

B.Sc. ZOOLOGY

LOCF SYLLABUS 2026

(w.e.f. June 2026)



Department of Zoology

School of Life Sciences

St. Xavier's College (Autonomous) Palayamkottai

Affiliated to Manonmaniam Sundaranar University, Tirunelveli
(Recognized as "College with Potential for Excellence" by UGC)
(Accredited with "A⁺⁺" Grade with a CGPA of 3.66/4 in IV cycle)

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

ALLOTMENT OF MARKS

CIA – 1 conducted for 50 marks

CIA – 2 conducted for 50 marks

Cumulative marks of CIA -1 and 2 will be converted to 70 marks

Assignment – 15 marks

Viva voce – 15 marks

Aggregate marks = 100

Theory Question Pattern for CIA and Semester Examination –Part-I,II&III (3Hours)

Examination type	Part A	Part B	Part C	Part D	Total
	All	All	Either or	Open Choice	
Internal(1.30.hrs)	6 x 1 = 6	3 x 3 = 9	3 x 5 = 15	2 x 10 = 20	50
External	20 x 1 = 20	5 x 3 = 15	5 x 7 = 35	3 x 10 = 30	100

Theory Question Pattern for CIA and Semester Examination –Part-IV (2Hours)

Examination type	Part A MCQ	Part B (2 marks)	Part C	Part D	Total
	All	All	Either or		
Internal(1.00.hrs)	5 x 1 = 5	5 x 3 = 15	2 x 7.5 = 15	-	35
External	5 x 1 = 5	5 x 2 = 10	5 x 5 = 25	1 x 10 = 10	50

Note: The Internal and External marks will be computed for 50 for each paper and the consolidation of these Internal and External marks will be for 100.

QUESTION PATTERN AND MARKS FOR PRACTICAL EXAMINATION

Type of questions	Marks
Major Practical 1. Dissection, display, flag labeling /Procedure-5; Performance of the experiment/observation, calculation and table or graph- (10 B.Sc.)	15
2.Minor Practical / Instrumentation Performance of the experiment/observation, calculation and table or graph- (10 B.Sc.)	10
3.Identification of animals / instruments / spotters (5 or 10)	5
4.Spotters (5 x 3) -Identification – ½ mark, Diagram – ½ mark, Labeling – ½ mark; Unlabelled diagram carries no mark, explanation - 1½ mark	15
5.Record note book	5
Total	50

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 SPECIFIC OUTCOMES (PSOs)

On completion of the B.Sc.programme in Zoology,the students will be able to:

- Classify, identify and list out common animals (invertebrates, vertebrates)
- Analyze the impact of environment on our bodies
- Understand various genetic abnormalities
- Describe the role and impact of different environmental conservation programmes
- Summarize the importance of genetic engineering [cell culture, transgenic animals, antibiotics, engineered microbes, biodiesel, bio-plastics, biopesticides]
- Apply tools of information technology for all activities related to Zoology
- Develop self-employment skills such as vermitechnology, bee keeping, sericulture, aquarium fish keeping.
- Evaluate various potential risk factors to health of humans
- Manage harmful and beneficial animals

CAREER OPPORTUNITIES FOR B.SC. ZOOLOGY STUDENTS

- ❖ Employment areas of B.Sc. Zoology includes: pharmaceutical companies, Environmental Agencies, Medical Laboratories, Museum, Agriculture and Veterinary Farms, Medical Representatives, Sales manager of bioproducts.
- ❖ After completing B.Sc. Zoology one can seek admission in Master of Science where the student needs to go through the deep knowledge of science.
- ❖ B.Sc. course is globally agreeable where the students from science theme can pursue from any of the approved university.

- ❖ Eligibility of students for higher studies: after completing UG Zoology, the students are eligible for admission in M.Sc., degree course in Zoology, Life sciences, Aquaculture, Forensic Science, Genetics, Microbiology, Biotechnology, Integrated biology, Physiology, Aquaculture, Marine biotechnology, integrated Ph.D., P.G diploma courses in lab technology, Radiology. Further eligible for B.Ed., TNPSC, IAS, IPS, IFS (group 1 exams); also eligible to get admission in MCA, MBA, **M.Sc. Microbial Gene Technology, Genomics, Biochemical Technology, Marine Biology, M.Sc. Environmental Biology**, Biochemistry, **Environmental Biotechnology**, Medical Clinical Embryology, Clinical Virology, Bioinformatics, Pharmaceutical and Analytical Chemistry etc.
- ❖ After completing B.Sc. Zoology, one can specialize in various fields within zoology like Arachnology, Entomology, Arthropodology, Apiology, Cetology, Anthrozoology, Conchology, Ethology, Helminthology, Mammalogy, Neuroethology, Myrmecology, Nematology, Ornithology, Paleozoology, Malacology, Primatology, Herpetology etc.

EXTRA CREDIT COURSES (ECC) FOR ADVANCE LEARNERS

- ✓ Courses with extra credit for advanced learners are introduced to improve the knowledge base of the students in their Core Area
- ✓ These are self-study courses and are optional
- ✓ There is no Continuous internal assessment tests (CIA)
- ✓ There should be no standing arrears for opting Extra Credit Courses
- ✓ Students are not permitted to write the course as arrear, if he / she fails in the courses with extra credit.

CERTIFICATE COURSE

- Eligibility for Admission: Candidate who passed 10 + 2 examination with at least 45% marks in aggregate in Arts / Science / Commerce.
- The candidate after passing examination will be awarded a separate “Certificate” in addition to his/her regular degree/Detailed Marks Card of B.A., B.Sc. and B.Com.
- The supplementary examination shall be held in April or as fixed by the Controller of Examination Office.
- The candidate who doesn't pass in the supplementary examination will be given another chance to appear in above said course along with the forthcoming annual examination.
- A candidate who passed the course in the supplementary examination or in the third chance in annual examination can appear alongside in next subsequent examination of above said course.
- The candidate who is unable to pass the course in three given chances, will not be allowed to continue the above said course
- Every candidate will be required to attend minimum of 75% lectures/periods delivered to that class.
- The candidate must obtain 40% of the total marks in theory and practical separately to pass the course.
- The candidate must have obtained in House Examination at least 25% marks in the subject.
- Candidates will be offered English as the medium of Instructions/ Examination

OBJECTIVES:

To provide opportunities to learn, obtain knowledge and develop skills in various self-employment opportunities in Zoology and allied aspects of Life Sciences. Students will be motivated to gain knowledge on the basics of self-employment awareness and also provide an opportunity to get training experience and exposure to the industry.

B.Sc. ZOOLOGY - COURSE PATTERN
(With effect from June 2026)

Se m	Par t	Status	Course Code	Title of the Course	Ho urs	Cr edi t
I	I	Language	26UGTL11	General Tamil-I	6	3
			26UGFL11	French-I		
			26UGHL11	Hindi-I		
	II	English	26UGEL11	General English-I	6	3
	III	Core-T1	26UZOC11	Invertebrata	5	5
	III	Core-P1	26UZOC12	Invertebrata- Practical	3	3
	III	EC-T1	26UCHE11	Chemistry - I	4	3
	III	EC-P1	26UCHE12	Chemistry – I - Practical	2	2
	IV	SEC-1	26UZON11	Human Vectors/ Public Health and Hygiene	2	2
	IV	FC	26UHER11/26UHEE11	Foundation course: Religion: 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	English	26UGEL21	General English-II	6	3
	III	Core-T2	26UZOC21	Chordata	5	5
	III	Core-P2	26UZOC22	Chordata - Practical	3	3
	III	EC-T2	26UCHE21	Chemistry – II	4	3
	III	EC-P2	26UCHE22	Chemistry – II - Practical	2	2
	IV	SEC2	26UZON21	Animal Husbandry / Wild Life and Nature Watch	2	2
	IV	SEC3	26HE121/26UHEE21	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	English	26UGEL31	English-III	6	3
	III	Core -T3	26UZOC31	Cell Biology	5	5
	III	Core -P3	26UZOC32	Cell Biology - Practical	3	2
	III	EC-T3	26UBOE31	Allied Botany -III	4	4
	III	EC-P3	26UBOE32	Allied Botany –III - Practical	2	2
	IV	SEC-4	26UHEL31	Life issues & Entrepreneurial Skill Development	2	2
	IV	SEC-5	26UZOS31	Biostatistics	2	2
	Sub-Total				30	23
IV	I	Language	26UGTL41	General Tamil-IV	6	3
			26UGFL41	French-IV		
			26UGHL41	Hindi-IV		
	II	English	26UGEL41	General English-IV	6	3
	III	Core-T4	26UZOC41	Biochemistry	5	5
	III	Core-P4	26UZOC42	Biochemistry - Practical	3	3

	III	EC-T4	26UBOE41	Allied Botany -IV	4	3
	III	EC-P4	26UBOE42	Allied Botany –IV - Practical	2	3
	IV	EC-T5	26UZOE41	Aquaculture	2	2
	IV	EVS	26UEVS41	Environmental studies	2	2
	V	Extension Activities		STAND		1
	Sub-Total					30
V	III	Core-T5	26UZOC51	Developmental Biology	5	5
	III	Core-T6	26UZOC52	Ecology	5	4
	III	Core-P5	26UZOC53	Developmental Biology & Evolution –Practical	3	2
	III	Core-P6	26UZOC54	Ecology– Practical	3	2
	III	EC-T6	26UZOE51	Genetics and Animal Biotechnology	5	3
	III	EC-P5	26UZOE52	Genetics and Animal Biotechnology – Practical	3	2
	III	EC-T7	26UZOE53	Evolution	4	4
	IV	VE	26UVEH51	Human Rights & Social Analysis	2	2
	IV	Internship	26UZOI51	Internship	-	2
	Sub-Total					30
VI	III	Core-T7	26UZOC61	Animal Physiology	5	4
	III	Core-T8	26UZOC62	Immunology and Microbiology	5	4
	III	Core-P7	26UZOC63	Animal Physiology - Practical	3	2
	III	Core-P8	26UZOC64	Immunology and Microbiology– Practical	3	2
	III	Core	26UZOC65	Project with viva voce	6	3
	III	EC-T8	26UZOE61	Entomology	4	2
	III	EC-P6	26UZOE62	Entomology - Practical	2	1
	IV	SEC-6	26UZOS61	Zoology for Competitive Examinations	2	2
	Sub-Total					30
Total					180	140
Additional Compulsory Courses						
I UG	Add –on (Any one)	26UZOA01/ 26UZOA02/ 26UZOA03	Sericulture/Ornamental fish culture/ Basics of Ornithology		2	
II UG	Value Added – (Any one)	26UZOVA1/26 UZOVA2	Medical coding/ Medical lab technology		2	
III UG	ECC (Any one)	26UZOEC1	Poultry farming		2	
		26UZOEC2	Human anatomy			
		26UZOEC3	Animal behaviour			
		26UZOEC4	Biodiversity conservation			
		26UZOEC5	Pharmacology			
		26UZOEC6	Ethnomedicine			
Field visit/ Industrial visit						1
MOOC						2
Cocurricular / Extra curricular Activities						1
Total					180	150

EC- Elective course; FC- Foundation course; VE- Value education; SEC-Skill Enhancement Course

IV	Allied	26UZOE31	Animal structure and function	4	4
		26UZOE32	Animal structure and function- practicals	2	1
		26UZOE41	Immunology and animal biotechnology	4	4
		26UZOC64	Immunology and animal biotechnology -practical	2	2

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	புதுக்கவிதைவரலாற்றினைஅறிந்துகொள்ளுதல்.(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 - மரியாள் 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 - Tamil Virtual University Library – www.tamilvu.org/library - Project Madurai – www.projectmadurai.org - Chennai Library – www.chennailibrary.com - Tamil University Library – 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	பக்தி 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. தமிழ்விடுதாது - 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 நார்ஜஹான் -அன்வர் பாலசிங்கம்	15

III	தமிழ் இலக்கியவரலாறு (பக்திஇலக்கியம்,சிறுநிலக்கியம் 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 - தாயசவேரியார் 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 தனித்துவங்களைவிளக்கிக் 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) பாலையங்கோட்டை. - 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)	15

	3. தமிழில் தன்விவரக் குறிப்புரைதல் (பயிற்சி)	
	4. மேடைப்பேச்சு நடப்பங்கள் (நேர்முகப் பயிற்சி மற்றும் மதிப்பீடு)	
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 – tamilebooksdownloads.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 (गिनती 1-100),
- Vaakyong mein Prayag kijiye (वाक्यों में प्रयोग कीजिये)
- Rishto ke Naam (रिश्तो के नाम)
- Gharelu padartho ke Naam (घरेलु 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
Sara 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: Proud yogiki 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 priksa par aadharit Computer sambandhit prashikshan Karya

- Hindi mein Powerpoint banana
- Hindi mein Google Document taiyar karna
- Hindi mein Google form taiyar karna
- Vibhinna pratiyogi parikshao 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 multiculturalisme.
Projet:	faire une liste des camarades 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 decrire 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.
 Courses I –VI –*Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 1999.

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	
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

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
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PART A - MCQs (5 from each of the Units I, II, III & IV)	20
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PART B- Compulsory - (5X3)	15
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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
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- 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
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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	TOTAL HOURS: 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.

INVERTEBRATA

(Subject code: 26UZOC11)

SEMESTER I	Core: T 1	CREDITS – 5	Hours: 5
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Course Objective: To provide students with a comprehensive understanding of the classification, organization, and diversity of invertebrate animals from Protozoa to Echinodermata.

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

CO1	Explain the basic principles of animal classification, levels of organization, symmetry, and general characters of major invertebrate phyla.	K2
CO2	Illustrate the structural organization, life history, and biological significance of selected type study organisms across invertebrate phyla.	K3
CO3	Apply knowledge of morphology and physiology to explain adaptations, locomotion, nutrition, and parasitic modes of life in invertebrates.	K3
CO4	Analyze evolutionary relationships and affinities among major invertebrate groups based on structural and developmental features.	K4
CO5	Evaluate the ecological and economic importance of invertebrates, including beneficial and harmful forms, in natural and human systems.	K5
CO6	Interpretnvertebrate systems (canal system, coelom, water vascular system, larval forms) to justify their adaptive significance.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

UNIT I: Classification of Animals and Protozoa (15 Hours)

Animal kingdom – systems of classification, taxonomy and nomenclature. Levels of organization, Types of symmetry. General characters of Protozoa and classification (up to class) with examples.

Type study: *Paramecium caudatum*.

General topics: Protozoan parasites, Life cycle of *Plasmodium*, Locomotion and Nutrition in Protozoa, Economic importance of Protozoa.

UNIT II: Porifera and Coelenterata (15 Hours)

General characters and classification (up to class) of Porifera and Coelenterata with examples and salient features of Ctenophora.

Type study: *Leucosolenia* and *Obelia geniculata*.

General topics: Canal system in sponges, Polymorphism in Coelenterata, Diversity of Corals, Structure of coral polyp and coral reefs, Affinities of Ctenophora.

UNIT III: Platyhelminthes, Aschelminthes and Annelida (15 Hours)

General characters and classification (up to class) of Platyhelminthes, Aschelminthes and Annelida with examples.

Type study: *Taenia solium* and Earthworm.

General topics: Nematode parasites and their adaptations, Coelom and Coelomoducts, Metamerism in Annelida, Modes of life in polychaetes.

UNIT IV: Arthropoda (15 Hours)

General characters and classification (up to class) of Arthropoda with examples. Brief descriptions of *Limulus* & *Sacculina*.

Type study: Prawn (Digestive system, Nervous system, Excretory system)

General topics: Larval forms in Crustacea, Mouthparts of insects, Beneficial insects, Salient features of arachnids, Affinities of *Peripatus*.

UNIT V: Mollusca and Echinodermata

(15 Hours)

General characters and classification (up to class) of Mollusca and Echinodermata with examples.

Type study: *Pila globosa*, *Asterias rubens* (External features, Digestive system, Circulatory system, Respiratory system, Reproductive system).

General topics: Torsion and de-torsion in gastropods, Cephalopods as an advanced mollusc, Economically important molluscs, Water vascular system, Larval forms of Echinoderms, Affinities of echinoderms.

Textbooks:

1. Jordan, E. L., & Verma, P. S. (2014). Invertebrate Zoology. S. Chand & Company Ltd.
2. Murugan, T., Arumugam, N., & Ragunathan, M. G. (2019). A Text Book of Invertebrates (5th ed.). Saras Publications.
3. Kotpal, R. L., Agarwal, S. K., & Ketarpal, R. P. R. (2019). Modern Text Book of Zoology: Invertebrates (12th ed.). Rastogi Publications.

Reference Books:

1. Barnes Robert D, (2004). Invertebrate zoology. Cengage Learning.
2. Rupert et al., (2006). Invertebrate zoology. Thomson Brooks Publishers.
3. Anderson DT, (2001). Invertebrate zoology. Oxford University Press.
4. Barrington EJW, (2000). Invertebrate structure and function. English Language Book Society.
5. Pechenik, J. A. (2014). Biology of the Invertebrates (7th ed.). McGraw-Hill.

E-resources

1. <https://uou.ac.in/sites/default/files/slm/MSZO-501.pdf>
2. http://rcastilho.pt/DA/ewExternalFiles/Invertebrates_Cap_33_Cambell.pdf
3. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBC1201.pdf
4. <https://assets.vmu.ac.in/MZO01.pdf>
5. <http://anucde.info/material/101ZO24%20Final.pdf>

Mapping with programme outcomes								
Cos	P01	P02	P03	P04	P05	P06	P07	P08
C01	M	S	M	M	S	S	L	S
C02	S	S	M	M	S	M	S	S
C03	S	S	M	S	S	M	M	S
C04	S	S	S	L	S	S	M	S
C05	S	S	S	L	M	S	M	S
C06	S	S	L	L	M	L	S	S

* S- Strong, M- Medium, L- Low

INVERTEBRATA - PRACTICALS

(Subject code: 26UZOC12)

SEMESTER I	Core: P 1	CREDITS – 3	Hours: 3
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Course objective: To familiarize students with laboratory techniques used in the study of invertebrate animals. To develop skills in identification, mounting, and examination of invertebrate specimens.

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

CO1	Explain to identify major invertebrate groups using morphological characters	K2
CO2	Illustrate and demonstrate proficiency in mounting and slide preparation techniques	K3
CO3	Classify invertebrates up to suitable taxonomic levels based on observations.	K3
CO4	Analyze and document observations scientifically using labeled diagrams and reports	K4
CO5	Evaluate and apply proper methods for collection and preservation of specimens.	K5
CO6	Interpret anatomical features through virtual and preserved dissections	K5

1. Mounting -Earthworm body setae and pineal setae
2. Cockroach-Mouthparts, digestive system, reproductive system, nervous system
3. Mounting of marine prawn appendages -Cephalothorax and abdominal Appendages
4. Separation of spicules from drifted sponges
5. Virtual dissection / Video demonstration: Grasshopper, Earthworm and Starfish
6. Collection, preservation and submission of invertebrates (dead specimens only).
7. Survey of pond water for free-living organisms.
8. Field Visit: Terrestrial and coastal ecosystem (compulsory)
9. Mini project:
 - An animal album with photographs, paper cuttings with appropriate write-up
 - Photographs, paper cuttings of endangered and threatened invertebrates
10. Study of preserved specimens: *Hydra*, *Aurelia*, Sea anemone, *Sepia*, Octopus, Star fish, Sea urchin, Sea cucumber, Sea lily, Liver fluke, Tape worm, *Ascaris*, *Nereis*, Earthworm, Leech, Prawn, Scorpion, Millipede, Crab, Scorpion, *Limulus*, *Peripatus*, *Pila*, *Lamellidens*
11. Study of slide mounted specimens: *Paramecium*, *Euglena*, *Leucosolenia*, Redia larva, Cercaria larva, Trochophore larva, Nauplius larva, Zoea larva, Mysis larva, Megalopa larva, Bipinnaria larva and Planaria
12. Medicinal value of silkworm, earthworm and marine invertebrates

CHEMISTRY FOR BIOLOGICAL SCIENCES
(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, hybridization, 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 Solvechemical problems. (K3)
- CO4:** Analyze intermolecular forces, electrolysis processes, and conductance behavior 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 Hours)

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 Hours)

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 Hours)

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, electro negativity, conductors, insulators, boiling point, melting point

UNIT IV: Aldehydes, Ketones, Acids and Amides (12 Hours)

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-Aceton, 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 group of aldehydes, ketones and amides

UNIT V: Amines, Amino Acids and Proteins (12 Hours)

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, 2014.

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.

HUMAN VECTORS
(Subject code: 26UZON11)

SEMESTER I	SEC:1 (Optional)	CREDITS – 2	HOURS 2
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Course objective: This course aims to provide fundamental knowledge on the human vectors; and to emphasize prevention, control, and management of vector-borne diseases affecting humans and animals.

Course Outcomes:

At the end of the course the students will be able to		
CO1	Label the taxonomy, classification and life of insects in the animal kingdom.	K1
CO2	Demonstrate mechanisms of transmission of diseases from pets to humans.	K2
CO3	Organizing insects that act as vectors causing diseases in animals and human.	K3
CO4	Categorize about biology, nature of damage of the harmful vectors.	K4
CO5	Determining and emphasizing the importance of disease-causing insects and their management measures.	K5
CO6	Elaborate and identify and name insects with the use of literature and other resources.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Unit I: Salient features of human Vectors (Hours: 6)

General salient features of insects, rodents, snails, birds, dogs, bats and other carnivorous mammal vectors of human beings; Host- vector relationship, Vectorial capacity; Adaptations as vectors.

Unit II: Insect Vectors-I (Hours: 6)

General life cycle, mode of disease transmission, prevention and control of mosquitoes.

Unit III: Insect Vectors-II (Hours: 6)

General life cycle, mode of disease transmission, prevention and control of houseflies, cockroaches, head louse and Triatomine bugs.

Unit IV: Other invertebrate vectors (Hours: 6)

General life cycle, mode of disease transmission, prevention and control of helminths, fleas, ticks, mites and snails.

Unit V: Vertebrate vectors (Hours: 6)

General life cycle, mode of disease transmission, prevention and control of birds, dogs and mammals.

Textbooks:

1. Mathews, G. 2011. Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases, Wiley-Blackwell
2. Mike Service 2012. Medical Entomology for Students, Cambridge University Press.
3. Kochhar, S.K. 2009. A Textbook of Parasitology, Dominant Publishers & Distributors, New Delhi

Reference books:

1. Imms, A.D. 1977. A General Text Book of Entomology. Chapman & Hall, UK
2. Chapman, R.F. 1998. The Insects: Structure and Function. IV Edition, Cambridge University Press, UK.
3. Pedigo L.P. 2002. Entomology and Pest Management, Prentice Hall Publication
4. Sougata Ghosh, Jayaram Paniker, C.K. 2018. Textbook of Medical Parasitology, Jaypee Medical Publishers, New Delhi.
5. Tyagi B.K. 2022. Medical Entomology, Scientific Publishers, New Delhi.

E-resources

1. <https://www.rentokil.com/vector-control/disease-vectors>
2. <https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases>
3. <https://www.cdc.gov/mosquitoes/about/index.html>
4. https://web.natur.cuni.cz/parasitology/vyuka/LekEnt_CV/Service%20-%20Medical%20Entomology%20for%20Students%202012.pdf
5. <https://www.ncbi.nlm.nih.gov/books/NBK52941/>

Mapping with programme outcomes								
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	M	S
CO3	S	S	S	M	L	S	S	M
CO4	S	S	S	S	L	S	S	S
CO5	S	S	S	S	L	S	S	M
CO6	S	S	S	S	L	M	S	S

* S- Strong, M- Medium, L- Low

PUBLIC HEALTH AND HYGIENE

(Subject code: 26UZON11)

SEMESTER I	SEC:1	CREDITS – 2	HOURS 2	H/W=2
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Course objective: This course aims to provide students with basic knowledge of health concepts, hygiene, and nutrition essential for a healthy life.

Course Outcomes:

At the end of the course the students will be able to		
CO1	Remember the spectrum of health and health awareness.	K1
CO2	Explain the concepts of health and a balanced diet	K2
CO3	Acquire knowledge on environment and health	K3
CO4	Analyse mental health and self-control	K4
CO5	Compare health education and health situation in India	K5
CO6	Create awareness of the value of human health for successful existence.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

UNIT I: Health Concepts (6 Hours)

Determinants of health; indicators of health; personal hygiene; public and community health

UNIT II: Nutrients (6 Hours)

Macronutrients – proteins, carbohydrates and lipids; micronutrients and trace elements; vitamins; Energy requirements; balanced diet; malnutrition in children and adult.

UNIT III: Nutritional requirements (6Hours)

Nutritional requirements of growing children, adults, pregnant women, lactating women and convalescents.

UNIT IV: Diseases and Treatment (6 Hours)

Communicable diseases - viral and bacterial diseases (Polio, Chicken box, Dengue, Malaria); Non communicable diseases - diabetics, heart diseases and kidney problems.

UNIT V: Environment and Health (6 Hours)

Causative agent, symptoms, prevention and management of waterborne (Typhoid and Cholera) and airborne diseases (Tuberculosis).

Textbooks:

1. Sorna Raj, R & Kumerasen V. 2010. Public health and hygiene, Saras Publications.
2. Ambika Shanmugam 1999. Fundamentals of Biochemistry for Medical Students, Published by the Author, Chennai.

3. Shubhangini A. Joshi 1992. Nutrition and dietetics - Tata McGraw Hill, Publishing company Ltd, New Delhi.

Reference Books:

1. Srilakshmi, S. 1993. Dietetics - New Age International (P) Ltd. Publishers, New Delhi.
2. Ananthanarayanan, R. and JayaramPaniker, C.K. 2000. Text Book of Microbiology, Orient Longman, Chennai.
3. ShashiKiranSolanki and PreetiRathi, 2024. Public Health and Hygiene, AsthaPrakashan Publication, Delhi.
4. AnjanaAgarwal, Shobha A Udipi, 2014. Textbook of Human Nutrition, Jaypee Medical Publishers, New Delhi.
5. Suryatapa Das 2025. Textbook Of Human Nutrition. Academic Publishers, Kolkata

E-Resources:

1. www.traditionalmedicine.nic.in
2. www.moef.nic.in
3. www.iucn.org/india
4. www.who.int
5. www.wwfindia.org

Mapping with programme outcomes								
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	L	L	S	S	S	S	S
CO2	S	L	S	L	S	S	M	S
CO3	S	L	M	M	M	M	S	M
CO4	S	L	L	S	M	S	S	S
CO5	S	M	S	L	M	S	S	M
CO6	S	S	S	S	L	M	S	S

* S- Strong, M- Medium, L- Low

CHORDATA

(Subject code: 26UZOC21)

SEMESTER II	Core: T 2	CREDITS – 5	HOURS 5
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Course objective: To provide students with a fundamental understanding of the classification, diversity, and general characteristics of chordates from protochordates to mammals.

Course Outcomes:

CO1	Remember the general characters and systematic classification of chordates up to class and major vertebrate groups up to order.	K1
CO2	Understand the structure and functioning of major organ systems in representative chordates.	K2
CO3	Apply anatomical and morphological features to identify and differentiate major chordate groups	K3
CO4	Analyze similarities, differences, and affinities among protochordates and vertebrates.	K4
CO5	Evaluate adaptive features, physiological mechanisms, and evolutionary trends in chordates.	K5
CO6	Create evolutionary relationships among chordates based on comparative anatomy and adaptations.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

UNIT I: Prochordates and Pisces

(15 Hours)

General characters and classification of Chordata (up to class) and Pisces (up to order) with examples. Type study: *Amphioxus*, *Scoliodon* (digestive, circulatory, sensory, reproductive systems).

General topics: Affinities of Hemichordates, Retrogressive metamorphosis in Ascidia, Key difference between Prochordates and Vertebrates, Salient features of Cyclostomes, Holocephali and Dipnoi, Accessory respiratory organs in fishes, Types of fins & function, Migration of fishes. Economic importance of fishes.

UNIT II: Amphibia

(15 Hours)

General characteristics and classification of Amphibia (up to order) with examples.

Type study: Frog (respiratory, digestive, reproductive system).

General topics: Metamorphosis of amphibians, Limbless amphibians, Parental care in amphibians and Paedomorphosis. Economic importance of amphibians.

UNIT III: Reptilia

(15 Hours)

General characteristics & classification of Reptilia (up to order) with examples.

Type study: *Calotes* (respiratory, digestive, and reproductive system).

General topics: Identification of venomous and non-venomous snakes, Poison apparatus and types of venom, Snakebite & first aid, Skull of reptiles and Salient features of Chelonia and Crocodilia. Economic importance of reptiles.

UNIT IV: Aves

(15 Hours)

General characteristics and classification of Aves (up to order) with examples.

Type study: *Columba livia* (respiratory, circulatory, and digestive systems).

General topics: Flightless birds, Flight adaptations in birds, Mechanism of flight, Feet and beak modifications, and Migration in birds. Economic importance of aves.

UNIT V: Mammalia

(15 Hours)

General characteristics and Classification of Mammals (up to order) with examples.

Type study: *Oryctolagus cuniculus* (respiratory, circulatory, and digestive systems).

General topics: Affinities of monotremes, Diversity of marsupials, Aquatic mammals and adaptation, Dentition in mammals. Economic importance of mammals.

Text books

1. Thangamani TK et al., (2018). A textbook of chordates. Saras Publications.
2. Jordan EL, Verma PS, (2010). Chordate Zoology. S Chand & Company.
3. Ekambaranatha Ayyar M, Ananthakrishnan TN, (2000). Manual of zoology, Volume II, Chordata

Reference books

1. Young JZ, (2011). The life of vertebrates. Oxford University Press.
2. DeBeer Gavin, (2000). Vertebrate zoology. Sidgwick & Jackson Ltd.
3. Robert T Orr, (2000). Vertebrate biology. WB Saunders Company.
4. Barrington EJW, (2000). Biology of hemichordata and protochordata. Oliver & Boyd.
5. Pough Harvey F, Christine M. Janis and John B. Heiser (2002). Vertebrate Life, Pearson Education Inc. New Delhi.

E-Resources

1. <https://www.earthlife.net/inverts/hemichordata.html>
2. <http://www.askiitians.com/biology/animal-kingdom/phylum-chordata-and-hemichordata.html#difference-between-lower-and-higher-chordates>
3. <http://www.biozoo.com/2011/11/pisces-classification-super-class.html>
4. <https://www.shapeoflife.org/resource/about-chordates>
5. <https://www.oercommons.org/courseware/lesson/15083/overview?section=9>

Mapping with programme outcomes								
COs	P01	P02	P03	P04	P05	P06	P07	P08
C01	M	S	M	M	S	S	L	S
C02	S	S	M	M	S	M	S	S
C03	S	S	M	S	S	M	M	S
C04	S	S	S	L	S	S	M	S
C05	S	S	S	L	M	S	M	S
C06	S	S	L	L	M	L	S	S

* S- Strong, M- Medium, L- Low

CHORDATA - PRACTICAL

(Subject Code: 26UZOC22)

SEMESTER II	Core: P 2	CREDITS – 3	HOURS: 3
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Course objective: To train students in the practical study of chordate diversity using specimens; and to understand diagnostic features of vertebrate classes through hands-on analysis.

Course outcomes:

CO1	Remember chordate specimens using morphological traits.	K1
CO2	Understand functional adaptations of chordates to different environments.	K2
CO3	Apply phylogenetic concepts in grouping vertebrates.	K3
CO4	Analyze vertebrate scales, feathers, and skeletal structures.	K4
CO5	Evaluate and develop basic skills in biodiversity documentation and conservation studies.	K5
CO6	Create and relate anatomical features to evolutionary significance	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

1. Mounting of Placoid Scales - Preserved specimens (Shark skin)
2. Types of scales in fishes - Preserved specimens
3. Diversity of Feathers- Preserved specimens
4. Digestive system of a fish - (market specimens)
5. Air bags in fishes (market specimens)
6. Reproductive systems of a fish (market specimens)
7. Simple phylogenetic grouping of Animals
8. Virtual dissection / Video demonstration
-Frog –<https://www.emindweb.com/demo/frog/>
9. Activity card preparation – observation of birds and their behaviour
10. Key for identification of venomous and non-venomous snakes
11. Zoological names for common animals
12. Field Visit: Terrestrial ecosystem and a Sea shore (compulsory).
13. Submission: Work sheets, Map of Hot spots of the world, Pictures of endangered species. Documentation of coral histories and folklore related to wildlife
14. Project related to Biodiversity, traditional conservation practices and submission of report.
15. **Spotters (restricted to 30specimens only):** Prochordates: Amphioxus, Balanoglossus, Ascidian; Pisces: Petromyzon, Myxine, *Scoliodon*, *Astrape*, *Anguilla*, *Echenis*, *Hippocampus*, Sardine, *Channa*, Catfish, Diodon, Tetrodon; Amphibia: *Ichthyophis*, *Salamandra*, *Ambystoma*, Axolotl larva, *Rhacophorus*, *Bufo*; Reptilia: *Hemidactylus*, Draco, Chameleon, Cobra, Viper, *Enhydrina*, *Echis*, *Dendrophis*, *Typhlops*, *Chelonia*, *Testudo*, Crocodile; Aves: Blue jay, *Netolopus*, Indian spoonbill, great Indian hornbill, pelicanus, White breasted kingfisher, Braminikite, Parakeet, Patridge, Black drango, Quail; Mammals: Hedge hog, Loris, Mongoose, Pangolin, Bat, Porcupine; Osteology of Rabbit- skull dorsal view, Lower Jaw, Lumbar vertebrae, Pectoral girdle, Pelvic girdle, Fore and Hind limb.

Allied Chemistry II
CHEMISTRY FOR BIOLOGICAL SCIENCES-II

(Subject Code: 26UCHE21)

SEMESTER II	EC- T2	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 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 Hours)

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 Hours)

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 Hours)

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 Hours)

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- Skraup synthesis - Reactions of quinoline

Self-study: Isomers, cyclic compounds, practice to draw the structure of simple molecules like H₂O, NH₃ etc.

UNIT V Analytical Chemistry-II (12 Hours)

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.

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 outcomes

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: Analyze 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: Laboratory manual is supplied.

ANIMAL HUSBANDRY
(Subject Code: 26UZON21)

SEMESTER II	SEC: 2	CREDITS – 2	Hours: 2 H/W=2
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Course objective: To provide students with fundamental knowledge of livestock production and management practices; and to emphasize the economic importance of animal husbandry.

Course Outcomes:

At the end of the course, the students will be able to		
CO1	Define livestock production and management.	K1
CO2	Demonstrate different breeds of livestock	K2
CO3	Examine the product, nutritional and economic values of livestock	K3
CO4	Categorize the common diseases and give appropriate treatments.	K4
CO5	Justify the role of livestock in Indian economy and human health	K5
CO6	Devise strategies for sustainable livestock farming	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Unit 1: Dairy farming (6 Hours)

Cattle breeds (indigenous and exotic); housing of dairy animals, dairy products; nutritive value of milk; Lactometer

Unit II: Poultry farming (6 Hours)

Poultry house; Management of chicks, growers, and layers; Management of broilers and layers; Nutritional requirement for different stages of layers and broilers; common poultry diseases, their control and prophylaxis.

Unit III: Goat and Sheep farming (6 Hours)

Breeds of Indian goats and sheep; Exotic breeds of goats and sheep; Nutrition requirements; Housing and management of lambs and kids; Common diseases and vaccination.

Unit IV: Rabbit farming (6 Hours)

Rabbit breeds; nutritional requirement; housing, caring and farm management.

Unit V: Pig Farming (6 Hours)

Pig breeds; housing and maintenance of pigs, nutritional requirements; care during weaning; common diseases and their management.

Text Book:

1. Banerjee, G.C. 2010. Text book of animal husbandry, Oxford & IBH Publishing company Pvt. Ltd, New Delhi, India.
2. Arumugam, N., Jeyasurya, Nair, N.C., Soundarapandian, N., Thangamani, A., Narayanan, L.M., Leelavathi, S., Murugan, T., Prasanna Kumar, S., Johnson Rajeshwar, J. and Ram Prabu, R. 2013. Economic Zoology, Saras publication, Nagerkoil.
3. Chandrama Singh (2023) Handbook Of Animal Husbandry, Bio Green books Publishers, Delhi.

Reference Books:

1. SandeepTomar 2011. Basic operations of Animal husbandry, Oxford Publishers, New Delhi.
2. SandeepTomar (2011).Basic operations of Animal husbandry.Oxford Publishers, New Delhi.
3. ChetrajUpreti, NirajBaskota and SujayaUpreti (2020) Introductory Animal Husbandry, Heritage Publishers, New Delhi.
4. Sreenivasaiah., P. V. (2015) Textbook of Poultry Science.1st Edition. Write & Print Publications, New Delhi.
5. Grace A. Strong, (2023) Poultry Farming, A Beginners guide to Poultry Business, Independently Published.

E-resources

1. https://agritech.tnau.ac.in/animal_husbandry/animhus_index.html
2. <http://www.sheepfarm.in/goat-sheep-farming-business-plan>
3. <https://nios.ac.in/media/documents/srsec314newE/PDFEL33B.pdf>
4. <https://www.fao.org/4/ba0027e/ba0027e00.htm>
5. <https://www.youtube.com/watch?v=RJkViXmMn-s>

Mapping with programme outcomes								
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	L	M	M	L	L	M	L	M
CO2	L	M	M	L	L	M	M	M
CO3	M	M	M	L	L	M	M	M
CO4	S	M	L	M	S	S	M	M
CO5	S	S	S	M	S	S	S	M
CO6	S	S	S	M	S	S	S	M

* S- Strong, M- Medium, L- Low

WILDLIFE AND NATURE WATCH

(Subject code:26UZON21)

SEMESTER II	SEC: 2	CREDITS – 2	Hours: 2	H/W=2
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Course objective: To expand the knowledge of the underlying conceptual and theoretical framework required by conservation biologist.

Course Outcomes:

At the end of the course the students will be able to		
CO1	Outline the significance and need of conserving resources.	K1
CO2	Categorize the distribution and diversity of fauna.	K2
CO3	Organize various strategies adopted in the conservation of various species.	K3
CO4	Integrate the necessity of forensics related to wildlife crimes.	K4
CO5	Examine conservation issues along a spectrum ranging from individual animals to populations, reintroductions, habitat restoration and anthropogenic sources of conflict	K5
CO6	Create awareness to students explore biodiversity for new product development.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Unit I: Wildlife in India

(6 Hours)

Definition, WWF India, Brief account of National Parks, Biosphere Reserve, World Network of Biosphere Reserves, Wild life sanctuaries, Tiger Reserves and project Tiger; National & State symbols.

Unit II: Tools and Techniques

(6 Hours)

Tools - Trail and digital cameras, Track plates, GPS Units, Binoculars, Wildlife Callers; Techniques – count, tracking, capturing-marking-recapture, genetic sample collection, census, radio-telemetry, Pugmarks, traps, radio-telemetry.

Unit III: Wildlife Biology and Conservation

(6 Hours)

Biology of selected wild animals of Western Ghats; Snakes of India - identification of venomous and non-venomous snakes, first aid for snake bite; Wildlife conservation–principles, needs and efforts in India.

Unit IV02: Bird Watching

(6 Hours)

Salim Ali's Contributions, Birds of Tirunelveli district, Morphology of birds, Bird behaviour, Silhouette: Shape, Size, Bird flight.

Unit V: Eco-Ethics

(6 Hours)

Wildlife tours - Dress code, Behaviour code, Do's and Don'ts, Zoo behaviour; Eco-living, Man-wildlife conflicts, Man-eaters. Ethno-ornithology: Local people's cultural heritage with reference to birds. Backyard attraction of birds - Migratory birds - Birds in Indian mythology.

Text books:

1. Prater, S.H. 1974. The Books of Indian Mammals, Oxford University Publication, New Delhi
2. Salim Ali, 1996. Birds of Indian Subcontinent, Bombay Natural History Society publication, Bombay.
3. Krishnamurthy K.V, 2009. An Advanced Textbook on Biodiversity Principles and Practice, Oxford & IBH Publishing Co Pvt.Ltd, New Delhi, India.

Reference Books:

1. Richard Grimmet, 2007. Princeton field guide Birds of India,
2. Romulus Whitaker 2004. Common Indian Snakes, Oxford University Publication, New Delhi
3. Jim Corbett, 2001. Man-eaters of Kumaon, Oxford India Publications, Chennai.
4. Jim Corbett, 2001. Man eating leopard of Rudraprayag. Oxford India Publications, Chennai.
5. Hosetti B.B and Ramkrishna S. 2016. Biodiversity: Concepts and Conservation, Aavishkar Publishers, Jaipur

E-resources

1. www.wii.gov.in
2. www.wwfindia.org
3. www.bnhs.org
4. www.indianjungles.com
5. www.sanctuaryasia.com

Mapping with programme outcomes								
C0s	P01	P02	P03	P04	P05	P06	P07	P08
C01	S	S	S	S	S	S	S	S
C02	S	S	M	M	S	S	M	S
C03	S	M	M	M	S	S	S	M
C04	S	M	S	M	S	M	S	S
C05	S	M	M	M	S	S	S	S
C06	S	S	S	M	S	M	S	M

* S- Strong, M- Medium, L- Low

CELL BIOLOGY
(Subject code: 26UZOC31)

SEMESTER III	CORE: T 3	CREDITS – 5	Hours: 5
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Course Objective: To learn the detailed organization of cells, key cellular processes, and instruments of importance for application in research.

Course Outcomes:

At the end of the course the students will be able to		
CO1	Describe the basic physical and chemical organization of living organism, and use of microscopy	K1
CO2	Explain the structural organization and function of cell organelles	K2
CO3	Experiment how cells grow, divide, and die and how these important processes are regulated	K3
CO4	Distinguish the molecular structure, function and interaction of genes	K4
CO5	Predict gene regulation in prokaryotes and eukaryotes	K5
CO6	Prepare histological specimens	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Unit I: Introductory cytology (15 Hours)

Cell theory, ultrastructure of prokaryotic and eukaryotic cells; Principle, components, resolving power and applications of Compound, Phase contrast, Fluorescent, Confocal and Electron Microscopes (SEM and TEM); Histological techniques - Tissue fixation, Sectioning and Staining.

Unit II: Cell organelles (15 Hours)

Ultrastructure and functions of Plasma membrane, Specializations of plasma membrane, Cell junctions; Ultrastructure and functions of membranous organelles (Endoplasmic reticulum, Golgi body, Mitochondria, Peroxisomes, Lysosomes, Transport Vesicles), Ultra structure and functions of non-membranous organelles (Ribosomes, Microtubules, Actin Filaments, Intermediate Filaments).

Unit III: Nucleus and cell division (15 Hours)

Ultra structure of nucleus - Nuclear envelope, Chromatin, Nucleosome, Nucleolus, Nuclear matrix; Cell division –cell cycle, phases of mitosis and meiosis, its regulation; Chromosomes – structure and types, Karyotype, Giant chromosome, Apoptosis, Cell differentiation, Cancer – properties, origin, types and causes.

Unit IV: Nucleic acids, DNA repair and Mutagenesis (15 Hours)

Salient features of DNA and RNA; Watson and Crick model of DNA; Types and role of RNA, the structure of tRNA; Mechanism of DNA replication; DNA repair mechanisms - Pyrimidine dimerization and mismatch repair; Modern concept of prokaryotic and eukaryotic genes; Mutation – types; Mutagens, Molecular basis of mutation.

Unit V: Gene expression and regulation (15 Hours)

Gene expression - transcription, short outline of post-transcriptional modifications, RNA transport; Gene regulation -Transcription regulation in prokaryotes: lac operon and trp operon; Transcription regulation in eukaryotes: Activators, Repressors, Enhancers, Silencer elements;

Gene silencing and Genomic imprinting. Properties of genetic code; Polysomes, Protein synthesis (prokaryotes & eukaryotes), post-translational modifications.

Textbooks:

1. Arumugam N, 2010. Cell Biology & Molecular Biology, Saras Publications, Nagercoil.
2. Rastogi S C 2011. Cell and Molecular Biology, New Age International Publishers.
3. Verma, P.S. and Agarwal, V.K. 1998. Concepts of Molecular Biology, S. Chand & Company Ltd., New Delhi.

Reference books:

1. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
2. Karp, Gerald 2012. Cell and molecular Biology, John Wiley and sons, New York
3. Prakash S. Lohar 2007. Cell and Molecular Biology, M.J.P. Publications, Chennai.
4. Sivarama Sastri, K.G. and Padbanaban and Subramanian 1994. Textbook of Molecular Biology. Mac Millan India Ltd. New Delhi.
5. Ajoy Paul. 2011. Text book of cell and molecular Biology, Third Edition, Books of Allied (P) Ltd., Chintamani Das Lane, Kolkatta.

E-resources :

1. <https://www.hccfl.edu/media/572066/microscopy.pdf>
2. <http://www.science-info.net/docs/AO-Spenser/GreysHandbook.pdf>
3. <http://www.microbiologynotes.com/differences-between-prokaryotic-and-eukaryotic-cells/>
4. <https://www.kenhub.com/en/library/anatomy/cellular-organelles>
5. <http://www.iupui.edu/~anatd502/lecture.f04/cell.f04/Nucleus.pdf>

Mapping with programme outcomes								
Cos	P01	P02	P03	P04	P05	P06	P07	P08
C01	L	L	M	L	L	M	L	S
C02	M	M	M	L	L	M	L	S
C03	S	S	M	M	L	S	M	S
C04	S	S	M	M	L	M	S	S
C05	S	S	M	S	L	M	S	S
C06	S	S	S	S	L	M	S	S

* S- Strong, M- Medium, L- Low

CELL BIOLOGY – PRACTICAL

(Subject code: 26UZOC32)

SEMESTER III	CORE: P 3	CREDITS – 2	Hours: 3	H/W=2
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Course objective: To provide hands-on experience in observing cell structure, cell division, and subcellular components through microscopic and biochemical methods.

Course outcomes:

At the end of the course the students will be able to		
CO1	Recall the structure and functions of cell organelles, chromosomes, and molecular components of the cell.	K1
CO2	Explain the principles behind microscopy, cell division, staining techniques, and cell separation methods.	K2
CO3	Perform standard laboratory procedures such as slide preparation, staining, and microscopic observation of cells.	K3
CO4	Differentiate mitotic and meiotic stages, cell types, and chromosome structures based on microscopic observations.	K4
CO5	Assess the accuracy of experimental results such as WBC differential count, cell size measurement, and DNA quantification.	K5
CO6	Design and execute simple experimental setups for cell isolation, organelle extraction, and cytological analysis.	K6

1. Compound microscope – Setting and handling procedures
2. Squash preparation of onion root tip for mitotic stages
3. Squash preparation of grasshopper testis for meiotic stages
4. Smear preparation of human blood for RBC/WBC observation
5. Differential count of WBC
6. Study of Polytene chromosomes from Chironomous / Drosophila larvae
7. Smear preparation of squamous epithelium of human buccal cavity.
8. Separation and isolation of cells by sedimentation.
9. Cell size measurement by micrometer.
10. Observation of yeast cell (Eukaryotic cell).
11. Isolation of DNA from animal tissue.
12. Collection of reports on traditional techniques of treatment, leech therapy, bee venom therapy

Spotters: Plasma membrane, Mitochondria, Ribosomes, Lysosomes, Endoplasmic reticulum, nucleus, Nucleolus, Golgi complex, Centrioles, Types of chromosomes, Ultra structure of chromosomes, Cell secretion, DNA double helix, Variants of double helical DNA, Protein synthesis, DNA- Replication, Structure of Lac operon, DNA repair, Types of Mutation

ALLIED BOTANY-III

PLANT SCIENCE -I (SUB.CODE: 26UBOE31)

SEMESTER – III	EC – T3	HOURS –4	CREDITS – 4
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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 Text Book 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: 26UBOE32)

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 (sterilisation & inoculation) involved in *invitro* 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)

BIOSTATISTICS

(Subject code: 26UZOS31)

SEMESTER – III	SEC: 5	HOURS: 2	CREDITS: 2
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Course objective: To understand and apply the basic biostatistical methods and use of computer applications to solve common and scientific problems in science.

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

CO1	Define the measures that can be used to summarise a data set: mean, median, mode, percentiles, variance, standard deviation and range.	K1
CO2	Understand the basics of data collection, categorisation, and presentation	K2
CO3	Experiment with common types of statistical analyses of continuous, discontinuous data and apply the knowledge in the future course of their career development in higher education and research	K3
CO4	Distinguish different applications of computers in biology, using MS Word, MS –Excel and MS PowerPoint.	K4
CO5	Rate scientific problems by applying statistical formulas.	K5
CO6	Write the basic concepts of primary and secondary data	K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create

Unit I: Data–collection and Categorisation (6 Hours)

Types of data: Primary and secondary data collection; Methods, merits and demerits, sampling error; Categorization - ungrouped and grouped data with continuous and discontinuous series. Aryabhata's mathematics on modern statistical reasoning.

Unit II: Data-Presentation and Tabulation (6 Hours)

Presentation – Tabulation and Diagrammatic presentation –line, bar diagram, pie diagram, histogram.

Unit III: Measures of central tendency and dispersion (6 Hours)

Arithmetic mean, median, mode, standard deviation and standard error.

Unit IV: Tests of significance (6 Hours)

Chi-square test, Functions–significance tests (t , Z , F): Excel/ AI statistical functions for analysis.

Unit V: Correlation and Regression (6 Hours)

Correlation, Regression (Linear), regression line. Components of research proposal.

Textbooks:

1. Ramakrishnan, P. 2015. Biostatistics, Saras Publication, Nagercoil.
2. Veer Bala Rastogi. 2011. Fundamentals of biostatistics, 2nd edition. Ane Books Pvt. Ltd.
3. Gurumani, N. 2010. An introduction to Biostatistics, Tamil Nadu Book House, Chennai.

Reference books:

1. Ronald N Forthofer *et al.* 2007. Biostatistics a guide to design, analysis and discovery. Academic Press.
2. Clifford Blari, Richard A Taylor. 2009. Biostatistics for health sciences. Pearson education.
3. Negi KS. 2012. Methods in biostatistics with latest MCQs. AITBS Publishers.
4. Zar 2003. Biostatistical analysis (IV Ed.), Pearson Education, Singapore.
5. Carlberg, Conrad. 2016. Statistical Analysis: Microsoft EXCEL 2016. Carlberg, Conrad. Pearson Education. 4th edition

E-resources

1. <http://www.nios.ac.in/media/documents/316courseE/E-JHA-31-10A.pdf>
2. <http://www.indiana.edu/~ensiweb/lessons/oat.stat.signif.pdf>
3. <https://uou.ac.in/sites/default/files/slm/MSCBOT-606.pdf>
4. <https://www.suz.uzh.ch/dataforstat/statistik2/inlinks/SRM.pdf>
5. <https://www.scribbr.com/frequently-asked-questions/one-way-vs-two-way-anova/>

Mapping with programme outcomes								
Cos	P01	P02	P03	P04	P05	P06	P07	P08
C01	S	S	S	S	S	S	S	S
C02	S	S	M	M	S	S	M	S
C03	S	M	M	M	S	S	S	M
C04	S	M	S	M	S	M	S	S
C05	S	M	M	M	S	S	S	S
C06	S	S	S	M	S	M	S	M

1. * S- Strong, M- Medium, L- Low

BIOCHEMISTRY

(Subject code: 26UZOC41)

SEMESTER: IV	CORE: T 4	CREDITS: 5	HOURS: 5
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Course objective: To impart knowledge on the molecules of biological importance, and to inculcate the basic knowledge on the step-by-step biochemical reactions in a cell.

Course Outcomes:

At the end of the course the students will be able to		
CO1	Define biomolecules and their properties	K1
CO2	Describe the major biochemical pathways in the biological system	K2
CO3	Determine the general three-dimensional structure of the highlighted molecules	K3
CO4	Classify the molecules based on their structure and properties	K4
CO5	Recognize deficiency and metabolic diseases	K5
CO6	Build models on cell metabolism	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit I: Properties of biomolecules (12 Hours)

Physicochemical forces acting on the living body: Definition of pH, its determination, maintenance of pH in blood – water - buffers and electrolytes in the body and their functions, Definition of osmosis (a method of determining osmotic pressure - oedema and dehydration).

Unit II: Carbohydrates (12 Hours)

Carbohydrates: structure, properties, classification; Monosaccharides, Oligosaccharides and Polysaccharides; Metabolism - Glycogenesis, Glycolysis, Krebs's cycle, Electron transport chain and oxidative phosphorylation, HMP shunt, Glyoxylate cycle.

Unit III: Lipids (12 Hours)

Lipids: structure, properties, classification and fatty acids, biosynthesis of saturated fatty acids – palmitic acid; β oxidation of fats.

Unit IV: Amino acids and Proteins (12 Hours)

Amino acids: structure, properties, classification, transamination, deamination and biosynthesis of urea. Protein: properties, classification, structural organization – primary (peptide bond), secondary (α and β), tertiary (myoglobin) and quaternary (haemoglobin) structure; Ramachandran Plot- analysis of Protein structure; biological importance of proteins.

Unit V: Nucleic acids, Enzymes and Vitamins (12 Hours)

Chemistry of DNA, Nitrogen bases, nucleosides, nucleotides, variants of DNA, and types of RNA; Enzymes - Classification, Mechanism of enzyme action and factors influencing enzyme action; enzyme inhibition; Vitamins: Types, sources, structure and deficiencies of vitamins.

Textbooks:

1. Arumugam N *et al.*, (2014). Biochemistry. Saras Publication.
2. Satyanarayana U *et al.*, (2013). Essentials of biochemistry. Books and allied (P) Ltd.

- Ambika Shanmugam, (2011). Fundamentals of biochemistry for medical students. Arthur's Publication

Reference books:

- Keith Wilson, John Walker, (2017). Biochemistry and molecular biology. Cambridge University Press.
- Michael M Cox, David L Nelson, (2010). Lehninger's principles of biochemistry, 5th edition. WH Freeman and Co.
- Mary K Campbell, Shawn O Farrell, (2009). Introduction to biochemistry. Cengage learning.
- William H Elliott, Daphne C Elliott, (2007). Biochemistry and molecular biology. Oxford University Press.
- A. Hofmann and S. Clokie. 2018. Wilson and Walker's - Principles and Techniques of Biochemistry and Molecular Biology. 8th edition. Cambridge University Press. 929pages.

E-resources:

- <https://themedicalbiochemistrypage.org/>
- <http://www.cellimagelibrary.org/home>
- <https://www.proteinatlas.org/>
- <https://www.brenda-enzymes.info/>
- <https://biochem.oregonstate.edu/undergraduate/educational-resources>

Mapping with programme outcomes								
Cos	P01	P02	P03	P04	P05	P06	P07	P08
C01	L	L	M	L	L	M	L	S
C02	M	M	M	L	L	M	L	S
C03	S	S	M	M	L	S	M	S
C04	S	S	M	M	L	M	S	S
C05	S	S	M	S	L	M	S	S
C06	S	S	S	S	L	M	S	S

* S- Strong, M- Medium, L- Low

BIOCHEMISTRY – PRACTICAL

(Subject code: 26UZOC42)

SEMESTER: IV	CORE: P 4	CREDITS: 3	HOURS: 3
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Course objective: To develop an understanding of the structure, function, and analysis of biomolecules and nucleic acids. To acquire practical skills in enzyme kinetics, qualitative and quantitative biochemical techniques, and laboratory instrumentation.

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

CO1	Identify and interpret structure–function relationships of carbohydrates, proteins and lipids	K3
CO2	Explain the structure and biological role of nucleic acids, purines, pyrimidines and related concepts	K2
CO3	Understand enzymes, their mechanism, kinetics, inhibition and regulation	K2
CO4	Apply basic laboratory techniques and use biochemistry instruments safely and accurately	K3
CO5	Perform qualitative and quantitative biochemical experiments and analyze experimental data	K4
CO6	Evaluate experimental results and interpret biochemical data using appropriate laboratory and analytical techniques	K5

1. Qualitative analysis of carbohydrates
2. Determination of Glucose Concentration by Nelson's Method
3. Qualitative analysis of proteins
4. Qualitative analysis of amino acids
5. Qualitative analysis of fats
6. Preparation of buffer and molar solutions
7. Determination of pH change during fermentation
8. Absorption maxima of coloured solution using colorimeter.
9. Separation of amino acids and determination of R_f value by paper chromatography
10. **Spotters:** Structure of glucose, Starch, Secondary structure of protein, Myoglobin, Haemoglobin, Ramachandran plot, Oleic acid, Cyclic AMP, Urea cycle, Krebs cycle, Nitrogenous bases, Nucleosides, Nucleotides, Enzyme action- lock and key model, Induced fit model; Fat soluble and water-soluble vitamins, Instruments: pH meter, colorimeter, Paper chromatography, gel electrophoresis, spectrophotometer and centrifuge.

ALLIED BOTANY- IV

(SUB.CODE: 26UBOE41)

SEMESTER – IV	EC – T4	HOURS –4	CREDITS – 3
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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 fertilisation, 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

S-Strong (3)

M-Medium (2)

L-Low(1)

**ALLIED BOTANY
PRACTICAL - IV
(SUB.CODE: 26UBOE42)**

SEMESTER – IV	EC – P4	HOURS –2	CREDITS – 3
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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

- Description of plants in technical terms**, identification of families using diagnostic characters, and study of vegetative and floral morphology of the prescribed families.
- Dissection of a flower**, construction of floral diagram, and writing of floral formula.
- Present the economic uses of species belonging to the five prescribed families.
- Preparation of suitable micro-slides** of anatomical materials prescribed in the syllabus.
- Observation of ovule and embryo sac** using prepared microslides.
- Demonstration of emasculation and bagging techniques.**

Recommended Texts:

- Subramaniam, N.S. 1996. Laboratory Manual of Plant Taxonomy. Vikas Publishing House Pvt. Ltd., New Delhi.
- Noggle G.R and G.J. Fritz. 2002. Introductory Plant Physiology. Prentice Hall of India, New Delhi.

Reference Books:

- Aler Gingauz. 2001. Medicinal Chemistry. Oxford University Press & Wiley Publications.
- 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)

AQUACULTURE

(Subject code: 26UZOE41)

SEMESTER – IV	EC: T5	HOURS –2	CREDITS – 2
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Course objective: To introduce and familiarize the basic and aspects of culture practices of both fin fishes and shell fishes, feeding and breeding techniques and help the students to pursue higher studies and research and job opportunities in aquaculture.

Course Outcomes:

At the end of the course the students will be able to		
CO1	Recollect the basic knowledge about important cultivable fin fishes.	K1
CO2	Explain the modern techniques and methods of fishery industries	K2
CO3	Determine ornamental fish breeding which is highly professional	K3
CO4	Categorize commercially important edible fishes	K4
CO5	Validate the importance of supplementary fish feeds and Artificial feed preparation.	K5
CO6	Create and construct fishponds for aquaculture	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Unit I: Pond construction and management (6 hours)

Aquaculture-Global scenario, Present status in India and Tamil Nadu; Fish pond construction-site selection; types of ponds, water quality analyses, liming and fertilization, morphology and commercial characteristics of cultivable fishes, culture practice, predator and weed control.

Unit II: Fin fish culture (6 hours)

Composite fish culture (Indian Major Carps), Murrel farming (Contributions of Dr. MAH); sewage-fed fish culture and integrated fish culture, Marine water fish culture.

Unit III: Shellfish and seaweed culture (6 hours)

Culture of prawns, edible and pearl oysters, crabs; adaptive management; Seaweeds- types and culture practices.

Unit IV: Feeding and breeding (6 hours)

Live feed organisms – Artemia and rotifers culture; Fish feed - types, formulation and preparation, techniques, Importance of artificial feeding; Breeding – Bundh breeding and hypophysation; rearing of hatchlings, fry and fingerlings.

Unit V: Aquaculture techniques (6 Hours)

Identification of cultivable fish species; Morphometry of pond (Enclosed rectangular method/Shore length/ shore area and shoreline development); Breeding techniques - natural seed collection and artificial seed production (artificial fertilization and hypophysation). Pokkali culture.

Textbooks:

1. Rath, AK (2011). Freshwater Aquaculture, Third Edition, Scientific Publishers, Jodhpur, India.
2. Arumugam N (2008). Aquaculture. Saras publications.

3. Santhanam R, Sukumaran N (2000). Manual of freshwater aquaculture. SugainnaPathipagam.

Reference Books:

1. Jhingran VG (2000). Fish and fisheries of India. Hindustan Publishers.
2. Peter B Moyle, Joseph J Cech, (2004). Fishes an introduction to ichthyology, 5th edition, PHI Learning Pvt. Ltd.
3. Baeumont Hoare K, (2000). Biotechnology and genetics in fisheries and aquaculture. Blackwell Publishing.
4. Landau Matthew, (2000). Introduction to aquaculture. John Wiley & Sons Inc.

E-resources

1. http://agritech.tnau.ac.in/fishery/fish_freshwaterprawn.html
2. <http://www.fao.org/3/contents/6c2f5977-bc3e-528e-b90f-ee63c7605e27/AC417E00.htm>
3. http://nacogdoches.agrilife.org/files/2011/06/feeding_fish_7.pdf
4. <https://www.slideshare.net/SameerChebbi1/freshwater-brackish-water-and-marine-fish-culture-of-india-by-dr-s-g-chebbi>
5. <http://www.sheepfarm.in/goat-sheep-farming-business-plan>

Mapping with programme outcomes								
C0s	P01	P02	P03	P04	P05	P06	P07	P08
C01	S	S	S	S	S	S	S	S
C02	S	S	S	S	S	M	M	S
C03	S	S	S	M	S	S	M	S
C04	S	S	S	M	L	M	S	S
C05	S	S	S	S	L	S	S	S
C06	S	S	S	S	L	M	S	M

* S- Strong, M- Medium, L- Low

DEVELOPMENTAL BIOLOGY
(Subject code: 26UZOC51)

SEMESTER – V	CORE: T 5	CREDITS – 5	HOURS –5
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Course objective: To provide a comprehensive understanding of animal development from gametogenesis to birth; and to explain cellular and molecular mechanisms underlying embryonic development.

Course Outcomes:

At the end of the course the students will be able to		
CO1	Remember methodological approaches to the study of embryonic development and the characteristics of the principal experimental models.	K1
CO2	Understand the embryonic sequences in developmental processes in order.	K2
CO3	Apply and Categorize the derivatives of embryonic structures.	K3
CO4	Analyze basic conceptual knowledge of the principal cellular mechanisms of development and identifying the genetic and molecular Elements that are involved.	K4
CO5	Evaluate development in applied sciences like Biotechnology, Genetic engineering and Molecular Biology	K5
CO6	Create laws and concepts to describe evo-devo trends.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

UNIT I: Gametogenesis and Fertilization (15 Hours)

Structure of mammalian ovary and testis; Spermatogenesis and Oogenesis- ovulation; Types of eggs; Fertilization - external and internal, physiological and chemical changes, post-fertilization changes; Parthenogenesis (General account).

UNIT II: Cleavage, Fate Map and Gastrulation (15 Hours)

Cleavage: rules, patterns and laws; Cleavage in Frog; Fate map and gastrulation; morphogenetic movements. Dr. Manju Sharma- cellular differentiation, Dr. Vijayanarayana – development of *Drosophilla* nervous system

UNIT III: Organizer and Organogenesis (15 Hours)

Types of embryonic induction - structure, mechanism, and theories of induction; organizer concept; organogenesis - brain, eye, and heart in frog; Development of Pro, Meso and Metanephric kidneys.

UNIT IV: Extra-embryonic Membranes and Placenta (15 Hours)

Egg membranes; Development and factors involved in the formation of amnion, chorion, allantois and yolk sac - their function; Formation of extra-embryonic membranes in humans; Origin, types and functions of the placenta. Embryonic stem cells and significance.

UNIT V: Reproductive cycles and assisted technologies (15 Hours)

Oestrous, Menstrual cycle and menopause, Pregnancy, Trimesters, fetal development, Twins – types. Infertility: causes; Diagnosis- Amniocentesis, Treatment: Assisted Reproductive Technology (IVF, GIFT, ZIFT, ICSI).

Textbooks:

1. Arumugam. 2009. Textbook of embryology. Saras Publications.
2. Veer Bala Rastogi, 2000. Developmental Biology. Kedarnath, Ramnath & Co.
3. Verma, P.S. and Agarwal, V.K. 1999. Chordate Embryology, Chand & Co. New Delhi.

Reference Books:

1. Twyman RM 2003. Developmental biology, Viva books Pvt. Ltd.
2. Banerjee.S 2005, A Textbook of Developmental Biology, Dominant Publishers and Distributors.
3. Werner A Muller 2005. Developmental biology. Springer Publications.
4. Balinsky, RJ. 1981. An Introduction to Embryology, CBS College Publishing, Holt, Rinehart and Winston.
5. Scott F. Gilbert 2000. Developmental biology. Sinauer Associates Inc.

E-Resources:

1. <https://plato.stanford.edu/entries/biology-developmental/>
2. <https://bastiani.biology.utah.edu/courses/3230/db%20lecture/lectures/a6cleav.html>
3. <https://organismalbio.biosci.gatech.edu/growth-and-reproduction/animal-development-ii/>
4. Wwww. YouTube.com (Search for)
5. WWW. Linkein.com (connect with experts)

Mapping with programme outcomes								
Cos	P01	P02	P03	P04	P05	P06	P07	P08
C01	S	S	S	S	S	S	S	S
C02	S	S	S	S	M	M	M	S
C03	S	S	S	M	M	S	S	M
C04	S	S	S	L	S	M	S	S
C05	S	M	M	M	S	S	M	S
C06	S	S	S	L	S	M	L	L

* S- Strong, M- Medium, L- Low

ECOLOGY

(Subject code: 26UZOC52)

SEMESTER – V	CORE: T 6	CREDITS – 4	HOURS –5
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Course objective: To provide understanding of ecological principles governing organisms, populations, communities, and ecosystems; and enable students to analyze interactions between biotic and abiotic components.

Course Outcomes:

At the end of the course, the students will be able to		
CO1	Define the principles and basics of ecology	K1
CO2	Learn population and animal relationships	K2
CO3	Illustrate biogeochemical cycles and correlate the choice of habitat for organisms to abiotic factors	K3
CO4	Classify natural resources	K4
CO5	Recommend wildlife conservation approaches	K5
CO6	Develop strategies to reduce, re-use and recycle for environmental protection	K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create

Unit I: Concepts of Ecology (15 Hours)

Definition and Scope, Biosphere, Biotic factors. Abiotic factors and its ecological roles - soil, light, temperature, water; Limiting factors. Ecosystem- concept, structure, types and function, Concept of species -Keystone species, Indicator species, Umbrella and flagship species. Population dynamics and growth curves, Population ecology, Community ecology.

Unit II: Nutrient cycles and interactions (15 Hours)

Biogeochemical cycles - Carbon, Oxygen, Nitrogen, Sulphur, Phosphorous. Food chain, food web, pyramids, trophic levels, energy flow. Animal relationship -Symbiosis, Commensalisms, Mutualism, Antagonism, (Antibiosis, Parasitism, Predation), Competition;

Unit III: Habitat ecology (15 Hours)

Characteristic features, types and faunal adaptations – Freshwater (Lotic-Tamiraparani, and Lentic), Marine, Estuarine, Mangrove, Tundra, Savanna, Cave, Forest and Desert ecosystems. Ecotone & edge effect. Significance and conservation of wetlands; ecological succession & niche concepts. Manmade ecosystems - effects of dams, hydroelectric projects and aquaculture.

Unit IV: Pollution and its control (15 Hours)

Sources, causes, effects and management of - Land, Water, Air, Thermal and Pesticide pollution. Nuclear hazards – Management of Solid waste, Plastic waste, Medical waste and e-waste. Pollution control devices; Biomagnifications; Bioindicators and their role in environmental monitoring; Pollution control acts and regulations of India. 3R concept.

Unit V: Natural resources and conservation (15 Hours)

Natural resources – definition and types. Biodiversity - definition, value, loss and cause; biodiversity hotspots in India; IUCN, CITES & brief outline of Indian laws of conservation; Indian endangered species. Biodiversity conservation -*in situ* and *ex situ* - Community reserves, Sanctuaries, National parks, Tiger reserves in Tamil Nadu. Afforestation

&Deforestation.Human-animal conflicts. Traditional methods of managing animal-human conflict (native dogs, fencing and barriers, chilli-garlic fences, beehive fences, scare tactics, community vigilance and patrols, deterrents, and rotational grazing).

Textbooks:

1. Arumugam N, (2010). Ecology and toxicology. Saras Publications.
2. Verma PS, Agarwal VK, (2005). Principles of ecology. S Chand & Co. Ltd.
3. Tyagi PN, (2013). Textbook of ecology. Astha Publishers Distributors.

Reference books:

1. Michael PN, (2016). Ecology. CBS Publishers & Distributors Pvt. Ltd.
2. Eugene P Odum, (2014). Fundamentals of ecology. Cengage Learning.
3. Edward J Kormondy, (2013). Concepts of ecology, 4th edition. PHI Learning Pvt. Ltd.
4. Saha TK, (2010). Ecology and environmental biology. Books and allied (P) Ltd.
5. Peter J Russell et al., (2009). Ecology. Brooks/Cole Cengage Learning.

E-resources

1. <http://download.nos.org/333courseE/10.pdf>
2. <http://bio1510.biology.gatech.edu/module-2-ecology/population-ecology/>
3. <https://www.cbd.int/2010/biodiversity/#tab=2>
4. <https://collection.bccampus.ca/textbook/hpbQwHbk>
5. https://egyankosh.ac.in/handle/123456789/59036?utm_source=chatgpt.com

Mapping with programme outcomes								
C0s	P01	P02	P03	P04	P05	P06	P07	P08
C01	L	L	M	L	L	M	L	S
C02	M	M	M	L	L	M	L	S
C03	S	S	M	M	L	S	M	S
C04	S	S	M	M	L	M	S	S
C05	S	S	M	S	L	M	S	S
C06	S	S	S	S	L	M	S	S

* S- Strong, M- Medium, L- Low

DEVELOPMENTAL BIOLOGY& EVOLUTION - PRACTICAL

(Subject code: 26UZOC53)

SEMESTER – V	CORE: P 5	CREDITS – 2	HOURS –3
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Course objective: To provide hands-on experience and conceptual understanding of developmental biology and evolutionary principles through laboratory observations, demonstrations, comparative studies, and field exposure.

Course Outcomes:

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

CO1	Explain the development of multicellular organisms from a single-celled zygote through various embryonic stages.	K2
CO2	Describe the mechanisms regulating growth, differentiation, and development in animals.	K2
CO3	Identify and explain unique post-embryonic developmental processes such as metamorphosis and regeneration in animals.	K3
CO4	Evaluate the concept of ageing and assess the relevance of developmental biology in medical and applied sciences.	K5
CO5	Analyze evolutionary concepts using comparative anatomy, embryological evidence, fossils, and homologous and analogous structures.	K4
CO6	Construct evolutionary relationships among animals based on ecological morphology, skeletal structures, and fossil records.	K6

Developmental Biology and Evolution

1. Temporary mounting of Chick blastoderm
2. Drosophila – Life stages observation, Sex and mutant identification
3. Observation of Mosquito life stages
4. Teratology – abnormal development in animals.
5. Regeneration - frog tadpole tail (demonstration)
6. Effect of iodine on metamorphosis of frog (optional/demonstration).
7. Spotters: Slides of mammalian sperm and Ovum, Different developmental stages of chick embryos (primitive streak, 24,48,72,96hrs), Blastula and gastrula of frog(morula, early gastrula, yolk plug stage, late gastrula), Placenta of fish, sheep, pig, rabbit and rat.
8. Studying healing practices for developmental disorders in humans

EVOLUTION

9. Study of ecological morphology of animals.
10. Mimicry: leaf insects, stick insects, monarch and Viceroy butterflies
11. Embryological evidence for evolution
12. Serial homology in appendages of prawn
13. Study of human skull
14. Study of fossils (museum specimens)
15. Comparative study of Animal Skull (pig, horse, dog and deer)

16. Osteology of vertebrates (museum specimens)

17. Visit to Athichanallur/ Ariyaloor fossil site/ Keezhadi Archaeological Site/ Govt. Museum

Spotters: Homologous organs, Analogous organs, Vestigial Organs, Mesozoic reptiles (Allosaurus, Tyrannosaurus, Brontosaurus, Iguanodon, Stegosaurus, Triceratops, Rhamphorhynchus, Pteranodon, Dimetrodon), Connecting link (Archaeopteryx), Living Fossil (Limulus), Fossils (Gastropod – Tertiary, Ammonite – Jurassic).

ECOLOGY– PRACTICAL

(Subject code: 26UZOC54)

SEMESTER – V	CORE: P 6	CREDITS – 2	HOURS –2
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Course objective: To familiarize students with ecological field and laboratory techniques for analyzing soil and water quality. To develop practical skills in assessing ecosystem productivity, biodiversity, and environmental parameters.

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

CO1	Recall basic ecological terms, concepts, instruments, and standard methods used in environmental analysis.	K1
CO2	Explain the principles behind soil and water quality parameters such as pH, dissolved oxygen, salinity, and hardness.	K2
CO3	Apply standard laboratory and field techniques to estimate primary productivity, plankton diversity, and water transparency.	K3
CO4	Analyze ecological data related to water quality and organism responses, including LC ₅₀ / LD ₅₀ values using SPSS software.	K4
CO5	Evaluate ecosystem health, species interactions, and biogeochemical cycles based on experimental and field observations.	K5
CO6	Prepare scientific practical records and field visit reports demonstrating ecological understanding and conservation awareness.	K5

Experiments:

1. Determination of pH of Soil and Water
2. Determination of primary productivity (dark and light bottle)
3. Transparency of water using Secchi disc
4. Analysis of freshwater and marine water planktons
5. Estimation of salinity (chlorides) of water samples
6. Estimation of dissolved oxygen of pond water and sewage water.
7. Determination of water hardness – Silicates and phosphates
8. Calculation of LC₅₀ /LD₅₀ using SPSS software
9. Visit to a Wild Life Sanctuary/National Park/Zoo/Biosphere Reserve/Natural Ecosystems/ Xavier solai – Report submission (compulsory)
10. **Spotters:** Ecosystem - Aquatic (freshwater and Marine) and terrestrial (Grass land and forest); Pyramids (biomass, number and energy)- Animal inter relationship, (Parasitism, Commensalism, Mutualism), Food chain and food web, energy flow in an ecosystem, Biogeochemical cycle (Phosphorous, Nitrogen and Carbon); Instrumentations – field thermometer, anemometer, barometer, hygrometer and anemometer.

GENETICS AND ANIMAL BIOTECHNOLOGY

(Subject code: 26UZOE51)

SEMESTER – V	EC: T 6	CREDITS:3	HOURS: 5
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Course objective: To introduce and familiarize the basic aspects of genetics and to inculcate the knowledge of biotechnological tools and their application.

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

CO1	Explain the Structural and functional aspects of Genes and Chromosomes	K1
CO2	Analyse Mendelian Principles and dominance	K2
CO3	Evaluate the concepts behind genetic disorders, gene mutations and various causes associated within- born errors of metabolism	K3
CO4	Recall an idea about the various techniques used in modern biotechnology.	K4
CO5	Apply the applications of biotechnology and advances in different areas such as medical, microbial, animal and forensics.	K5
CO6	Describe the Structural and functional aspects of Genes and Chromosomes	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

UNIT- I Mendelism and its deviations

(15 hours)

Mendel's law – Law of segregation and law of independent assortment, backcross and test cross. Allelic interaction- Incomplete dominance, Codominance, Complementary genes, Lethal genes, Reversion, Epistasis, Multiple allele inheritance - ABO blood groups, Rh factor; Polygenic inheritance – skin colour.

UNIT – II Linkage, crossing over and sex-linked inheritance

(15 hours)

Linkage and crossing over, linkage map; Sex determination in man and Drosophila; Gynandromorphism; sex linked inheritance in man and drosophila; non-disjunction, holandric genes, sex influenced and sex limited genes; Extra chromosomal inheritance- maternal inheritance.

UNIT – III Human genetics and chromosomal alterations

(15 hours)

Human chromosomes; Abnormalities of chromosomes – Edward, Down's, Klinefelter's, Turner's syndromes, sickle cell anaemia; Inborn errors of metabolism -alkaptonuria, phenylketonuria; Chromosomal aberrations- deletion, duplication, inversion, translocation; Eugenic, eugenics and euphenics; Pedigree analysis

UNIT – IV Genetic engineering

(15 hours)

rDNA technology-construction of recombinant DNA, gene transfer techniques (gene gun, electroporation, liposome-mediated), Selection and multiplication of recombinant host cells, expression of cloned gene. Cloning vectors – pBR322, Ti plasmid, bacteriophage, DNA sequencing (Sanger's), cDNA libraries; Method of gene amplification- PCR.

UNIT – V Applications of genetics**(15 hours)**

Monoclonal antibodies, DNA finger printing (CCMB), Biotechnological products-insulin, drugs, somatotropin production, Cloning method-Dolly; transgenic animals and their applications; Gene therapy and immunotoxins.

Text books:

1. Verma, P.S. and Agarwal, V.K. 1998. Concepts of Genetics, Human Genetics and Eugenics. S.Chand&Company Ltd, Ram Nagar, New Delhi.
2. Sambamurthy, A.V.S.S. 2010. Genetics, Narosa Publication, New Delhi
3. N. Arumugam, L.M. Narayanan, A. Mani A.M. Selvaraj, P. Singh, 2013. Genetic engineering, Saras publications

Reference books:

1. Gardner, Simmons and Snusted (2006). Principles of Genetics, John Wiley & Sons, INC, New York.
2. Tamarin, R.H (2010). Principles of genetics, Tata McGraw Hill Publishing company, New Delhi.
3. Lewine Benjamin 2007. Gene XII, Pearson Education International, New Jersey. Alice Marcus. 2009. Genetics, MJP publishers.
4. Micheal Fumento (2009), Biotechnology How It Is Changing Our Life, Jaico Publishing House.

Online resources:

1. <https://www.coursera.org/learn/genetics-evolution>
2. <https://www.coursera.org/learn/genomics-research>
3. <https://www.genetics.org>
4. <https://egyankosh.ac.in/handle/123456789/101807>
5. <https://www.nifa.usda.gov/grants/programs/biotechnology-programs/animal-biotechnology>

Mapping with programme outcomes								
Cos	P01	P02	P03	P04	P05	P06	P07	P08
C01	S	L	M	L	L	M	L	S
C02	M	M	M	L	L	M	L	S
C03	S	S	M	S	S	S	M	S
C04	S	S	M	S	L	M	S	S
C05	S	S	M	S	SS	M	S	S
C06	S	S	S	S	L	M	S	S

* S- Strong, M- Medium, L- Low

GENETICS AND ANIMAL BIOTECHNOLOGY-PRACTICAL

(Subjectcode:26UZOE52)

SEMESTER – V	EC: P - 5	CREDITS:1	HOURS: 2
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Objective: To build competency in the principles of inheritance, population genetics and skill in basic laboratory techniques in animal biotechnology, thereby enhancing the students' observational, analytical, and interpretative skills and applications.

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

CO1	Impart the fundamental principles of inheritance, including Mendelian hypothesis, gene interactions, and population genetics using simple experimental models.	K1
CO2	Familiarize with genetic variation in humans, through the study of phenotypic traits, chromosomal disorders, sex-linked inheritance, and population equilibrium concepts.	K2
CO3	Inculcate analytical skills in biological molecules like SDS PAGE, AGE and D-Gel software.	K3
CO4	Develop basic laboratory skills in molecular techniques, such as isolation of proteins, DNA, organic acids, and assessment of cell viability.	K4
CO5	Handle modern molecular biology and biotechnology tools, including electrophoresis, PCR demonstrations and spotters.	K5
CO6	Create observational, analytical, and interpretative skills and their applications.	K6

(K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6–Create)

Experiments:

1. Demonstration of Monohybrid and Dihybrid cross using coloured beads.
2. Verification of Hardy–Weinberg's equilibrium using coloured beads (partial)
3. Polygenic inheritance–Human height–weight
4. Variation in left thumb impression
5. Probability–Coin tossing (two coins only)
6. Isolation of casein from milk
7. Isolation of citric acid from lemon juice
8. Isolation of Protein–PAGE (Demonstration)
9. Isolation of DNA–AGE (Demonstration)
10. Demonstration of DNA amplification (PCR)
11. Cell viability test

Spotters: Test cross, Incomplete dominance, Codominance, Complementary genes, Lethal genes, and Epistasis, Rh factor, Free-Martin, colour blindness, Turner's Syndrome, Klinefelter's Syndrome, Down's Syndrome and Albinism, hypertrichosis (holandric gene), Gene mutation, construction of recombinant DNA, PCR, PBR322, Gene gun, Microinjection, Monoclonal antibodies, DNA finger printing, insulin production, Cloning, Dolly.

EVOLUTION

(Subject code: 26UZOE53)

SEMESTER – V	EC: T 7	CREDITS:4	HOURS: 4
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Course objective: To make the students understand the concepts, trends and patterns of evolution as well as the evolution of selected groups; to develop an idea of the adaptations and their significance with evolution; and to construct a phylogenetic tree using molecular data.

Course Outcomes:

At the end of the course the students will be able to		
CO1	Describe the history and development of evolutionary thought, list and describe the evidence for evolution and its required corollaries mechanisms by which evolution occurs.	K1
CO2	Understand how phylogenetic trees should be constructed using molecular data.	K2
CO3	Develop an idea of the adaptations and its significance with evolution	K3
CO4	Implement speciation concepts to understand the patterns of evolution	K4
CO5	Know the adaptive features and behavioral and natural selection	K5
CO6	Devise evolutionary scientific thoughts based on advances in molecular studies	K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create

Unit I: Evolutionary history and Origin of cells (12 hours)

Evolutionary time scale: eras, period, and epoch; Major events in the evolutionary time scale, fossils; Origin of biomolecules, chemical and biological evolution of life; concepts of Oparin and Haldane-experimental evidences.

Unit II: Paleontology and Evolutionary thoughts (12 hours)

Lamarckism, Darwinism-, Natural selection in action, fitness and adaptive value, industrial melanism mutation theory and modern synthetic theory. Evolution of horse; Physical and cultural evolution of Man.

Unit III: Patterns of evolution (12 hours)

Speciation, concepts, Sequential and divergent evolution, isolating mechanisms; micro, macro and mega evolution; Adaptive radiation of reptiles, birds and mammals; migration, navigation, domestication.

Unit IV: Behavioral Adaptation and Variation (12 hours)

Mimicry and colouration- Batesian and Mullerian mimicry. Variation – pre-adaptation and post adaptation; normalizing, directional and diversifying selection; Group and individual selection, Altruism-Kin selection.

Unit V: Molecular Evolution (12 hours)

Principles of molecular evolution studies; methods of molecular evolution studies; DNA bar coding- mtDNA, molecular phylogeny– history, terms, definition and limitations, construction of phylogenetic trees using molecular data, construction of phylogenetic trees. Evidences of evolution in Tamil tradition, reflecting the dynamic nature of language, culture, and society

over centuries. Major archaeological sites in Tamil Nadu (Ariyalur, Porunai-Adhichanallur, Keezhadi).

Textbooks

1. Arumugam N, (2010). Organic evolution. Saras Publication.
2. Veer Bala Rastogi, (2017). Organic evolution, 13th edition. Medtech Publisher.
3. Sanjib Chattopadhyay. (2011). Evolution, adaptation, ethology. Books and allied (P) Ltd.,

Reference Books

1. Strickberger, M.W. 2005. Evolution. Jones and Bartett Publishers, London.
2. Jay M Savage (2000). Evolution. Amerind Publishing Company.
3. David J Merrell, (2000). Evolution and genetics. Holt, Rinehart and Winston Publishers.
4. Julian S Huxley (2000). Story of evolution. Rath bone Books.
5. Dobzhansky T et al., (1973). Evolution. Surjeet Publication, New Delhi.

E-Resources

1. <https://openstax.org/books/biology/pages/18-1-understanding-evolution>
2. <https://evolution.berkeley.edu/triggering-adaptive-radiation/>
3. <https://www.khanacademy.org/science/biology/her/x324d1dcc:more-about-natural-selection/a/lines-of-evidence-for-evolution>
4. <https://adntro.com/en/blog/genetic-curiosities/theory-of-evolution-throughout-history/?srsId=AfmBOopJXbaJyWQ8NvYVcGMIFNpp2CDFQSV-I7i1ZmoL-m7S1u6PkqF7>
5. [https://bio.libretexts.org/Courses/Lumen_Learning/Fundamentals_of_Biology_I_\(Lumen\)/05%3A_Module_2-_History_of_Life/5.04%3A_Theory_of_Evolution](https://bio.libretexts.org/Courses/Lumen_Learning/Fundamentals_of_Biology_I_(Lumen)/05%3A_Module_2-_History_of_Life/5.04%3A_Theory_of_Evolution)

Mapping with programme outcomes								
C0s	P01	P02	P03	P04	P05	P06	P07	P08
C01	S	L	M	S	L	M	L	S
C02	S	M	M	L	L	M	L	S
C03	S	S	M	S	M	S	M	S
C04	S	S	M	S	L	M	S	S
C05	S	S	M	S	S	M	S	M
C06	S	S	S	S	L	M	S	S

* S- Strong, M- Medium, L- Low

INTERNSHIP

SEMESTER – V	Sub. Code: 26ZOI51	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.

ANIMAL PHYSIOLOGY
(Subjectcode:26UZO151)

SEMESTER – VI	CORE: T 7	CREDITS:4	HOURS: 5
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Course objective: To provide a strong conceptual foundation in the fundamental organization and basic constitution of major physiological systems, developing the ability to describe the detailed structure and functions of organs and sensory receptors in relation to coordination and response.

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

CO1	Familiarize with the basic physiological functions of animals, mechanism, and functional significance of various receptors.	K1
CO2	Describe the physiological functions of different organ systems and the coordination and control to maintain internal balance.	K2
CO3	Provide conceptual understanding of regulatory mechanisms, emphasizing feedback mechanisms involved in the regulation of organ system functions.	K3
CO4	Develop an understanding of structure–function relationships	K4
CO5	Analyze how physiological processes are synchronized with molecular signaling pathways.	K5
CO6	Create awareness on integrated physiological functions, illustrate the role of neural, hormonal, and molecular feedback mechanisms in maintaining homeostasis.	K6

(K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6–Create)

UnitI:NutritionandRespiration (15hours)

Nutrients – Types, calorific values and daily requirements. Digestion and absorption of carbohydrates,proteinsandlipids.Mineralsandvitamins–theirdeficiency.Respiration-types,Respiratorypigments – structureofhaemoglobin,Structureof mammalian lungs
Transportation of gases - Bohr effect, respiratory quotient, Regulation of respiration,

Unit II: Circulation, Excretion and Thermoregulation (15 hours)

Blood - Composition and functions, Mechanism of clotting, Types of hearts, Structure of human heart and its working mechanism.Heartbeat, pacemaker, Cardiac cycle,ECG,pulse & blood pressure.Structure of Kidney and Nephron, Mechanism of urine formation.Excretory products, Osmoregulation in aquatic and terrestrial animals, Thermoregulation.

Unit III: Muscle and Nerve Physiology (15 hours)

Types of muscles, Ultrastructure of striated muscle, Muscle contraction - physiology, theories and properties. Neurons - Structure and types, Impulse propagation, synaptic transmission, neurotransmitters. Reflex action, Nervedisorders-epilepsy, Alzheimer’s disease, Parkinson’s disease.

UnitIV: Senseorgans

(15Hours)

Structure of eye, physiology of vision, visual pigments, Eyedefects-myopia, hyperopia, presbyopia, astigmatism, cataract. Structure of ear and mechanism of hearing, hearing impairments - deafness, labyrinthine disease. Olfactory, gustatory and tactile sense organs.

Unit V: Reproductive physiology and Endocrinology

(15 Hours)

Human- male and female reproductive organs. Endocrine glands in man-structure, hormones, action and disorders of pituitary, thyroid, parathyroid, adrenal gland, testis and ovary, Feedback mechanism, Hormonal control of the menstrual cycle. Role of hormones in growth, metamorphosis and reproduction in arthropods.

Textbooks:

1. Rastogi, S.C., 2001. Essentials of Animal Physiology (III Ed.),New Age International Publication, New Delhi.
2. Verma, Tyagi and Agarwal,2000.Animal Physiology. Chand and Company Ltd., New Delhi.
3. JainA. K., 2024.Textbook of Physiology (10th Eds.). Avichal Publishing Company.

ReferenceBooks:

1. Animal Physiology: From Genes to Organisms. 2012. Lauralee Sherwood, Hillar Klandorf, and Paul H. Yancey. Cengage Learning publications.
2. Schmidt-Nielsen,K.,2002. Animal Physiology: Adaptation and Environment, Cambridge University Press, Cambridge.
3. WilliamS.Hoar,2004.General and Comparative Physiology, Third Edition, Prentice- Hall of India Private Limited, New Delhi.
4. Yapp W B, 2000. Introduction to Animal Physiology, International Development Research Centre.
5. Murkat,P.C., and Mathur,P.M., 2000.Textbook of Animal Physiology,S. Chand and Company, New Delhi.

E-resources:

1. <https://library.viu.ca/c.php?g=189003&p=1247721>
2. <https://louis.oercommons.org/curated-collections/56>
3. <https://learninglink.oup.com/access/butler>
4. <https://bookeshi.com/best-physiology-free-online-resources-for-medical-students-2/>
5. <https://open.umn.edu/opentextbooks/textbooks/introductory-animal-physiology>

IMMUNOLOGY AND MICROBIOLOGY
(Subject code: 26UZOC62)

SEMESTER – VI	CORE: T 8	CREDITS:4	HOURS: 5
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Course objective: To strengthen the knowledge on immune system, immune response, microbial diseases as well as to impart knowledge on microbiological applications; and to introduce organs and cells of the immune system, and diversity of microorganisms.

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

CO1	Describe organs and cells involved in immune system, its structure and functions	K1
CO2	Explain taxonomy and diversity of microorganisms, and immune response and mechanisms	K2
CO3	Examine the basic structure of microbes and their growth in relation to abiotic factors	K3
CO4	Categorize microbial diseases, their causative agents, symptoms, curative and control methods	K4
CO5	Handle, identify and assess growth characters of microbes	K5
CO6	Prepare different microbial products of biological utilization	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Unit I: The Immune system (15 hours)

Types of immunity - innate and adaptive, Lymphoid organs - primary and secondary; Cells of immune system - B and T cell, mast cells, dendritic cells, NK cells, Null cells, and Macrophages. Immune response, Immunoglobulin - structure and types, Basic concepts of MHC.Epitopes, Paratopes, Haptens and Adjuvants.

Unit II: Immune Response and Reactions (15 hours)

Antigen and Antibody interactions; T-cell activation, B-cell activation. Basic properties and functions of cytokines, interferons and complement proteins. Hypersensitivity - Types and Mechanisms. Immunity to infection (Antibacterial immunity and Antiviral immunity). Autoimmunity, Immunodeficiency.

Unit III: Microbe classification (15 hours)

Characters and basic classification of Kingdom Monera and Fungi. Scope of Microbiology. Systematic position of Virus - classification - structure of bacteriophage. Viroids and Prions. General structure of fungi. General structure (ultrastructure of *E. coli*), classification and identification of bacteria.

Unit IV: Bacterial culture and microbial diseases (15 hours)

Sterilisation, Types of Culture medium, Culture of Bacteria, Bacterial growth and growth curve, Factors influencing bacterial growth. Maintenance & characteristics of colonies. Staining of bacteria, Pathogenicity, epidemiology, prevention and control of Bacterial (Cholera, Typhoid), Viral (Rabies, HIV) & Fungal (Candidiasis, Dandruff) diseases in man.

Unit V: Applied immunology and microbiology (15 hours)

Vaccines - types & Immunization - schedule, Monoclonal antibodies, Control of Microbes, Preservation of Milk - Microbes in food spoilage, Culture of yeast & economic importance. Microbial nitrogen fixation – stages, Types and methods of fermentation & products, Basic

concepts of Probiotics, Bio-fermenters and its role in mass culture. *Bt*, NPV, Bacculoviruses in agriculture.

Textbooks

1. Abbas AK, Lichtman KH, Pillai S (2016). Basic Immunology: Functions and disorders of the immune system. 5th edition, Elsevier.
2. Ananthanarayan R, Jayaram Paniker CK (2016). Text book of Microbiology, 9th edition. Universities Press.
3. Dubey RC, Maheshwari DK (2010). A Textbook of Microbiology, S. Chand Publishers, New Delhi.

Reference Books

1. Joanne M. Willey, Linda Sherwood, Christopher J. Woolverton (2011). Prescott's Microbiology. Mc-Graw Hill.
2. Tortora G, Funke B, Case C, Weber D. (2018). Microbiology in Introduction, 13th edition. Addison-Wesley Publications.
3. Ryan KJ, Ray CG, (2018) editors. Sherris medical microbiology. 7th edition, McGraw-Hill Education.
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, Kubby, Janis 2013. Immunology, W.H. Freeman, New York

E-resources

1. <http://www.helmberg.at/immunology.pdf>
2. <https://icuadelade.com.au/files/primary/physiology/immunology.pdf>
3. https://en.wikipedia.org/wiki/List_of_infectious_diseases
4. <https://www.rncollegehajipur.in/rn/uploads/products/b.sc.-notes.pdf>
5. <https://courses.lumenlearning.com/suny-microbiology/chapter/vaccines/>

Mapping with programme outcomes								
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C01	L	L	M	L	L	M	L	S
C02	M	M	M	L	L	M	L	S
C03	S	S	M	M	L	S	M	S
C04	S	S	M	M	L	M	S	S
C05	S	S	M	S	L	M	S	S
C06	S	S	S	S	L	M	S	S

1. * S- Strong, M- Medium, L- Low

ANIMAL PHYSIOLOGY – PRACTICALS
(Subject code: 26UZOC63)

SEMESTER – VI	CORE: PN 7	CREDITS:2	HOURS: 3
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Course Objectives: To provide hands-on understanding of fundamental physiological processes in animals and humans through laboratory experiments; to develop skills in experimental techniques, observation, measurement, data recording, and interpretation related to animal physiology.

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

CO1	Recall and describe basic concepts of animal and human physiology related to respiration, digestion, excretion, circulation, and osmoregulation	K1
CO2	Explain the physiological principles underlying experiments such as oxygen consumption, enzyme activity, salt balance, and opercular movement in fishes	K2
CO3	Perform laboratory experiments and demonstrations including estimation of haemoglobin, blood pressure measurement, BMI analysis, and clotting time determination.	K3
CO4	Analyze experimental observations and results related to enzyme activity, temperature effects, nitrogenous excretion, and physiological parameters.	K4
CO5	Interpret physiological charts and spotters such as ECG, oxygen dissociation curve, endocrine glands, human organ systems, and reproductive cycles.	K5
CO6	Assess physiological adaptations in freshwater fishes and humans based on experimental data and observations.	K5

1. Rate of oxygen consumption of a freshwater fish
2. Salt loss and salt gain in freshwater fish
3. Effect of temperature on human salivary amylase activity
4. Identification of nitrogenous excretory products – ammonia, urea, uric acid
5. Estimation of Haemoglobin using haemoglobinometer
6. Measurement of blood pressure in Man – Demonstration
7. Preparation of haemin crystals in human/chick blood
8. BMI analysis using height and weight
9. Determination of blood clotting time
10. Qualitative analysis of protease, amylase and lipase in cockroach digestive system.
11. Effect of temperature on fish opercular movement
12. **Spotters**–Animal physiology: Human brain, heart, lungs, eye, tongue, ear, Pancreas, Human Kidney, Human circulatory system, digestive system, L.S. of testis and Ovary, Types of muscles, Endocrine glands (Pituitary gland, Thyroid gland, Parathyroid gland, Adrenal gland), ECG, Oxygen dissociation curve (Bohr effect), Menstrual cycle, and Gastrointestinal hormone.

IMMUNOLOGY AND MICROBIOLOGY-PRACTICAL

(Subject code: 26UZOC64)

SEMESTER – VI	CORE: P 8	CREDITS: 2	HOURS: 3
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Course objective: To build competency and hands on training in immunological techniques, lymphoid organs; and the standard laboratory practices in microbiology such as aseptic techniques, microbial culture, isolation and observation of bacteria.

Course outcomes: At the end of the course the students will

CO1	Familiarize with the fundamental principles of immunology and microbiology	K1
CO2	Get hands-on training in basic immunological and hematological techniques, including blood grouping, blood cell counting, antigen–antibody reactions, and immunoassays.	K2
CO3	Familiarize with immune cells, lymphoid organs, and their functional significance.	K3
CO4	Develop fundamental microbiological skills, such as preparation of culture media, isolation and cultivation of microbes, staining techniques and observational skills.	K4
CO5	Introduced to standard laboratory practices and aseptic techniques, emphasizing accuracy, safety, and interpretation of experimental outcomes.	K5
CO6	Improve analytical and diagnostic skills, enabling students to identify microbial colonies, pathogens, viral structures, and immunoglobulins relevant to health and disease.	K6

(K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6–Create)

Experiments:

1. Human blood grouping (ABO and Rh factor).
2. WBC counting 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 tetanii*, 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).

Core 3 - Project
(Subject code: 26UZOC65)

SEMESTER – VI	PROJECT	CREDITS:3	HOURS: 6
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Individual project can help the students to develop skills specific to collaborative efforts, which pool knowledge of all individuals, are increasingly important in the professional world. Positive group experiences have been shown to contribute to student learning and retention and also to institutional growth.

Number of students are allotted to the staff members, based on the total strength of students in III B.Sc. class and they will be selected by the staff members by lot system during the fifth semester. Topics are allotted depending on the interest of the student / research centres of the faculty. The tentative title of the project is displayed in the department notice board at the beginning of the sixth semester.

Two continuous assessments will be done on 31st and 62nd day of the working day. In the first assessment, a review of literature (photo copies of the reprints), objectives, materials and methods and works carried out by the candidates should be submitted for evaluation. In the second assessment, results obtained up to the submission could be submitted along with first assessment materials. Marks for these internal assessments will be allotted by the guide. In the final (External) evaluation students are required to submit hard bound detailed project report in the form of dissertation. After completing project work plagiarism will be checked in the collegelibrary. It will be evaluated by the guide and external examiner and the marks will be allotted based on dissertation and *viva voce* thereof.

ENTOMOLOGY

(Subject code: 26UZOE61)

SEMESTER – VI	EC: T 8	CREDITS:2	HOURS: 4
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Course Objective: To provide students with a comprehensive understanding of insect classification, morphology, and identification; the biology and economic importance and design effective pest management strategies

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

CO1	Recognize and identify the major insect orders based on their diagnostic characters.	K1
CO2	Explain the structural organization and salient features of different insect orders.	K2
CO3	Apply taxonomic keys and morphological characters to identify unknown insects up to the family level.	K3
CO4	Analyze insect pests of field, horticultural, and stored products based on damage symptoms and life history traits.	K4
CO5	Evaluate the role of insect vectors in transmission of plant pathogens and assess appropriate vector management strategies.	K5
CO6	Design suitable pest management strategies integrating biological, cultural, chemical, and integrated pest management (IPM) approaches.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit I: Structure and Salient features (12 Hours)

Insect classification and their distinctive characters; Morphological features of head, thorax and abdomen; Salient features of insect orders - Orthoptera, Isoptera, Hemiptera, Diptera, Coleoptera, Lepidoptera, Dermaptera, Odonata, Neuroptera and Hymenoptera

Unit II: Productive and Beneficial insects (12 Hours)

Bionomics and economic importance of Silkworms, Honeybee and Lac insects; Brief account on biological control agents - Lacewings, ladybird beetles, reduviid predators (contributions of DP Ambrose), Trichogramma; Pollinators, weed killers, scavengers, insect as food and feed.

Unit III: Field crop and Horticultural Crop Pests (12Hours)

Bionomics, damage, symptoms and management of two major pests of rice (Scirpophagaincertulas and Cnaphalocrocis mainsails) sugarcane (Chilo infuscatellus and Aleurolobusbarodensis) groundnut (Amsactaalbistriga and Aproaeremamodicella), cotton (Helicoverpaarmigera and Aphis gossypii), coconut (Oryctes rhinoceros and Rhynchophorusferrugineus), brinjal Leucinodesorbonalis and Henosepilachnavigintioctopunctat a, tomato (Bemisiatabaci and Tuta absoluta) and banana (Cosmopolites sordidus and Odoiporuslongicollis)

Unit IV: Pests of stored products, Domestic pests and insect vectors (12 Hours)

Bioecology, damage caused and management of *Callosobruchus chinensis*, *Sitophilus oryzae* and *Tribolium castaneum*; Medical importance and management of *Pediculus humanus capitis*, *Pediculus humanus corporis*, *Anopheles*, *Culex*, *Aedes*, *Xenopsyllacheopsis*.

Unit V. Pest management concept, components and methods (12 Hours)

Infestations – sucking, defoliators, borers; Economic Injury Level; Pest Management decision making; Brief account on physical, chemical, cultural, biological, genetic control of pests, IPM (general account only), Bt cotton -concepts and application.

Textbooks:

1. David, B.V. and Ananthakrishnan, T.N. 2004. General and Applied Entomology. Tata-McGraw Hill Publishing Company, New Delhi.
2. Kalyanasundaram, S. and Kalyanasundaram, M. 2003. Pest management in field Crops / Horticultural Crops. Keran Desk Top Publisher, Vellore.
3. Ambrose, D. P. 2015. The Insects - Structure, Function and Biodiversity, Kalyani Publishers, Ludhiana.

Reference books:

1. Robert F. Norris, Edward P. Caswell-Chen, Marcos Kogan. 2003. Concepts in Integrated Pest Management, Prentice Hall, the University of Michigan.
2. Chapman, R.F., S.J. Simpson and A.E. Douglas. 2012. The Insects: Structure and Function, Fifth Edition, Cambridge University Press, pp-959.
3. Imms, A.D., O.W. Richards and R.G. Davies (Eds.) IMMS' General Textbook of Entomology, Volume I: Structure, Physiology and Development, pp-418; Volume 2: Classification and Biology, pp-934, Springer Netherlands.
4. Prasad T.V. 2019. Handbook of Entomology, New Vishal Publication, Fourth Edition, pp-536.
5. Anilkumar B. Pardeshi. 2017. General and Economic Entomology, Oxford book company, pp-252.

E-resources:

1. https://agritech.tnau.ac.in/crop_protection/crop_prot_crop_insect_pest.html
2. <http://agritech.tnau.ac.in/pdf/6.pdf>
3. http://books.irri.org/9712200280_content.pdf
4. <http://oar.icrisat.org/2424/1/Pest-Control.pdf>
5. <http://www.nasda.org/File.aspx?id=30498>

Mapping with programme outcomes								
Cos	P01	P02	P03	P04	P05	P06	P07	P08
C01	S	L	M	S	S	S	L	S
C02	M	M	M	S	S	M	L	S
C03	S	S	M	M	S	S	M	S
C04	S	S	M	M	L	M	S	M
C05	S	S	M	S	S	S	S	M
C06	S	S	S	S	L	M	S	M

* S- Strong, M- Medium, L- Low

ENTOMOLOGY – PRACTICAL
(Subject code: 26UZOE62)

SEMESTER – VI	EC: P 6	CREDITS:1	HOURS: 2
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Course Objective: To provide students with practical knowledge of insect diversity, morphology, and classification through hands-on laboratory and field studies

Course Outcomes:

CO1	Recall the basic concepts of entomology, major insect orders, and commonly used insect collection and preservation methods.	K1
CO2	Explain the structure and function of insect body parts such as mouthparts, wings, legs, antennae, and spiracles.	K2
CO3	Demonstrate skills in collecting, preserving, mounting, and preparing insect specimens and slides using standard laboratory techniques.	K3
CO4	Differentiate insect orders and identify harmful insects based on morphological characters and life stages.	K4
CO5	Assess the nature of damage caused by major crop pests and human vectors and evaluate suitable control measures.	K5
CO6	Prepare mini-projects and field visit reports documenting insect diversity, pest status, and management practices.	K6

Experiments:

1. Insect collection devices and preservation methods
2. Representative insects from various insect orders
3. Cockroach: Mounting of antennae, mouthparts, spiracles
4. Housefly: Mounting of mouthparts, halter, wing
5. Mounting of mosquito mouthparts.
6. Honeybee (preserved slide): mouthparts, legs, and sting
7. Traditional practices for pest management preparation of mosquito repellent and biopesticide
8. Submission of representative harmful insects from different orders
9. Mini-projects
 - 8.1. Human vectors [mosquitoes, bed bugs, louse, cockroaches] –photos or paper cutting with notes.
 - 8.2. Life cycle, nature of damage, control measures of cotton, paddy, coconut, brinjal, lady's finger pests
10. Spotters: Insect pests (maximum of 6); Types of head, antennae, mouth parts, legs, wings.
11. Field trip and inclusion of report in the record notebook – Agro-ecosystems / Agriculture College /Research institutes (compulsory)

ZOOLOGY FOR COMPETITIVE EXAMINATIONS
(Subject code: 26UZOS61)

SEMESTER – VI	SEC 6	CREDITS:2	HOURS: 2
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Objective: To revise the fundamentals of various branches of Zoology and to prepare for competitive exams for higher education and employment.

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

CO1	Recognize and identify different animals.	K1
CO2	Compare and distinguish salient features of animals.	K2
CO3	Acquire the knowledge of different organ systems	K3
CO4	Acquaint with various genetic and microbiology techniques.	K4
CO5	Examine different aspects of developmental stages and levels of evolution in animal husbandry	K5
CO6	Develop and implement new technologies in animal husbandry	K6

Unit I: Animal diversity and classification (6 Hours)

Concepts of biological classification, hierarchy, nomenclature, General classification and salient features: Invertebrates – ten Major phyla (Protozoa – Echinodermata) Prochordates (pro, meso and urochordates) Vertebrates – five classes (Fishes –Mammals)

Unit II: Physiology, Cell biology and Biochemistry (6 Hours)

Human physiology –General account on digestion, respiration, circulation, excretion, skin, eye, ear, brain and nervous system, endocrine and exocrine glands and skeletal system.

Cell and cell organelles – plasma membrane, Golgi complex, Endoplasmic reticulum, lysosome, mitochondria, ribosome, nucleus, nucleolus and centriole.

Small molecules and biological importance of carbohydrates, amino acids, proteins, lipids, nucleic acids and vitamins.

Unit III: Genetics, Genetic Engineering, Microbiology and Immunology (6 Hours)

General account on Mendelian concepts, Gene mutation, chromosomal aberration, inborn errors of metabolisms, genetic disorders, Eugenics, Euthenics and Euphenics. Genetic engineering Microscopy– microscope types, general account on bacteria. Communicable diseases of human beings Lymphoid organs, Innate and Acquired immunity, active and passive immunity.

Unit IV: Developmental Biology, Evolution and Environmental Biotechnology(6 Hours)

Gametogenesis and organogenesis. Patterns of evolution; Geological time scale and mile stones of human evolution. Types of ecosystems, pollution control – sewage treatment, solid waste management – xenobiotics, heavy metals and hydrocarbon; biomagnification and bioleaching. Global warming and climate change.

Unit V: Application biology (6 Hours)

Marine and freshwater aquaculture: fin fish and shell fish culture Sericulture, apiculture, lac culture, poultry, dairy, piggery, and leather industry

Textbooks

1. Saxena, O.P. (1998). Objective Zoology, Prakashan Publishers, Meerut.
2. Zoology Question Bank, Dept of Zoology, St. Xavier's College, Palayamkottai.
3. Dr. V. K. Agarwal, Zoology for Degree Students, 2011, S. Chand Publishing, New Delhi.

Reference Books

1. Kohli, K.S. and Kavita Sahni (2010). Animal Diversity and Evolution, Ramesh Book Depot, Jaipur.
2. Jordan, E.L. and Verma P.L (2003) - Invertebrate Zoology. Chand & Company Ltd. Ramnagar, New Delhi.
3. Jordan, E.L. and Verma P.S. (2004) - Chordate Zoology, Chand and Company Ltd. New Delhi.
4. Veer Bala Rastogi (2018). *Cell Biology, Genetics, Molecular Biology and Evolution*. Medtech, New Delhi.
5. Odum, E.P. & Barrett, G.W. (2015). *Fundamentals of Ecology*. Brooks/Cole.

E-resources:

1. <https://www.tnpscjob.com/tnpsc-science-zoology-study-materials/>
2. <https://www.scribd.com/document/488571718/TNPSC-TET-zoology-pdf>
3. <https://meritnotes.com/tnpsc-model-questions/health-hygiene-objective/1->
4. <https://tnpscstudymaterial.com/tnpsc-government-study-material-pdf-free-download-and-online-coaching/>
5. <https://weshineacademy.com/tnpsc-free-study-materials/>

Add on Courses

SERICULTURE (Subject Code: 26UZOAO1)

Add-on: 1	CREDITS:2	HOURS: 30
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Course objective: To create awareness of the economic importance and status of the silkworm industry and develop skills in mulberry cultivation and silkworm rearing techniques.

Course Outcomes:

At the end of the course the students will be able to		
CO1	Gain knowledge on rearing of silk worm.	K1
CO2	Describe the cultural practices and pest management in mulberry garden.	K2
CO3	Apply rearing techniques and use of appliances	K3
CO4	Recommend treatments for infestation with natural enemies and diseases.	K4
CO5	Evaluate quality parameters, economics and marketing of silk.	K5
CO6	Build a cottage industry as well as generate an employment opportunity	K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6- Create

Unit I: Introduction (6 HOURS)

Silk producing organism - Silkworm (Tasar, Muga, Eri, Anaphe, Gonometa, Fagara, Coan), Uses of silk, History of sericulture, Silk production in the world, Sericulture in India, The Central Silk Board, Research Institutes, Future scope.

Unit II: Moriculture (6 HOURS)

Conditions for mulberry growth, Classification of mulberry, Planting systems, Methods of propagation, Methods of irrigation, Manuring - organic and chemical, Types of pruning, Methods of harvesting. Leaf-eating pests & control measures.

Unit III: Silkworm (6 HOURS)

Bombyx mori - Taxonomy, Life cycle, Races (indigenous and commercial), Morphology (structure of egg, larva, pupa & adult), Silk gland, Pests of silkworm (Uzi fly, Dermestid beetle), Silkworm diseases - causative agent, symptoms and their management (Pebrine, Flacherie, Grasserie & White muscardine).

Unit IV: Rearing facilities and operations (6 HOURS)

Procedures in grainages, Rearing house, Rearing appliances, Feeding appliances, Mountage - types, Disinfection (physical and chemical methods), Brushing, Mounting - methods, Rearing methods for young worms and mature larvae.

Unit V: Marketing**(6 HOURS)**

Commercial characters of cocoon, Defective cocoons. Silk reeling steps - Stifling, Storage, Sorting, Riddling, Blending, Cooking, Brushing, Reeling appliances. Raw silk testing, By-products of sericulture.

Textbooks

1. Johnson M and Kesary, M. 2020. *Sericulture*, Saras Publication, Kanyakumari,
2. Ganga G, Sulochana Chetty J (2008). An introduction to sericulture (2nd edition), Oxford and IBH Publishing House, New Delhi.
3. Ullal S.R. and Narasimhanna, M.N. Handbook of Practical Sericulture: CSB, Bangalore.

Reference books:

1. David, B.V. and Ramamoorthy, V.V. 2011. Elements of economic entomology. NP Namrutha Publications, Chennai.
2. Sengupta, K. A. 1989. Guide for Bivoltine Sericulture; Director, CSR & TI, Mysore.
3. Jyoti Das, 2023. A Textbook on Sericulture Rearing and Management of Silkworm, I P Iterative International Publishers, India
4. NityaGopalMukerji, 2013. Handbook of Sericulture, RareBooksClub.com, India
5. Madan Mohan Rao M. 2019. An Introduction to Sericulture, BS Publications, Hyderabad.

E-resources

1. http://www.ijarse.com/images/fullpdf/1525178845_Reva541ijarse.pdf
2. <https://csb.gov.in/publications/annual-report/>
3. <https://pmc.ncbi.nlm.nih.gov/articles/PMC4909305/#!po=1.90840>
4. <https://agriculture.vikaspedia.in/viewcontent/agriculture/farm-based-enterprises/sericulture/sericulture-in-india?lgn=en>
5. http://www.agritech.tnau.ac.in/sericulture/seri_index.html

Mapping with programme outcomes								
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C01	L	M	M	L	L	M	L	M
C02	M	M	M	L	L	M	M	M
C03	M	M	M	L	L	M	M	M
C04	S	M	S	M	S	S	M	M
C05	S	S	S	M	S	S	S	M
C06	S	S	S	M	S	S	S	M

* S- Strong, M- Medium, L- Low

ORNAMENTAL FISH CULTURE

(26UZOAO2)

Add-on: 2	CREDITS:2	HOURS: 30
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Course objective: To equip students with practical knowledge and skills in aquarium management, identification and breeding of ornamental fishes, feeding practices, disease control and economic aspects of ornamental fish farming.

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

CO1	Understand the modern techniques and methods of fishery industries	K1
CO2	Recollect the basic knowledge about important Ornamental fishes	K2
CO3	Classify aquarium plants and determine ornamental fish breeding which is highly professional	K3
CO4	Categorize commercially important edible fishes	K4
CO5	Validating the importance supplementary fish feeds and Artificial feed preparation.	K5
CO6	Develop integrated methods to combat diseases and trade ornamental fish.	K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create

Unit 1: Aquarium (6 HOURS)

Construction of ornamental fish unit. Aquarium accessories - Aerators, filters and lighting; Design, construction, setting and maintenance of fresh water aquarium; Selection of ornamental fishes, maintenance and management of home aquarium.

Unit 2: Identification of common ornamental fishes (6 HOURS)

General account of common ornamental fishes, fighting fish, Gold fish, koicarp, Gourami, Rosy barbs, Tetras (Widow tetra, Jewel tetra, Buenos aires tetra, Neon tetra), Angel fish, Red tailed black shark, Bridle shark, cichlids (Oscar, firemouth, zebra, blue morph and Ram cichlid), Live bearer (Moontail molly, sailfin molly, black molly, guppy, platy, redswordtail)

Unit 3: Aquarium plants and Induced breeding (6 HOURS)

Importance and Management of common Aquarium plants; General account of Breeding in aquarium fishes; Induced breeding – hypophysation

Unit 4: Food and Feeding (6 HOURS)

General account on live feed organism (Rotifers, Copepods, Cladocerans, Brine shrimp, Blood worm, Tubifex) and Artificial feeds. Methods of fish feeding, balanced diets for aquarium fishes

Unit 5: Disease management and Economics (6 HOURS)

General account of common parasitic (argulus, lernaea, nematodes), bacterial, viral, fungal diseases of ornamental fishes; Economics of ornamental fish culture and trading.

Text Books:

1. Jameson, J.D. and Santhanam. R. 1996, Manual of ornamental fishes and farming, Technologies Peejay, Thoothukkudi.
2. Arumugam, N. 2010. Home aquarium, Saras publications.
3. Santhanam R, Sukumaran N (2000), Manuel of fresh water aquaculture.

Reference Books:

1. Rath, R.K. 2000. Freshwater Aquaculture. Scientific Publishers (India). PO Box: 91, Jodhpur.
2. Mohan Kumar. C. 2008. Handbook on ornamental fish diseases, MPEDA, India
- Arumugam, N. 2010, Home Aquarium, Saras Publication
- H.S. Jagtap, S.N. Mukherjee and V.K. Garad, 2018. A Textbook of Pisciculture and Aquarium Keeping, Daya Book Publications, 2018, eighth Edition, PP. 264.
- Jhingran VG (2000). Fish and fisheries of India.Hindustan Publishers.

E-Resources:

1. <https://www.tfhmagazine.com/articles/aquatic-plants/types-of-aquarium-plants-to-encourage-breeding>
2. <https://www.youtube.com/watch?v=1sH7HG2V4Rk>
3. <https://www.slideshare.net/slideshow/management-of-ornamental-fish-farming-system/276919929>
4. <https://www.slideshare.net/SameerChebbi1/freshwater-brackish-water-and-marine-fish-culture-of-india-by-dr-s-g-chebbi>
5. <https://agriculture.vikaspedia.in/viewcontent/agriculture/fisheries/marine-fisheries/culture-fisheries/culture-of-fin-fishes/marine-fin-fish-culture?lgn=en>

Mapping with programme outcomes								
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C01	S	S	S	S	S	S	S	S
C02	S	S	S	S	S	M	M	S
C03	S	S	S	M	S	S	M	S
C04	S	S	S	M	L	M	S	S
C05	S	S	S	S	L	S	S	S
C06	S	S	S	S	L	M	S	M

* S- Strong, M- Medium, L- Low

BASICS OF ORNITHOLOGY
(26UZOA03)

Add-on: 3	CREDITS:2	HOURS: 30
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Course objective: To introduce students to the scientific study of birds and their diversity and to introduce modern research techniques in ornithology conservation ethics and citizen science participation.

Course outcomes:

At the end of the course the students will be able to		
CO1	Remember the taxonomic position of birds, and avian diseases	K1
CO2	Understand the external and internal structures of the bird and different types of bird behaviour	K2
CO3	Apply knowledge birds based on their morphology, foraging strategies and other behaviour	K3
CO4	Analyse how birds evolved, bird adaptations to flight, and threats to birds	K4
CO5	Evaluate case studies related to bird conservation	K5
CO6	Create and develop the role of citizen science in ornithology	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Unit I : Basic concepts and bird diversity (6 HOURS)

Introduction to Ornithology; Bird Lore; Birds and Humans; Classification of Birds, Bird Evolution and Speciation; Endemism

Unit II: Bird structure and adaptations (6 HOURS)

External Morphology of the Bird; Structure of bird feather, Internal Structure of the Bird; Adaptations to Flight

Unit III: Bird behaviour (6 HOURS)

Bird Behaviour: Foraging, Roosting, Vocalization, Imprinting, Feather care, Bird Intelligence, Social Behaviour, Mixed Species Flocks, Migration

Unit IV: Bird biology (6 HOURS)

Breeding Biology: Differential investment of sexes; territoriality, courtship and display behaviour, nesting, eggs, incubation and care of young, brood parasitism

Unit V: Bird research and conservation (6 HOURS)

Studying bird populations and communities, sampling methods; Macro ecology; Molecular Techniques in Ornithology; Avian Disease; Citizen Science and Ornithology; Threats faced by birds; Bird Conservation with case studies

Text Books

1. Ali, S. The Book of Indian Birds, BNHS.
2. Gill, F.B. Ornithology, W.H. Freeman.
3. Welty, J.C. & Baptista, L. The Life of Birds, Saunders.

Reference books:

1. Field Guide Salim Ali, BNHS
2. John W. Fitzpatrick, Irby J. Lovette (2016). Handbook of Bird Biology, 3rd ed. Wiley.

3. Tim Birkhead (2013). Bird Sense: What it's like to be a bird? Bloomsbury, NY.
4. Bob Montgomerie, Jo Wimpenny, Tim Birkhead (2014). Ten Thousand Birds: Ornithology since Darwin. Princeton University Press, Princeton, NJ.
5. Frank B. Gill, Richard O. Prum, Scott K. Robinson (2019). Ornithology, 4th ed. Macmillan.

E-resources

1. Wwww. Youtube.com (Search for)
2. WWW. Linkein.com (connect with experets)
3. WWW.Redditit.com, ask questins to get good answer
4. www.edge.org. For better understanding
5. www.nature.com

Mapping with programme outcomes								
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	L	L	L	L	L	L	M	M
CO2	L	L	L	L	L	L	M	M
CO3	M	M	M	M	M	L	S	S
CO4	M	S	M	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S

(S-Strong; M-Medium; L-Low)

BASICS OF MEDICAL CODING
(Subject Code: 26UZOVA1)

Value Added Course: 1	CREDITS:2	HOURS: 30
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Course objective: To impart knowledge on medical terminology and anatomy specifically required to understand and apply coding instruction, and to prepare students with skills suitable for a coding career.

Course outcomes: At the end of the course, student will be able to

CO1	Gain knowledge on the basics and importance of medical coding.	K1
CO2	Describe medical terms related to human anatomy and pathophysiology.	K2
CO3	Document medical records in the prescribed formats	K3
CO4	Analyse diseases or symptoms and assign codes for quick and efficient healthcare procedures.	K4
CO5	Improve patient outcomes, increasing accuracy in diagnosis and streamlining work associated with healthcare.	K5
CO6	Translate physician's reports into medical codes for accurate medical billing.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Unit I: Introduction to medical coding (6 HOURS)

Medical billing vs. Medical coding – Scope of medical coding – Tasks and responsibilities of a medical coder – Essential steps to become a medical coder – Factors for successful medical coding – Career routes open to medical coders – Prominent medical coding certifications & its importance – AAPC and AHIMA certification process.

Unit II: Codes and process in medical coding (6 HOURS)

Methods of converting medical services into codes – Significance of medical coding in healthcare business – Stakeholders in medical coding procedure – Common medical codes: ICD, CPT, HCPCS, NDC, DRG, HCC & Revenue codes – Modifier codes – Steps to construct error-free medical claim – Process for handling contractual issues and appeals.

Unit III: Healthcare terminology (6 HOURS)

Healthcare terms: Decodable terms, Non-decodable terms and Eponyms – Spelling rules – Overall structure of ICD-10-PCS – Suffixes (noun-ending, adjective, pathology, procedure, instrument) – Prefixes – Singular / Plural rules. Organization of human body – Surface anatomy terms – Positional & Directional terms – Body cavities – Body regions – Body planes.

Unit IV: Human body systems - I (6 HOURS)

Functions, Anatomy and Physiology, Pathology, Procedures & Abbreviations: Musculoskeletal system (bones, joints, ligaments, muscles, tendons) – Integumentary system – Digestive system – Urinary system – Male Reproductive system – Female Reproductive system.

Unit V: Human body systems – II

Functions, Anatomy and Physiology, Pathology, Procedures & Abbreviations: Blood and immune system – Circulatory system – Respiratory system – Nervous system – Eye – Ear – Endocrine system.

Textbooks:

1. Shiland, B. J. (2024). Medical terminology & anatomy for coding (5th ed.). Elsevier Health Sciences.
2. Brent, V. M. (2021). Medical billing & coding for beginners: The most complete guide to mastering your skills and boost your earnings potential. Independently published.

3. Diamond, M., & Lee, J. (2018). Medical coding: A journey (2nd ed.). American Academy of Professional Coders (AAPC).

Reference books:

1. Buck, C. J. (2025). Step-by-step medical coding (2025 ed.). Elsevier Health Sciences.
2. Taylor, L. (2021). Medical coding fundamentals: A balanced approach (1st ed.). Jones & Bartlett Learning.
3. Linton, C. B. (2020). Medical terminology: The basics. Independently published.
4. Corrington, S. M., & Lacey, G. (2019). Advanced medical coding and auditing (3rd ed.). Health Information Press.
5. Johnson, S. L., & Linker, R. (2015). Understanding medical coding: A comprehensive guide (4th ed.). Cengage Learning.

E-resources:

1. <https://rlmc.edu.pk/themes/images/gallery/library/books/Medical%20Education/Medical%20terminology%20systems.pdf>
2. <https://www.xacthealthcaresolutions.com/wp-content/uploads/2017/06/Chapter-One-2.pdf>
3. https://cache.aapc.com/cache/pdf/cpc_study_guide_sample_pages.pdf
4. https://www.sssutms.co.in/cms/Areas/Website/Files/Link/EContent/ANATOMY_PHYSIOLOGY.pdf
5. <https://www.drsgips.ac.in/ross-willson-anatomy-and-physiology.pdf>

Mapping with programme outcomes								
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	L	L	L	L	L	L	M	M
CO2	L	L	L	L	L	L	M	M
CO3	M	M	M	M	M	L	S	S
CO4	M	S	M	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S

(S-Strong; M-Medium; L-Low)

MEDICAL LABORATORY TECHNOLOGY
(Subject Code: 26UZOVA2)

SEMESTER II	VAC: 2	CREDITS:2	HOURS: 30
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Course objective: To equip with theoretical and practical knowledge in various diagnostic tests in order to work in a variety of laboratory settings including hospitals, research facilities and industrial laboratories.

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

CO1	Learn safety concerns and good practices of a laboratory.	K1
CO2	Acquire knowledge on the routine test methodologies for detecting ailments.	K2
CO3	Handle and process specimens procedurally.	K3
CO4	Examine and report basic screening tests for disease identification.	K4
CO5	Evaluate bodily functions, such as the kidney, liver, or thyroid function.	K5
CO6	Monitor treatment or disease progression.	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Unit I: Introduction

Clinical Laboratories: Organization, Ethics and Laboratory Medicine, Automation. Laboratory Safety and First Aid: Laboratory Safety Policies, Biohazard and Safety Precautions, Radiation Hazard, Fire Hazard, Personal Safety, First Aid Kits and Procedures. Basic Lab Operations: Units of measurements, Preparation of Reagents. Good Laboratory Practices.

Unit II: Haematology

Collection and Processing of Blood Specimen, Preparation of Blood Films. Routine Haematological Tests: Determination of Haemoglobin concentration, Haematocrit, Red Blood Cell Indices, ESR, Enumeration of Formed Elements, Microscopic study of Blood Smear, Reticulocyte Count, Absolute Platelet Count. Basic Screening Tests for Bleeding Disorders.

Unit III: Microbiology, Virology and Parasitology

Rules of Microbiology Laboratory, Basic Lab Procedures in Microbiology, Quick Reference of Media and Biochemical Tests. Diagnosis of Viral Infections: Direct Examination, Serological Testing, Limitations of Serological Diagnosis. Identifying Characteristics: Pathogenic Bacteria, Pathogenic Fungi and Helminths.

Unit IV: Clinical Pathology

Urine Analysis: Clinical Significance, Laboratory Diagnosis of Renal Function, Routine Examination of Urine. Examination of Body Fluids: Cerebrospinal Fluid, Serous Fluids, Synovial Fluid, Vaginal Discharge, Gastric Juice. Semen Analysis: Laboratory Investigation, Forensic Investigation. Stool Examination: Routine Laboratory Analysis.

Unit V: Clinical Biochemistry and Histology

Specimens of Biochemistry and their Handling, Types of Specimens, Automation. Routine Biochemical Test Procedures: Blood Glucose, Serum Protein, BUN, Uric Acid, Creatinine, Bilirubin, Thyroid Function Tests. Biochemical Test Profiles. Techniques in Histology: Laboratory Equipment, Tissue Preparation and Processing, Routine Staining Procedure.

Textbooks:

1. Mukherjee, K. L., & Chakravarty, A. (2008). Medical laboratory technology: Procedure manual for routine diagnostic tests (Vols. 1–3). CBS Publishers & Distributors.
2. Naigaonkar, A. V., & Burande, M. D. (2012). A manual of medical laboratory technology. Nirali Prakashan.
3. Jayaswal, R. P. (2018). Basics of medical laboratory science. Notion Press.

Reference books:

1. National Institute of Communicable Diseases. (2006). Manual of laboratory techniques for district public health laboratories. Government of India.
2. Patel, A. H. (2014). A manual of medical laboratory technology. AuthorHouse.
3. Raphael, S. S. (2011). Lynch's medical laboratory technology (5th ed.). Saunders.
4. Fischbach, F. T., & Fischbach, M. A. (2015). Fischbach's manual of laboratory and diagnostic tests (9th ed.). Wolters Kluwer Health/Lippincott Williams & Wilkins.
5. McPherson, R. A., & Pincus, M. R. (2017). Henry's clinical diagnosis and management by laboratory methods (23rd ed.). Elsevier.

E-resources:

1. <https://gppanchkula.ac.in/e-notes-medical-lab-technology/>
2. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SMB1607.pdf
3. https://www.nsdindia.org/scmp/assets/image/759275563-Preview_MLT_BOOK.pdf
4. <https://dokumen.pub/textbook-of-medical-laboratory-technology-first-edition.html>
5. <https://scert.kerala.gov.in/wp-content/uploads/2020/06/16-mlt.pdf>

Mapping with programme outcomes								
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	L	L	L	L	L	L	M	M
CO2	L	L	L	L	L	L	M	M
CO3	M	M	M	M	M	L	S	S
CO4	M	S	M	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S

(S-Strong; M-Medium; L-Low)

Extra Credit Courses
Poultry Farming
(Subject Code: 26UZOEC1)

SEMESTER – V	ECC: 1	CREDITS:2	HOURS: 30
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Course Objective: Students know about the fundamental knowledge of poultry farming, including breeds, housing, nutrition, and management practices.

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

CO1	Gain knowledge of the past and present status of poultry farming in our nation	K1
CO2	Explain the various practices in poultry farming	K2
CO3	Know the needs for poultry farming and the status of India in the global market.	K1 and K2
CO4	Apply the techniques and practices needed for poultry Farming.	K3
CO5	Know the difficulties in poultry farming and be able to propose plans against them.	K4 and K5
CO6	Develop new strategies to increase egg and meat production to meet the high requirements.	K6

Unit I – Introduction

Farming poultry, poultry registration, Breed selection for farming, Poultry in Namakkal, Marketing, and Economics of poultry.

Unit II – Poultry farming

Different Types of Poultry Farming Systems – Backyard, commercial, breeder, mixed farming; Choosing commercial layers and broilers; Practical aspects of chick rearing; External and Internal body parts.

Unit III – Poultry Nutrition and feeding

Poultry diets in general, Energy and nutrients for poultry, various poultry diets, Major ingredients for poultry diets, Feeding appliances and programs.

Unit III – Poultry Management

Management of eggs, chick, beak trimming, breeders, brooders, growers, layers, broilers

Unit V – Poultry Diseases

Viral (Ranikhet diseases, Fowl pox), Bacterial (Salmonellosis, Mycoplasmosis, Tuberculosis); fungal (Aspergillosis and Aflatoxicosis), Miscellaneous diseases; Principle of immunity, immunization and control of infectious diseases.

Text Books

1. Jaday, N.V. 2010. Handbook of Poultry Production and Management, Second edition, Jaypee Brothers Medical Publishers Private Limited, PP. 410.
2. Sreenivasaiah, P.V. 2015. Text book of Poultry Science, Write and Print Publication, First Edition, PP. 720
3. Sushil Prasad. 2011. Handbook Of Poultry Production: A Practical Guide, Enkay Publishing House, PP. 248.

Reference Books:

1. Colin G. Scanes & Karen D. Christensen (5th Edition, **2019**) Poultry Science comprehensive academic text used in many animal science courses.
2. Egor P. Popov & Jagdish Prasad (6th Edition, **2020**) Poultry: Production and Management widely used textbook on management and production systems.
3. V. Jadhav, M.F. Siddiqui & Kavita Meena (**2023**, 3rd Ed.) Handbook of Poultry Production and Management practical and updated guidance for poultry production.
4. Debiprasanna Das et al. (**2022**) Textbook on Poultry Management covers key aspects of poultry husbandry.
5. C.V. Singh (**2019**) Poultry: Feeding, Breeding & Management integrated book on management, feeding, and breeding principles.

E-resources

1. <https://www.daera-ni.gov.uk/articles/introduction-poultry-and-eggs-farming>
2. http://www.fao.org/ag/againfo/themes/en/poultry/AP_management.html
3. http://agritech.tnau.ac.in/animal_husbandry/ani_chik_poultry%20mgt.html
4. <http://www.ag.auburn.edu/~chibale/an12poultryfeeding.pdf>
5. <https://www.bhumipublishing.com/wp-content/uploads/2025/09/Practical-Handbook-of-Poultry-Farming-B.-Sc.-II-SEC.pdf>

HUMAN ANATOMY
(Subject Code: 26UZOE2)

SEMESTER – V	ECC: 2	CREDITS:2	HOURS: 30
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Course objective: To provide students with fundamental knowledge of human anatomy, including the structure, functions, and common diseases of major organ systems in the human body.

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

CO1	Recall the basic anatomical terminology, levels of organization, organ systems, and vestigial organs in humans.	K1
CO2	Explain the structure and functions of the skeletal, muscular, integumentary and organ systems of the human body.	K2
CO3	Apply anatomical knowledge to identify major organs and relate their structure to function in health and disease.	K3
CO4	Analyze the functional relationships between different organ systems and their associated common diseases.	K4
CO5	Evaluate the impact of structural and functional abnormalities on the normal functioning of human organ systems.	K5
CO6	Develop simple anatomical models, charts, or presentations to illustrate the organization and functions of human body systems.	K6

Unit I: Introduction to Human Anatomy

Human Anatomy Human beings-*Homo sapiens sapiens* Features- Morphological features (Definition, types of Anatomy (microscopic and Gross), levels of organizations; vital properties of living beings.), Definition and significance of Vestigial organs.

Unit II: Skeletal and Muscular systems

Integumentary, Skeletal, Muscular systems – locations, organ basic structure and functions; their related common diseases.

Unit III: Neuro and Cardiovascular systems

Nervous, Endocrine, Cardiovascular—locations, organ basic structure and functions; their related common diseases.

Unit IV: Respiratory, digestive and Lymphatic systems

Lymphatic, Respiratory, Digestive—locations, basic structure and functions; their related common diseases.

Unit V: Urinogenital organ systems

Urinary, male Reproductive-, female Reproductive- — locations, basic structure and functions; their related common diseases.

Textbooks:

1. T.S. Ranganathan, A text book of Human Anatomy.
2. Ester.M. Greishcimer. Physiology and anatomy with Practical Considerations. J.P. LippinCott, Philadelphia.
3. William Davis. Understanding Human Anatomy and Physiology, MC Graw Hill.
William's(Pter, L) Gray's Anatomy, 38lfl eds. Churchill Livingstone, 1995.

Reference Books:

1. Michael Mckinley (Author) , Valerie O'Loughlin (Author) , Elizabeth Pennefather-O'Brien (Author) | Publisher: McGraw-Hill Education | Publisher Imprint: McGraw-Hill Education, Human Anatomy: 2024 Release ISE (Paperback) | Released: 20 Feb 2024
2. Dr Alice Roberts , Complete Human Body: The definitive visual guide | Anatomy, systems & functions explained | Packed with images & facts | Essential reference for students, medics & curious minds Hardcover – 6 April 2023
3. Chaurasia B.D, Chaurasia's Handbook of General Anatomy 7/e Paperback – 13 July 2023
4. Wonder House Book Knowledge Encyclopedia - Human Body Hardcover – 20 October 2022.
5. Richard Walker (Author), Steve Parker The Human Body Book Hardcover – 25 April 2019

E-resources

1. <http://www.medicalcity>
2. iq.net/medlib/Anatomy%20of%20the%20human%20Body.pdf
3. <https://www.youtube.com/watch?v=qrOz5VouG8A>
4. https://www.youtube.com/watch?v=x9_ko2N8PKE
5. https://www.google.com/search?sa=X&sca_esv=afe264c557d0f865&udm=7&fbs=A_Dc_l-

ANIMAL BEHAVIOUR

(Subject Code: 26UZOEC3)

SEMESTER – V	ECC: 3	CREDITS:2	HOURS: 30
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Objective: To understand the basic concepts of animal social and reproductive behaviours and their function-related environment.

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

CO1	List and explain the general and innate behaviours of animals.	K1
CO2	Comprehend the ecological aspects of animal behaviour such as foraging, aggression, and territoriality.	K2
CO3	Predict and analyze social behaviours including aggregation, altruism, and kin selection.	K3
CO4	Classify and compare different reproductive behaviours and mating systems in animals.	K4
CO5	Summarize biological rhythms, learning processes, and memory in animals	K2
CO6	Integrate the role of environmental and genetic factors influencing animal behaviour.	K5

Unit I: General and innate behaviour

Definitions of ethology and animal psychology - ethogram; classification of behavioural patterns - neural and hormonal control of behaviour - communication - genetic and environmental components in the development of behaviour.

Unit II: Ecological aspects of behaviour

Habitat and food selection -optimal foraging theories- aggression - homing - territoriality - dispersal- host parasite relationship.

Unit III: Social behaviour

Aggregation - schooling in fishes -flocking in birds -herding in mammals - group selection - kin selection - altruism - inclusive fitness - forms of social organization (insects and primates).

Unit IV: Reproductive behaviour

Reproductive strategies - mating systems - mate choice - sex differences - courtship - sexual selection - parental care in vertebrates - allomothering.

Unit V: Biological rhythms, learning and memory

Circadian and circannual migration of fishes and birds; conditioning, habituation - insight learning - association learning - reasoning - cognitive skills.

Text Books:

1. McFarland 1985. Animal behaviour, ECBS Longman, Essex.
2. Manning and M. S. Dawkins 1998. An Introduction to Animal Behaviour, Cambridge University Press, Foundation Books, New Delhi.
3. Alcock, J.2006. Animal Behaviour, Sinauer Associates, INC, Sunderland, Massachusetts

Reference Books:

1. Alcock J. 2013. Animal Behaviour, Sinauer Associate Inc., USA
2. Verma P.S. and Agarwal V.K. 2000, Environmental Biology, S.Chand& Co, New Delhi.
3. Gunadevia H.S. & Hare Govinda Singh, Text book of Animal Behaviour (2000)
4. Drickamer LC, Vessey SH. 2001. Animal Behaviour. McGraw-Hill
5. Dujatkin LA. 2014. Principles of Animal Behaviour. 3rd Edn. W.W.Norton and Co.

E-Resources:

1. <https://www.ncbs.res.in/content/animal-behaviour>
2. <https://funaab.edu.ng/wp-content/uploads/2011/12/Animal%20Behaviour%201.pdf>
3. <https://www.scribd.com/document/476381080/Animal-behavior-note>
4. <https://www.youtube.com/watch?v=WGU9QYZn92Y>
5. <http://www.vpscience.org/materials/Animal%20behaviour%20UNIT%204.pdf>

BIODIVERSITY CONSERVATION
(Subject Code: 26UZOE4)

SEMESTER – VI	ECC: 4	CREDITS:2	HOURS: 30
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Course objective: To educate the students about the importance of biodiversity, species concept, loss of animal diversity, direct implications for the management of species and ecosystems, captive breeding and reintroduction and habitat restoration

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

CO1	Recall and define basic concepts of biodiversity, species concepts, biodiversity hotspots, and biogeography of India.	K1
CO2	Explain the levels of biodiversity (genetic, species, ecosystem), causes of loss of animal diversity, and the status categories of species.	K2
CO3	Apply conservation tools such as in situ and ex situ conservation, captive breeding, and red listing processes to real-world wildlife conservation scenarios.	K3
CO4	Analyze threats to animal diversity, extinction patterns, and population decline using case studies from India and island biogeography concepts.	K4
CO5	Evaluate wildlife conservation policies, animal protection laws, protected area networks, and the role of national and international conservation organizations.	K5
CO6	Design conservation awareness strategies and community-based participation programs for biodiversity conservation at regional and national levels.	K6

Unit I: Biodiversity; species concepts; animal diversity

Ecosystem, Genetic and Species diversity; Assigning values to biodiversity - Species concepts; GIS and remote sensing for diversity assessment; Biodiversity Hotspots - Western Ghats, Indo-Burma region; Biogeography of India.

Unit II: Loss of animal diversity, status of species

Concepts of Island biogeography and extinction rates on Islands - human-induced, Modern and local extinctions - population reduction- threats to wildlife (examples). Threats to animal diversity in India; **Status of species** - Rare, endemic and threatened species; Measuring status of species in the wild - IUCN Red list.

Unit III: Conservation tools

In situ and *Ex situ* conservation; Captive breeding programme; People participation in conservation; Red listing process: categories and criteria; Wildlife conservation in India - importance of conservation - methods of wildlife conservation;

Unit IV: Animal laws and policies in India; Economics of biodiversity conservation:

Wildlife (Protection) Act of India (1972) - Protected Area network - forest policy - Prevention of cruelty to Animal Act - Convention on Biological diversity. Economics of biodiversity conservation; The world Conservation Unit (IUCN) - World wildlife fund (WWF) - Indian Board for Wildlife (IBWL).

Unit V: Conservation education, awareness and implementations

Role of NGO's and Government organizations in wildlife conservation. Wildlife / Animal magazines, Journals - Government organizations in wildlife conservation - Wildlife celebration

days in India; Wildlife conservation in Tamil Nadu; National park and sanctuaries in Tamil Nadu.

Textbooks

1. M. P. Singh and Arvind Kumar. 2015. Biodiversity and Conservation, APH Publishing Corporation, New Delhi.
2. Janamjit Singh, 2006. Biodiversity: Planning For Sustainable Development, Deep & Deep Publications Pvt Ltd, New Delhi.
3. Hosetti B.B and Ramkrishna S. 2016. Biodiversity: Concepts and Conservation, Aavishkar Publishers, Jaipur

Reference Books

1. Prabodh K. Maiti and Paulami Maiti, 2011. Biodiversity: Perception, Peril and Preservation, Prentice-Hall of India Pvt.Ltd, New Delhi.
2. Gabriel Melchias, 2001. Biodiversity and Conservation, Oxford & IBH Publishing Company, Delhi.
3. B. K. Singh, 2004. Biodiversity: Conservation and Management, Mangal Deep Publications, Jaipur, Rajasthan.
4. Krishnamurthy K.V, 2009. An Advanced Textbook on Biodiversity Principles and Practice, Oxford & IBH Publishing Co Pvt.Ltd, New Delhi, India.
5. Omkar Verma and Ravi Shanker .2023. Biodiversity Conservation, *New Age International P Ltd*, New Delhi.

E-resources

1. <https://www.conserve-energy-future.com/biodiversity-conservation-types-importance-methods.php>
2. <https://www.environmentalpollution.in/essay/biodiversity-types-importance-and-conservation-methods-with-diagram/311>
3. http://www.businessandbiodiversity.org/the_issues_conserve.html
4. <https://vikaspedia.in/energy/environment/biodiversity-1/conservation-of-biodiversity>
5. <https://www.worldwildlife.org/pages/what-is-biodiversity>

PHARMACOLOGY
(Subject Code: 26UZOEC5)

SEMESTER – VI	ECC: 5	CREDITS:2	HOURS: 30
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Course objective: To introduce the fundamental principles of pharmacology including drug classification, routes of administration, pharmacokinetics and factors influencing drug action, and to impart knowledge on drugs acting on the nervous system, organs, endocrine system and infectious diseases.

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

CO1	Define basic pharmacological terms and classify drugs based on their source, action and therapeutic use.	K2
CO2	Explain the processes of absorption, distribution, metabolism and excretion of drugs and factors modifying drug effects.	K2
CO3	Describe the mechanism of action, therapeutic uses and side effects of drugs acting on the nervous system and major organs.	K2
CO4	Apply pharmacological principles to select appropriate drugs for common disorders related to organs and endocrine system.	K3
CO5	Analyze drug interactions, adverse drug reactions and contraindications in different physiological conditions.	K4
CO6	Evaluate the rational use of chemotherapeutic agents and hormones in disease management considering safety and efficacy.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit I: General Pharmacology

Definition, categories of drugs, routes of drug administration; absorption, distribution and excretion of drugs; factors modifying drug effects.

Unit II: Drugs acting on nervous system

Hypnotics and sedatives, anti-convulsants, analgesic-antipyretics, antidepressants, local anaesthetics, cholinergic and adrenergic drugs and their side effects.

Unit III: Drugs acting on organs

Gastrointestinal - appetizers, emetics, antiulcer drugs; Respiratory organ -bronchial asthma, expectorants, antitussives; Heart -anti-arrhythmic, anti-hypertensive agents; and their side effects.

Unit IV: Hormones and hormone antagonists

Adrenocortical steroids, androgen and anabolic steroids, estrogens and progestins, thyroid and antithyroid drugs, oral antidiabetic drugs and their side effects.

Unit V: Chemotherapy

Synthetic antimicrobial agents; Common Antibiotics-penicillins, cephalosporins, tetracyclins; Chemotherapy of urinary tract infections, malaria, typhoid, tuberculosis, amoebiasis; Diabetics and hypoglycaemic drugs, Disinfectants and antiseptics.

Textbooks:

1. Murugesh, N. (2004). A concise textbook of pharmacology. Sathya Publishers.
2. Tripathi, K. D. (2000). Essentials of medical pharmacology. Jaypee Brothers Medical Publishers.

3. Rang, H. P., Dale, M. M., Ritter, J. M., Flower, R. J., & Henderson, G. (2015). Rang & Dale's Pharmacology (8th ed.). Elsevier.

Reference books:

1. Panda, U. N. (2005). Handbook of pharmacology. AITBS Publishers.
2. Bhandari, U. (2012). A textbook of pharmacology. Biotech Pharma Publications.
3. Das, S. (2001). Pharmacology. Books & Allied (P) Ltd.
4. Chunawalla, S. A. (1998). Essentials of pharmacology. Himalaya Publishing House.
5. Budhiraja, R. D. (1993). Elementary pharmacology and toxicology. Popular Prakashan.

E-resources:

1. https://pharmacomedicale.org/images/cnpm/CNPM_2016/katzung-pharmacology.pdf
2. <https://rlmc.edu.pk/themes/images/gallery/library/books/Pharmacology/GENERAL%20PRINCIPLES%20OF%20PHARMACOLOGY.pdf>
3. <https://pharmainfonepal.com/wp-content/uploads/2020/12/KD-Tripathi-Pharmacology-Book.pdf>
4. <https://home.mednotes.in/subjects/pharmacology>
5. https://www.alghad.edu.ly/control_panel/books/Pharmacology%207%20days.pdf

ETHNOMEDICINE
(Subject Code:26UZOEC6)

SEMESTER – VI	ECC: 6	CREDITS:2	HOURS: 30
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Course objective: To provide basic information on the therapeutic species and their uses in traditional medicine and conservation.

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

CO1	Describe the basics of Ethnotaxonomy.	K2
CO2	Learn the importance of therapeutic animals in traditional medicine	K2
CO3	Examine the role of animals in ecological diversity	K2
CO4	Categorize about the Ethnozoological practices in tribes	K3
CO5	Summarize the importance and conservation of animals	K4
CO6	Generate awareness on ethno-medicine	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Unit I: Ethnotaxonomy and Zootherapy

Introduction to Ethnotaxonomy; Ethnozoology -Traditional medicine; Tribes-Ethnic Groups and Indigenous people, Sacred Grooves and Sacred groove animals; Zootherapy; Zootherapeutic species in India.

Unit II: Ethnomedicine

Folk medicine- Healers, local healer, Traditional healers, Bhopa; Method of preparation of ethnomedicine, Route of administration.

Unit III: Ethnozoological Practices

Animal byproducts from Arthropods and Molluscs, Ethno-entomological practices (mites, spiders and insects); Medical importance of Honey bee and its venom; Leech therapy; Ethnozoological practices in tribes in South Asian countries.

Unit IV: Ethnonutrition and medicine

Nutritional importance of animals and their products- Magico-religious purpose, rituals, taboos and cultural practices; Thanatophobia; Role of animals and their parts in Siddha, Ayurvedha, Unani and Chinese medicine; Common herbals/metals/salts used in ethnozoology.

Unit V: Conservation of Traditional Knowledge and Systems.

Ethnozoology in India and other Countries, Conservation of ancient knowledge system- Traditional knowledge system- Indigenous knowledge system, local ecological knowledge, Conservation of therapeutic animals.

Text Books:

1. V.S. Manickam, V. Sundaresan, V. Chelladurai and S. Ignacimuthu. Flora of Tirunelveli Hills, Gamopetalae, Vol II Bishen Singh Mahendra Pal Singh, Dehra Dun Figures P. 1- 538. Text P. 1-409; 2022
2. Perumal Samy, R., Sarumathi, M. and Ignacimuthu, S., 2004, Antibacterial screening of *Tragia involucrata*, L. (Euphorbiaceae), a tribal used medicinal plant, In: Novel compounds from natural products in the new Millennium, Potential and Challenges 48 (Eds. B.K.H,

- Tan, B.H. Bay, Y.Z. Zhu), World Scientific Publishing Co. Pvt. Ltd., Singapore, pp 112-122. 7.
3. Sankarasivaraman, K. and Ignacimuthu, S., 2006, Ethnomedicinal plants used by the Paliyar tribe in Madurai district, Tamil Nadu. In: Herbal medicine: Traditional practices (Ed. P.C. Trivedi), Aavishkar Publishers, Distributors, Jaipur, pp 122-132.

REFERENCE BOOKS

1. Ethnobiology in India, A Status Report. 2014. AICRPE. Ministry of Environment and Forests, Govt. of India, New Delhi.
2. Jose L. Martinez,, Amner Mun.oz-acevedo, Mahendra Rai, Ethnobotany: Application of Medicinal Plants Paperback – 31 March 2021
3. Ayyanar, M. and Ignacimuthu, S., 2011. Diversity of Endemic medicinal plants in KalakadMundanthurai Tiger Reserve, Southern India. In: Medicinal Plants and Sustainable Development (Ed. C.P. Kala), Nova Science Publishers, INC, Hauppauge, New York
4. Ayyanar, M. and Ignacimuthu, S., 2009, Medicinal Plants used by tribal inhabitants in the forest area of Tamil Nadu: A review, In: Indigenous Ethnomedicinal Plants (Eds. P.C. Trivedi), Pointer Publishers, Jaipur, pp. 94-111.
5. Ayyanar, M., Ignacimuthu, S. and Sekar, T., 2010. Inventorization of edible plants in KalakadMundanthurai Tiger Reserve, southern India. In: “Biodiversity and its Conservation” (Eds. Pramila Suresh & G. R. Victor), Kittel Science College, Dharwad, Karnataka, India. pp. 201-208.

E- Resources

1. onlinelibrary.wiley.com
2. <https://study.com/learn/lesson/video/ethnomedicine-history-and-examples.html>
3. <https://www.youtube.com/watch?v=5Dk0PDDJpSo>
4. <https://www.youtube.com/watch?v=iKflJGJ9Fog>
5. <https://www.youtube.com/watch?v=4h769TJmXxM>

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

SEMESTER – III	Allied: Theory 1	CREDITS:4	HOURS: 4
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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 - PRACTICALS

(Subject Code:26UZOE32)

SEMESTER – III	Allied: 1	CREDITS:1	HOURS: 2
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Course objective: To provide basic and advanced knowledge of animals morphology and physiology of animals

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

CO1	Describe 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 practicals that involve animal physiology experiments	K5
CO6	Integrate the information in the practicals 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 and 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*, *Naja*, Pelican, Parrot, Rabbit, Bat, *Manis* (pangolin),
13. 3-D Models: Human system / organs: – digestive system, lungs, kidney, nephron, heart, neuron, eye, thyroid.

IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

(Sub code: 26UZOE41)

SEMESTER – IV	Allied: Theory (EC 4)	CREDITS:3	HOURS: 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 Hours)

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 Hours)

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 Hours)

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 (12 Hours)

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 Hours)

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. Chakravarthy 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
- 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:26UZOC64)

SEMESTER – IV	Core: P 8	CREDITS:2	HOURS: 3
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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 tetanii*, 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).