of social media: WhatsApp, Face book, Twitter and others.

Recommended Books/e-resources:

- R.R. Gaur, R Sangal, G.P. Bagaria (2009): A Foundation Course in Human Values and Professional Ethics, Excel Books.
- D.R. Kiran (2014) Professional Ethics and Human Values, McGraw Hill Education (India).
- Vivian L Vignoles (2017): Identity: Personal and Social, Chapter to appear in Oxford Handbook of Personality and Social Psychology (2nded.), edited by Kay Deaux and Mark Snyder.
- https://cdn.visionias.in/value_added_material/3b896-ethics.pdf
- Sargolzaei, E., & Nikbakht, M. (2017). The Ethical and Social Issues of Information Technology: A Case Study. International Journal of Advanced Computer Science and Applications, 8(10), 138–146. <https://doi.org/10.14569/ijacsa.2017.081019>
- Mirghaderi, L., Sziron, M., & Hildt, E. (2023). Ethics and Transparency Issues in Digital Platforms: An Overview. AI (Switzerland), 4(4), 831–843. <https://doi.org/10.3390/ai4040042>
- Müller, V. C. (2022). The History of Digital Ethics. Digital Dreams Have Become Nightmares: What We Must Do. <https://doi.org/10.1145/3640479.3640499>
- Course Material Prepared by Department of Human Excellence.

INTEGRATED PERSONALITY DEVELOPMENT

(26UHEI21)

SEMESTER: II	SEC3	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30
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Course Outcomes:

After completing this course, students will be able to:

- CO1:** Analyze individual personality traits, habits, and attitudes by utilizing self-awareness frameworks such as SWOC and the Johari Window. (K4)
- CO2:** Formulate actionable plans to build self-confidence, a positive mindset, and healthy self-esteem for continuous personal growth. (K6)
- CO3:** Implement self-management techniques, including mindfulness, yoga, and distraction control, to regulate stress and improve discipline. (K3)
- CO4:** Demonstrate effective interpersonal skills, including rapport building, assertiveness, and conflict management, within group discussions and team environments. (K3)
- CO5:** Design a systematic roadmap of realistic personal and academic goals using structured goal-setting methodologies. (K6)
- CO6:** Integrate ethical values, social responsibility, and gender sensitivity into professional conduct and real-life decision-making. (K4)

UNIT-I: Self-Knowledge

(6 Hours)

Exploring Habits, Attitudes, Self Awareness – Self introspection - SWOC analysis – Johari Window's Self identity. Enhancing one's Self image, Self -Esteem, Building self Confidence and Positive Mind Set.

UNIT-II: Self Management

(6 Hours)

Understanding of One's Life Story- Focusing on Internal Narratives – Self-Talk, Self-Discipline- Managing Change, -Adaptation to change, Managing Distractions, Yoga and Mindfulness -Overcoming Inferiority Complex

UNIT-III: Personal Competence and Goal Setting

(6 Hours)

Developing Rapport - Giving and Receiving Constructive Feedback - Assertiveness and Conflict Management Skills - Group Discussion Skills –Goal Setting.

UNIT-IV: Personality Development

(6 Hours)

Recognizing the growth in different dimension of Holistic and Integrated Personality Development-Ethical Behavior-Gender Sensitivity and Respect- Civic Responsibility-Social Media Responsibility

UNIT-V: Emotional Well-Being

(6 Hours)

Meaning -Types of Emotions- Expressing Emotions- Managing Difficult Emotions - Self-Control-Healthy Relationships- Building Resilience & Coping Skills - -Mental Health Awareness.

Reference Books:

1. Dr.Xavier Alphonse S.J ,We Shall Overcome, ICRDEC Publications,Chennai,2004.
2. Harold R Wallace and L. Ann Masters, Personality Development South- Western Cengage Learning India PL,NewDelhi,2006.
3. Course Material Prepared by Department of Human Excellence.

**LIFE COPING AND ENTREPRENEURIAL SKILLS MANAGEMENT
(26UHEL31)**

SEMESTER:III	SEC 4	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

After completion of the Course, the students will be able to

- CO1:** Explain holistic health including physical, mental, and social wellbeing. (K2)
- CO2:** Apply healthy lifestyle practices including nutrition, hygiene, and digital wellbeing. (K3)
- CO3:** Analyze social and professional situations using empathy and ethical reasoning. (K4)
- CO4:** Apply structured decision-making and problem-solving skills in real-life situations. (K3)
- CO5:** Demonstrate coping strategies for stress, crisis, and uncertainty. (K3)
- CO6:** Evaluate addiction risks and design strategies for a healthy lifestyle. (K5)

Unit I: Holistic Health & Lifestyle Management (6 Hours)

WHO's definition of Health – Dimensions of Health – Adolescent Health and Women's Health – Understanding Physical Self – Personal Hygiene and Grooming – Balanced Diet and Nutrition – Healthy Habits and Lifestyle – Lifestyle Diseases and Prevention – Digital Wellbeing (Screen Time, Sleep Cycle, Mental Balance) – Public Health Awareness.

Unit II: Social Intelligence & Relationship Management (6 Hours)

Family Relationship: Values in family relationship, nuclear family, Joint Family, Dependence, Overdependence, Happy family, Broken Family - Caring Elders - Rapport Building with Peers/ Friends, Strangers, Transgenders - Professional Relationship: Officials, Mentors, Staff & Service Personnel- Other centeredness and others point of view and Empathy.

Unit III: Decision-Making & Problem-Solving Skills (6 Hours)

Types of Problems (Academic, Personal, Financial, Social) – Problem-Solving Strategies – Decision-Making Process – Rational and Intuitive Decision-Making – Ignatian Discernment Process – Lateral Thinking and Creativity – Basic Financial Literacy (Needs vs Wants, Saving, Budgeting).

Unit IV: Coping with Stress, Crisis & Change (6 Hours)

Meaning and Types of Stress – Causes of Stress (Academic, Social, Digital) – Stress Management Techniques – Emotional Regulation Strategies – Time Management and Productivity – Crisis Management (Failure, Uncertainty, Loss) – Building Resilience and Adaptability.

Unit V: Addiction Awareness & Personal Safety (6 Hours)

Meaning and Types of Addiction – Substance Addiction – Digital and Internet Addiction – Causes and Effects of Addiction – Prevention and Control Measures – Self-Regulation Techniques – Cyber Safety and Responsible Internet Usage – Seeking Help and Counselling Support.

Activity Collaborators: Anti-drug Club, Women's Forum.

Reference Books:

1. Dr. Xavier Alphonse S.J., We Shall Overcome, ICRDEC Publications, Chennai, 2004.
2. Covey Sean, Seven Habits of Highly Effective Teens, New York, Fireside Publishers, 1998.
3. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.
4. Clear, James. 2018. Atomic Habits: An Easy & Proven Way to Build Good Habits & Break Bad Ones. New York: Avery
5. Atomic Habits – James Clear, Avery, 2018.
6. The 7 Habits of Highly Effective People – Stephen R. Covey, Free Press.
7. Emotional Intelligence – Daniel Goleman, Bantam Books.
8. Thinking, Fast and Slow – Daniel Kahneman, Penguin Books.
9. Course Material prepared by the Department of Human Excellence.

ENVIRONMENTAL STUDIES
(26UEVS41)

SEMESTER:IV	EVS	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

The students will be able to:

CO1: Describe various natural resources and the fundamental principles of sustainable development to explain resource interdependence. (K1)

CO2: Explain the relationship between biodiversity and various conservation approaches to maintain ecological balance. (K2)

CO3: Apply prevention and mitigation strategies to address specific environmental issues and ecosystem degradation. (K3)

CO4: Illustrate the adverse health impacts of different types of pollution on human populations and ecosystems. (K3)

CO5: Evaluate environmental quality indicators and the effectiveness of climate change mitigation risks. (K5)

CO6: Summarize major international environmental treaties and national legislations aimed at environmental protection. (K2)

Unit I: Natural Resources (6 Hours)

Environment – Definition; Overview of natural resources: definition, types of natural resources. Biotic and abiotic, renewable and non-renewable resources. Water resources: types, over-exploitation, issues, challenges, water scarcity, conflicts. Soil and mineral resources: important minerals, problems, soil as a resource. Energy resources: sources, conventional and non-conventional, implications. (IKS- Traditional water conservation methods (e.g., temple tanks, ooranis, johads). Indigenous agricultural practices and soil conservation methods.)

Unit II: Environmental pollution and Health (6 Hours)

Natural and man-made disasters and their impacts of environment and management. Pollution: definitions, natural and man-made pollution. Different types of pollution- Air, Water, Soil, Noise, Radioactive and solid waste pollution: Sources of pollution, different types of pollutants, effects of pollution in environment and human health, prevention and control of pollution. (IKS- Traditional waste management practices. Herbal and indigenous methods to reduce pollution impacts.)

Unit III-Conservation of Biodiversity and Ecosystems (6 Hours)

Biodiversity and its distribution: Levels and types, India and world, hotspots, threat categories. Ecosystems and ecosystem services: major types in India, basic characteristics, significance. Threats to biodiversity and ecosystems: land use, commercial exploitation of species and invasive species. Types of Biodiversity conservation (*In-situ and Ex-situ*). (IKS- Sacred groves and community-based conservation practices, Role of indigenous communities in biodiversity protection)

Unit IV: Climate change: Impacts, Adaptation and Mitigation (6 Hours)

Climate change: structure and different layers of atmosphere, Impacts, vulnerability and adaptation to climate change. Mitigation of climate change: GHGs types, sources, impacts and control. Importance of 1.5 °C and 2.0 °C Global warming and Ozone depletion. Concept of carbon intensity, energy intensity and carbon neutrality; policy instruments, carbon capture and storage, climate justice. Anthropogenic factors - Human over population, over consumption, pollution, Mining, Transport, Environmental degradation and Impact of human activities. (IKS- Traditional climate-resilient farming practices. Indigenous housing designs for climate adaptation.)

Unit V: Environmental Treaties, Legislation and Sustainable Development (6 Hours)

Overview of instruments of international cooperation: bilateral, multilateral, conventions and protocols, COPs. Major International Environmental Agreements: CBD, CITES, UNCCD, UNFCCC. Major Indian Environmental Legislations: acts, rules, sites, areas, zones and judgments. Introduction to sustainable development: SDGs, targets and indicators, challenges and strategies. Principle of sustainable development, international efforts of sustainable development and sustainable development in India: Perspective and strategies. (IKS- Community based natural resource management models.)

Skill-Based Activities:

Unit-I	➤ Field observation of local water bodies ➤ Preparation of a household resource audit report ➤ Case study analysis on sustainable practices
Unit-II	➤ Air and water quality observation survey ➤ Preparation of eco-friendly products (natural cleaners, composting) ➤ Awareness campaign design
Unit-III	➤ Biodiversity documentation of campus/local area ➤ Preparation of herbarium or digital biodiversity register
Unit-IV	➤ Carbon footprint calculation (individual/department level) ➤ Tree plantation and climate awareness drive
Unit-V	➤ Mock COP session ➤ Policy analysis and presentation ➤ Preparation of sustainability action plan for the campus

General Suggestions:

- Educational visit to Xavier Solai be organized as a common activity for all students.
- Include activity based and project based assignments.
- Conduct orientation programs for EVS faculty on IKS and skill based pedagogy.
- Students examine environmental problems in their local communities and develop solutions to address them.

Reference Books:

1. Singh, J.S., Singh, S.P., Gupta, S.R. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications.
2. Harris, Frances (2012). Global Environmental Issues, 2nd Edition. Wiley- Blackwell.
3. Krishnamurthy, K.V. (2003). Textbook of Biodiversity, Science Publishers, Plymouth, UK.
4. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI).
5. Pittock, Barrie (2009). Climate Change: The Science, Impacts and Solutions. 2nd Edition. Routledge.
6. Ministry of Environment, Forest and Climate Change (2019). A Handbook on International Environment Conventions & Programmes.
7. KanchiKohli, Manju Menon (2021). Development of Environment Laws in India, Cambridge University Press.

HUMAN RIGHTS AND SOCIAL ANALYSIS
(26UVEH51)

SEMESTER:IV	VE	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Recall key concepts of rule of law, democracy, equality, human dignity, citizenship, social justice, secularism and human rights.(K1)

CO2: Explain the Preamble to the Constitution of India, Fundamental Rights, Directive Principles, civil and political rights, socio-economic and cultural rights and collective rights.(K2)

CO3: Apply constitutional principles and human rights concepts to contemporary social issues. (K3)

CO4: Analyze interrelationships among inequalities, social structures, social problems, and reform initiatives in India. (K4)

CO5: Evaluate the effectiveness of constitutional provisions in promoting equality and social justice.(K5)

CO6: Design strategies fostering equality, communal harmony, responsible democratic citizenship and civic participation. (K6)

Unit I: Understanding basic concepts (6 Hours)

Understanding of key concepts, their meaning and significance in today's context – Rule of law, democracy, equality, human dignity, citizenship, social justice, secularism, human rights, fundamental rights and constitutional values.

Unit II: Classification of Human Rights (6 Hours)

Civil and Political rights, socio-economic and cultural rights collective rights or group rights – Preamble to the Constitution of India, Fundamental Rights - Equality rights, personal freedom and right to life, rights against arbitrary arrest and illegal detention, Rights against exploitation, Religion Freedom, Minority rights and Fundamental Duties (Art. 51A)

Unit III: Indian Social System (6 Hours)

Social Analysis - Social system and its components, Inequalities, caste structures and manifestation, Patriarchy and violence against women, Gender and sexual Minorities– A land of cultural linguistic and religious diversity –secular ethos – religious -fundamentalism-Indian politics -Interdependence of human being and society

Unit IV: Social Problems (6 Hours)

Indian Economic inequality and Poverty - Caste Discrimination : Untouchability, honour killing - Reservation policy, and Dalit empowerment - illiteracy and its effects Child labour, child abuse, bonded labour and their effects

Unit V: Social Reformers (6 Hours)

Promoting social justice and equality, women's rights, and eradication of caste discrimination - Dr. B. R. Ambedkar, Mahatma Gandhi, Dr. Muthulakshmi Reddy, Savitribai Phule, Fathima Sheik, Pandita Ramabai and E. V. Ramasamy - Focusing on service to the marginalized, healthcare, education, and human values

Reference Books:

1. P.N. Sharma, "Social problems and issues in India", Bharat Book Centre, 2014, New India
2. The Reality Reloaded, Gurjot S. Kaler, Chandigarh, India, 2018
3. Course Material Prepared by the Department of Human Excellence
4. Activity-based learning will be conducted in collaboration with the Democracy Forum and Electoral Literacy Club to promote democratic values, constitutional awareness, and responsible citizenship.

PLANT DIVERSITY I
(ALGAE, FUNGI, LICHENS & BRYOPHYTES)
(SUB. CODE: 26UBOC11)

SEMESTER – I	CORE-T1	HOURS –5	CREDITS – 5
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Course Outcomes:

Upon completion of the courses, the students will be able to

- List out the diversity of the lower group of plants **(K1)**
 - Explain the morphological and anatomical characters of algae, fungi, lichens and bryophytes **(K2)**
 - Describe the reproduction and life cycle of algae, fungi, lichens and bryophytes **(K2)**
 - Summarize the economic values of algae, fungi, lichens and bryophytes **(K2)**
 - Apply the knowledge to identify the different species of algae, fungi, lichens and bryophytes **(K3)**
 - Analyse the adaptations of algae, fungi, lichens and bryophytes in different environments **(K4)**
- (Developmental studies not included)**

UNIT: I **(15 hours)**

Algae: General characters of the algae - Outline classification of algae according to Fritsch (1945). Detailed study of the following types: (occurrence, structure of thallus and cell, reproduction and life cycle)

Chlorophyceae: *Chlorella*, *Volvox*, *Caulerpa*.

UNIT: II **(15 hours)**

Detailed study of the following types: (Occurrence, Structure of thallus and cell, reproduction and life cycle)

Phaeophyceae: *Sargassum*; Rhodophyceae: *Gracilaria*; Cyanophyceae/: *Nostoc*

Economic importance of algae.

UNIT: III **(15 hours)**

Fungi: General characters of the fungi. Outline classification proposed by Alexopoulos and Mims (1979). Detailed study of the following fungi (occurrence, structure, reproduction and life cycle)

Oomycetes: *Albugo* Zygomycetes: *Pilobolus*

UNIT: IV **(15 hours)**

Detailed study of the following types: (occurrence, structure of thallus and cell, reproduction and life cycle)

Ascomycetes: *Peziza*; Basidiomycetes: *Agaricus*; Economic importance of fungi.

Lichens: *Usnea*- morphology, anatomy and reproduction. Economic importance of lichens

UNIT: V

(15 hours)

General characters of the Bryophytes. Outline classification by Rothmaler (1951). Detailed study of the following types – *Marchantia* and *Funaria*. Economic importance of Bryophytes.

TEXT BOOK

1. **Pandey, S. N. & P.S. P. Trivedi. 1994 :** Textbook of Botany, Vikas Publishing House Pvt. Ltd., Delhi.

REFERENCES:

1. Dube, H. C. 2005. Introduction to Fungi. Vikas Publishing House, New Delhi.
2. Gangulee, Das and Kar. 1959. College Botany Vol II, Central Book Depot, Allahabad.
3. Singh, Pandey and Jain. 2000. A Textbook of Botany, Rastogi Publications
4. Vashishta, B. R.2002.The Algae, S. Chand & Co., New Delhi.
5. Vashishta, B. R.2002.The Fungi, S. Chand & Co., New Delhi.
6. Vashishta, B. R.2003. The Bryophytes, S. Chand & Co., New Delhi.
7. Alexopoulos, C.J., Mims, C. W., Blackwell, M. 1988. Introductory Mycology, Wiley Eastern Ltd., New Delhi.
8. Parihar, N. S. 1967.Bryophyta, Central Book Depot, Allahabad.
9. Fritsch, F. E. 1972.The Structure and Reproduction of Algae. Vol I& II. Cambridge University Press, London.
10. Vashsita, B. R., Sinha, A.K. and Singh, V. P. 2007.Algae. S. Chand & Co., New Delhi.
11. Vashsita, B. R., Sinha, A.K. and Singh, V. P. 2007. Fungi. S. Chand & Co., New Delhi.
12. Vashsita, B. R., Sinha, A.K. and Singh, V. P. 2007. Bryophytes.S. Chand & Co., New Delhi

PLANT DIVERSITY -I PRACTICAL
(ALGAE, FUNGI, LICHENS & BRYOPHYTES)
(Sub Code: 26UBOC12)

SEMESTER – I	CORE-P1	HOURS –3	CREDITS – 3
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Explain the morphology and anatomy of algae, fungi, lichens, and bryophytes **(K2)**

CO2: Identify algae, fungi, lichens, and bryophytes based on thallus structure **(K3)**

CO3: Identify microslides of vegetative and reproductive structures of algae, fungi, lichens, and bryophytes **(K3)**

CO4: Classify algae, fungi, lichens, and bryophytes based on external and internal structures **(K4)**

CO5: Prepare microslides of algae, fungi, lichens, and bryophytes **(K6)**

Study of the following types:

Algae : *Nostoc, Chlorella, Volvox, Caulerpa, Sargassum, Gracilaria*

Fungi : *Albugo, Pilobolus, Peziza, Agaricus*

Lichens : *Usnea.*

Bryophytes : *Funaria or Polytrichum, Marchantia.*

GARDENING AND LANDSCAPING
(SUB.CODE: 26UBON11)

SEMESTER – I	SEC-1	HOURS –2	CREDITS – 2
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Course Outcomes:

Upon completion of the course, the students will be able to

C1: To know about the fundamental concepts of gardening and landscaping. (K1)

C2: To provide an overview of various gardening styles and their scope in recreation and bio-aesthetic planning. (K2)

C3: To illustrate the significance of garden adornments and propagation structures. (K3)

C4: To inculcate entrepreneurial skills in students for creative landscaping design using CAD software. (K4)

C5: To create the design of outdoor and indoor gardens and inculcate entrepreneurial skills for landscaping. (K5)

Unit I (6 hours)

Principles of gardening, Components of a garden – Lawn trees, shrubs, climbers, creepers, borders, edges.

Unit II (6 hours)

Hedges, flower beds, carpet beds. Topiary – trophies. Constructed elements – drives, walkways, pathways, pergolas, gazebos.

Unit III (6 hours)

Styles of garden - formal, informal and free style, special types of gardens – water garden, rock garden, marsh garden, vertical gardens, roof gardens. Indoor gardening – containers, care and maintenance.

Unit IV (6 hours)

Therapeutic gardening, eco-tourism, Bonsai – culture and art. Flower arrangement – importance, production, constraints, post-harvesting practices.

Unit V (6 hours)

Basic principles of landscape design, components, xeriscaping, waterscaping, Landscaping of residential, public areas and Colleges.

Recommended Texts:

1. Acquaah, J. 2009. Horticulture – principles and practices, 4th edition, PHI Learning Pvt. Ltd.
2. Rao Manibhushan K. 1991. Textbook of horticulture. Macmillan India Ltd.
3. Gangulee H. C. and Kar A. K. 2004. College Botany Vol II, New Central Book Agency
4. Sharma V. K. 1999. Encyclopedia of Practical Horticulture, Vol I –IV, Deep and Deep Publ. Pvt. Ltd.
5. Singh, J. 2018. Fundamentals of Horticulture. Kalyani Publishers.

Reference Books:

1. Berry, F. and Kress, J. 1991. Heliconia: An Identification Guide. Smithsonian Books.
2. Butts, E. and Stensson, K. 2012. Sheridan Nurseries: One hundred years of People, Plans, and Plants.

Dundurn Group Ltd.

3. Russell, T. 2012. Nature Guide: Trees: The world in your hands (Nature Guides).

4. Acquaah, J. 2009. Horticulture – principles and practices, 4th edition, PHI learning Pvt. Ltd.

5. Edment Senn Andrews. 1994. Fundamentals of Horticulture. Tata. McGraw Hill Publishing Co., Ltd., Delhi.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	2	1	1	2	3	1
CO2	3	3	2	2	1	3	2	3	3	2
CO3	2	2	3	2	1	2	1	3	2	3
CO4	3	3	2	3	1	2	3	3	3	2
CO5	3	3	2	3	2	3	1	3	3	2

S-Strong (3) M-Medium (2) L-Low(1)

CHEMISTRY FOR BIOLOGICAL SCIENCES-I
(For Botany and Zoology students) (SUB CODE: 26UCHE11)

SEMESTER I	EC- T1	CREDITS – 2	H/W : 4
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Course outcomes

On completion of the course, the students will be able to

- CO1** Recall the concepts of chemical bonding, atomic orbitals, hybridisation, and molecular geometry. (K1)
- CO2** Explain redox reactions, acid–base theories, and principles of volumetric analysis. (K2)
- CO3** Apply concepts of oxidation numbers, solution concentrations, and electrochemical principles to Solve chemical problems. (K3)
- CO4** Analyse intermolecular forces, electrolysis processes, and conductance behaviour of electrolytes (K4)
- CO5** Evaluate the reactivity and distinguishing characteristics of aldehydes, ketones, carboxylic acids, amides, and amines. (K5)
- CO6** Design systematic approaches to identify and predict the properties of organic compounds, amino acids, and proteins based on their structure and functionality. (K6)

Unit I: Chemical Bonding

(12 hrs)

Valency and valence electrons - Electronic theory of valency -Electrovalency- conditions favouring electrovalency-illustration -Electrovalent compounds and their properties - covalency- conditions favouring covalency-illustration- Covalent compounds and their properties-Coordinate covalency-conditions favouring formation of the bond-illustration- Transition from electrovalency to covalency- polarisation and polarizability- Fajan’s rules-statement and illustration- Atomic orbitals-Definition-charge cloud interpretation-shapes of s, p and d orbitals- Overlapping of atomic orbitals-conditions for overlap-types(s-s, s-p, and p-p) with illustrations-sigma and pi overlaps- hybridization sp^3 in CH_4 , sp^2 in BF_3 and sp in $BeCl_2$. Geometry of H_2O and NH_3 molecules- VSEPR theory.

Self-Study: Atomic number, mass number, isotopes, electronic configuration of atoms and ions.

Unit II: Redox Systems and Analytical Chemistry-I

(12 hrs)

Redox systems- Redox reactions in terms of electron transfer - Oxidation Number-Definition- Rules for assigning oxidation number- Calculation of oxidation number- Redox processes in terms of oxidation number- Advantages and disadvantages of the concept- Acids and bases- Arrhenius concept –illustration- Lowry-Bronsted concept-conjugate acid and conjugate base - Principles of volumetric analysis. Methods of expressing concentration of solution. Normality, Molarity, Molality, Mole fraction, Equivalent weights of acids bases, oxidizing agents and reducing agents. Primary standard, secondary standard, preparation of standard solution. Principles of Acid-base titrations-theory of indicators, permanganimetry, Dichrometry, Iodometry, Iodimetry.

Self-Study: Preparation of solution at different concentration, acids and bases.

UNIT III: Intermolecular Forces and Properties of Liquids

(12 hrs)

Polar and non-polar molecules - Dipole-dipole (Debye) forces, dipole-induced dipole (Keesom) forces, induced dipole-induced dipole (London) forces. Repulsive forces - Resultant intermolecular energies- Hydrogen bonding-Nature of hydrogen bonding-conditions favouring hydrogen bonding- Types of hydrogen bonding- illustrations-impact of hydrogen bonding on melting points, boiling points and solubilities. Electrolysis - What is electrolysis-strong and weak electrolytes - Mechanism of electrolysis - Electrical units-coulomb, Ampere, Ohm and Volt- Faradays laws of electrolysis and their importance - Conductance of electrolyte – Conductance- Specific conductance and molar conductance-Units – Variation of equivalent conductance with concentrations

Self-Study: pure covalent bonds with examples, electronegativity, conductors, insulators, boiling point, melting point

UNIT IV: Aldehydes, Ketones, Acids and Amides

(12 hrs)

Aliphatic aldehydes and ketones-Nomenclature-General reactions- Formaldehyde- a comparison with other aldehydes of the series - Aromatic Aldehydes-Reactions of benzaldehyde-benzaldehyde compared with acetaldehyde - Aromatic ketones-Acetone, acetophenone and benzophenone-distinction- Aliphatic saturated monocarboxylic acids-Nomenclature, general reactions-comparison of formic acid with other acids of the series. Aromatic saturated monocarboxylic acids-distinction between benzoic acid and acetic acid - Aliphatic amides-nomenclature, general reactions - Aromatic Amides-Distinction between benzaldehyde and acetamide.

Self-Study: aliphatic compounds, aromatic compounds, functional groups of aldehydes, ketones and amides

UNIT V: Amines, Amino Acids and Proteins

(12 hrs)

Aliphatic monoamines - Nomenclature and classification - General reactions- Aniline- Reactions of aniline- Distinction between aniline and ethylamine- Amino acids-classification-zwitter ions-isoelectric point-preparation and properties of glycine and alanine- Proteins-introduction-peptides and polypeptides-partial hydrolysis and terminal residue analysis in the determination of structure of peptides.

Self-Study: Functionalities of amino acids and amines, Functionalities of proteins (nitrogen-containing compounds)

NOTE: Course materials will be supplied to the students.

Textbook:

1.V. Veeraiyan, Textbook of Ancillary Chemistry; High Mount Publishing House, Chennai, first edition,2009.

2. S. Vaithyanathan, Textbook of Ancillary Chemistry; Priya Publications, Karur,2006.

3. Arun Bahl, B. S. Bahl, Advanced Organic Chemistry; S. Chand and Company, New Delhi, twenty-third edition, 2012.
4. P. L. Soni, H. M. Chawla, Textbook of Inorganic Chemistry; Sultan Chand & Sons, New Delhi, twenty-ninth edition, 2007.

Reference Books

1. P. L. Soni, Mohan Katyal, Textbook of Inorganic Chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007.
2. B.K, Sharma, Industrial Chemistry; GOEL Publishing House, Meerut, sixteenth edition,

CHEMISTRY PRACTICAL FOR BIOLOGICAL SCIENCES-I
(for Botany and Zoology students)
(SUB CODE: 26UCHE12)

SEMESTER I	EC- P1	CREDITS – 2	H/W=2
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- CO1** Recall the principles, reagents, indicators, and calculations involved in acid–base, redox, and complexometric titrations. (K1)
- CO2** Explain the reactions and stoichiometry underlying volumetric estimation methods. (K2)
- CO3** Perform acid–base, permanganometric, dichromate, iodometric, and EDTA titrations accurately. (K3)
- CO4** Analyze titration data to determine the concentration and purity of chemical substances. (K4)
- CO5** Evaluate the accuracy and reliability of volumetric results through error analysis and standardization procedures. (K5)
- CO6** Design suitable volumetric methods for the quantitative estimation of acids, bases, oxidizing agents, reducing agents, and metal ions. (K6)

S.NO		Link	Standard
1	Strong acid	Weak base/ Strong base	Strong acid
2	Strong acid	Strong base	Weak acid
3	NaOH	Strong acid	Na ₂ CO ₃
4	Oxalic acid	Potassium permanganate	Oxalic acid
5	Ferrous sulphate	Potassium permanganate	Ferrous ammonium sulphate
6	Potassium dichromate	Ferrous sulphate	Potassium dichromate
7	Ferrous ammonium sulphate	Potassium dichromate	Ferrous sulphate
8	Potassium permanganate	Sodium thiosulphate	Potassium dichromate
9	Magnesium sulphate	EDTA	Zinc sulphate
10	Zinc sulphate	EDTA	Magnesium sulphate

Note: Laboratory manual will be supplied.

PLANT ANATOMY AND EMBRYOLOGY

(SUB. CODE: 26UBOC21)

SEMESTER – II	CORE -T2	HOURS - 5	CREDITS - 5
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COURSE OUTCOME(COs)

By the end of the course the students will be able to

- Acquire basic knowledge of various kinds and organization of plant tissues (K1).
- Understand the developmental aspects of plant structures (K2).
- Understand the development of male and female reproductive structures in plants (K2).
- Examine and illustrate the fertilization process in plants (K3).
- Differentiate the development of embryo and endosperm in dicots and Monocots (K2)
- Analyze the application of apomixis and polyembryony (K4)

UNIT: I

(15 hours)

Tissues – types – Simple and Complex - The cell wall – ultrastructure and chemistry of the cell wall – Meristems: classification (based on position, origin and function) – shoot apex (Tunica Corpus theory). Root apex (Korper-Kappe theory). Xylem and phloem – structure, components and functions.

UNIT: II

(15 hours)

Vascular cambium –origin, structure and function. Anatomy of Dicot and Monocot – root & stem. Normal secondary thickening in dicot stem and dicot root. Anomalous secondary thickening in *Boerhaavia* and *Dracaena*.

Brief study on nodal anatomy: Unilacunar node (*Justicia*), trilacunar node (*Azadirachta*), multi lacunar node (*Aralia*).

UNIT: III

(15 hours)

Leaf anatomy: dicot leaf – dorsiventral (*Hibiscus*), isobilateral (*Eucalyptus*); monocot leaf (*Saccharum*), Kranz anatomy.

Structure and development of microsporangium; tapetum – types and functions; anther wall developmental types.

Microsporogenesis - structure and development of male gametophyte.

UNIT: IV

(15 hours)

Megasporangium: structure of ovule, types of ovules, Megasporogenesis – structure and development of the female gametophyte (*Polygonum*, *Allium* and *Peperomia*).

Fertilization: germination and growth of pollen tube, entry of pollen tube into the ovule and embryo sac – pollen tube discharge – double fertilisation and post-fertilization changes

UNIT: V

(15 hours)

Types and development of endosperms (nuclear, cellular and helobial) – ruminant endosperm. Development of dicot embryo (*Capsella* type) and monocot embryo (*Luzula* type).

Polyembryony: Classification/ types and causes.

Apomixis: Vegetative reproduction – agamospermy – apospory and parthenogenesis.

TEXT BOOKS

1. **Pandey, B. P. 2001.** A text book of Botany: Angiosperms (Fifth Edition), S. Chand Publishing.
2. **Bhojwani, S. S. & Bhatnagar, S. P. 2008.** The Embryology of Angiosperms, Vikas Publishing House Pvt. Ltd., Noida.
3. **Chandurkar, P. J. 1977.** Plant Anatomy, Oxford and IBH.
4. **Pandey, S. N. & Chadha, A. 1997.** Plant Anatomy and Embryology, Sangam Books Ltd
5. **Fahn, A. 1990.** Plant Anatomy. Pergamon Press.

REFERENCES

1. **Vashishtha, P. C. 2000.** Plant Anatomy, S. Nagin & Co.
2. **Pandey, B. P. 1978.** Plant Anatomy, S. Chand & Co.
3. **Maheshwari, P. 1971.** An introduction to the Embryology of Angiosperms, Tata McGrawHill Publishing Co., New Delhi.
4. **Pandey, A. K. 1997.** Introduction to Embryology of Angiosperms, CBS Publishers & Distributors, New Delhi.

PLANT ANATOMY AND EMBRYOLOGY – PRACTICAL II

(26UBOC22)

SEMESTER – II	CORE -P2	HOURS - 3	CREDITS - 3
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ANATOMY:

1. Simple and complex permanent tissues
2. Stem: Dicot (young and old), monocot.
3. Root: Dicot (young and old), monocot.
4. Anomalous secondary thickening: Dicot stem - *Boerhaavia*, Monocot stem - *Draceana*
5. Nodal anatomy: Unilacunar (*Justicia*), trilacunar (*Azadirachta*) and multilacunar (*Aralia*).
6. Leaf anatomy: Dicot – Dorsiventral (*Hibiscus*), isobilateral (*Eucalyptus*). Monocot (*Saccharum*).
7. Demonstration of maceration technique to study the components of wood (secondary xylem)
8. Submission of at least five double-stained permanent slides.

EMBRYOLOGY:

9. Different stages of anther development – *Datura*
10. Different types of ovules.
11. Pollen viability test (Acetocarmine method).
12. Observation of pollen germination – *in vivo* (on the stigma) and *in vitro*
13. Dissection of early stages of embryo development (*Tridax*/ Cucumber/ Mustard).
14. Endosperm: Cellular/Nuclear. (Coconut, Maize, Rice).

CHEMISTRY FOR BIOLOGICAL SCIENCES-II

(Subject Code: 26UCHE21)

SEMESTER II

EC- T2

CREDITS – 2

Course outcomes

On completion of the course, the students will be able to

- CO1:** Recall the fundamental concepts of thermodynamics, surface chemistry, colloids, carbohydrates, stereochemistry, and analytical chemistry. (K1)
- CO2:** Explain the principles governing thermodynamic processes, colloidal behavior, stereoisomerism, and qualitative analysis. (K2)
- CO3:** Apply thermodynamic laws, adsorption concepts, and analytical principles to solve basic chemical problems. (K3)
- CO4:** Analyze the structure, properties, and reactions of carbohydrates, alkaloids, terpenoids, and heterocyclic compounds. (K4)
- CO5:** Evaluate the factors influencing spontaneity, colloidal stability, stereoisomerism, and qualitative chemical separations. (K5)
- CO6:** Design systematic approaches for identifying chemical species and interpreting physicochemical phenomena using fundamental chemical principles. (K6)

Unit I Thermodynamics

12 hrs

Introduction - Basic terminology and functional concepts- System, boundary and surrounding- Types of systems: open, closed and isolated- Properties of a system: extensive and intensive - State of a system and state variables (or state functions)-Thermodynamic equilibrium - Process and types: Isothermal, adiabatic, isochoric, isobaric, cyclic, reversible, and irreversible- comparison between isothermal and adiabatic processes, reversible and irreversible processes - Internal energy as a state function- components of internal energy- Work: Thermodynamic concept-types of work - Heat : Thermodynamic concept- Heat and work as path functions - First law of thermodynamics- Statement of the law of conservation of energy- Mathematical expression of the law- Application of the law- Heat capacity, specific heat capacity and molar heat capacity of a system- Relation between molar heat capacities of gases- Enthalpy and enthalpy change- Enthalpy as a state function- Relation between ΔH and ΔE - Enthalpies of reaction, formation and combustion-Definition and illustration- standard state- Calculation of enthalpy change using simple molecules. Hess law- Bond enthalpies and bond dissociation enthalpies-Definition and illustration using as example (Numerical problems not expected)- Spontaneous (natural) process- Entropy-it's meaning of disorder- Gibb's free energy-its meaning as available energy- Criteria for spontaneity

Self-study: Ideal gas, ideal gas equation, homogeneous reactions and heterogeneous reactions, heat.

UNIT II Surface Chemistry and Colloidal Chemistry

12 hrs

Adsorption chemistry-introduction-definition-distinction from adsorption- Adsorption and adsorbate-definition and explanation- Types of colloidal systems- Classification of colloids-Lyophilic and lyophobic sols-a comparison- Stability of colloids-origin of charge- electrical double layer-salvation- Electrical properties-electrophoresis and electro-osmosis- Gels- gelation-classification-properties of gels-hydration, swelling or inhibition, syneresis and thixotropy- Emulsions-types of emulsion-identification of emulsion-dilution test, dye test, spreading test, viscosity and electrical conductivity-de-emulsification- Application of colloid in food, medicine, industry, purification of water, artificial rain, blue colour of the sky and cleaning action of soap.

Self-study: Adsorbent, adsorbate, molecular interactions.

UNIT III Carbohydrates, Alkaloids and Terpenoids

12 hrs

Introduction- Monosaccharide- Reaction of glucose- Open chain structure and ring structure of glucose (elucidation not expected)- Epimers, mutarotation- Interconversion of glucose into fructose and vice versa- Disaccharides- Reactions and structure of sucrose (elucidation nor expected)- Structure of maltose and lactose (elucidation not expected)- Polysaccharide- Starch- amylase and amyl pectin-type of glycosidic linkage- Reaction of starch-action of heat-, hydrolysis and with iodine- Alkaloids- Definition, classification, (based on structure) occurrence and extraction- General methods of identification-functional nature of oxygen-functional nature of nitrogen-unsaturation-exhaustive methylation- Structure of conine- Terpenoids- Introduction, classification of terpenoids-Isoprene rule- Structure of citral (synthesis not included)

Self-study: Examples for food contains carbohydrates

UNIT IV Stereoisomerism and Heterocyclic Compounds

12 hrs

Optical isomerism- Plane polarized light - Optical activity - Asymmetric carbon- chirality - Elements of symmetry-plane of symmetry- axis of symmetry-centre of symmetry- dissymmetric- Van't Hoff-le Bel theory- Optical isomerism of tartaric acid- Racemization - Resolution of racemic-mixture-biochemical method, chemical method and chromatographic method- Geometrical isomerism- Cause for geometrical isomerism- Illustration of compounds containing C-C double bond - Heterocyclic compounds- Pyrrole- Introduction- aromatic character- Basic and acidic character of pyrrole- Pyridine- Electronic interpretation of electron-rich centres- Reaction of pyridine- Quinoline- Skaraup synthesis - Reactions of quinoline

Self-study: Isomers, cyclic compounds, practice to draw the structure of simple molecules like H_2O , NH_3 etc.

UNIT V Analytical Chemistry-II

12 hrs

Types of reactions relevant to qualitative analysis - Displacement reaction – Decomposition - Double decomposition- Hydrolysis- redox reaction- Complex formation- Interfering anions and their elimination- Group reagents and analytical group classification- Explanation and application of the following principles in qualitative analysis- Solubility and solubility product- Common ion effect- pH- Buffer.

Self-study: Anions, cations, saturated solution, unsaturated solution, oxidation and reduction

Note: Course materials will be supplied to the students.

Textbook:

- 1.V. Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009.
2. S. Vaithyanathan, Textbook of Ancillary Chemistry; Priya Publications, Karur, 2006.
3. Arun Bahl, B. S. Bahl, Advanced Organic Chemistry; S. Chand and Company, New Delhi, twenty-third edition,2012.
4. P. L. Soni, H. M. Chawla, Textbook of Inorganic Chemistry; Sultan Chand & sons, New Delhi, twenty-ninth edition, 2007.

Reference Books

1. P. L. Soni, Mohan Katyal, Textbook of Inorganic chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007.
2. B.K, Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.

CHEMISTRY PRACTICAL FOR BIOLOGICAL SCIENCES-II
(For BOT and ZOO)
Inorganic quantitative analysis-Subject code: 26UCHE22

SEMESTER II	EC- P2	CREDITS – 2	H/W=2
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COURSE OUTCOME(COs)

On completion of the course, the students will be able to

CO1: Recall the principles, reagents, and characteristic tests used in qualitative inorganic salt analysis.

(K1)

CO2: Explain the reactions involved in the identification of common anions and cations. **(K2)**

CO3: Apply systematic analytical procedures to detect and identify anions and cations in simple salts.

(K3)

CO4: Analyse experimental observations to distinguish between different ionic species. **(K4)**

CO5: Evaluate the accuracy of analytical results through confirmatory tests and logical interpretation.

(K5)

CO6: Design a systematic scheme for the qualitative analysis and identification of unknown inorganic salts **(K6)**

Qualitative analysis of a simple salt containing one anion and one cation

Anions : Carbonate, Borate, Fluoride, Oxalate and Phosphate

Cations : Lead, Bismuth, Copper, Cadmium, Cobalt, Nickel, Manganese, Zinc, Barium, Strontium, and Ammonium

Note: The laboratory manual is supplied

HERBAL TECHNOLOGY

SUB.CODE: 26UBON21)

SEMESTER – II	SEC-2	HOURS –2	CREDITS – 2
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Course Outcomes:

Upon completion of the courses, the students will be able to

- CO1 : To provide students with knowledge of herbal drug industry, the quality of raw material, and guidelines for quality maintenance (K1)
- CO2 : To gain an insight into the commercially important secondary products and significance of bioprospecting (K2)
- CO3 : To understand various plant-based drugs used in Ayurveda, unani, homeopathy, siddha etc.(K3)
- CO4 : To apply the knowledge to cultivate medical plants. (K4)
- CO5 : To know the pharmacological importance of medicinal plants (K5)

Unit I: Herbal Technology

(6 hours)

Definition and scope; Herbal medicines: history and scope; Traditional systems of medicine, and overview of AYUSH (Traditional Indian Systems of Medicine); Cultivation - harvesting - processing - storage of herbs and herbal products.

Unit II: Value added plant products

(6 hours)

Herbs and herbal products recognized in India; Major herbs used as herbal medicines, nutraceuticals, cosmetics and biopesticides, their Botanical names, plant parts used, major chemical constituents.

Unit III: Pharmacognosy

(6 hours)

Systematic position, botany of the plant part used and active principles of the following herbs: Tulsi, Ginger, Curcuma, Fenugreek, Indian Gooseberry, Catharanthus roseus, *Withania somnifera*, *Centella asiatica*, *Achyranthes aspera*, Kalmegh, Giloe (*Tinospora*), Saravar. Herbal foods, future of pharmacognosy.

Unit IV: Analytical pharmacognosy

(6 hours)

Morphological and microscopic examination of herbs, Evaluation of drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds).

Unit V

(6 hours)

Plant gene banks, Cultivation of Plants and their value-added processing / storage / quality control for use in herbal formulations, Introductory knowledge of Tissue culture and Micro propagation of some medicinal plants (*Withania somnifera*, Neem and Tulsi),

TEXT BOOKS:

1. AYUSH (www.indianmedicine.nic.in). About the systems—An overview of Ayurveda,

Yoga and Naturopathy, Unani, Siddha and Homeopathy. New Delhi: Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH), Ministry of Family Welfare, Government of India.

2. Evans, W.C. 2009: Trease and Evans PHARMACOGNOSY. 16th Edition, SAUNDERS / Elsevier.

3. Sivarajan, V.V. and India, B. 1994. Ayurvedic Drugs and Their Plant Sources. Oxford & IBH Publishing Company, 1994 - Herbs - 570 pages.

4. Miller, L. and Miller, B. 2017. Ayurveda & Aromatherapy: The Earth Essential Guide to Ancient Wisdom and Modern Healing. Motilal Banarsidass,; Fourth edition.

5. Kokate, C.K. 2003. Practical Pharmacognosy. Vallabh Prakashan, Pune.

Reference Books:

1. Agarwal, P., Shashi, Alok., Fatima, A. and Verma, A. 2013. Current scenario of Herbal Technology worldwide: An overview. Int J Pharm Sci Res; 4(11): 4105-17.

2. Arber, Agnes. 1999. Herbal Plants and Drugs. Mangal Deep Publications, Jaipur.

3. Varzakas, T., Zakyntinos, G, and Francis Verpoort, F. 2016. Plant Food Residues as a Source of Nutraceuticals and Functional Foods. Foods 5 : 88.

4. Aburjai, T. and Natsheh, F.M. 2003. Plants Used in Cosmetics. Phytotherapy Research 17 :987-1000.

5. Patri, F. and Silano, V. 2002. Plants in cosmetics: Plants and plant preparations used as ingredients for cosmetic products - Volume 1. ISBN 978-92-871-8474-0, pp 218.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	3	3	3	3	1	3	1
CO3	3	3	3	3	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	1	3	1
CO5	3	3	3	3	3	3	3	1	3	1

S-Strong (3)

M-Medium (2)

L-Low(1)

PLANT DIVERSITY - II
(PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY)
(SUB. CODE: 26 UBOC31)

SEMESTER – III	CORE -T3	HOURS - 5	CREDITS - 5
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COURSE OUTCOME(COs)

By the end of the course, the students will be able to

- Identify the non-flowering vascular plants in their environment (K1)
- Summarize the characteristic features of Pteridophytes & Gymnosperms (K2)
- Differentiate non-seeded plants with seeded plants (K2)
- Determine the richness of Pteridophytes and Gymnosperms in India (K3)
- Understand the evolutionary history and relationship among various groups of plants (K2)
- Classify the plants based on their morphological and anatomical features (K4)
- Justify the economic importance of plants in sustenance of human beings (K4)

UNIT: I Pteridophytes (Developmental studies not included) (15 hours)

General characters and life cycle pattern of homosporous and heterosporous Pteridophytes. Classification of Pteridophytes according to K. R. Sporne. Economic importance of Pteridophytes: Edible, Medicinal, Ornamental, Biofertilizers, Phytoremediators and other uses.

UNIT: II (15 hours)

Detailed study (Ecology, distribution, morphology, anatomy and life cycle) of the following genera: *Lycopodiella*, *Selaginella*, *Marsilea*, *Pteris* and *Equisetum*.

UNIT: III Gymnosperms (Developmental studies not included) (15 hours)

General characters and life cycle pattern of Gymnosperms. Classification according to K.R. Sporne. Economic importance of Gymnosperms: Timber, Edible, Ornamental, Medicinal, Gums / Resins, other uses.

UNIT: IV (15 hours)

Detailed study (Morphology, Anatomy, Ecology, Distribution and Life cycle) of the following genera: *Cycas*, *Pinus* and *Gnetum*.

UNIT: V Paleobotany (15 hours)

Definition and importance of Paleobotany. Geological time scale. Fossilisation process and types of fossils. Detailed study of the following genera: *Rhynia*, *Lepidodendron* and *Lyginopteris*.

Contribution by Birbal Sahni. Indian fossils: *Cyathea siwalika* and *Glossopteris* sp.

TEXTBOOK

1. **Pandey S.N., S. P Misra and P.S.Trivedi. 2005.** A text book of Botany Vol. II. Vikas Publishing House, Pvt. Ltd. New Delhi.
2. **Pandey, B. P.** 1978. Pteridophyta. S. Chand & Company Ltd., New Delhi.

REFERENCES

1. **Bhatnagar S. P. and AlokMoitra. 1996.** Gymnosperms. New Age International Ltd., Publishers, New Delhi.
2. **Rashid, A.1990.** An introduction to Pteridophyta. Vikas Publishing House Pvt. Ltd., New Delhi.
3. **Srivastava, H. N.1990.** Fundamentals of Pteridophytes. Pradeep Publications, Jalandhar.
4. **Vashista, P. C.1997.**Pteridophyta. S. Chand and Company Ltd., New Delhi
5. **Vashista, P. C.1991.** Gymnosperms. S. Chand and Company Ltd., New Delhi.
6. **Sporne, K. R.** The Morphology of Pteridophytes, Hutchinson & Co, London.
7. **Sporne, K. R.** The Morphology of Gymnosperms, Hutchinson & Co, London.
8. **Bera, S.et al., 2014.** First megafossil evidence of Cyatheaceous tree fern from the Indian Cenozoic. *J. Earth Syst. Sci.***123**: 1433-38.
9. **Surange, K. R.1966.** Indian Fossil Pteridophytes. Botanical Monograph, No. 4, Council of Scientific & Industrial Research, New Delhi.

**PLANT DIVERSITY - II (PTERIDOPHYTES, GYMNOSPERMS AND
PALEOBOTANY) – PRACTICAL III**

SUB CODE: 26UBOC32

SEMESTER – III	CORE -P3	HOURS - 3	CREDITS - 3
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1. Morphological and anatomical studies on vegetative and reproductive parts of:
 - i. **Pteridophytes:** *Lycopodiella, Equisetum, Pteris, Selaginella, Marsilea, Adiantum*
 - ii. **Gymnosperms:** *Cycas, Pinus, Gnetum*
 - iii. **Paleobotany:** *Rhynia, Lepidodendron, Lyginopteris.*

ALLIED - ZOOLOGY
ANIMAL STRUCTURE AND FUNCTION
(Subject Code: 26UZOE31)

Semester: III Allied: Theory 1 Credit: 3 Hours: 4

Course objective: To provide basic and advanced knowledge of animals on taxonomy, morphology and physiology of animals

Course Outcomes: At the end of the course the students will be able to

CO1	Identify and classify animals	K1
CO2	Distinguish the structural organization of an invertebrate from a vertebrate	K2
CO3	Examine the process of digestion, respiration and excretion in humans	K3
CO4	Illustrate circulatory and nervous system of human body	K4
CO5	Summarize the role of hormones in reproduction.	K5
CO6	Integrate animal structure with its functions.	K6

Unit I: Invertebrata (12 Hours)

Salient features of invertebrates, classification up to phyla with diagnostic features and examples.
Type study: Cockroach (morphology, digestive, nervous, reproductive system)

Unit II: Chordata (12 Hours)

Classification up to classes of Vertebrata with diagnostic features and examples; Type study: Frog – External morphology, digestion, respiration and circulation, reproductive systems

Unit III: Digestion, Respiration and Excretion in man (12 Hours)

Digestion – structure of alimentary canal, Physiology of digestion and absorption; Respiration – structure of lungs, respiratory pigments, transport of oxygen and carbon dioxide, respiratory quotient; Excretion - structure of kidney and nephron, mechanism of urine formation.

Unit IV: Circulation, Nervous system and Receptors in man (12 Hours)

Circulation – structure of heart, composition and functions of human blood, cardiac cycle, blood pressure; Nervous system - structure of neuron, nerve impulse conduction, reflex action; Receptors - Structure of eye and physiology of vision.

Unit V: Endocrine Glands and Reproductive System

(12 Hours)

Structure and hormones of endocrine glands - Pituitary, thyroid, adrenal, islets of Langerhans; Human reproductive system, female reproductive cycle, contraceptives.

Text books:

1. Jordan, E.L., Verma, P.S. 2012. Invertebrate Zoology, S. Chand and Company.
2. Verma, Tyagi, Agarwal, 1997. Animal Physiology, S. Chand and Company.
3. Ayyar, E. 2009. A manual of Zoology, Volume 11, S. Visvanathan P Ltd., Chennai.

Reference books:

1. EkambaranathaAyyar M., Ananthakrishnan, T.N. 1995. A Manual of Zoology, Vol. I (Invertebrata) Part I & II. Viswanathan Pvt. Ltd.
2. Kotpal, R.L. 2000. Invertebrates, Rastogi Publications.
3. Rastogi, S.C. 2001. Essentials of Animal Physiology, New Age International Publications.
4. *Biology of the Invertebrates* by Jan Pechenik

E-resources:

1. <https://www.pmfias.com/classification-animalia-animal-kingdom/>
2. <http://www.biologydiscussion.com/invertebrate-zoology/21-general-characteristics-of-invertebrates/28088>
3. <http://biology.tutorvista.com/organism/vertebrates.html>
4. <http://www.arvindguptatoys.com/arvindgupta/human-body-systems.pdf>
5. <https://www.wsfcs.k12.nc.us/cms/lib/NC01001395/Centricity/Domain/8472/Body%20Systems%20Interactions%20chart.pdf>

ANIMAL STRUCTURE AND FUNCTION - PRACTICAL

(Subject Code:26UZOE32)

Semester: III

Allied: 1

Credit: 2

Hours: 2

Course objective: To provide basic and advanced knowledge of animal morphology and physiology

Course Outcomes: At the end of the course, the students will be able to

CO1	Describe the connection between structure and function at the organ- and organism level.	K1
CO2	Analyse how the organs work together to ensure survival of the animal and to enable the animal to adapt to different environments	K2
CO3	Examine the key physiological mechanisms involved in animal adaptations to different environments	K3
CO4	Illustrate the animal groups will range from invertebrates to vertebrates	K4
CO5	Summarise the laboratory practical that involve animal physiology experiments	K5
CO6	Integrate the information in the practical and to help the students to understand the important concepts.	K6

1. Cockroach: Digestive system, Nervous system and Reproductive system.
2. Mounting of Insect - mouth parts: Cockroach, mosquito, housefly
3. Mounting of prawn appendages
4. Collection, isolation of soil nematodes
5. Virtual dissection / Video demonstration of frog (Digestive system, Nervous system and Reproductive system).
6. Effect of temperature on salivary amylase activity.
7. Qualitative analysis of excretory products – ammonia, urea, uric acid.
8. Observation of cellular constituents of human blood.
9. Quantitative Estimation of haemoglobin using haemoglobinometer.
10. Demonstration of blood pressure.
11. Slide mounted specimens: *Paramecium*, *Leucosolenia*
12. Preserved specimens: *Hydra*, *Taeniolum*, *Ascaris*, *Megascolex*, *Palaemon*, *Pila globosa*, *Asterias*, *Amphioxus*, *Balanoglossus*, *Ascidian*, *Anguilla*, *Rhacophorus*, *Chamaeleon*, *Najanaja*, Pelican, Parrot, Rabbit, Bat, *Manis* (pangolin),
13. 3-D Models: Human system / organs: – digestive system, lungs, kidney, nephron, heart, neuron, eye, thyroid.

MUSHROOM CULTIVATION
(SUB.CODE:26UBOS31)

SEMESTER – III	SEC-5	HOURS –2	CREDITS – 2
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Course Outcomes:

Upon completion of the courses, the students will be able to

CO1: To learn and develop skills in mushroom cultivation. (K1)

CO2: To understand and appreciate the role of mushrooms in Nutrition, Medicine and health (K2)

CO3: To cultivate mushroom cultivation in small scale industry. (K3)

CO4: To learn about diseases and post-harvest technology (K4)

CO5: To study new methods and strategies to contribute to mushroom production (K5)

Unit I **(6 hours)**

Introduction: Morphology, Types of Mushrooms, identification of edible and poisonous mushroom, Nutritive values, life cycle of common edible mushrooms.

Unit II **(6 hours)**

Mushroom cultivation, prospects and scope of Mushroom cultivation in small scale Industry.

Unit III **(6 hours)**

Life cycle of *Pleurotus spp* and *Agaricus spp*.

Unit IV **(6 hours)**

Spawn production, growth media, spawn running and harvesting of mushrooms and marketing.

Unit V **(6 hours)**

Diseases and post-harvest technology, Insect pests, nematodes, mites, viruses, fungal competitors and other important diseases.

Recommended Texts:

1. Handbook of Mushroom Cultivation. 1999. TNAU publication.
2. Marimuthu, T., Krishnamoorthy, A.S., Sivaprakasam, K. and Jayarajan. R. 1991. Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
3. Swaminathan, M. 1990. Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
4. Sing. 2005. Modern Mushroom Cultivation, International Book Distributors, Dehradun.
5. Verma, 2013. Mushroom: edible and medicinal: cultivation conservation, strain improvement with their marketing. Daya Publishing House

Reference Books:

1. Handbook of Mushroom Cultivation. 1999. TNAU publication.
2. Marimuthu, T., Krishnamoorthy, A.S., Sivaprakasam, K. and Jayarajan. R. 1991. Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.

3. Swaminathan, M. 1990. Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
4. Nita Bahl. 2002. Handbook on Mushroom 4th edition Vijayprimlani for oxford & IBH publishing co., Pvt., Ltd., New Delhi. Dr.C. Sebastian Rajesekaran Reader in Botany Bishop Heber College, Trichy – 17.
5. Suman. 2005. Mushroom Cultivation Processing and Uses, M/s. IBD Publishers and Distributors, New Delhi.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	1	3	2	1	2	2
CO 2	3	1	1	2	1	3	2	3
CO 3	2	1	1	3	1	2	1	3
CO 4	3	3	3	3	1	2	3	3
CO 5	3	3	2	1	1	1	3	3

S-Strong (3)

M-Medium (2)

L-Low(1)

TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY

(SUB.CODE: 26UBOC41)

SEMESTER – IV	CORE -T4	HOURS – 5	CREDITS – 5
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Course Outcomes:

Upon completion of the courses, the students will be able to

CO1: Define the concepts in plant morphology and rules of ICN in botanical nomenclature (K1).

CO2: Classify systems of plant classification and recognize the importance of herbarium and virtual herbarium (K2).

CO3: Describe the core concepts of economic botany and relate its applications in human life (K3).

CO4: Analyze the characters of the families according to the Bentham and Hooker's system of classification (K4).

CO5: Assess terms and concepts related to Phylogenetic Systematics (K5).

Unit I

(15 hours)

Morphology – root system – modifications. Shoot system – modifications – (Aerial, sub-aerial and underground). Leaf- Types- simple and compound- phyllotaxy, modifications (phyllode, pitcher), tendrils, stipules. Inflorescences – definition and types – racemose, cymose, mixed and special types. Fruits - classification.

Unit II

(15 hours)

History of Angiosperm classification – Artificial, Natural and Phylogenetic system of classification. An outline of Bentham and Hooker system of classification, an overview of APG Classification. Herbarium technique–collection, pressing, drying, mounting and preservation of plant specimens, digital herbarium. Botanical Survey of India. Botanical nomenclature–rules, typification and author citation.

Unit III

(15 hours)

Study of the following families based on the Natural system and their economic importance: Meliaceae, Capparidaceae, Rutaceae, Fabaceae (Papilionoideae, Caesalpinioideae, Mimosoideae), Cucurbitaceae, Asteraceae, Apocynaceae and Asclepiadaceae.

Unit IV

(15 hours)

Study of the following families based on the natural system and their economic importance: Convolvulaceae, Acanthaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Liliaceae, Orchidaceae and Poaceae.

Unit V

(15 hours)

Source, cultivation method (brief) and the extraction/processing of the economically important products of the following – Cereal (Rice), Pulses (Black gram), Sugar (Sugarcane), Beverage (Coffee), Oil seed (Groundnut), spices (Cardamom), essential oil, natural rubber and timber plants (Teak) and Fibre (Cotton).

Recommended Texts

1. Lawrence, G.H.M. 1985. An Introduction to Plant Taxonomy, Central Book Depot, Allahabad.
2. Porter, C.L. 1982. Taxonomy of Flowering Plants, Eurasia Publications House, New Delhi
3. Solbrig, O.T. 1970. Principles and Methods of Plant Biosystematics. The MacMillan Co-collier-MacMillan Ltd., London.
4. Solbrig, O.T and Solbrig, D.J. 1979. Population Biology and Evolution, Addison-Wesley Publishing Co. Ind USA.
5. Takhtajan, A.L. 1997. Diversity and Classification of Flowering Plants. Columbia University Press, New York.
6. Woodland, D.W. 1991. Contemporary Plant Systematics. Prentice Hall. New Jersey.
7. Rajni Gupta. 2012. Plant Taxonomy: Past, Present and Future. Vedams (P) Ltd. New Delhi.

Reference Books

1. Hutchinson, J. 1973. The Families of Flowering plants, Oxford University press, London.
2. Gamble, J.S., Fisher, L.E.F. 1967. The Flora of the presidency of Madras (Vol-III) BSI, Calcutta
3. Davis, P.H and Heywood, V.M. 1965. Principles of Angiosperm Taxonomy, Oliver and Boyd Edinburgh.
4. Clive AS. 1989. Plant Taxonomy and Biosystematics, Chapman and Hall Inc. New York.
5. Harborne, J.B and Turner, B.L. 1984. Plant Chemosystematics, Acad. Press, London.
6. Lawrence, G.H. 1955. Taxonomy of Vascular Plants, MacMillan Co., USA.
7. Jones, S.B. Jr. and Luchsinger, A.E. 1986. Plant Systematics (2nd edition). McGraw-Hill Book Co., New York.

**TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY-
PRACTICAL IV
(SUB.CODE: 23UBOC53)**

SEMESTER – IV	CORE – P4	HOURS –3	CREDITS – 3
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Course Outcomes:

Upon completion of the courses, the students will be able to

CO 1: Recognize the distinguishing plant morphological characters (K1).

CO 2: Identify locally available plants to their respective families (K2).

CO 3: Develop comprehensive skills in field identification, collection of specimens, writing technical description, botanical drawings and herbaria preparation. (K3).

CO 4: Construct floral diagram and write floral formula for a given flower (K4).

CO 5: Validate the plant specimen by analyzing and dissecting the vegetative and floral characters (K5).

EXPERIMENTS

1. Morphology of root, stem and leaf modification, types of inflorescences.
2. Plants of local flora included under theory syllabus and family identification and derivation based on reasoning.
3. Dissection, identification, observation and sketching the floral parts of the plants belonging to the families included in the syllabus.
4. Students must describe the floral parts, draw the L.S., floral diagram and write the floral formula of at least one flower from each family.
5. Twenty (20) Herbarium sheets, field notebook and bonafide record to be submitted.
6. Study the products of plants mentioned in the syllabus of economic botany with special reference to the morphology, botanical name and family.

Recommended Texts

1. Subramaniam, N.S. 1996. Laboratory Manual of Plant Taxonomy. Vikas Publishing House Pvt. Ltd., New Delhi.
2. Gokhale, S.B., Kokate, C.K. and Gokhale, A. 2016. Pharmacognosy of Traditional Drugs. NiraliPrakashan, 1st Edition. ISBN: 9351642062.
3. Rendle, A.B. 1980. The Classification of Flowering Plants (Vol. I & II), Vikas Students Education.
4. Pandely, B.P. 1987. Taxonomy of Angiosperms.
5. Nordenstam, B., El Gazaly, G and Kassas, M. 2000. Plant Systematics for 21st Century. Portlant Press Ltd., London.

Reference Books

1. Mann J. Davidson, R. S and J.B.Hobbs, D.V.Banthorpe, J.B. Harborne.1994.*Natural Products*. Longman Scientific and Technical Essex.
2. Gopalan,C., B.V.Ramasastri and S.C. Balasubramanian.1985. Nutritive Value of Indian

Foods. National Institute of Nutrition, Hyderabad.

3. Grant, W.E. 1984. Plant Biosystematics. Academic Press, London.

4. Harrison, H.J. 1971. New Concepts in Flowering Plant Taxonomy. Rieman Educational Book Ltd., London.

5. Jones, A.D. and Wilbins, A.D. 1971. Variations and Adaptations in Plant Species. Hieman & Co. Educational Books Ltd. London.

IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

(Sub code: 26UZOE41)

SEMESTER – IV	Allied : Theory (EC 4)	HOURS –4	CREDITS – 4
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Course Objective: To inculcate the fundamental aspects of the immune system, antigen antibody reaction as well as techniques involved in animal cell culture and gene manipulation.

Course Outcomes: At the end of the course the students will be able to

CO1	Describe the concepts, components and principles of immune system	K1
CO2	Explain primary and secondary lymphoid organs	K2
CO3	Demonstrate antigen and antibody interactions and their techniques	K3
CO4	Classify hypersensitivity and autoimmune disorders	K4
CO5	Summarize animal cell culture techniques.	K5
CO6	Design techniques in gene manipulation	K6

Unit I: Immune system

(12 Hrs)

Concepts, components and principles of innate and adaptive immune systems; Haematopoiesis; Cells of immune system - B cells, T cells, null cells and macrophages; Primary and secondary lymphoid organs.

Unit II: Antigen and Antibodies

(12 Hrs)

Antigens – properties, types and determinants; Antibody (Immunoglobulin) – classes, structure, mechanism of action, functions; Monoclonal and polyclonal antibodies; ELISA and RIA techniques and their applications.

Unit III: Immuno-prophylaxis, Hypersensitivity and Autoimmunity

(12 Hrs)

Vaccines – definition, types, mechanism of action, immunization schedule; Hypersensitivity - Definition, types, treatment of type I anaphylactic hypersensitivity; Autoimmunity – classification, disorders and therapy.

Unit IV: Animal cells culture

(12Hrs)

Characteristic features of animal cells in growth; Requirement - culture media, Equipments; Isolation of animal tissue- physical and chemical methods; Establishment of cell culture - primary, secondary cell culture and cell lines; Organ and embryo culture.

Unit V: Technique of gene manipulation in animals

(12 Hrs)

Strategies of r-DNA technology; DNA finger printing ;Gene transfer methods; Cloning methods- Dolly; Transgenic animals; causes of infertility in male and female ; *in vitro* fertilization (IVF) and embryo transfer.

Text Books:

1. Chakravorthy Ashik, K. 1996. Immunology – Tata Mc Graw-Hill Publishing Company Ltd., New Delhi.
2. Purohit, S. S. 2000. Biotechnology Fundamentals and Applications, Agrobios, Jodhpur, India
3. Roitt I.M. 2000. Essential Immunology. Blackwell Scientific Publishers, London.
3. Paul's Fundamental Immunology – 8th edition by Marian, Singh, Holland

Reference Books:

1. Kuby, J. 1999. Immunology W.H. Freeman and Company, New York.
2. Roitt, Brostoff and Male, 1993. Immunology, Mosby, London.
3. Gupta, P. K. 1999. Elements in biotechnology, Rastogi Publication, Meerut, India.
4. Subhash Chandra Parija (2012). Textbook of Microbiology & Immunology, 2nd Edition, Elsevier India.
5. Owen, Judith A, Punt, Jenni, Stranford, Sharon A, Jones, Patricia P, Kuby, Janis 2013. Immunology, W.H. Freeman, New York

E-resources

1. <https://microbiologyinfo.com/antigen-properties-types-and-determinants-of-antigenicity/>
2. <http://www.kean.edu/~jfasick/docs/Fall%2009%20&%20SP10%20%20A&PII/Chapter%2021b.pdf>
3. <http://jeeves.mmg.uci.edu/immunology/CoreNotes/Chap04.pdf>
4. http://cdrwww.who.int/immunization/documents/Elsevier_Vaccine_immunology.pdf
5. http://www.lab.anhb.uwa.edu.au/hb313/main_pages/timetable/lectures/2007%20Tissue%20Culture%20Lecture%20%20combinedBjanka.pdf

IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY -PRACTICAL

(Subjectcode:26UZOE42)

SEMESTER – IV	Allied : Practical	HOURS –2	CREDITS – 2
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Course Objective: To build a clear understanding, competency and hands on training in immunological and microbiological techniques including the basic aspects of blood grouping, identification of white blood cells and immunoglobulins, lymphoid organs.

Course Outcomes: At the end of the course the students will be able to

CO1	Familiarize with immune cells, lymphoid organs, and their functional significance	K1
CO2	Get hands-on training in basic immunological and hematological techniques.	K2
CO3	Introduced to standard laboratory practices and aseptic techniques, emphasizing accuracy, safety, and interpretation of experimental outcomes	K3
CO4	Develop fundamental microbiological skills, such as preparation of culture media, isolation and cultivation of microbes, staining techniques and observational skills.	K4
CO5	Students learn about transgenic animals their applications in the pharmaceutical industry.	K5
CO6	Analyse the diagnostic skills, enabling students to identify microbial colonies, pathogens, viral structures, immunoglobulins relevant to health and disease.	K6

Experiments:

- 1.Human blood grouping (ABO and Rh factor).
- 2.WBC count in human blood
- 3.Double diffusion /radial immunodiffusion.
- 4.Separating lymphocytes.
- 5.Demonstration of lymphoid organs of rat(preserved specimen)
- 6.Demonstration of ELISA
- 7.Preparation of different types of culture media
- 8.Isolation of microbes from animals by serial dilution technique
- 9.Plating techniques and culture of microbes with agar
- 10.Gram staining technique
- 11.Motility test
12. Spore counting with Haemocytometer

Spotters: Bacterial Colony appearance, *Streptococi*, *Vibrio cholerae*, *Clostridium tetani*, Morphology of viral particles: T4 bacteriophage, HIV, Hepatitis – B, Immunoglobulins - IgM, IgG, IgA, IgE and IgD; Immune cells – B-Cells, T-Cells, Macrophage; Lymphoid organs – Rat lymphoid organs (preserved specimens), Thymus, Bone marrow, Bursa of Fabricius, Spleen and lymph node (book plates/images)

GLOBAL CLIMATE CHANGE
(SUB CODE: 26UBOE41)

SEMESTER:IV	EC-T5	HOURS:2	CREDITS:2
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Course Outcomes:

Upon completion of the course, the students will be able to

C1: To gain insights on the impact of the greenhouse effect on global climate change and mitigation measures.(K1)

C2: To understand the implications of carbon and ecological footprint.(K2)

C3: To apply the knowledge to greenhouse effects.(K3)

C4: To know the rain and its effects on plants.(K4)

C5: To know about Global Environmental change issues.(K5)

Unit I **(6 hours)**

Global Environmental Change Issues.UNFCCC, IPCC, Kyoto Protocol, CDM, Carbon footprint and ecological footprint.

Unit II **(6 hours)**

Stratospheric ozone layer: Evolution of ozone layer; Causes of depletion and consequences; Effects of enhanced UV-B on plants, microbes, animals, human health and materials; Global efforts for mitigation of ozone layer depletion.

Unit III **(6 hours)**

Climate change: Greenhouse effect; causes; Greenhouse gases and their sources; Consequences of climate, oceans, agriculture, natural vegetation and humans; International efforts on climate change issues.

Unit IV **(6 hours)**

Atmospheric deposition: Past and present scenario; Causes and consequences of excessive atmospheric deposition of nutrients and trace elements; Eutrophication.

Unit V **(6 hours)**

Acid rain and its effects on plants, animals, microbes and ecosystems.

Recommended Texts:

1. Adger, N. Brown, K and Conway, D. 2012. Global Environmental Change: Understanding the Human Dimensions. The National Academic Press.
2. Turekian, K. K. 1996. Global Environmental Change-Past, Present, and Future. Prentice-Hall.
3. Eugene Odum, 2017. Fundamentals of Ecology, 5th Ed. Cengage, Bengaluru.
4. Sharma P.D. 2019. Plant ecology and phytogeography, Rastogi Publications, Meerut

. 5. Neeraj Nachiketa. 2018. Environmental & Ecology A Dynamic Approach. 2nd Edition, GKP Access Publishing.

Reference Books:

1. Matthew. R.A. 2009. Jon Barnett, Bryan McDonald. Global Environmental Change and Human Security. MIT Press., USA.
2. Hester, R.E and Harrison, R.M. 2002. Global Environmental Change. Royal Society of Chemistry.
3. Keddy, P.A. 2017. Plant Ecology: Origins, processes, consequences. 2nd ed. Cambridge University Press. ISBN.978-1107114234.
1. Krishnamurthy, K.V. 2004. An Advanced Textbook of Biodiversity- Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi.
- Kormondy, E.J. 2017. Concepts of Ecology. Prentice Hall, U.S.A. 4th edition.

MICROBIOLOGY AND PLANT PATHOLOGY

(SUB. CODE: 26 UBOC 51)

SEMESTER - V	CORE – T5	HOURS - 5	CREDITS - 4
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COURSE OUTCOMES (CO)

By the end of the course, the students will be able to:

- Recall the basic principles of microbiology (K1)
- Understand the biological structure of microbes (K2)
- Analyze the importance of microbes in our lives and the ecosystem (K3)
- Compare the various facets of the life of a microorganism (K4)
- Apply the importance of microbes in the life of human beings and plant species (K5)
- Identify the diseases caused by microbes on plants and apply the control measures (K6)

UNIT: I Microbiology

(15 hours)

Introduction, Contributions to microbiology by Anton Van Leeuwenhoek, Louis Pasteur, Robert Koch, Christian Gram. Morphology of bacterial cells - size, shape, arrangement- fine structure of bacterial cells. Cell wall and its chemical composition – flagella - pili (Fimbriae), capsule, cytoplasmic membrane, mesosomes and endospores. Bacterial virus - morphology and structure - reproduction - lytic and lysogenic cycles. Plant virus - TMV - structure and multiplication.

UNIT: II Bacterial Growth

(15 hours)

Bacterial Growth - measurement of growth - phases of growth-physical conditions required for growth (temperature, gaseous atmosphere, pH). Reproduction of bacteria- binary fission, conjugation, transduction and transformation. Nutritional types of bacteria- Outline of Bergey's classification of bacteria. Economic importance of Bacteria.

UNIT: III Control of microorganisms and Water Microbiology

(15 hours)

Control of microorganisms- sterilization, disinfectants, antiseptic germicide, bactericide, bacteriostasis, antimicrobial agents, physical and chemical agents for controlling microorganisms (high temperature, low temperature, desiccation, osmotic pressure, radiation, detergents and formaldehyde.

Water microbiology: potable and non-potable water. Tests for detection of coliform bacteria in water, sewage treatment- primary, secondary and tertiary oxidation ponds-sewage treatment by aerobic digestion. Industrial microbiology: vinegar production- microorganisms involved- uses.

UNIT: IV Plant Pathology**(15 hours)**

Plant diseases- concept, classification and importance- Identification of plant diseases-Koch's Postulates-disease development: Inoculum, inoculum potential-penetration, infection, colonization of host- exit of pathogens-defence mechanisms-mechanical and structural.

UNIT: V Etiology of Plant Diseases**(15 hours)**

Study of the following diseases with reference to causal agents, symptoms and control measures
a. Paddy blast, b. Powdery mildew of black gram, c. Tikka disease of groundnut, d. Bunchy top of banana, e. Black arm of cotton, f. Citrus canker, g. Little leaf of brinjal, h. Smut of Sorghum (Grain Smut), i. Red Rot of sugarcane and j. Wheat rust (Brown Rust)

TEXT BOOK

1. **Sharma, P. D. 2000.** Microbiology and Plant Pathology, Rastogi & Co., Meerut.

REFERENCES

1. **Purohit, S. S. 2000.** Microbiology - Agro Botanica, New Delhi
2. **Powar, C. B. &Daginawala. 2000.** General Microbiology Vols. I & II - Himalaya Publishing House
3. **Rangaswami, G. 1988.** Diseases of crop plants in India, Prentice Hall of India Pvt. Ltd. Delhi.

CELL BIOLOGY, GENETICS AND EVOLUTION

SUB CODE: 26UBOC52

SEMESTER – V	CORE – T6	HOURS –5	CREDITS – 4
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Course Outcomes:

Upon completion of the courses, the students will be able to

CO1 : Enumerate the structure and functions of cells, cellular structures and organelles.

CO2 : Explain about cell cycle, cell division and laws of inheritance with examples (K2).

CO3 : Elucidate concepts of sex determination and sex-linked inheritance (K3).

CO4 : Analyze the importance of interaction of genes at population and evolutionary levels (K4).

CO5: To provide a basis for better understanding of the evolution higher of plants. (K2)

Unit – I

(15 hours)

Introduction- scope- cell organisation- Ultra structure of Prokaryotic cell and Eukaryotic cell. Plant cell structure and function. Cell wall – primary and secondary wall - Structure, chemistry and functions of cell wall, Pits - (simple and bordered), Plasmodesmata. Plasma membrane-occurrence, structure (fluid mosaic model) chemistry, function and origin. Properties of Cytoplasm Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis.

Unit – II

(15 hours)

Occurrence, structure, function and origin of Endoplasmic reticulum, Golgi apparatus, Lysosomes, Ribosomes, Mitochondria, Chloroplast and Micro bodies. Ultrastructure and functions of Nucleus, nuclear envelope, nuclear pore complex, nucleolus, chromosome structure, molecular organization of chromatin, Euchromatin, heterochromatin, Polytene and Lampbrush chromosomes, Centromere: types. Cell cycle, Cell division, Mitosis and Meiosis- their significance.

Unit – III

(15 hours)

Mendelian genetics–monohybrid, dihybrid crosses. Laws of Mendel, Reciprocal cross - Back cross and Test cross. Incomplete dominance – *Mirabilis jalapa*. Interaction of factors– Complementary genes, Supplementary genes, inhibitory genes, Epistasis (dominant and recessive), duplicate genes. Multiple alleles. ABO Blood grouping in Humans. Chromosome theory of linkage, crossing over, recombinations and mapping of genes on chromosomes. Sex determination in plants.

Unit – IV

(15 hours)

Sex linked inheritance: haemophilia and colour blindness. Polyploidy: origin, types and significance. Mutation-types and significance. Chromosomal aberrations - addition, deletion, inversion, duplication and translocation. Extranuclear inheritance and its significance-Male sterility in corn, Maternal inheritance–Plastid Inheritance in *Mirabilis jalapa*. Genetics of *Neurospora*. Population genetics–Hardy–Weinberg principle.

Unit – V

(15 hours)

Evolution - origin of life, chemosynthetic theory - evidence. Theories of evolution - Darwin, Lamarck and De Vries, Urey – Miller experiment, modern synthetic theory. Variation – the raw

material for evolution, sources of variation. Concept of species. Natural selection, Mechanism of speciation, Reproductive Isolation and adaptive radiation, Convergent and divergent evolution, Coevolution.

Recommended Texts

1. Verma, P.S and V.K. Agarwal. 2002. Cytology. S. Chand & Co. Ltd., New Delhi-55.
2. Sinnott, E.W., Dunn, L.L and Dobzhansky, T. 1997. Principles of Genetics, Tata McGraw-Hill Publishing Co. New Delhi.
3. Cohn. N.S. 1979. Elements of Cytology, Freeman Book Co.
4. Singh, R. J. 2016. Plant Cytogenetics, 3rd Edition. CRC Press, Boca Raton, Florida, USA.
5. Singh, R.J. 2017. Practical Manual on Plant Cytogenetics. CRC Press, Boca Raton, Florida, USA.

Reference Books

1. De Robertis and De Robertis. 1990. Cell and Molecular Biology, Saunders College, Philadelphia, USA.
2. Gardner, E.J., Simmons, M.J and Snustad, D. 1991. Principles of Genetics, John Wiley Sons Inc., 8thEdn., New York.
3. Cooper, G.M and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C. Sinauer Associates, MA.
4. Klug, W.S., Cummings, M.R., Spencer, C.A. 2009. Concepts of Genetics. 9th edition. Benjamin Cummings, U.S.A.
5. Lewin. 2007. Gene IX. Jones and Barlett Pub. ISBN. O 7637 52223.
6. Strickberger, M.W. 1999. Genetics. Prentice Hall of India Pvt Ltd, New Delhi.

MICROBIOLOGY AND PLANT PATHOLOGY – PRACTICAL V
(SUB. CODE: 26 UBOC53)

SEMESTER - V	CORE – P5	HOURS – 3	CREDIT – 2
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MICROBIOLOGY

1. Sterilization of glassware.
2. Preparation of media
 - i. Nutrient broth
 - ii. Nutrient medium
 - iii. Czapeckdow agar medium
 - iv. PDA medium.
3. Enumeration of microbes from air, water and soil using pour plate
4. Isolation of microbes using Streak Plate Method from sewage, pond, well and tap water.
5. Isolation of microbes using streak plate technique
6. Examine the mobility of microbes using hanging drop experiment
7. Classify the bacteria by Gram's stain method.
8. Counting of microbes – cell count method

PATHOLOGY

9. Symptoms, Causal organisms and control measures of the diseases prescribed in the syllabus.
10. Infected leaf sectioning
11. Enumeration of microbes from phyllosphere

CELL BIOLOGY, GENETICS AND EVOLUTION PRACTICAL -VI
(SUB CODE: 26UBOC54)

SEMESTER – V	CORE – P6	HOURS –3	CREDITS – 2
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Course Outcomes:

Upon completion of the courses, the students will be able to

- CO1: Recall the key structures and functions of cell organelles by examining photomicrographs (K1).
CO2: Compare the functions of various ergastic substances present in plant tissues (K2).
CO3: Design and execute emasculation techniques in plant breeding experiments, demonstrating proficiency in controlled pollination (K5).
CO4: Interpret the given genetic data to develop genetic map based on the principles of Mendelian inheritance and gene interaction (K4).
CO5: Utilize the three-point test cross method to construct chromosome maps and understand gene linkage and recombination (K3).

EXPERIMENTS

Cell biology

1. Study of generalized plant cell by using the onion peel or Hydrilla leaf. Observe cell wall, cytoplasm and nucleus using the same.
2. Study of the photomicrographs of cell organelles.
3. Observation and study of the different stages of mitosis and meiosis by means of permanent slides.
4. Study of Ergastic substances
 - a. starch grains
 - b. aleurone grains
 - c. crystals – cystoliths and raphides.
3. Study of polytene and lamp brush chromosome structure through photograph.
4. Identification of different stages of mitosis by using squash technique – Onion root tip.
5. Karyotyping

Genetics

1. Genetic problems
 - a. Monohybrid cross – Complete dominance and Incomplete dominance.
 - b. Dihybrid cross
 - c. Test cross
 - d. Back cross
 - e. Allelic interactions
 - i. Complementary Genes
 - ii. Dominant Epistasis
2. Multiple alleles problems

- a. Blood Groups in Man
 - b. Coat Colour in Mice
 - c. Eye colour in *Drosophila*.
3. Chi Square test

Evolution

1. Morphological study of fossils
- a. Petrifications (*Rhynia*)
 - b. Compressions (*Glossopteris* leaves)
 - c. Impressions
 - d. Slide observation (any two)

ECOLOGY
SUB CODE: 26UBOE51

SEMESTER: V	EC-T6	HOURS: 5	CREDITS:4
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Course Outcomes:

Upon completion of the course, the students will be able to

- CO1 : Relate to the significance of the biotic and abiotic components of the ecosystems and energy flow (K1).
- CO 2 : Summarise the phytogeographical division of India (K2).
- CO 3 : Explain the implications of pollution on the environment (K3).
- CO 4 : Analyse the implications of functional and behavioural ecology in natural and man-made areas, biodiversity and conservation (K4).
- CO 5: Develop mitigations for the effective conservation of biodiversity and disaster management products (K5).

UNIT I **(15 hours)**

Definition, plant ecology and its divisions. Applications of plant ecology. Plant adaptations to the environment; eco-physiological adaptations, xerophytes, hydrophytes, epiphytes, mesophytes, heliophytes and halophytes.

UNIT II **(15 hours)**

Ecosystem ecology: Definition, structure and components. Energy and its flow in ecosystem. Biogeochemical cycles – Carbon, water, nitrogen, phosphorus. Ecological niche and habitat.

UNIT III **(15 hours)**

Population: definition, properties (density, natality, mortality, age – structure, population growth). Biotic interactions: positive and negative interactions. Community ecology: community concept, characteristics of community, community structure. Succession and climax concept, kinds of succession, hydrosere, xerosere.

UNIT IV **(15 hours)**

Environmental Pollution: Definition, Causes and effects of Air, Water, Soil, Thermal, Noise and radiation pollution on ecosystem. Waste water Treatment. Biological methods of control of water and soil pollution. Green building and Disaster management.

UNIT V **(15 hours)**

Biodiversity concept and definition. Conservation biology: Principles and aims of conservation; *in-situ* conservation of biodiversity, sanctuaries, national parks, biosphere reserve, sacred groves. *Ex-situ* conservation, zoological park, Botanical gardens.

Phytogeography- principles of phytogeography, types of plant distribution: continuous, discontinuous and endemic. Theories of distribution. Continental drift, theory of land bridges, age and area hypothesis, centres of origin of plants.

TEXT BOOKS:

1. Erach Bharucha, 2005. Text book of Environmental studies, UGC New Delhi
2. Misra, R. 1973. Ecology workbook Oxford & IBH Publishing Co New Delhi
3. Odum, E. P. 1996. Fundamentals of Ecology Sounders Co Philadelphia

REFERENCE BOOKS

1. Shanna, P.D. 2011. Ecology and Environment Rastogi publications, Meerut
2. Shukla, R.S. and Chandel, P.S. 2006. A text book of Plant Ecology, S Chand & Company, New Delhi
3. Verma, P.S. and Agarwal, V. K. 2014. Environmental Biology, Principles of Ecology 2nd Edition, S Chand & Company Ltd, New Delhi
4. Verma, V. 2011. Plant Ecology, Ane Books Pvt Ltd. Chennai.
5. Weaver and Clements. 1938. Plant Ecology, McGraw-Hill University of California

ECOLOGY – PRACTICAL VII

SUB CODE: 26UBOE52

SEMESTER: V	EC-P5	HOURS: 3	CREDITS:2
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1. Morphological and anatomical adaptations of
 - a. Phyllode - *Acacia*
 - b. Cladode – *Asparagus*
 - c. Cladophyll – *Opuntia*
 - d. Stem – *Casuarina*
 - e. Leaf – *Nerium*
 - f. Stem – *Hydrilla*
 - g. Petiole – *Eicchornia*
 - h. Pneumatophore – *Avicennia*
 - i. Aerial Root – *Vanda*
2. Vegetational Studies – Study of Vegetation by Quadrat method and Biological Spectrum
3. Water Analysis
 - a. Estimation of phytoplanktons
 - b. Estimation of DO, salinity and chlorinity
 - c. Estimation of Na and K using Flame photometer
 - d. Estimation of Phosphate
 - e. Estimation of Alkalinity

BIOLOGICAL TECHNIQUES
(SUB.CODE: 23UBOE53)

SEMESTER – V	EC-T7	HOURS – 4	CREDITS – 2
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Relate to the various biological techniques and their importance (K1).

CO2: Explain the principles of Light microscopy, compound microscopy, Fluorescence microscopy and electron microscopy (K2).

CO 3: Apply suitable strategies in data collection and disseminating research findings (K3 & K6).

CO 4: Compare and contrast the significance of different types of chromatography techniques (K4).

CO 5: Develop methodologies for extraction and analysis of biochemical compounds (K5).

Unit I- MICROSCOPY

(12 hours)

Principles of microscopy; Light microscopy; compound microscope, bright field microscope, dark field microscope, phase-contrast microscope, Fluorescence microscopy; Transmission and Scanning electron microscopy. Microscopic measurements-micrometry, Microscopy drawing: Camera Lucida.

Unit II- CHROMATOGRAPHIC PRINCIPLES AND APPLICATIONS

(12 hours)

Principle; Paper chromatography, Thin Layer Chromatography (TLC), Column chromatography, Gas chromatography – Mass spectrometry (GCMS), High Performance Liquid Chromatography (HPLC).

Unit III- ELECTROPHORESIS AND pH METER

(12 hours)

Basic principle, construction and operation of pH meter. Polyacrylamide gel electrophoresis (PAGE), Agarose Gel Electrophoresis.

Unit IV-SPECTROPHOTOMETRY AND CENTRIFUGATION

(12 hours)

Principle and law of absorption, construction, operation and uses of colorimeter and UV–Visible spectrophotometer, Principles, methods of centrifugation, types of centrifuge and applications.

Unit V – BIOSTATISTICS

(12 hours)

Data collection methods, population, samples, parameters; Representation of Data: Tabular, Graphical– Histogram – frequency curve – Bar diagram–measures of central tendency – Mean, Median and Mode; Standard deviation, Standard error, Chi-square test and goodness of fit –t–test.

Recommended Texts

1. Sharma, V.K. 1991. Techniques in microscopy and cell biology, Tata McGraw Hill, New Delhi.

2. Sawhney, S.K and Randhir Singh. 2000. Introductory practical biochemistry, Narosa Publishing House.
3. Asokan, P. 2001. Basics of analytical biochemistry. Chinna Publications.
4. Bajpai, P.K. 2006. Biological instrumentation and methodology. S. Chand & Company, New Delhi.
5. Veerakumari, L. 2009. Bioinstrumentation. MJP Publications.
6. Palanivelu, P. 2013. Analytical Biochemistry and Separation techniques, 20th century publications, Palkalainagar, Madurai.

Reference Books

1. Rana, S.V.S. 2009. Biotechniques: Theory and Practice. Rastogi Publications.
2. Zar, J.H. 2012. Biostatistical Analysis. 4th edition. Pearson Publication. U.S.A.
3. Sundar Rao, P.S.S and Richard, J. 2011. Introduction to Biostatistics and research methods, PHI learning Private Ltd., New Delhi.
4. Johansen, D.A. 1940. Plant Micro technique, TATA McGraw Hill Book Co., Ins., New Delhi.
5. Peter Gray. 1964. Handbook of Basic Micro technique. McGraw hill publication, New York.
6. Cooper, T.G. 1991. The Tools of Bio - chemistry, John Wiley & sons, London.
7. Dey, P.M and Harborne, J.B. 2000. Plant Biochemistry Harcourt Asia Pvt. Ltd.
8. Plummer, D.T. 2003. An introduction to practical Biochemistry. 3rd Edn. Tata McGraw Hill Publishing Company Ltd. New Delhi.
9. Zar, J.H. 1984. Biostatistics Analysis, Prentice Hall International, England Cliffs, New Jersey.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	2	1	2	2	3	2
CO2	3	3	2	2	1	3	2	3	3	3
CO3	2	2	3	2	1	2	1	3	2	2
CO4	3	2	1	1	3	2	1	3	3	2
CO5	3	2	1	3	2	2	3	3	3	2
S-Strong (3)			M-Medium (2)			L-Low (1)				

BIOSTATISTICS AND BIOINFORMATICS

(Sub. Code: 26UBOE53)

SEMESTER – V	EC- T7	HOURS – 4	CREDITS – 2
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COURSE OUTCOMES:

- Recall the principles and concepts of biology, computer science and mathematics (K1)
- Describe the basic concepts of bioinformatics and its significance in biological data analysis (K2)
- Explain the basics of sequence alignment and analysis (K3)
- Demonstrate the technique in retrieval of data from biological databases (K3)
- Solve the problems associated with molecular modelling and phylogenetic analysis (K4)
- Outline the application of bioinformatics tools in biology (K5).
- Justify the necessities of bioinformatics in modern biological research (K6).

UNIT: I

(12 hours)

Biostatistics - introduction – applications – data - primary and secondary data-collection of data - methods of collection of data - classification of data - frequency tables - presentation of data – tabulation of data – elements of a statistical table - graphs - pictures and diagrams.

Measures of central tendency and dispersion - arithmetic mean, median and mode, standard deviation and co-efficient of variation.

UNIT: II

(12 hours)

Sampling methods and Sample size determination - Advantages of sampling method – Sample surveys - uses of sample surveys - The principal steps in a sample survey.

Sampling theory - Probability sampling - Alternatives to Probability sampling. Normal distribution - Use of normal distribution. Sampling Bias and its effects, the mean square error - Simple random sampling, Selection of a simple random sample, properties of the estimate.

UNIT: III

(12 hours)

Introduction to Hypothesis Testing - Null and alternative hypotheses - Simple hypotheses - Critical region - Level of significance - one-tailed and two tailed testing. Types of errors (Type I & II) - Power and Sample size - P - value interpretation and its associated misconceptions- Nonparametric Tests - Test of goodness of fit - Chi square test.

UNIT: IV

(12 hours)

Introduction to Bioinformatics – aims and scope and applications – Major areas of Bioinformatics – genomics – Proteomics – databases in bioinformatics- types of databases- resources in NCBI, EMBL, DDBJ, PDB, PIR and SWISSPROT. Specialized databases- data retrieval methods

UNIT: V**(12 hours)**

Tools and software in bioinformatics- similarity search- BLAST- FASTA- sequence alignment tools- molecular visualization tools- Prediction tools- docking tools- Homology modelling – drug designing

TEXT BOOKS

1. **Ravindra Reddy, B., Sharma, K. L. A. P and Pullaiah, T. 2012.** Biostatistics. Astral International.
2. **Rajan S.S. and Balaji R. 2002.** Introduction to Bioinformatics, Himalaya Publishing House.

REFERENCES

1. **Balaji, K. P., Raghavaiah, V. S. and Jayaveera, K. N. 2012.** Biostatistics. I. K. International Publishing House Pvt. Ltd.
2. **Bergeron, B. 2003.** Bioinformatics Computing, Prentice Hall of India.
3. **Bozdogan, H. 2003.** Statistical Data Mining & Knowledge Discovery, CRC Press
4. **Shanmughavel, P. 2005.** Principles of Bioinformatics, Pointer Publishers.

INTERNSHIP
(SUB.CODE: 23UBOI51)

SEMESTER – V	INTERNSHIP		CREDITS – 2
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- All UG students will undergo internship during the summer holidays of the second year after completing IV semester.
- Two credits will be given for internship.
- Minimum contact days: 21
- Minimum working time per day: 3 Hrs. & Maximum working Time: 5 Hrs.
- The places of internship can be government offices, Panchayats, MP, MLA offices, private institutions, companies, production units etc.
- The HoD of the departments will give a letter of introduction to each student.
- The students will identify the company / institution for internship.
- The students will be divided equally based on the number of professors available in the departments. Each professor will serve as a guide to the assigned students.
- The students will finalize the institutions / companies for the internship in consultation with the guides.
- The students shall maintain a work diary which will be countersigned by the managers / authorities of the company in which the students do the internship on daily basis.
- The work diary, Work completion certificate obtained from the company and a comprehensive report (plagiarism-checked) on the learning outcomes will be submitted to the guides at the end of the internship.
- Viva will be conducted based on the experience of the internship in the month of August. The guide will be the internal examiner and another faculty from the same department will serve as the external examiner.

PLANT PHYSIOLOGY

(SUB. CODE: 26 UBOC61)

SEMESTER - VI	CORE – T7	HOURS - 5	CREDITS - 4
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COURSE OUTCOMES (CO)

- Relate understand properties and importance of water in biological system, nutrients and its translocation. (K1)
- Summarize physiological process that taken place in plant cells (K2)
- Explain the energy requirement and nitrogen metabolism (K3)
- Compare the various growth regulators that influence plant growth (K4)
- Discuss the senescence and plant response to environmental stress (K5 & K6)
- Describe the mechanisms of photoperiodism, seed dormancy and seed germination (K2)

UNIT: I Water Relations and Mineral Nutrition

(15 hours)

Importance of water, water absorbing organs, Water potential and its components - Absorption of water and minerals, water absorption by roots – Apoplast and Symplast concept, Mechanism of water absorption, ascent of sap. Transpiration: types, mechanism of stomatal movement. Soil, plant, air continuum (SPAC), Factors affecting transpiration, Anti-transpirants. Guttation. Mineral nutrition - Essential elements, criteria for essential elements, macro and micro elements. Role of macro and microelements – deficiency symptoms in plants.

UNIT: II Mineral movements and Photosynthesis

(15 hours)

Mineral movements. Absorption of solutes – translocation of solutes – pathways and mechanisms. Photosynthesis: organization of thylakoids, Photosynthetic pigments, photo-electron transport and photophosphorylation. Calvin cycle, C₄ cycle, CAM cycle. Factors affecting photosynthesis. Phloem loading and unloading - translocation of photosynthates – source- sink relationship – partitioning of assimilates and harvest index.

UNIT: III Respiration and Nitrogen metabolism

(15 hours)

An overview of plant respiration. Respiration: Aerobic and anaerobic respiration – fermentation – alcohol and lactic acid production - Glycolysis, Krebs's cycle, Electron transport system, Oxidative phosphorylation. Factors affecting respiration. Nitrogen metabolism: Sources of nitrogen, nitrogen fixation, symbiotic and non-symbiotic - reductive amination and transamination, GS-GOGAT pathway.

UNIT: IV Photoperiodism, vernalization and Senescence

(15 hours)

Photoperiodism and Biological clock: Concepts – Circadian rhythm. Vernalization- Mechanism and its practical application Mechanism of flowering – Phytochrome and their action on flowering

Seed dormancy and physiology and biochemistry of seed germination. Fruit ripening- Biochemical, Physiological changes and control of fruit ripening.

UNIT: V Plant Growth Regulators and Plant Stress Physiology

(15 hours)

Growth, Growth curve, Factors affecting growth. Plant growth regulators - Auxins, Gibberellins, Cytokinins, Ethylene, Abscissic acid, Occurrence, structure and their physiological effects. An overview of stress physiology - Plant response to environmental stress: Biotic and Abiotic stress - Adaptive mechanism to various stresses (avoidance, escape, tolerance)

TEXTBOOKS

1. **Devlin, K. M. 1969.** Plant Physiology, Reinehart and Winston and Affiliated East West Press (P) Ltd, New Delhi.
2. **Salisbury, F. B. and Ross, C. W. 1986.** Plant Physiology, CBS Publishers and Printers, New Delhi.
3. **Pandy, S. N. 1991.** Plant Physiology, Tata McGraw Hill Publishers (P) Ltd., New Delhi.
4. **Verma, V. 1991.** A Text Book of Plant Physiology, Emkay Publications, New Delhi.
5. **Gill, D. S. 2000.** Plant Physiology, S.Chand and Co., New Delhi.

REFERENCES

1. **Noggle, G. R. and Fritz, G. J. 1982.** Introductory Plant Physiology. Prentice Hall of India Private Ltd.
2. **Steward, F. C. 1904.** Plants at Work (A summary of Plant Physiology), Addition – Wertley publishing Co., Inc., Reading, Massachusetts, Pa. also, London.

BIOCHEMISTRY & BIOPHYSICS

(SUB. CODE: 26UBOC62)

SEMESTER -VI	CORE -T8	HOURS - 5	CREDITS- 4
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COURSE OUTCOMES:

- Recall the various biomolecules that make up the body of a living organism (K1)
- Understand the biomolecules that are very essential for the normal growth of living organisms (K2)
- Analyze the role of different biomolecules in the metabolism of living organisms (K3)
- Compare the different cycle of pathways of living organisms (K4).
- Explain the importance of reactions catalyzed by enzymes (K5)
- Evaluate the role of light in the living world (K6)

UNIT: I

(15 hours)

Biochemistry: Definition and scope. Basic concepts of atoms, molecules and types of bonding in biomolecules. Isomerism – types, structural – stereo and optical. Buffers –definition, pH scale, and biological significance of buffers.

UNIT: II

(15 hours)

Carbohydrates: Nomenclature, definition and classification. -Monosaccharides: glucose – structure: linear/ open chain, ring form, chair and boat model. Properties of monosaccharides.- Disaccharides: structure and classification– maltose, lactose, sucrose. Polysaccharides: structure and classification – starch, cellulose, hemicellulose and pectin.

UNIT: III

(15 hours)

Amino acids: classification based on polarity and electrical charge. Structure and properties of amino acids.

Proteins: classification based on composition, solubility, shape and function. Structure: primary – peptide bond, N and C terminals. Secondary – types of bonding in secondary structure. Tertiary – types of bonding in tertiary structure - Physical and chemical properties of proteins.

UNIT: IV

(15 hours)

Lipids: Classification of lipids, saturated and unsaturated fatty acids. Cholesterol, bile acids, bile salts and porphyrins. Properties of lipids. Simple lipids: fats and oils. Compound lipids: Phospholipids – phosphoglyceride, glycolipids - Derived lipids: steroids, terpenes, carotenoids (with an example each).

Vitamins: structure, importance, source, deficiency symptoms of water-soluble vitamins e.g. thiamine, riboflavin, niacin – fat soluble vitamins: Vit A and D.

Plant pigments: structure and biological importance of chlorophyll, carotenoids and xanthophylls.

UNIT: V Biophysics:

(15 hours)

Bioenergetics: energy and work – laws of thermodynamics. Concepts of entropy and free energy.

Enzymes – Classification, properties, active site, Mechanism of enzyme action.

Photobiology: dual nature of light – characteristics of electromagnetic radiation, action and absorption spectrum energy states, light emission – phosphorescence, fluorescence and bioluminescence.

TEXT BOOK

1. **Jain J. L. 2001.** Fundamentals of Biochemistry. S. Chand and Company Ltd., New Delhi

REFERENCES

1. **Conn, E. E. and Stumpf, P. K. 2004.** Outlines of Biochemistry, Wiley Eastern Ltd.
2. **Lehninger, A. L. 1974.** Biochemistry, Kalyani Publishers.

PLANT BIOTECHNOLOGY AND MOLECULAR BIOLOGY
(SUB.CODE: 26UBOC63)

SEMSTER – VI	CORE -T9	HOURS- 5	CREDITS -4
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1 :Recognize the fundamental concepts of plant biotechnology and genetic engineering (K1).

CO 2 : Explain various steps in transcription, protein synthesis and protein modification (K2).

CO 3 : Elucidate gene cloning and evaluate different methods of gene transfer (K3).

CO 4 : Analyze the major concerns and applications of transgenic technology (K4).

CO 5: Develop their competency on different types of plant tissue culture (K5).

Unit – I

(15 hours)

Biotechnology – definition, history and scope. Application of plant biotechnology in various fields. Agriculture - Biofertilizers, Biopesticides. Medicine – Antibiotics (Penicillin), Recombinant insulin and vaccines. Environment – Bioremediation and Biofuel. Industry – ethanol production (yeast), citric acid production (*Aspergillus niger*) and protease production (*Bacillus sps*).

Unit -II

(15 hours)

Plant tissue culture - introduction, scope and importance, concept of totipotency, aseptic techniques in plant tissue culture. Composition of media, types of media, sterilization, explant preparation and inoculation. Callus induction and micropropagation. Organisation of Plant Tissue Culture laboratory. Synthetic seed technology.

Unit -III

(15 hours)

Vectors; plasmid, bacteriophage, viral vectors, cosmids. Restriction enzymes. Recombinant DNA technology, gene transfer – indirect method, *Agrobacterium-mediated* gene transfer. Direct method – Biolistic method. Development of transgenic plants with reference to insect resistance, Pros and cons of GM food.

Unit – IV

(15 hours)

Nature and function of genetic materials, Nucleic acid – base pairing – Chargaff's rule, DNA – structure. Types, denaturation - renaturation. Replication of DNA in Prokaryotes and Eukaryotes. RNA structure and types. DNA repair mechanism.

Unit -V

(15 hours)

Transcription – Enzymology – RNA polymerase – classes of RNA molecules – transcription in Prokaryotes & Eukaryotes. Protein synthesis – Genetic code – characters – codons and anticodons. Gene regulation in Prokaryotes – *lac* operon and *trp* operon and in Eukaryotes.

Recommended Texts

1. Bhajwani, S and Razdan, 1984. Plant tissue culture. Theory and practice.
2. Verma P.S and Agarwal V.K. 2010. Molecular Biology. S Chand Publishers.
3. Ignacimuthu, S.J. 2003. Plant Biotechnology. Oxford & IBH Publishing, New Delhi.
4. Bhojwani, S.S and Razdan, M.K. 2004. Plant Tissue Culture, Read Elsevier India Pvt. Ltd.
5. Purohit, S.S. 2010. Plant tissue culture, Student edition, Jodhpur.
6. Bajaj, Y.P.S. 1987. Biotechnology in agriculture and forestry. Springer – Verlag.

Reference Books

1. Bernard R Glick and Jack J Pasternak. 2001. Molecular biotechnology: principles and applications of recombinant DNA, (2nd Edition), ASM Press, Washington, D.C.
2. Jogdand, SN. 1997. Gene biotechnology, Himalaya Publishing House, New Delhi.
3. Ernst L. Winnaccker. 2002. From Genes to Clones-introduction to gene technology, VCR Pub., Weintein.
4. James, D Watson et al., 1992. Recombinant DNA (2nd Edition), WH Freeman and Co., New York.
5. Maniatis and Sambrook. 2003. Molecular Cloning- A lab manual Vol.I, II & III, Cold Spring Harbour Laboratory Press, New York.
6. Old, RW and Primrose, SB. 2001. Principles of Gene Manipulation-an introduction to genetic engineering, Blackwell Science Ltd., New York.
7. Halder, T and Gadgil, V.N.1981. Plant cell culture in crop improvement. Plenum, New York.
8. Neuman, K.H., Barz, W and E. Reinhard. 1985. Primary and secondary metabolism of plant cell cultures – Springer – Verlag, Berlin.
9. Barz, W., Reinhard, E and Zenk, M.H. 1977. Plant tissue culture and its biotechnology application – Springer – Verlag, Berlin.
10. Hu, C.Y and P.J.Wang. 1984. Handbook of plant cell culture Vol.1. Mac millan, New York.
11. Hammond, J.C., McGarvey and V. Yusibov. 2009. Plant Biotechnology, Springer Verlag. New York.

PLANT PHYSIOLOGY – PRACTICAL VIII

(SUB. CODE: 26 UBOC64)

SEMESTER - VI	CORE -P7	HOURS – 2	CREDITS -2
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1. Determination of water potential by the leaf plasmolytic method.
2. Determination of water potential by the Gravimetric method
3. Transpiration index by the cobalt chloride method
4. Plant Ash analysis
5. Effect of temperature and detergent on membrane permeability.
6. Estimation of photosynthetic pigments with reference to age
7. Estimation of amylase
8. Estimation of flavonoids.
9. Estimation of CAM
10. Estimation of IAA

BIOCHEMISTRY AND BIOPHYSICS – PRACTICAL IX

(SUB CODE: 26UBOC65)

SEMESTER: VI	CORE: P8	HOURS: 2	CREDITS: 2
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1. Qualitative tests for carbohydrates (glucose, lactose, sucrose and starch), proteins and lipids.
2. Quantitative estimation of total carbohydrates by phenol sulphuric acid method.
3. Estimation of proteins by Lowry method.
4. Estimation of lipids.
5. Estimation of total phenol.
6. Separation of plant pigments by paper chromatography.
7. Separation of phospholipids by TLC.
8. Preparation of acetate/ phosphate buffers.
10. Estimation of nitrate reductase/peroxidase activity.
11. Separation of plant pigments by paper chromatography.

PROJECT WITH VIVA VOCE
(SUB.CODE: 26UBOC67)

SEMESTER – VI	CORE	HOURS- 5	CREDITS – 3
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As part of curriculum, every BSc Botany Student is required to undertake a simple project work in any branch of Botany under the supervision of a faculty member. The project aims to develop research aptitude, practical skills, and scientific writing ability in students. Students are expected to conduct field/laboratory work, collect and analyse data, and submit a dissertation in the prescribed format, duly certified by the guide and Head of Department.

Marks: 100

Evaluation:

Internal Assessment: 50 Marks - Based on progress, regularity, data collection and presentation.

External Assessment: 50 Marks - Based on dissertation submission and viva-voce examination by an external examiner.

PLANT BIOTECHNOLOGY AND MOLECULAR BIOLOGY PRACTICAL -X
(SUB.CODE: 26UBOS61)

SEMSTER – VI	SEC-6	HOURS- 2	CREDITS –2
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Recognize the fundamental concepts of plant biotechnology and genetic engineering(K1).

CO 2 : Demonstrate skills in green planning and callus culture (K2).

CO 3: Elucidate gene cloning and evaluate different methods of gene transfer. (K3).

CO 4: Analyze the major concerns and applications of transgenic technology. (K4).

CO 5: Develop competency in different types of plant tissue culture. (K5).

Demonstration

1. Sterilization techniques in plant tissue culture.
2. MS - Media preparation.
3. Seed Culture
4. Embryo Culture
5. Micropropagation

Molecular Biology

1. DNA Isolation
2. DNA separation using Agarose Gel Electrophoresis
3. Problem – Molecular Weight Determination
4. Similarity index Calculation
5. Genetic code problems

Recommended Texts

Bhojwani, S.S and Razdan, M.K. 1996. Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.

Reference Books

Gamborg, O.L and G.C. Phillips (eds). 1995. Plant cell, tissue and organ culture. Springer Lab Manual.

HORTICULTURE

(SUB.CODE: 26UBOE61)

SEMSTER – VI	EC-T8	HOURS- 4	CREDITS –2
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Course Outcomes:

Upon completion of the course, the students will be able to

CO 1: Enumerate the concepts in horticulture and nursery management. (K1)

CO 2: Demonstrate a working knowledge of the biology of soil, compost making, designing and planning of gardens, pests, diseases and nutrient management practices. (K2)

CO 3: Appraise the importance of floriculture and evaluate the contribution of spices and condiments to the economy(K3)

CO 4: Analyze different methods of weed control in horticultural crops (K4)

CO 5: Develop their competency on pre- and post-harvest technology in horticultural crops (K5 & K6)

Unit I (12 hours)

Importance and scope of horticulture. Classification of horticultural crops –fruits and vegetables. Essentials of nursery Management - Soil management: Garden soil, Physical and chemical properties of soil, Organic matter, Compost, Cultural practices; Water management: Water quality, Irrigation, Mulching. Nursery structures: Protected cultivation (greenhouses), environment controls.

Unit II (12 hours)

Hydroponic culture-types of containers. Use of manures and fertilizers in Horticultural crop production. Principles of organic farming. Environmental factors influencing vegetable and fruit production.

Unit III (12 hours)

Horticultural crop protection; physical control - pruning. Chemical control- pesticides, fungicides. Plant propagation - cutting, layering, budding, grafting. Types of gardens: formal, informal, kitchen and Terrace. Indoor gardening-bottle garden. Floriculture, ornamental gardening.

Unit IV (12 hours)

A brief account of annuals, biennials and perennials with reference to ornamental gardens. Green house, terrarium, water garden, rockery plants, bonsai techniques. Landscaping, principles and basic components.

Unit V (12 hours)

Technology of horticultural crops - market preparation: harvesting and handling, packaging and transport, storage; chemical treatment. Economics of cultivation Crops: Cardamom, pepper, clove. Food processing - freezing, bottling and canning, drying and chemical preservation.

Recommended Texts

1. Hartmann, H.T and D.E. Kester. 1989. Plant propagation – principles and practices. Half of India. New Delhi.
2. Bose, T.K and Mitra and Sadhu. 1991. Propagation of tropical and subtropical horticultural crops. Naya Prakash.
3. Singh, S.P. 1989. Mist propagation Metropolitan book Co., New Delhi.
4. Chadha, K.L. 1986. Ornamental horticulture in India ICAR, Krishi Bhavan, New Delhi.
5. Bose, T.K and Mukharjee, D. 1977. Gardening in India. Oxford & IBH Pub., Co., Calcutta.
6. Gopalswamy Iyyangar. 1970. Complete gardening in India, Kalyan Printers, Bangalore.
7. Rangaswami, G and Mahadevan, A. 1999. Diseases of Crop Plants in India (4th edition). Prentice Hall of India Pvt. Ltd., New Delhi

Reference Books

1. Arditti, A. 1977. Orchid biology, Cornell Univ., Press. Ithaca.
2. Bailey, S. 1971. Perpetual flowering carnation, Fabner and Fabner, London.
3. Laurie, A., Kiplinger, D.D and Nelson, K.S. 1968. Commercial flower forcing. Mc Graw-Hill Book, London.
4. Cumming, R.W. 1964. The chrysanthemum Book. D.Van., Nostrand Inc.
5. Biswas, T.D. 1984. Rose growing – Principles and Practices – Assoc., Pub., Co., New Delhi.
6. Hartman, H.T and Kester, D.E. 1989. Plant propagation. Printice Hall Ltd., New Delhi.
7. Abraham, A and Vatsala, P. 1981. Introduction to Orchids. Trop. Bot. Garden, Trivandrum.
8. Bose, T.K and Yadav, L.P. 1989. Commercial flowers. Naya Prakash, Calcutta.
9. Mc Daniel, G.L. 1982. Ornamental horticulture. Reston Publ., London. Helleyer, A. 1976. The Collingridge Encyclopedia of gardening Chartwell Book, Inc., New Jercey.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	1	2	1	2	2	2	1
CO 2	3	3	2	1	1	3	1	3	1	3
CO 3	2	2	3	3	1	2	2	3	1	2
CO 4	3	3	2	2	3	2	3	1	3	2
CO 5	3	3	2	3	1	3	2	3	1	3

S-Strong (3)

M-Medium (2)

L-Low(1)

ORGANIC FARMING

(SUB CODE: 26UBOE61)

SEMESTER: VI	EC-T8	HOURS -4	CREDITS-2
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COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Understand the scope and concepts of organic farming in India

CO2: Experiment with various methods of preparation of organic manures and biofertilizers

CO3: Manage indigenous pests and weeds for organic farming.

CO4: Understand the certification process for organic farm produces

CO5: Develop entrepreneur skills and ideas to practice organic farming

Unit-I

(12 hours)

Definition – Principles, Aims and objectives of organic farming. History – organic farming concepts – Needs of organic farming and sustainable agriculture. SWOT analysis of organic farming. Organic farming in India – PKVY.

Unit-II

(12 hours)

Composting: Organic manure, Farmyard manure (FYM) preparation. Compost process, phases, requirements and microorganisms in composting; methods of composting (Bangalore, Indore, Coimbatore, NADEP methods).

Unit-III

(12 hours)

Vermicompost and vermiculture, Importance, benefits, Methods of vermicomposting, Preparation and management of vermicompost unit. Vermiwash Preparation and its uses. Biofertilizers, Importance, classification and benefits of biofertilizers (*Azospirillum*, *Azotobacter*, *Rhizobium*, PSB, VAM etc.)

Unit-IV

(12 hours)

Green manuring, Classification of green manures (GM), advantages of GM, Desirable characteristics of leguminous GM crops.; Organic liquid manure - Beejamrita, Jivamrit, Panchakavya and Dasakavya. Biodynamic manure – cow horn manure – cow horn silica – preparation of cow pat pit manure (CPP).

Unit-V

(12 hours)

Biopesticides and Bioherbicides (mycoherbicides). Weed management in organic farming, Different methods of weed management, Biological weed control. Organic certification: Types of certification, Certification process and procedure.

Text Books

1. Palaniappan, S.P and Annadurai, K. (1999) Organic Farming – Theory and Practice. Scientific Publ.
2. Sharma, A. (2002) Hand Book of Organic Farming. Agrobios.
3. Dushant G. 2012. Organic farming – components and management, Bharat printers, Jodhpur

References

1. Ananthakrishnan, T. N. (ed.) (1992) Emerging Trends in Biological Control of Phytophagous Insects. Oxford & IBH.
2. Gaur, A.C. (1982) A Manual of Rural Composting, FAO/UNDP Regional Project Document, FAO.
3. Lampkin, N. (1990) Organic Farming. Press Books, Ipswich, UK.
4. Veeresh, G. K, Shivashankar, K. and Singlachar, M. A. (1997) Organic Farming and Sustainable Agriculture. Association for Promotion of Organic Farming, Bangalore.
5. Dahama AK. 2005. Organic Farming for Sustainable Agriculture. 2nd Ed. Agrobios.
6. Gehlot G. 2005. Organic Farming; Standards, Accreditation Certification and Inspection. Agrobios.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	3	3	3	3	1	3	1
CO3	3	3	3	3	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	1	3	1
CO5	3	3	3	3	3	3	3	1	3	1

S-Strong (3) M-Medium (2) L-Low (1)

ADD ON COURSES (AOC)

ENVIRONMENTAL BIOTECHNOLOGY

(SUB.CODE:26UBOAO1)

SEMESTER – I	AOC - 1		CREDITS – 2
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Course Outcomes:

Upon completion of the courses, the students will be able to

- CO1: To introduce the student to the various developed and applications of environmental biotechnology (K1)
CO2: To provide knowledge about the scope of bioremediation and bioleaching using GMOs (K2)
CO3: To study about pollution of water bodies (K3)
CO4: To know about bioremediation (K4)
CO5: To study about biomineralization (K5)

Unit I: Introduction:

The environment-soil, water and air, Pollution and its causes (outline only)

Unit II: Source and treatment of polluted waters and effluents:

Pollution of water bodies by heavy metals and pesticides – removal of heavy metals and pesticides by Biosorption. Removal of oil spills by using microbes. Biological treatment of sewage – characteristics of sewage and objectives in sewage treatment – Anaerobic digestion.

Unit III: Soil and air pollution and their treatment:

Soil pollution by Xenobiotics. Degradation of Xenobiotics – pathways of phenol, pentachlorophenol and polychlorinated biphenyl degradation.

Unit IV: Bioremediation:

Introduction to bioremediation, *ex situ* and *in situ* bioremediation.

Unit V: Biometallurgy and related topics:

Biomineralization – bioleaching - Biofilms and biocorrosion.

Recommended Texts:

1. Alan Scragg. 1999. Environmental Biotechnology. Pearson Education Limited.
 2. Dubey R.C. 2004. A text book of Biotechnology aspects of microbiology, British Sun Publication.
 3. Joseph C. Deniel. 1996. Environmental aspects of microbiology, British Sun Publication.
 4. KeeshavThehan. 1997. Biotechnology, New age international (P) Limited, New Delhi.
- Chandra, A.M and Ghosh, S.K. 2010.Remote sensing and Geographical Information System,

Reference Books:

- 1.Sharma, P.D. 2005. Environmental Microbiology, Narosa Publishing House Pvt. Ltd., New Delhi.
2. Raina Maier M. Iran Pepper L., Charles P. Gerba, 2000, Environmental Microbiology, Academic press, U.K.
3. Alexander N. Glazer and Hiroshi Nikaido. 1994. Microbial Biotechnology.
4. Special issue on Bioremediation and biodegradation. Indian Journal of Experimental Biology, September 2003. Vol. 41(9) National Institute of Science Communication and Information Resources, CSIR New Delhi.
5. Keddy, P.A. 2017. Plant Ecology: Origins, processes, consequences.2nd ed. Cambridge University Press.ISBN.978-1107114234.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	2	1	2	2	1	3
CO2	3	3	2	2	2	3	2	3	2	2
CO3	2	2	3	3	1	2	1	3	3	3
CO4	3	3	3	3	3	2	3	3	3	3
CO5	3	3	2	3	2	3	3	3	2	3

S-Strong (3)

M-Medium (2)

L-Low(1)

FORENSIC BOTANY
(SUB.CODE:26UBOAO2)

SEMESTER – II	AOC - 2	HOURS –2	CREDITS – 2
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Course Outcomes:

Upon completion of the courses, the students will be able to

CO1: Recognize morphological and anatomical features of plants, which could be useful for forensic investigations (K1)

CO2: Summarize the forensic importance of different parts of plants. (K2)

CO3: Apply techniques for the collection and preserve of botanical evidences of crime (K3)

CO4: Analyze and decipher the significance of classic and DNA based forensic botany cases (K4)

CO5: Interpret and deduce new methods for the detection of plant poisons used in crime. (K5 & K6)

UNIT I

General plant classification schemes, Sub specialization of forensic botany- plant morphology, plant anatomy, plant systematic, palynology, plant ecology, limnology, Plant architecture- roots, stems, flowers, leaves. Practical plant classification schemes: vegetables and herbs, fruits bearing trees and plants, landscaping plants: trees, shrubs and vines, grasses, plant cell structure and functions.

UNIT II

Various types of woods, timbers, seeds and leaves and their forensic importance, Identification and matching of various types of wood, timber varieties, seeds and leaves. Types of fibers – forensic aspects of fiber examinations, Identification and comparison of man-made and natural fibres. Various types of planktons and diatoms and their forensic importance. Study and identification of pollen grains, Identification of starch grains, powder and stains of spices etc. Paper and Paper Pulp identification.

UNIT III

Various types of poisonous plants: *Abrus precatorius*, *Aconitum napellus*, *Anacardium occidentale*, *Argemone mexicana*, *Cannabis sativa*, *Claviceps purpuria*, *Croton tiglium*, *Atropa belladonna*, *Gloriosa superba*, *Jatropha curcas*, *Lathyrus sativus*, *Nerium indicum*, *Nicotiana tabacum*, *Strychnos nux vomica*, *Thevetia nerifolia*. Types of plants yielding drugs of abuse – opium, cannabis, coco, tobacco, datura, *Psilocybin* mushrooms.

UNIT IV

Collection and preservation of botanical evidences: Botanical samples, outdoor crime scene consideration.

UNIT V

Analysis of samples, DNA analysis, plant DNA typing, Classic forensic botany cases: Case histories by using Plant anatomy and systematic, Palynology, Plant ecology, Limnology, Plant Molecular Biology and DNA, Drug enforcement and DNA.

Recommended Texts

1. Coyle, H.M. 2005. Forensic Botany: Principles and Applications to Criminal Casework. CRC Press.
2. James, S.H., Nordby J.J., Bell, S. 2015. Forensic Science: An Introduction to Scientific and Investigative Techniques. CRC Press; 4 edition.
3. David W. Hall, Dr. Jason H. Byrd. 2012. Forensic Botany. Wiley-Blackwell; United Kingdom.
4. Jane H Bock, David Norris. 2015. Forensic Plant Science. Elsevier.
5. Patricia E. J. Wiltshire. 2012. Forensic Ecology, Botany, and Palynology: Some Aspects of Their Role in Criminal Investigation. Criminal and Environmental Soil Forensics pp 129–149.

Reference Books

1. Hall, D.W and Byrd, J. 2012. Forensic Botany: a practical guide. Wiley-Blackwell, 1 edition.
2. Bock, J.H and Norris, D.O. 2016. Forensic Plant Science, Academic Press.
3. Nicholas Marquez Grant, John Wiley. 2012. Forensic Ecology Handbook. Wiley Backwell.
4. David W. Hall, Jason Byrd. 2012. Forensic Botany: A Practical Guide. Wiley-Blackwell.
5. Heather Miller Coyle. 2007 Forensic Botany: Principles and Applications to Criminal Casework is packed with details — David M. Jarzen, Florida Museum of Natural History, University of Florida, in AASP Newsletter, Vol. 40, No. 2.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	3	2	1	2	2	2	1
CO 2	3	3	2	1	1	3	2	3	1	3
CO 3	2	1	2	3	1	2	1	3	1	2
CO 4	3	3	3	3	2	1	3	3	2	1
CO 5	3	3	2	3	2	3	1	2	2	3

S-Strong (3)

M-Medium (2)

L-Low(1)

VALUE ADDED / CERTIFICATE COURSES (VAC)

MUSHROOM CULTIVATION

(SUB.CODE:26UBOCC1)

SEMESTER – III	CC -1		CREDITS – 2
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Course Outcomes:

Upon completion of the courses, the students will be able to

- CO1:** To learn and develop skills in mushroom cultivation in scientific way (K1)
- CO2:** To understand and appreciate the role of mushrooms in Nutrition, Medicine and health and the importance of embarking on self-employment (K2)
- CO3:** To cultivate mushroom cultivation in a small-scale industry and work out the economics of mushroom cultivation (K3).
- CO4:** To learn about diseases and post-harvest technology and identify business opportunities in the chosen sector (K4).
- CO5:** To study new methods and strategies to contribute to mushroom production and plan and market value-added products (K5).

Unit I

Introduction: Morphology, Types of Mushrooms, Identification of edible and Poisonous Mushrooms, Nutritive values, Life Cycle of Common Edible Mushrooms. History of mushroom cultivation.

Unit II

Mushroom cultivation, prospects and scope of Mushroom cultivation in small-scale industry. Present status of the mushroom industry in India. Nutritional and medicinal values of mushrooms.

Unit III

Cultivation techniques of *Pleurotus* spp. (Oyster mushroom), *Volvariella volvacea* (Paddy straw mushroom), *Calocybe indica* (Milky mushroom), and *Agaricus* spp. (Button mushroom). Construction of a mushroom shed and preparation of a mushroom bed.

Unit IV

Spawn production, growth media, spawn running, harvesting of mushrooms and marketing. Cost-benefit analysis of mushroom cultivation.

Unit V

Diseases and post-harvest technology, Insect pests, nematodes, mites, viruses, fungal competitors and other important diseases. Preservation of mushrooms – freezing, dry freezing, drying, canning, quality assurance and entrepreneurship. Value added products of mushroom.

Recommended Texts:

1. Handbook of Mushroom Cultivation. 1999. TNAU publication.
2. Marimuthu, T., Krishnamoorthy, A.S., Sivaprakasam, K. and Jayarajan. R. 1991. Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
3. Swaminathan, M. 1990. Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
4. Sing. 2005. Modern Mushroom Cultivation, International Book Distributors, Dehradun.
5. Verma, 2013. Mushroom: edible and medicinal: cultivation conservation, strain improvement with their marketing. Daya Publishing House.

Reference Books:

1. Handbook of Mushroom Cultivation. 1999. TNAU publication.
2. Marimuthu, T., Krishnamoorthy, A.S., Sivaprakasam, K. and Jayarajan. R. 1991. Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
3. Swaminathan, M. 1990. Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
4. Nita Bahl. 2002. Handbook on Mushroom 4th edition Vijayprimlani for oxford & IBH publishing co., Pvt., Ltd., New Delhi. Dr. C. Sebastian Rajesekaran Reader in Botany Bishop Heber College, Trichy – 17.
5. Suman. 2005. Mushroom Cultivation Processing and Uses, M/s. IBD Publishers and Distributors, New Delhi.
6. Singh, R. and Singh, U.C. 2020. Modern mushroom cultivation, 3rd Edition, Agrobios (India), Jodhpur.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	1	3	2	1	2	2
CO2	3	1	1	2	1	3	2	3
CO3	2	1	1	3	1	2	1	3
CO4	3	3	3	3	1	2	3	3
CO5	3	3	2	1	1	1	3	3

S-Strong (3) M-Medium (2) L-Low(1)

NURSERY AND GARDENING

(SUB.CODE:26UBOCC2)

SEMESTER – IV	CC - 2		CREDITS – 2
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Course Outcomes:

Upon completion of the courses, the students will be able to

1. Recognize the basic principles and components of gardening. (K1)
2. Explain about bio-aesthetic planning and conceptualise flower arrangement. (K2)
3. Apply techniques for design various types of gardens according to the culture and art of bonsai. (K3 & K6)
4. Compare and contrast different garden styles and landscaping patterns. (K4)
5. CO:4 Learn how to prepare potting soil, seed germination (K4)
- CO:5 Learn to grow vegetables and herbs in garden (K5)
- CO:6 Provide technical support to other enthusiasts promote sustainable production and consumption(K6)

UNIT I

Introduction, prospects and scope of nursery and gardening. Manures, composting – vermicomposting

UNIT II

Methods of Propagation – cutting, layering, grafting, budding, Floriculture – Rose, Chrysanthemum, Jasmine – cultivation.

UNIT III

Gardening – formal garden, informal garden, vegetable garden. Nursery structures – Greenhouse – Shade house, Mist chamber – Topiary, Bonsai culture.,

Unit IV

Gardening tools, size of kitchen garden, purpose, kitchen garden site, preparation, containers, Soil types, Types of Soil, Soil pH, Water holding capacity. Loam, farmyard manure, vermicompost, compost, cocopeat, vermiculite, perlite, clay balls, potting mixture

Unit V

Seed, structure types, seed viability, seed germination, nursery, transplanting, study of cultivation of different vegetables, tomato, green chillies.

Reference books

1. Amarnath V. 2006. Nursery and Landscaping, M/s IBD Publishers, New Delhi.
2. Butts, E and Stensson, K. 2012. Sheridan Nurseries: One hundred years of People, Plans, and Plants. Dundurn Group Ltd.

3. Russell, T. 2012. Nature Guide: Trees: The world in your hands (Nature Guides). Mukherjee D. Gardening in India, Oxford IBH publishing co, New Delhi.
4. Kumar, N. 1997. Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
5. Butts, E. and Stensson, K. 2012. Sheridan Nurseries: One hundred years of People, Plans, and Plants. Dundurn Group Ltd.
6. Indoor Gardening – Elizebeth Millard
7. Kitchen gardening for beginners – Mathews Holmes and Roger Markham

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	3	2	1	2	2	1	3
CO2	3	3	2	2	3	3	2	2	2	2
CO3	2	2	3	1	1	1	1	3	3	1
CO4	3	2	2	1	3	2	1	3	2	1
CO5	3	3	2	3	2	1	2	3	2	3

S-Strong (3) M-Medium (2) L-Low(1)

EXTRA CREDIT COURSES

AQUATIC BOTANY (SUB.CODE:26UBOEC3)

SEMESTER – V	ECC - 1		CREDITS – 2
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Course Outcomes:

Upon completion of the courses, the students will be able to

1. Recognize aquatic plants and their ecological importance. (K1)
2. Explain about commonly occurring marine and limnetic algae of the Indian coasts. (K2)
3. Apply techniques for conservation of aquatic plants for value addition. (K3)
4. Analyze and decipher the significance and properties of mangroves, other aquatic angiosperms and microalgae. (K4)
5. Develop new strategies to conserve mangroves and devise innovative methods for cultivation of aquatic plants. (K5 & K6)

UNIT - I

MARINE AND LIMNETIC MACRO ALGAE: Common seaweeds of Indian subcontinent: *Ulva*, *Caulerpa*, *Sargassum*, *Gracilaria*, etc. Common terrestrial algae, including cyanobacteria and lichen photobionts of Indian subcontinent and its life cycle, ecology and taxonomy: *Anabaena*, *Chlorella*, *Scenedesmus*.

UNIT - II

MANGROVES: Mangrove forests of India, including Sundarbans, Pichavaram, Kerala mangroves, Rathnagiri mangroves. Common species of mangroves and mangrove-associated plants, including *Avicennia*, *Rhizophora*, *Acanthus*, and *Aegiceras*. Ecological significance of mangroves.

UNIT - III

PHYTOPLANKTONS, CYANOBACTERIA, DINOFLAGELLATES AND DIATOMS: Common marine microalgae of India, including phytoplanktons and picoplanktons, Common diatoms and dinoflagellates of Indian Ocean, Common limnetic and terrestrial cyanobacteria of India.

UNIT - IV

AQUATIC ANGIOSPERMS: Common aquatic angiosperms of India, including Lotus, Water Lilly, Water Hyacinth. Ecology, life cycle, taxonomy and economic importance of aquatic angiosperms.

UNIT - V

VALUES AND USES OF AQUATIC PLANTS: Economic importance of aquatic plants, Ecosystem services of aquatic plants, including biogeochemical cycles, oxygen production and

carbon sequestration and so on, edible seaweed and algal resources of India, aesthetic, cultural, and spiritual importance of aquatic plants.

Recommended Texts

1. Lee, R.E. 2008. Phycology. 4th edition. Cambridge University Press, Cambridge.
2. Wile, J.M, Sherwood, L.M and Woolverton, C.J. 2013. Prescott's Microbiology. 9th Edition. McGraw Hill International.
3. Kumar, H.D. 1999. Introductory Phycology. Affiliated East-West Press, Delhi.
4. Hoek, C. Van, D. 1999. An Introduction to Phycology. Cambridge University Press.
5. Daubenmire, R.F.1973. Plant and Environment. John Willey.
6. Sharma, J.P.2004. Environmental Studies, Laxmi Publications (P) Ltd. New Delhi.
7. Bast, F. 2014. Seaweeds: Ancestors of land plants with rich diversity. Resonance, 19(2) 1032-1043 ISSN: 0971-8044.

Reference Books

- 1.Kathiresan, K and S.Z. Qasim 2005. Biodiversity of Mangrove Ecosystems. Hindustan Lever Limited.
2. Allan, J.D. and Castillo, M.M. 2009. Stream Ecology (Second Ed.). Springer, Netherlands.
3. Barnes, R.S.K. 1974. Fundamentals of Aquatic Ecosystems, (R.S.K. Barnes & K.H. Mann,eds.), Blackwell Sci. Publ., London, 229 pp.
4. Bennet, G.W. 1971 Management of Lakes and Ponds. Von Nostrand Reinhold Co., NY.375 pp.
5. Goldman, C.R. & A.J. Horne 1983. Limnology. McGraw Hill Internat. Book. Co. Tokyo,464 pp.
6. Boney, A.D., 1975. Phytoplankton. Edward, Arnold, London.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	2	1	2	2	2	1
CO2	3	2	1	1	2	3	2	3	2	3
CO3	2	2	3	1	1	2	1	3	1	2
CO4	3	3	3	3	3	2	1	2	3	2
CO5	3	2	1	1	2	3	3	3	2	3

S-Strong (3)

M-Medium (2)

L-Low(1)

FERMENTATION TECHNOLOGY

(SUB.CODE: 26UBOEC6)

SEMESTER – VI	ECC – 2		CREDITS – 2
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Course Outcomes:

Upon completion of the courses, the students will be able to

CO1	Enumerate the significance of industrially useful microbes (K1).
CO2	Explain the design and operation of industrial practices in mass production of fermented products (K2).
CO3	Explain the process of maintenance and preservation of microorganisms (K3).
CO4	Analyze the various aspects of the fermentation technology and apply for fermentative production. (K4).
CO5	Validate the experimental techniques for microbial production of enzymes: amylase and protease, bio product recover (K5).

Unit I

Preparation of microbial culture; preparation and sterilisation of fermentation media. Isolation and improvement of industrially important microorganisms.

Unit II

Maintenance and preservation of microorganisms, Metabolic regulations and overproduction of metabolites. Kinetics of microbial growth and product formation.

Unit III

Scope and opportunities of fermentation technology. Principles of fermentation: Submerged, solid state, batch, fed-batch and continuous culture.

Unit IV

Fermentative production of vinegar, alcohol (ethanol, wine, beer), acids (citric acid and gluconic acid), amino acids (lysine and glutamic acid) and antibiotics (penicillin and streptomycin).

Unit V

Microbial production of enzymes: Amylase and Protease. Bioproduct recovery.

Recommended Texts

1. Waites M.J. 2008. Industrial Microbiology: An Introduction, 7th Edition, Blackwell Science, London, UK.
2. Prescott S.C., Dunn C.G., Reed G. 1982. Prescott & Dunn's Industrial Microbiology, 4th

Edition, AVI Pub. Co., USA.

3. Reed G. 2004. Prescott & Dunn's industrial microbiology, 4th Edition, AVI Pub. Co., USA.
4. JR Casida L.E. 2015. Industrial Microbiology, 3rd Edition, New Age International (P) Limited Publishers, New Delhi, India.
5. Waites M.J., Morgan N.L., Rockey J.S. and Higon G. 2001. Industrial Microbiology: An Introduction. 1st Edition, Blackwell Science, London, UK.
6. Pelczar M.J., Chan E.C.S. and Krieg N.R. 2003. Microbiology. 5th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.

Reference Books

1. Peter F Stanbury, Allan Whitaker, Stephen J Hall. 2016. Principles of Fermentation Technology. Butterworth-Heinemann Press. UK.
2. Peppler, H. J. D. Perlman. 2014. Microbial Technology: Fermentation Technology. Academic Press.
3. T. El-Mansi, C. Bryce, Arnold L. Demain, A.R. Allman. Fermentation Microbiology and Biotechnology. Second Edition. 2006. CRC Press, USA.
4. Hongzhang Chen. Modern Solid State Fermentation: Theory and Practice. 2013. Springer Press, Germany.
5. John E. Smith. Biotechnology. 2009. Cambridge University Press. UK.
6. Celeste M. Todaro, Henry C. Vogel. 2014. Fermentation and Biochemical Engineering Handbook. William Andrew Press. Norwich, NY.
7. Lancini, G. R. Lorenzetti. 2014. Biotechnology of Antibiotics and other Bioactive Microbial Metabolites. Springer publications, Germany.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	3	2	1	2	2	1	2
CO2	3	3	2	2	1	2	3	2	2	3
CO3	2	2	3	1	1	1	2	3	1	2
CO4	3	3	2	1	3	2	1	3	2	1
CO5	3	3	2	1	2	2	3	3	2	3

S-Strong (3)

M-Medium (2)

L-Low(1)

SELF-STUDY COURSES (SSC)

ORGANIC MANURES AND BIOPESTICIDES

(SUB.CODE:26UBOSS4)

SEMESTER – V	SSC-1		CREDITS – 2
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Course Outcomes:

Upon completion of the courses, the students will be able to

CO 1: Understand the scope and concepts of organic farming in India

CO 2: Experiment various methods of preparation of organic manures and biofertilizers

CO 3: Manage indigenous pest and weed for organic farming.

CO 4: Understand the certification process for organic farm produces

CO5: Develop entrepreneur skills and ideas to practice organic farming

Unit-I

Definition – Principle, Aims and objectives of organic farming. History – organic farming concepts – Needs of organic farming and sustainable agriculture. SWOT analysis of organic farming. Organic farming in India – PKVY.

Unit-II

Composting: Organic manure, Farmyard manure (FYM) preparation. Compost process, phase, requirements and microorganism in composting, Methods of composting (Bangalore, Indore, Coimbatore, NADEP methods).

Unit-III

Vermicompost and vermiculture, Importance, benefits, Methods of vermicomposting, Preparation and management of vermicompost unit. Vermiwash Preparation and its uses. Biofertilizers, Importance, classification and benefits of biofertilizers (*Azospirillum*, *Azotobacter*, *Rhizobium*, PSB, VAM etc.,)

Unit-IV

Green manuring, Classification of green manures (GM), advantages of GM, Desirable characteristics of leguminous GM crops.; Organic liquid manure - Beejamrita, Jivamrit, Panchakavya and Dasakavya. Biodynamic manure – cow horn manure – cow horn silica – preparation of cow pat pit manure (CPP).

Unit-V

Biopesticides and Bioherbicides (mycoherbicides). Weed management in organic farming, Different methods of weed management, Biological weed control. Organic certification: Types of certification, Certification process and procedure.

Text Books

1. Palaniappan, S.P and Annadurai, K. (1999) Organic Farming – Theory and Practice. Scientific Publ.
2. Sharma, A. (2002) Hand Book of Organic Farming. Agrobios.
3. Dushant G. 2012. Organic farming – components and management, Bharat printers, Jodhpur

References

1. Ananthakrishnan, T. N. (ed.) (1992) Emerging Trends in Biological Control of Phytophagous Insects. Oxford & IBH.
2. Gaur, A.C. (1982) A Manual of Rural Composting, FAO/UNDP Regional Project Document, FAO.
3. Lampkin, N. (1990) Organic Farming. Press Books, Ipswich, UK.
4. Veeresh, G. K, Shivashankar, K. and Singlachar, M. A. (1997) Organic Farming and Sustainable Agriculture. Association for Promotion of Organic Farming, Bangalore.
5. Dahama AK. 2005. Organic Farming for Sustainable Agriculture. 2nd Ed. Agrobios.
6. Gehlot G. 2005. Organic Farming; Standards, Accreditation Certification and Inspection. Agrobios.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	3	3	3	3	1	3	1
CO3	3	3	3	3	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	1	3	1
CO5	3	3	3	3	3	3	3	1	3	1

S-Strong (3) M-Medium (2) L-Low(1)

HERBAL MEDICINE

(SUB.CODE:26UBOSS2)

SEMESTER – VI	SS -2		CREDITS – 2
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Course Outcomes:

Upon completion of the courses, the students will be able to

CO1: Define and describe the principle of cultivation of herbal products. (K1)

CO2: Explain about the phytochemistry of economically important medicinal herbs (K2)

CO3: Apply techniques for evaluation of drug adulteration through biological testing (K3)

CO4: Formulate the value-added processing / storage / quality control for the better use of herbal medicine (K4)

CO5: Develop the skills for cultivation of plants and their value-added processing/storage/quality control. (K5 & K6)

UNIT - I

Importance and Relevance of Herbal drugs in Indian System of Medicine, Pharmacognosy – Aim and scope.

UNIT - II

Medicinal gardening – Gardens in the Hills and plains; House gardens; plants for gardening – Poisonous plants – Types of plant poison; action of poisons; treatment for poisons, some poisonous plants; their toxicity and action.

UNIT - III

Adulteration of crude drugs and its detection – methods of adulteration; types of adulteration. Medicinal plants of export values; rejuvenating herbs; Medicinal uses of Non-flowering plants.

UNIT - IV

Botanical description and active principles of Root drugs; Rhizomes woods and bark drugs (Two examples for each plant organs).

UNIT - V

Botanical description and active principles of leaves; Flowers; Fruits seed and entire plants as drugs. Taxonomic study of some selected herbals (Two examples for each plant organs).

Recommended Texts

1. Somasundaram, S. 1997. Medicinal botany (MaruthuvarThavaraviyal) – (Tamil Medium Book).
2. Wallis, T.E. 1967. Text Books of Pharmacognosy. J. & A. Churchill Ltd., London,
3. Jains, S.K.. 1996. Medicinal Plants. Deep Publications, New Delhi.

4. Srivastava, A.K. 2006, Medicinal Plants, International Book Distributors, Dehradun.
5. Agarwal, O.P. 1985, Vol. II, Chemistry of organic – natural products. S Chand & Company, New Delhi.
6. Gamble, J.S. and Fisher, 1921, CEC I, II, III Flora of the Presidency, Madras Volumes. Mathew K.M., 1988, Flora of the Tamilnadu and Carnatic.

Reference Books

1. Nair, N.C and Henry, A.N. 1983, Flora of Tamil Nadu, India, Botanical Survey of India.
2. Chopra, R.N., Nagar S.L., and Chopra, I.C. 1956, Glossary of Indian Medicinal Plants.
3. Chopra, R.N., Chopra, I.C., Handa, K.L., and Kapur L.D., 1994, Indigenous drugs of India.
4. Chopra, R.N., Badhuvar R.L and Gosh, G. 1965. Poisonous plants in India.
5. Miller, L and Miller, B. 2017. Ayurveda & Aromatherapy: The Earth Essential Guide to Ancient Wisdom and Modern Healing. *Motilal Banarsidass, Fourth edition.*
6. Patri, F and Silano, V. 2002. Plants in cosmetics: Plants and plant preparations used as ingredients for cosmetic products - Volume 1. ISBN 978-92-871-8474-0, pp 218.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	1	2	1	3	2	1
CO2	3	3	2	1	1	2	2	2	2	2
CO3	2	2	1	3	1	2	1	3	2	1
CO4	3	2	1	2	1	2	3	3	2	3
CO5	3	3	2	2	1	1	3	3	1	3

S-Strong (3) M-Medium (2) L-Low(1)

Annexure -1

ALLIED BOTANY-III (FOR ZOOLOGY STUDENTS) (SUB.CODE: 26UBOE31)

SEMESTER – III	EC – T3	HOURS –4	CREDITS – 3
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Course outcomes:

On completion of this course, the students will be able to:

- CO1** : Describe the general characteristics, structure, and reproduction of viruses and bacteria (K1).
- CO2** : Explain the morphology, life cycles, and economic importance of algae and fungi (K2).
- CO3** : Illustrate structural organization and evolutionary significance of bryophytes, pteridophytes, and gymnosperms (K2).
- CO4** : Analyze major physiological processes in plants including photosynthesis, nitrogen metabolism, transpiration, and plant growth responses (K4).
- CO5** : Apply fundamental concepts of plant tissue culture techniques and in vitro propagation methods in biotechnology (K3).
- CO6** : Evaluate the ecological, agricultural, and biotechnological importance of microorganisms and plants in sustainable development (K5).

Unit I- Virus and Bacteria

(12 hours)

Virus - general characters, structure of TMV, structure of bacteriophage. Bacteria - general characters, structure and reproduction of *Escherichia coli* and economic importance of bacteria.

Unit II – Algae and Fungi

(12 hours)

General characters of algae - Structure, reproduction and life cycle of the following genera of *Anabaena* and *Sargassum* and economic importance of algae.

General characters of fungi; Structure, reproduction and life cycle of the following genera – *Penicillium* and *Agaricus* and economic importance of fungi.

Unit III -Bryophytes, Pteridophytes and Gymnosperms

(12 hours)

General characters of Bryophytes, Structure, reproduction and life cycle of *Marchantia*.

General characters of Pteridophytes, Structure, reproduction and life cycle of *Selaginella*.

General characters of Gymnosperms, Structure, reproduction and life cycle of *Cycas*.

Unit IV –Plant Physiology

(12 hours)

Transpiration – types, mechanism and significance; Photosynthesis - overview, Light reaction, C3 and C4 cycle, Nitrogen cycle, biological nitrogen fixation; Photoperiodism, Vernalization & Seed germination.

Unit V- Plant Biotechnology**(12 hours)**

Plant tissue culture- laboratory organization, sterilization and aseptic techniques– Media preparation and components - *In vitro* culture methods – direct & indirect organogenesis. Plant tissue culture and its application in biotechnology.

Recommended Texts:

1. Singh, V., Pande, P. C and Jain, D. K. 2021. A Textbook of Botany. Rastogi Publications, Meerut.
2. Bhatnagar, S.P and Alok Moitra. 2020. Gymnosperms, New Age International (P) Ltd., Publishers, Bengaluru.
3. Sharma, O.P.2017. Bryophyta, MacMillan India Ltd. Delhi.
4. Lee, R.E. 2008. Phycology, IV Edition, Cambridge University Press, New Delhi.
5. Rao, K., Krishnamurthy, K.V and Rao, G.S. 1979. Ancillary Botany, S. Viswanathan Pvt. Ltd., Madras

Reference books:

1. Parihar, N.S. 2012. An introduction to Embryophyta –Pteridophytes, Surjeet Publications, Delhi.
2. Alexopoulos, C.J. 2013. Introduction to Mycology. Willey Eastern Pvt. Ltd.
3. Vashishta, P.C. 2014. Botany for Degree Students Gymnosperms. Chand & Company Ltd, Delhi.
4. Coulter, M. Jhon, 2014. Morphology of Gymnosperms. Surjeet Publications, Delhi.
5. Vashishta, P.C. 2014. Botany for Degree Students Algae. 2014. Chand & Company Ltd, Delhi.
6. Parihar, N.S. 2013. An introduction to Embryophyta –Bryophytes -, Surjeet Publications, Delhi.
7. Pandey B.P. 1986, Text Book of Botany (College Botany) Vol I &II, S.Chand and Co. New Delhi.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	2	3	3	3	3	1	3	3	3	3
CO4	3	3	2	3	3	3	2	3	2	3
CO5	3	2	2	2	2	2	2	1	2	1

S-Strong (3)**M-Medium (2)****L-Low (1)**

ALLIED BOTANY PRACTICAL- III

(SUB.CODE: 23UBOE32)

SEMESTER – III	EC – P3	HOURS –2	CREDITS – 2
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Course outcomes:

On completion of this course, the students will be able to:

CO1	:	Identify and classify representative specimens of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and plant biotechnology materials using diagnostic features (K1).
CO2	:	Describe the structural characteristics observed in micro-preparations of selected plant groups (K2).
CO3	:	Prepare suitable temporary micro-slides of specimens prescribed under Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms using standard laboratory techniques (K3).
CO4	:	Demonstrate plant physiological experiments using Ganong's photometer, respiroscope, light screen experiment and clinostat (K3).
CO5	:	Analyze experimental observations to explain physiological processes such as transpiration, respiration and phototropic responses (K4).
CO6	:	Interpret spotter specimens and experimental setups to relate structure and function in lower plants and plant biotechnology applications (K5).

EXPERIMENTS

1. Make suitable micro preparation of the types prescribed in Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.
2. Demonstration experiments in Plant Physiology
 - a) Ganong's photometer
 - b) Ganong's respiroscope
 - c) Ganong's light screen experiment
 - d) Clinostat
3. Spotters - Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Plant Biotechnology.
4. Demonstration of basic techniques (sterilization & inoculation) involved in *in vitro* plant tissue culture.

Recommended Texts:

1. Sharma, O.P.2017. Bryophyta, MacMillan India Ltd, New Delhi.

2. Sharma, O.P.2012. Pteridophyta, Tata McGraw-Hills Ltd, New Delhi.

Reference Books:

1. Nancy Serediak and M. Huynh. 2011. Algae identification lab Guide. Accompanying manual to Algae Identification Field Guide, Ottawa Agriculture and Agri food Canada Publisher.
2. Mohammed Gufran Khan, Shite Gatew and Bedilu Bekele. 2012. Practical manual for Bryophytes and Pteridophytes. Lambert Academic Publishing.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	2	3	3	3	3	1	3	3	1	3
CO4	3	3	2	3	3	3	3	2	3	3
CO5	3	2	2	2	2	2	2	1	2	2

S-Strong (3) M-Medium (2) L-Low (1)

ALLIED BOTANY-IV

(SUB.CODE: 26UBOE41)

SEMESTER – IV	EC – T4	HOURS –4	CREDITS – 4
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Course outcomes:

On completion of this course, the students will be able to:

- CO1** : Describe the vegetative and reproductive morphology of flowering plants, including root, stem, leaf, inflorescence and floral terminology (K1).
- CO2** : Explain principles of plant taxonomy and classify plants based on diagnostic characters of prescribed families and their economic importance (K2).
- CO3** : Illustrate the organization of plant tissues and tissue systems and compare anatomical features of monocot and dicot roots, stems and leaves (K2).
- CO4** : Analyze reproductive structures and processes in angiosperms including anther, ovule, embryo sac development and double fertilization (K4).
- CO5** : Apply fundamental concepts of plant breeding such as selection methods, hybridization techniques and acclimatization in crop improvement (K3).
- CO6** : Evaluate the role of heterosis and polyploidy in developing improved plant varieties for agricultural productivity (K5).

Unit I- MORPHOLOGY OF FLOWERING PLANTS

(12 hours)

Vegetative and reproductive parts of a plant. Structure and functions of root and stem, leaf and its parts. Leaf types- simple and compound. Phyllotaxy and types. Inflorescence - Racemose, Cymose and Special types. Terminology with reference to flower description.

Unit II- PLANT TAXONOMY

(12 hours)

Definition, scope and objectives of plant taxonomy. Study of the range of characters and plants of economic importance in the following families: Rutaceae, Caesalpiniaceae, Asclepiadaceae, Euphorbiaceae and Poaceae.

Unit III- PLANT ANATOMY

(12 hours)

Definition and scope of plant anatomy. Plant tissues - simple and complex tissues; tissue systems – epidermal, ground & vascular. Anatomy of monocot and dicot roots - anatomy of monocot and dicot stems - anatomy of dicot and monocot leaves

Unit IV- PLANT EMBRYOLOGY

(12 hours)

Structure of mature anther and ovule - Types of ovules, structure of embryo sac, pollination - double fertilization, structure of dicotyledonous and monocotyledonous seeds.

Unit V – PLANT BREEDING**(12 hours)**

Introduction to plant breeding – its scope & importance, introduction, acclimatization, types of selection (mass selection, pure line selection & clonal selection), Hybridization – objectives, types and procedure, Concept of heterosis. Role of polyploidy in crop improvement.

Recommended Texts:

1. Sharma, O.P. 2017. Plant Taxonomy. (II Edition). The McGraw Hill Companies.
2. Bhojwani, S.S. Bhatnagar, S.P and Dantu, P.K. 2015. The Embryology of Angiosperms (6th revised and enlarged edition). Vikas Publishing House, New Delhi.
3. Maheshwari, P. 1963. Recent Advances in Embryology of Angiosperms. Intl. Soc. Plant Morphologists, New Delhi.
4. Salisbury, F. B.C.W. Ross.1991. Plant Physiology. Wassworth Pub. Co. Belmont.
5. Ting, I.P. 1982. Plant Physiology. Addison Wesley Pb. Philippines

Reference books:

1. Lawrence. G.H.M. 1985. An Introduction to Plant Taxonomy, Central Book Depot, Allahabad.
2. Bhojwani, S.S and Bhatnagar, S.P. 2000. The Embryology of Angiosperms (4th revised and enlarged edition). Vikas Publishing House, New Delhi.
3. Pandey, B.P. 2012. Plant Anatomy. S Chand Publishing.
4. Jain, VK. 2006. Fundamentals of Plant Physiology, S. Chand and Company Ltd.
5. Rajni Gupta. 2012. Plant Taxonomy: Past, Present and Future. Vedams (P) Ltd. New Delhi.
6. Jain, V.K. 2006. Fundamentals of Plant Physiology, S. Chand and Company Ltd. New Delhi.
7. Verma, S.K. 2006. A Textbook of Plant Physiology, S.K. Chand & Co., New Delhi.

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	2	3	3	3	3	1	3	3	3	3
CO4	3	3	2	3	3	3	3	2	3	2
CO5	3	2	2	2	2	2	2	1	2	2

ALLIED BOTANY PRACTICAL - IV

(SUB.CODE: 26UBOE42)

SEMESTER – IV	EC – P4	HOURS –2	CREDITS – 2
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Course outcomes:

On completion of this course, the students will be able to:

- CO1** : Identify plant families using diagnostic morphological characters and describe plants using technical botanical terminology (K1)
- CO2** : Explain floral organization through flower dissection, floral diagram construction, and floral formula interpretation (K2).
- CO3** : Prepare temporary micro-slides of plant anatomical materials following standard laboratory procedures (K3).
- CO4** : Examine and differentiate plant tissues and anatomical structures using microscopic observation (K4).
- CO5** : Interpret the structure of ovule and embryo sac through observation of prepared microslides (K2).
- CO6** : Demonstrate basic plant breeding techniques such as emasculation and bagging used in controlled hybridization (K3).

EXPERIMENTS

1. **Description of plants in technical terms**, identification of families using diagnostic characters, and study of vegetative and floral morphology of the prescribed families.
2. **Dissection of a flower**, construction of floral diagram, and writing of floral formula.
3. Present the economic uses of species belonging to the five prescribed families.
4. **Preparation of suitable micro-slides** of anatomical materials prescribed in the syllabus.
5. **Observation of ovule and embryo sac** using prepared microslides.
6. **Demonstration of emasculation and bagging techniques**.

Recommended Texts:

1. Subramaniam, N.S. 1996. Laboratory Manual of Plant Taxonomy. Vikas Publishing House Pvt. Ltd., New Delhi.
2. Noggle G.R and G.J. Fritz. 2002. Introductory Plant Physiology. Prentice Hall of India, New Delhi.

Reference Books:

1. Aler Gingauz. 2001. Medicinal Chemistry. Oxford University Press & Wiley Publications.
2. Steward, F.C. 2012. Plant Physiology Academic Press, US

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	2	3	3	3	3	1	3	3	1	3
CO4	3	3	2	3	3	3	3	2	3	3
CO5	3	2	2	2	2	2	2	1	2	2

S-Strong (3) M-Medium (2) L-Low (1)