

# VIVEKANANDA COLLEGE

**College with Potential for Excellence**

Residential & Autonomous – A Gurukula Institute of Life-Training  
Re-accredited (3<sup>rd</sup> Cycle) with 'A' Grade (CGPA 3.59 out of 4.00) by NAAC

Affiliated to Madurai Kamaraj University

(Managed by Sri Ramakrishna Tapovanam, Tirupparaitturai, Trichy)

**TIRUVEDAKAM WEST, MADURAI DISTRICT- 625 234**

**[www.vivekanandacollege.ac.in](http://www.vivekanandacollege.ac.in)**



*Department of Zoology*

Programme: **B.Sc., Zoology**

**Learning Outcomes based Curriculum Framework  
(LOCF)**

**(For those students admitted during the Academic Year 2021-22 and after)**

**POST GRADUATE AND RESEARCH DEPARTMENT OF ZOOLOGY**  
**B.Sc. ZOOLOGY**

**Vision**

- Unravel hidden research potentials & Entrepreneurial avenues in Zoology
- Bring a behavioural change in subject knowledge, scientific aptitude and instrumental skills to attract students with best caliber
- Raise students to international standards

**Mission**

- Strategic plans for translating goals and objectives by curriculum design, good teaching methods and evaluation
- Academic and research collaborations
- Bio-track –A forum to update knowledge
- Hands on training at Bio industries

**Programme Educational Objectives (PEOs)**

A graduate of B.Sc. Zoology programme after five years will

<b>PEO 1</b>	Acquire comprehensive knowledge of zoology and excel in the chosen area
<b>PEO 2</b>	Develop confidence to prepare for competitive examinations
<b>PEO 3</b>	Inculcate students to pursue higher education and life-long learning
<b>PEO 4</b>	Motivate students to develop an aptitude for animal preservation.
<b>PEO 5</b>	Train the youth for self-employment generation to become an entrepreneur

**Programme Learning Outcomes (PLOs)**

On completion (after three years) of B. Sc Zoology programme, the students are able to

<b>PLO 1</b>	Disciplinary Knowledge and Critical Thinking
<b>PLO 2</b>	Effective Communication and Digital Literacy
<b>PLO 3</b>	Social Interaction and Problem Solving
<b>PLO 4</b>	Effective Citizenship and Social Responsibility
<b>PLO 5</b>	Professional Ethics and Human Values
<b>PLO 6</b>	Environment and Sustainability
<b>PLO 7</b>	Self –directed and life – long learning

**Programme Specific Outcomes (PSOs)**

<b>PSO1</b>	Knowledge on animal taxonomy, preservation techniques and physiology will enable to become museum keepers.
<b>PSO2</b>	Understand organization of cell, cell organelles and its function, genetics, evolutionary relations and significance with physiology at molecular level.
<b>PSO3</b>	Applications of the techniques chemical reactions and biology module in Biotechnology, Bioinformatics, Biostatistics, Immunology, Lab technology and Microbiology.
<b>PSO4</b>	Use the animals in human welfare, societal behavior, diagnosis of disease, ancestry study, system regulations, source as food and genetics and developmental counseling.
<b>PSO5</b>	Enhance Bio-entrepreneurial skills to be self employable.

**Graduate Attributes (GA)**

	<b>Attributes</b>	<b>Description</b>	<b>Part</b>
<b>GA 1</b>	<b>Modern Tool Usage</b>	Application of appropriate techniques, resources and modern tools to complex activities with an understanding of the limitations	<b>Hand</b>
<b>GA 2</b>	<b>Environment and Sustainability</b>	Understanding the impact of solutions in societal and environmental contexts for sustainable development	<b>Hand</b>
<b>GA 3</b>	<b>Technical and Entrepreneurial Skills</b>	Creating confidence to become an entrepreneur by providing entrepreneurial and technical skills	<b>Hand</b>
<b>GA 4</b>	<b>Capacity</b>	Ability to face the realities of life and withstand current challenges	<b>Hand</b>
<b>GA 5</b>	<b>Graduate and Society</b>	Application of reasoning to assess social health, safety, legal and cultural issues and the consequent	<b>Heart</b>

		responsibilities relevant to the social practice	
<b>GA 6</b>	<b>Ethics and Values</b>	Application of ethical principles, professional ethics, responsibilities and norms of the life through value oriented life training	<b>Heart</b>
<b>GA 7</b>	<b>Creativity</b>	Demonstration of knowledge, understanding of management principles and application of these to one's own work to manage projects and in multidisciplinary environments	<b>Heart</b>
<b>GA 8</b>	<b>Harmonious Development of Individual</b>	Making an individual as perfect man through the harmonious development of physical, emotional and intellectual cultures	<b>Heart</b>
<b>GA 9</b>	<b>Adaptability</b>	Accepting the ground realities and adapt to the situation to overcome frustrations and failures.	<b>Heart</b>
<b>GA 10</b>	<b>Knowledge</b>	Application of knowledge of the respective discipline to the solution of complex problems in the day-to-day life	<b>Head</b>
<b>GA 11</b>	<b>Critical Thinking</b>	Analysis of problems to reach substantiated conclusion by using the principles of mathematics, natural and social sciences and by using research-based knowledge and research methods	<b>Head</b>
<b>GA 12</b>	<b>Problem Solving</b>	Designing of solution for complex problems that meet the specified needs with appropriate consideration as to public health and safety, cultural and societal environment	<b>Head</b>
<b>GA 13</b>	<b>Leadership Quality</b>	Functioning effectively as an individual, as a member or a leader in diverse teams and in multidisciplinary settings	<b>Head</b>
<b>GA 14</b>	<b>Communication</b>	Communication with society at large, such as, effective reporting, documentation designing, effective presentations and clear instructions	<b>Head</b>
<b>GA 15</b>	<b>Life-long learning</b>	Recognizing the need for independent and life-long learning in the context of technological changes	<b>Head</b>

#### Mapping of PEO with PLOs

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7
PEO 1							
PEO 2							
PEO 3							
PEO 4							
PEO 5							

#### Mapping of PO with GA

	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA 10	GA 11	GA 12	GA 13	GA 14	GA 15
PLO 1															
PLO 2															
PLO 3															
PLO 4															
PLO 5															
PLO 6															
PLO 7															



## Under Graduate Programme - Question Paper Pattern for Both CIA & End Semester Examinations

**With Effect From: 2021-22 onwards**

### Part I (Tamil / Hindi) and Part II English

**LOCF Syllabus UG:** Section A – Remembering (K1)  
 Section B – Remembering (K1)  
 Section C – Understanding (K2)  
 Section D – Applying (K3)

#### CIA Test Question Paper Pattern (UG) – 3 Tests per Semester – 2 Hours

Section - A: MCQs (Compulsory)	10 X 1 =10 Marks
Section - B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (3 out of 5)	3 X 6 = 18 Marks
Section - D: LA (1 out of 2)	1 X 12 =12 Marks

-----  
**Total** **50 Marks**  
 -----

#### End Semester Examinations Question Paper Pattern (UG) – 3 Hours

Section - A: MCQs	10 X 1 =10 Marks (From Question Bank given by the Course Teacher)
Section - B: VSA (5 out of 7)	5 X 2 =10 Marks
Section - C: SA (Either-or)	5 X 5 = 25 Marks
Section - D: LA (3 out of 5)	3 X 10 =30 Marks

-----  
**Total** **75 Marks**  
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### Part III (Core Course, AEC & DSE)

#### CIA Test Question Paper Pattern (UG) – 3 Tests per Semester – 2 Hours

Section - A: MCQs (Compulsory)	10 X 1=10 Marks
Section - B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (3 out of 5)	3 X 6 = 18 Marks
Section - D: LA (1 out of 2)	1 X 12=12 Marks

-----  
**Total** **50 Marks**  
 -----

#### End Semester Examinations Question Paper Pattern (UG) – 3 Hours

Section - A: MCQs	10 X 1 =10 Marks (From Question Bank given by the Course Teacher)
Section - B: VSA (5 out of 7)	5 X 2 =10 Marks
Section - C: SA (Either-or)	5 X 5= 25 Marks
Section - D: LA (3 out of 5)	3 X 10 =30 Marks

-----  
**Total** **75 Marks**  
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### Part IV (SEC-Skill Enhancement Course)

#### CIA Test Question Paper Pattern (UG) – 3 Tests per Semester at Department Level– 1 Hour

Section - A: MCQs	5 X 1 = 5Marks
Section - B: VSA (2 out of 4)	2 X 2 = 4 Marks
Section - C: SA (1 out of 2)	1 X 6 = 6 Marks
Section - D: LA (1 out of 2)	1 X 10=10 Marks

-----  
**Total**                    **25 Marks**  
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For competitive exam questions Pattern (OMR with 4 options will be used) 50X1=50 (1 hour)

#### End Semester Examinations Question Paper Pattern (UG) – 2 Hours

Section - A: MCQs	10 X 1 = 10 Marks (From Question Bank given by the Course Teacher)
Section - B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (Either-or)	3 X 9 = 27 Marks
Section - D: LA (2 out of 4)	2 X 14= 28 Marks

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**Total**                    **75 Marks**  
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For competitive exam questions Pattern (OMR with 4 options will be used) 75X1=75 (2 hours)

### Part IV (Generic Elective Course, Value Education and Environmental Studies)

#### CIA Test Question Paper Pattern (UG) – 1 Test per Semester – 2 Hours

Section - A: MCQs	10 X 1 = 10 Marks
Section -B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (3 out of 5)	3 X 6 = 18 Marks
Section - D: LA (1 out of 2)	1 X 12= 12 Marks

-----  
**Total**                    **50 Marks**  
-----

#### End Semester Examinations Question Paper Pattern (UG) – 2 Hours

Section - A: MCQs	10 X 1 = 10 Marks (From Question Bank given by the Course Teacher)
Section - B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (Either-or)	3 X 9 = 27 Marks
Section - D: LA (2 out of 4)	2 X 14= 28 Marks

-----  
**Total**                    **75 Marks**  
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### Part V (End Semester Examinations only)

#### EXTENSION ACTIVITIES

#### End Semester Examinations Question Paper Pattern (UG) – 2 Hours

Section - A: MCQs	10 X 1 = 10 Marks
Section - B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (Either-or)	3 X 9 = 27 Marks
Section - D: LA (2 out of 4)	2 X 14= 28 Marks

-----  
**Total**                    **75 Marks**  
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**Part VI (End Semester Examinations only) UG & PG**

**1. General Knowledge – (One Examination per Semester– UG & PG) – 1 Hour**

Section – A: MCQs 50 X 1 =50 Marks (OMR Sheet)

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**Total** **50 Marks**  
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**2. Wit for Wisdom and Humour for Health – (One Examination per Year – UG & PG) – 1 Hour**

Section – A: LA (5 out of 7) 5 X 20= 100 Marks

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**Total** **100 Marks**  
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**3. Spiritual Education– (One Examination per Year – UG & PG) – 1 Hour**

Section – A: VSA 20 X 2= 40 Marks

Section – B: SA (3 out of 5) 3 X 5 = 15 Marks

Section –C: LA (2 out of 4) 2 X 10 =20 Marks

-----  
**Total** **75 Marks**  
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**4. Physical Training– (One Examination for III Year UG & II Year PG Students) – 1 Hour**

Section - A: MCQs 10 X 1 = 10 Marks

Section – B: SA ((Either-or)) 4 X 5 = 20 Marks

Section – C: LA (2 out of 4) 2 X 10 =20 Marks

-----  
**Total** **50 Marks**  
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**Continuous Internal Assessment (CIA) - Distribution of Marks**

	UG		PG	
<b>Part - I, II Part - III</b>	Test (Best Two)	15 Marks	Test (Best Two)	15 Marks
	Cycle Test (5 × 1 = 5)	5 Marks	Quiz / Seminar	5 Marks
	Assignment (5 × 1 = 5)	5 Marks	Assignment	5 Marks
	<b>Total</b>	<b>25 Marks</b>	<b>Total</b>	<b>25 Marks</b>
<b>Part- IV</b>	Test (Best Two for SEC)	20 Marks		
	Assignment	5 Marks		
	<b>Total</b>	<b>25 Marks</b>		

**Abbreviations:**

**MCQs:** Multiple Choice Questions

**SA** : Short Answer

**VSA:** Very Short Answer

**LA** : Long Answer

### Core Course Practical

Bloom's Taxonomy	Continuous Internal Assessment (CIA)					End Semester Examinations (ESE)					
	Major	Minor	Spotters	Record	Total	Major 1	Major 2	Minor	Spotters	Record	Total
Remembering (K1)	5	2	4	5	Total 40 marks)	3.5	3.5	2	5	5	(Total 60 marks)
Understanding (K2)		3	4					4	5		
Applying (K3)	10	3	4			11.5	11.5	4	5		

### Ability Enhancement Course Practical

Bloom's Taxonomy	Continuous Internal Assessment (CIA)					End Semester Examinations (ESE)				
	Major	Minor	Spotters	Record	Total	Major	Minor	Spotters	Record	Total
Remembering (K1)	5	2	4	5	Total 40 marks)	5	5	10	5	(Total 60 marks)
Understanding (K2)		3	4				5	10		
Applying (K3)	10	3	4			15	5			

**POST GRADUATE AND RESEARCH DEPARTMENT OF ZOOLOGY**  
**Programme: B.Sc. Zoology (Under CBCS and LOCF)**  
 (For those students admitted during the Academic Year 2022 - 23 and after)  
**SECHME OF EXAMINATIONS**  
**FIRST SEMESTER**

Part	Study Component	Course Code	Course Title	Hrs.	Credits	CIA Marks	ESE Marks	Total Marks
I	Tamil	P1LT11	Kavithai Ilakkiyamum Kathai Ilakkiyamum	6	3	25	75	100
	Sanskrit	P1LS11	Fundamental grammar and History of Literature –Vedas to Pancamahakavyas					
II	English	P2LE11	Basic English Communication Skills	6	3	25	75	100
III	Core Course	09CT11	Invertebrates – I	4	4	25	75	100
	Core Course	09CT12	Invertebrates – II	4	4	25	75	100
	Core Course	09CP23	Practical –I	2	-	-	-	-
	AEC	07AEZ1	Chemistry for Biologist - I	4	4	25	75	100
	AEC	07APZ3	Volumetric Estimation	2	-	-	-	-
IV	GEC	09GE11	Human Anatomy	2	2	25	75	100
<b>TOTAL</b>				<b>30</b>	<b>20</b>			

**SECOND SEMESTER**

Part	Study Component	Course Code	Course Title	Hrs.	Credits	CIA Marks	ESE Marks	Total Marks
I	Tamil	P1LT21	Idaikkala Ilakkiyamum Nadaga Ilakkiyamum	6	3	25	75	100
	Sanskrit	P1LS21	Poetry, Grammar and History of Literature – Lyrics					
II	English	P2LE21	Advanced English Communication Skills	6	3	25	75	100
III	Core Course	09CT21	Chordates – I	4	4	25	75	100
	Core Course	09CT22	Chordates – II	4	4	25	75	100
	Core Course	09CP23	Practical –I	2	4	40	60	100
	AEC	07AEZ2	Chemistry for Biologist – II	4	4	25	75	100
	AEC	07APZ3	Volumetric Estimation	2	2	40	60	100
IV	GEC	09GE21	Food and Nutrition	2	2	25	75	100
<b>TOTAL</b>				<b>30</b>	<b>26</b>			

**THIRD SEMESTER**

Part	Study Component	Course Code	Course Title	Hrs.	Credits	CIA Marks	ESE Marks	Total Marks
I	Tamil	P1LT31	Kappiya Ilakkiyamum Urainadai Ilakkiyamum	6	3	25	75	100
	Sanskrit	P1LS31	Prose, poetics and History of Literature –Prose, Campukavyas and Fables					
II	English	P2LE31	English for Innovative Skills in Higher Education	6	3	25	75	100
III	Core Course	09CT31	Cell Biology	4	4	25	75	100
	Core Course	09CT32	Genetics	4	4	25	75	100
	Core Course	09CP43	Practical – II	2	-	-	-	-
	AEC	08AE01	Plant diversity	4	4	25	75	100
	AEC	08AP03	Practical – I	2	-	-	-	-
IV	SEC	09SE31	Public Health and Hygiene	2	2	25	75	100
<b>TOTAL</b>				<b>30</b>	<b>20</b>			

**FOURTH SEMESTER**

Part	Study Component	Course Code	Course Title	Hrs.	Credits	CIA Marks	ESE Marks	Total Marks
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I	Tamil	P1LT41	Sanga Ilakkiyamum Neethi Ilakkiyamum	6	3	25	75	100
	Sanskrit	P1LS41	Drama and History of Literature – Dramas					
II	English	P2LE41	English for Environmental Communication Skills	6	3	25	75	100
III	Core Course	09CT41	Developmental Biology	4	4	25	75	100
	Core Course	09CT42	Physiology	4	4	25	75	100
	Core Course	09CP43	Practical - II	2	4	40	60	100
	AEC	08AE02	Taxonomy of Angiosperms & Plant Physiology	4	4	25	75	100
	AEC	08AP03	Practical – I	2	2	40	60	100
IV	SEC	09SE41	Medical Lab Technology	2	2	25	75	100
<b>TOTAL</b>				<b>30</b>	<b>26</b>			

### FIFTH SEMESTER

Part	Study Component	Course Code	Course Title	Hrs.	Credits	CIA Marks	ESE Marks	Total Marks
III	Core Course	09CT51	Biochemistry and Biophysics	5	4	25	75	100
	Core Course	09CT52	Biotechnology	5	4	25	75	100
	Core Course	09CT53	Microbiology and Immunology	5	4	25	75	100
	Core Course	09CP63	Practical – III	6	-	-	-	-
	DSE	09DS5A	Biostatistics, Computer Applications & Bioinformatics	5	5	25	75	100
09DS5B		Animal behavior and Chronobiology						
IV	SEC	09SE51	Sericulture	2	2	25	75	100
	ES	ESUG51	Environmental Studies	2	2	25	75	100
<b>TOTAL</b>				<b>30</b>	<b>21</b>			

### SIXTH SEMESTER

Part	Study Component	Course Code	Course Title	Hrs.	Credits	CIA Marks	ESE Marks	Total Marks
III	Core Course	09CT61	Evolution	6	4	25	75	100
	Core Course	09CP62	Practical – III	6	4	40	60	100
	DSE	09DS6A	Dairy Farming	5	5	25	75	100
		09DS6B	Apiculture					
	DSE	09DS6C	Environmental Biology	5	5	25	75	100
09DS6D		Toxicology						
IV	SEC	09SE61	Fish Culture and Vermitechnology	2	2	25	75	100
	SEC	09SE62	Project	2	2	25	75	100
	SEC	09SE63	Zoology for Competitive	2	2	25	75	100
	VE	VEUG61	Value Education	2	2	25	75	100
V	EA	EAUG61	Extension Activities		1	25	75	100
<b>TOTAL</b>				<b>30</b>	<b>27</b>			
<b>TOTAL NUMBER OF HOURS /CREDIT / MARKS</b>				<b>180</b>	<b>140</b>			

**Note: Practical Examinations - 09CP23 - 4 Hrs; 09CP43-4 Hrs; 09CP62- 4 Hrs; 09AP03- 3 Hrs;**

விவேகானந்த கல்லூரி, திருவேடகம் மேற்கு - 625 234.

தமிழ்த்துறை,

Programme : B.A., BSc., (CBCS and Outcome Based Education (OBE)

(For those students admitted during the Academic Year 2022 – 2023 and after)

பாடத்திட்டத்தின் கட்டமைப்பு (PROGRAMME STRUCTURE)

UG Language PART – I TAMIL		SEMESTER: I	
Subject Title: கவிதை இலக்கியமும் கதை இலக்கியமும்			
Course Code: PILT11/PICT11	Hours per week: 18	Credit: 03	
CIA Marks: 25	ESE Marks: 75	Total Marks: 100	

**நிரல் கல்வி திட்டத்தின் குறிக்கோள்கள்  
(Programme Educational Objectives)**

- செம்மொழியான தமிழ் மொழியின் இலக்கியம் மற்றும் இலக்கணத்தின் வரலாறு தொடர்பான சிறப்பு கூறுகளை வழங்குதல்.
- தமிழ் இலக்கியத்தின் வாயிலாக பண்டைய தமிழர்கள் தங்கள் வாழ்க்கையில் பின்பற்றிய சுய ஒழுக்கங்களையும், அதன் மதிப்புகளையும் எடுத்துரைத்து அதனை செயல்படுத்த வழிவகை செய்தல்.
- தாய் மொழி அல்லாத பிற மொழியினைக் கற்றுத் தேர்ந்த மாணவர்களுக்குத் தமிழ் மொழியில் உள்ள இலக்கியத்தின் உறுதியான திறன்களை எடுத்துரைத்து, அதனை அம்மாணவர்கள் பெற முயற்சித்தல்.
- அனைத்து வகைகளிலும் முழுமையான ஆளுமைத் திறன்களின் வளர்ச்சியை ஊக்குவித்தல்.

**Programme Outcomes (POs)**

1. தமிழர்களின் பெருமையினை உணர்ந்து கொள்ளுதல்.
2. படைப்பாளர்களின் தன்மைகளை அறிந்து படைப்பாற்றல் பெறுதல்.
3. வாழ்க்கையின் ஒழுக்க நெறிகளைக் கடைபிடித்தல்.
4. மொழியினைப் பிழையின்றி பேச எழுதப்பழகுதல்.
5. இலக்கியங்களின் படைப்பாளர்களின் வரலாற்றினை அறிந்து கொள்ளுதல்.

**முன்னுரை(Preamble)**

1. மரபின் பழம்பெருமையினை மாணவர்களுக்கு உணர்த்துதல்.
2. புதுக்கவிஞர்களின் படைப்பாக்கங்களின் பொருண்மை வழி கட்டமைப்பு நிலைகளை எடுத்துரைத்தல்.
3. தனி மனித ஒழுக்கம் சார்ந்த நிலைகளைக் கடைபிடிக்க வலியுறுத்துதல்.
4. தமிழ் எழுத்துக்களின் வகைமைகளை வெளிக்கொணர் வழிவகை செய்வித்தல்.
5. தமிழிலக்கியத்தின் கவிதை மற்றும் கதை இலக்கிய வரலாற்றினை புலப்படுத்துதல்.

**பாடத்திட்டத்தின் முடிவுகள்(Course Outcomes (COs)**

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

NO	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	மரபுக்கவிதை வாயிலாக மொழியின் சிறப்புகள், பொதுவுடைமை குறித்தான சிந்தனைகளை வரையறை செய்வர்.	K <sub>1</sub> , K <sub>2</sub>
CLO 2	புதுக்கவிதைகளின் வழி சமூக போக்குகளையும், மக்களின் வாழ்வியல் நிலைப்பாட்டையும் கலந்துரையாடுவர்.	K <sub>2</sub> , K <sub>3</sub>
CLO 3	சிறுகதை மற்றும் நாவல் இலக்கியங்கள் வழி படைப்புகள் வெளிப்படுத்தும் மக்களின் வாழ்க்கை முறைகளையும், படைப்பாளர்களின் வரலாற்றினையும், கதையெழுதும் உத்திகளையும் விவரிப்பர்.	K <sub>2</sub> , K <sub>3</sub>
CLO 4	தமிழ் மொழியின் எழுத்து வடிவங்கள் குறித்தும் அவற்றை வகைப்படுத்தும் திறன்கள் குறித்தும் வெளிப்படுத்துவர்.	K <sub>2</sub>
CLO 5	மொழியினைப் பிழையின்றி எழுதுதல், பேசுதல், ஒலி வேறுபாட்டினை அறிந்து மயக்கம் நீக்குதல் போன்ற ஒரு மொழியின் பயன்பாட்டுத் தன்மையைத் தெளிவுறுத்துவர்.	K <sub>1</sub> , K <sub>2</sub> , K <sub>3</sub>

K<sub>1</sub>-Knowledge

K<sub>2</sub>-Understand

K<sub>3</sub>-Apply

## Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
CLO 1	9	3	9	9	3	9	9
CLO 2	9	3	9	3	9	3	9
CLO 3	9	3	9	9	3	9	9
CLO 4	9	1	3	9	9	-	9
CLO 5	9	1	3	9	9	-	9
	45	11	33	39	33	21	45

Note: Mapping Score Strong-9, Medium- 3 and Low-1

## பாடத்திட்டம் (Syllabus)

அலகு - 1	<p>மரபுக்கவிதைகள்</p> <p>1.1 பாரதியார் கவிதைகள்</p> <p>1. தமிழ் (நான்கு பத்தி)</p> <p>2. நடிப்புச் சுதேசிகள்</p> <p>1.2. பாரதிதாசன் கவிதைகள்</p> <p>1. நீங்களே சொல்லுங்கள்</p> <p>2. புதியதோர் உலகம் செய்வோம்</p> <p>1.3. நாமக்கல் கவிஞர் வெ.இராமலிங்கம் பிள்ளை</p> <p>1.குருதேவர் இராமகிருஷ்ணர் (3 பாடல்கள்)</p> <p>1.4. சோழவந்தானார் அரசஞ்சண்முகனார்</p> <p>1.திருவடிப்பத்து (மதுரை மீனாட்சியம்மை மீது பாடியது)</p>	18மணிநேரம்
அலகு - 2	<p>புதுக்கவிதைகள்</p> <p>2.1 கவிஞர் கண்ணதாசன் - 'அனுபவமே கடவுள்'</p> <p>2.2. கவிஞர் வைரமுத்து - "தீக்குச்சிக்குத் தின்னக் கொடுப்போம்"</p> <p>2.3 கவிஞர் மு.மேத்தா- "பொங்கும் கனவுகள்", 'தாய்'</p>	18மணிநேரம்
அலகு - 3	<p>சிறுகதை - நாவல் இலக்கியம்</p> <p>3.1.'உள்ளம் பெருங்கோயில்' - சிறுகதைத் தொகுப்பு (தமிழ்த்துறை வெளியீடு)</p> <p>3.2.'ஆத்தங்கரை ஓரம்' - நாவல்களில் - வெ.இறையன்பு</p>	18மணிநேரம்
அலகு - 4	<p>தமிழ் இலக்கணம் - எழுத்து</p> <p>4.1 முதல் எழுத்துகள் - சார்பெழுத்துகள்</p> <p>4.2 மொழி முதல் எழுத்துகள்-மொழி இறுதிஎழுத்துகள்</p> <p>4.3 வல்லெழுத்து மிகும் இடங்கள்</p> <p>4.4 வல்லெழுத்து மிகாஇடங்கள்</p>	18மணிநேரம்
அலகு - 5	<p>தமிழ் இலக்கிய வரலாறும் பயன்பாட்டுத் தமிழும்</p> <p>ய. கவிதை இலக்கியத்தின் தோற்றமும் வளர்ச்சியும்</p> <p>டி. கதை இலக்கியத்தின் தோற்றமும் வளர்ச்சியும்</p> <p>உ. மரபுப்பிழை நீக்குதல் - பிறமொழிச் சொற்களை நீக்குதல் - பிழையற்றத் தொடரைத் தேர்ந்தெடுத்தல் - ஒருமை பன்மை மயக்கம் - ஓர் எழுத்து ஒரு மொழிக்குரிய பொருள் - ஒலி வேறுபாடுகளும் பொருள் வேறுபாடுகளும் - பொருத்தமான பொருள் - பொருத்தமான தொடர் அறிதல்.</p>	18மணிநேரம்

## பாட நூல்கள்(Text books)

1. தமிழ்ச் செய்யுள் தொகுப்பு, தமிழ்த்துறை வெளியீடு, விவேகானந்த கல்லூரி, திருவேடகம் மேற்கு.
2. சிறுகதைத்தொகுப்பு, 'உள்ளம் பெருங்கோயில்' தமிழ்த்துறை வெளியீடு, விவேகானந்த கல்லூரி, திருவேடகம் மேற்கு.
3. ஆத்தங்கரை ஓரம் - நாவல் நியூ செஞ்சரி புக் ஹவுஸ்(பி)லிட், 41-பி, சிட்கோ இண்டஸ்டிரியல் எஸ்டேட், அம்பத்தூர், சென்னை- 600 098.

### **பார்வை நூல்கள் (Reference Books)**

1. தமிழ் இலக்கிய வரலாறு முனைவர் கி.இராசா நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட், 41-பி, சிட்கோ இண்டஸ்ட்ரியல் எஸ்டேட், அம்பத்தூர், சென்னை- 600 098.
2. நற்றமிழ் இலக்கணம் டாக்டர் சொ.பரமசிவம் பாட்டுப் பதிப்பகம், 1269, 32-ஆம் தெரு, 'ஐ' பிரிவு, சென்னை - 600 040.

### **கற்பிக்கும் முறைகள்(Pedagogy)**

விரிவுரை கொடுத்தல், கலந்துரையாடல், காட்சிப் பதிவுகளின் வழியாக புலப்படுத்துதல்.

### **கற்பிக்க உதவுதல் (Teaching Aids)**

கரும்பலகை பயன்படுத்துதல், காட்சி திரைவழியாகப் புலப்படுத்துதல்.

## DEPARTMENT SANSKRIT

Programme: B.A./ B.Sc. (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2022-23 and after)

PART – I : Sanskrit		SEMESTER - I
Course Title : <b>FUNDAMENTAL GRAMMAR AND HISTORY OF LITERATURE –VEDAS TO PANCAMAHAKAVYAS</b>		
Course Code: <b>PILS11</b>	Hours per week: <b>6</b>	Credits: <b>3</b>
CIA Marks: <b>25 Marks</b>	ESE Marks: <b>75 Marks</b>	Total Marks: <b>100 Marks</b>

### Preamble:

Sanskrit is offered as an alternative language under Part –I for B.A./ B.Sc students during first four semesters the above column explains the scheme of the I semester.

### Course Outcomes (COs)

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

Number	Statement	Knowledge Level
<b>CLO 1</b>	Identifying Devanāgarī script, Describe modern literature and Illustrate	K1, K2
<b>CLO 2</b>	Discriminate spirituality in Literature	K2
<b>CLO 3</b>	Classify and discuss traditional names of Divine beings to animals in the world	K2
<b>CLO 4</b>	Describe and defend history of early Sanskrit literature	K2
<b>CLO 5</b>	Practice Creativity and Demonstrate various culture of world	K2, K3

**K1-Knowledge**

**K2-Understand**

**K3-Apply**

### Mapping of CO with PO

	<b>PLO 1</b>	<b>PLO 2</b>	<b>PLO 3</b>	<b>PLO 4</b>	<b>PLO 5</b>	<b>PLO6</b>	<b>PLO7</b>
<b>CLO 1</b>	9	9	3	9	9	-	9
<b>CLO 2</b>	3	3	9	9	9	-	9
<b>CLO 3</b>	9	3	9	9	9	-	3
<b>CLO 4</b>	9	9	9	9	9	-	9
<b>CLO 5</b>	9	9	3	9	9	-	9
	39	33	33	45	45	-	39

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

**Unit 1:** Introduction to Sanskrit script, Verbs, nouns and Pronouns. Introduction: Definitions and Scope of Sanskrit. – Sanskrit (Devanāgarī) scripts. Formation of verbs and nouns. Characteristics of pronoun.

**Unit 2:** Introduction to History of early (vedic) Sanskrit literature. Classification of Vedas. Content of Vedas. Moral values inculcated through Vedas.

**Unit 3:** Introduction to Purāṇa literature. Origin of Purāṇa literature. Classification of Purāṇa. Mahāpurāṇa and Upapurāṇa. moral, social, environmental values inculcated through Purāṇas.

**Unit 4:** Introduction to Kāvya (poetry) literature. Definition of Kāvya. Types of Kāvya. Characteristics of Mahākāvya. Description of moral, social, environmental values inculcated through Kāvya

**Unit 5:** Introduction to Translation. Strategies adopted in translation. Translating Sanskrit verses into English. Translating English sentences into Sanskrit. Introducing International Phonetic code (IPC). Transliteration from Sanskrit (Devanāgarī) script to IPC. Transliterating from IPC to Sanskrit (Devanāgarī) script.

### Text Book(s)

Sāhityarasakaṇa, compiled by Dr. S. Jagadisan, Published by AMG Publications, Madurai -625010. Year of publication 1996.

A History of Sanskrit Literature, compiled by Dr. S. Jagadisan, Published by AMG Publications, Madurai -625010. Year of publication 1996.

### Reference Books

A Short History of Sanskrit Literature, by T.K. Ramachandra Aiyar, published by R.S. Vadhyar & Sons, Kalpathi, Palakkad -678003

A History of Sanskrit Literature, by A. Berriedale Keith, published by Motilal Banarsidass Publishers Private Limited, Delhi, 2017.

**Pedagogy**

Chalk & Talk, Group Discussion, PPT

**Teaching Aids**

Green Board, LCD Projector, Interactive White Board

## DEPARTMENT OF ENGLISH

Programme: B.A., B.Com., B.Com.(CA), & B.Sc.

(For the students of the Academic Year 2022-23 onwards)

PART – II: English		SEMESTER–I
Course Title: <b>Basic English Communication Skills</b>		
Course Code: <b>P2LE11/ P2CE11</b>	Hours per week: <b>6</b>	Credit: <b>3</b>
CIA Marks: <b>25</b>	ESE Marks: <b>75</b>	Total Marks: <b>100</b>

### Preamble

- The students are expected to inculcate English language proficiency and its socio-linguistic competency.
- The students are also expected to use the language skills for creativity and innovation with high quality both in study and profession.

### Course Outcomes (CO)

On the successful completion of the course, the students would be able to:

No	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Recognize listening, and reading proficiency through the prose discourse	K1, K2, K3
<b>CLO 2</b>	Use and interpret imaginative, and creative skills through the poetic genre	K1, K2, K3
<b>CLO 3</b>	Discuss the socio-linguistic and psychological behaviour of author, and characters found in the one-act-play	K1, K2, K3
<b>CLO 4</b>	Examine the functions of English language and its grammar in transactions	K1, K2, K3
<b>CLO 5</b>	Execute and exercise LSRW skills in everyday interactions	K1, K2, K3

**K1-Remembering K2 – Understanding K3 – Applying**

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	9	9	9	9	-	9
<b>CLO 2</b>	9	9	9	3	9	-	9
<b>CLO 3</b>	9	9	9	3	3	-	9
<b>CLO 4</b>	9	9	3	-	-	-	9
<b>CLO 5</b>	9	9	9	3	3	1	9
	45	45	39	18	24	01	45

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

#### Unit-1 Poetry

1. The Lord of My Life – Rabindranath Tagore
2. The Road Not Taken – Robert Frost
3. Hawk Roosting – Ted Hughes

#### Unit-2 Prose

1. The Secret of Work – Swami Vivekananda
2. Fourscore and Seven Years ago... – Abraham Lincoln
3. What Kind of Peace Do We Want? – J.F. Kennedy

#### Unit-3 Short Stories

1. A Shadow – R K Narayan
2. Karma – Khushwant Singh
3. The Romance of a Busy Broker – O Henry

#### Unit-4 Grammar

1. Parts of Speech
2. Kinds of Sentence
3. Punctuation

#### Unit-5 Oral & Written Communication

1. **Listening** – Comprehension practice from Poetry, Prose, Short-stories, observing/viewing E-content (with subtitles), Guest/Invited Lectures, Conference/Seminar Presentations & Tests and DD National News Live, BBC, CNN, VOA etc
2. **Speaking** – In Group Discussion Forum, speak about Tongue Twisters, Critical Thinking, Seminar Presentations on Classroom-Assignments, and Peer-Team interactions/AIF in Class-room
3. **Reading** – Pronunciation practice and enhancement from Poetry, Prose, Short-stories, Magazines, Newspaper etc
4. **Writing** – Asking & Giving Directions/Instructions, Developing Hints, and Filling Forms.

#### Text Books

1. *The Norton Anthology English Literature*. New York/London: W.W.Norton, 2012. (or) Vinay Harwadker, and A.K.Ramanujan, ed. *The Oxford Anthology of Modern Indian Poetry*. New Delhi: OUP, 1994. (or) Robert Anderson et al. *Elements of Literature: Fourth Course Literature of the United States*. Florida: HRW Inc. 1993. (or) Dr.M.Moovendhan, ed. *Wings of Poesy*. Chennai: Thamarai Publications, 2018. (or) <<https://www.poemhunter.com/poem/lord-of-my-life/>> The Lord of My Life – Rabindranath Tagore <<https://allpoetry.com/Hawk-Roosting>> Hawk Roosting <<https://poets.org/poem/road-not-taken>> The Road Not Taken.
2. Swami Vivekananda. “The Secret of Work.” *Links: Indian Prose in English*. Ed. G.S.Balarama Gupta. New Delhi: Macmillan Indian Limited, 1989.
3. Dr.P.C.James Daniel, ed. *Gateway to English: An Anthology of Prose*. Chennai: Harrows Publications, 2018. <http://www.abrahamlincolnonline.org/lincoln/speeches/gettysburg.htm>
4. Abhijit Acharijee, and Rakesh Ramamoorthy, ed. *Frontiers of Communication: An Anthology of Short Stories and Prose*. Chennai: Cambridge University Press, 2018.
5. Michael Swan and Catherine Walter. *How English Works: A Grammar Practice Book*. Oxford: OUP, 1997. (or) Wren and Martin. *High School English Grammar and Composition*. New Delhi: S.Chand & Company LTD.1935.
6. Owen Hargie, David Dickson, and Dennis Tourish. *Communication Skills for Effective Management*. New York: Palgrave Macmillan, 2004. (or)
7. British Council | LearnEnglish <<https://learnenglish.britishcouncil.org/skills>>
8. BBC News <<https://www.bbc.com/news>> VOA Learning English <<https://learningenglish.voanews.com/>>
9. University Grants Commission (UGC), New Delhi <<https://www.ugc.ac.in/subpage/EContent-URL.aspx>> British Council | LearnEnglish <<https://www.youtube.com/channel/UCOtnu-KKoAbN47IuYMeDPOg>> Cambridge Assessment English <<https://www.cambridgeenglish.org/test-your-english/>>
10. CLIL ( Content & Language Integrated Learning ) – Module by TANSCHÉ  
*Note: (Text: Prescribed chapters or pages will be given to the students by the department and the college)*

#### Pedagogy

Chalk & Talk, Group Discussion, PPT

#### Teaching Aids

Green Board, LCD Projector, Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III: Core Course</b>		<b>SEMESTER - I</b>
<b>Course Title: INVERTEBRATES - I</b>		
Course Code: <b>09CT11</b>	Hours per week: <b>4</b>	Credits: <b>4</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

To enable the students acquire knowledge on general characteristics, classification of Invertebrates and study the organization of various organs and organ systems.

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Acquire knowledge on general characteristic features, morphology and classification of Invertebrates (Protozoa – Helminthes)	K1, K2, K3
<b>CLO 2</b>	Understand the diversity and distribution of invertebrate fauna at different habitats	K1, K2, K3
<b>CLO 3</b>	Study the lifecycle and adaptation of Protozoan and helminthes parasites of human, mode of transmission and treatment	K1, K2, K3
<b>CLO 4</b>	Trace the origin, evolutionary relationships, phylogeny and affinities of minor phyla.	K1, K2, K3
<b>CLO 5</b>	Apply studied information to have knowledge on cattle and human diseases, observe marine animals at their natural habitats and understand their biodiversity through field visit	K1, K2, K3

K<sub>1</sub>-RememberingK<sub>2</sub>-UnderstandingK<sub>3</sub>-Applying**Mapping of CO with PO**

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	3	-	3	9	9	3
<b>CLO 2</b>	9	1	3	3	3	9	3
<b>CLO 3</b>	9	1	9	3	9	3	3
<b>CLO 4</b>	9	1	9	3	3	3	3
<b>CLO 5</b>	9	1	9	9	9	9	3
	<b>45</b>	<b>7</b>	<b>30</b>	<b>21</b>	<b>33</b>	<b>33</b>	<b>15</b>

**Mapping of CO with PSO**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	9	-	-	3	-
<b>CLO 2</b>	9	-	-	3	-
<b>CLO 3</b>	-	-	-	9	-
<b>CLO 4</b>	3	3	-	3	-
<b>CLO 5</b>	9	-	-	3	3
	<b>30</b>	<b>3</b>	<b>-</b>	<b>27</b>	<b>3</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus**

<b>UNIT-I:</b>	Phylum Protozoa General Characters of the phylum and classification upto class level Type study : Paramecium General topics : a) Locomotion in protozoa b) Nutrition in protozoa c) Etiology and life cycle of protozoan parasites of man (Entamoeba, Plasmodium and Trypanosoma)	<b>(12 Hrs)</b>
<b>UNIT-II:</b>	Phylum Porifera General characters of the phylum and classification upto class level Type study : Ascon sponge General topics : a) Canal system in sponges b) Spicules of sponges. c) Reproduction in sponges	<b>(12 Hrs)</b>
<b>UNIT- III:</b>	Phylum -Coelenterata General characters of the phylum and classification up to class level Type study : Obelia General topics : a) Polymorphism in hydrozoa b) Coral reefs c) Ctenophora Structure and affinities	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	Phylum Platyhelminthes General characters of the phylum and classification upto class level. Type study : <i>Fasciola hepatica</i> General topics : a) Origin of metazoa b) Origin of bilateria	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	Phylum Aschelminthes General characters of the phylum and classification upto class level Type study : Ascaris General Topics : a) Helminth parasites - Enterobius and Wuchereria - Disease and control b) Parasitic adaptations in Helminthes.	<b>(12 Hrs)</b>

#### Text Books

Jordan, E.I. and Verma, P.S. 2014 – Invertebrate Zoology, Chand & Co Limited, New Delhi.

#### Reference Books

- Pechenik, Jan A 2014 – Biology of the Invertebrates, Tata Mcgraw – Hill Pub. Company Ltd., New Delhi
- Vasantika Kashyap, 2013, Life of Invertebrates, Second Revised Edition, Vikas Pub. House Pvt. Ltd., New Delhi
- Kotpal, R.L. 2012. Modern Text Book of Zoology, Invertebrates (Animal diversity – I), Rastogi Publications, Meerut
- Barnes, R.D. 2006, Invertebrate Zoology, IV Edition, Holf Saunders International edition
- Ekambaranatha Ayyar and Ananthkrishnan, T.N. 2005, A manual of Zoology, volume I, Invertebrate, Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai.

#### E Resources

<https://www.slideshare.net/RameshPandi4/life-cycle-of-entamoeba-histoltyica>

<https://www.slideshare.net/RameshPandi4/trypanosoma-249254412>

<https://www.slideshare.net/RameshPandi4/biology-of-sponge>

<https://www.slideshare.net/RameshPandi4/plasmodium-life-cycle-249256049>

<https://www.livescience.com/40276-coral-reefs.html>

<https://ocean.si.edu/ocean-life/invertebrates/corals-and-coral-reefs> accessed on 08.09.2020.

<https://www.studyandscore.com/studymaterial-detail/phylum-porifera-canal-system-in-sponges-types-of-canal-systems-in-sponges-functions-of-water-current>

<https://www.slideshare.net/sjeyakumar/coral-reefs-28097009>

<https://youtu.be/UIXZYF1dZQ4>

<https://www.slideshare.net/mrmodaq/gaza-strip-parasite>

**Pedagogy**

Chalk & Talk, Group Discussion, PPT

**Teaching Aids**

Green Board, LCD Projector, Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III : Core Course		SEMESTER - I
Course Title : <b>INVERTEBRATES - II</b>		
Course Code: <b>09CT12</b>	Hours per week: <b>4</b>	Credits: <b>4</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

### Preamble

To enable the students understand basic aspects of invertebrate biology with their salient features and study of animal organization, comparative anatomy and functional morphology

### Course Outcomes (CO)

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Learn the general characteristics and classification of invertebrates (Annelida – Echinodermata)	K1, K2, K3
<b>CLO 2</b>	Study the biodiversity of invertebrates in different habitats	K1, K2, K3
<b>CLO 3</b>	Can trace the development and affinities of invertebrates	K1, K2, K3
<b>CLO 4</b>	Acquire knowledge on social and economical importance of insects	K1, K2, K3
<b>CLO 5</b>	Learn the adaptive radiation of marine forms	K1, K2, K3

**K<sub>1</sub>**-Remembering

**K<sub>2</sub>**-Understanding

**K<sub>3</sub>**-Applying

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7
<b>CLO 1</b>	9	-	-	-	-	-	-
<b>CLO 2</b>	9	-	-	-	-	-	-
<b>CLO 3</b>	9	-	-	-	-	-	-
<b>CLO 4</b>	9	-	9	-	9	-	-
<b>CLO 5</b>	9	-	-	-	-	-	-
	45	-	9	-	9	-	-

### Mapping of CO with PSO

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	9	-	-	-	-
<b>CLO 2</b>	9	-	-	-	-
<b>CLO 3</b>	-	3	-	3	-
<b>CLO 4</b>	-	-	-	9	9
<b>CLO 5</b>	-	9	-	-	-
	<b>18</b>	<b>12</b>	-	<b>12</b>	<b>9</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

<b>UNIT-I:</b>	Phylum Annelida General characters and classification upto class level with examples. Type study : Nereis General topics :	<b>(12 Hrs)</b>
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	a) Origin of coelom and metamerism b) Adaptive radiation in polychaetes	
<b>UNIT-II:</b>	Phylum Arthropoda General characters and classification up to class level with examples. Type study : Prawn General topics : a) Peripatus - Structure and affinities b) Larval forms of crustacea.	<b>(12 Hrs)</b>
<b>UNIT- III:</b>	External characters of Scorpion, Centipedes and Millipedes General topics : a) Social Life of Insects b) Economic Important of Insects	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	Phylum Mollusca General characters and classification upto class level with examples Type study : Pila General topics : a) Torsion in gastropods b) Cephalopods as advanced Molluscs	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	Phylum Echinodermata General characters and classification up to class level with examples. Type of study : Star fish General topic : a) Larval forms of echinoderm b) Affinities of echinoderm.	<b>(12 Hrs)</b>

#### Text Books

Jordan, E.I. & Verma, P.S. 2011, Invertebrate Zoology, Chand & Company Ltd, New Delhi.

#### Reference Books

Kotpal, R.L, 2011. Invertebrates, Rastogi Publications

Kotpal, R.L. 2004. Modern Text Book of Zoology, Invertebrates (Animal diversity – I), Rastogi Publications, Meerut.

Pechenik, Jan. A 2000, Biology of the Invertebrates, Tata Mcgraw – Hill Pub. Co. Ltd., New Delhi.

Meglitsch Paul. A 1972. Invertebrate Zoology, Second Edition, Oxford University Press, London.

Barrington, E.J.W. 1967 – Invertebrate Structure and Function. The English Language Book, Society, London.

#### E Resources

<https://www.slideshare.net/jessidildy/phylum-annelida-2016>

<https://www.slideshare.net/sarhar/phlum-annelida>

<https://www.slideshare.net/mcdevittapbio/phylum-annelida-11871311>

<https://www.slideshare.net/earland/phylum-arthropoda>

<https://www.slideserve.com/rea/phylum-arthropoda>

<https://www.slideshare.net/MuhammadTalhaHayat/the-importance-of-insects-the-importance-of-insects-in>

<https://www.slideshare.net/AmalGhazaliNasron/beneficial-insects>

[https://hugepdf.com/download/download-economic-importance-of-insects\\_pdf](https://hugepdf.com/download/download-economic-importance-of-insects_pdf)

<https://www.slideshare.net/vidhyakalaivani29/cephalopodes-are-advance-molluscs>

<https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/cephalopod>

<https://www.biologydiscussion.com/invertebrate-zoology/phylum-echinodermata/larva-found-in-phylum-echinodermata/33758>

<https://www.slideshare.net/avishshah2091/echinoderms-echinodermata>

#### Pedagogy

Chalk & Talk, Group Discussion, PPT

#### Teaching Aids

Green Board, LCD Projector, Interactive White Board

## DEPARTMENT OF CHEMISTRY

Programme: B.Sc. Botany / B.Sc. Zoology, (CBCS and LOCF)

(For those students who admitted during the Academic Year 2021-22 and after)

PART – III: Allied Subject Theory		SEMESTER I
Course Title: CHEMISTRY FOR BIOLOGIST -I		
Course Code: 07AEB1/07AEZ1	Hours per week: 4	Credits:4
CIA Marks:25 Marks	ESE Marks:75 Marks	Total Marks: 100 Marks

### Preamble

Students are enabled to

- ✓ Understand the basic organic principles study the principles of titrimetric elaborately.
- ✓ Acquire an idea about the catalysis and photochemistry
- ✓ Gain knowledge on general principles of titrimetry

### Course Outcomes (CO)

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	Identify and discuss the various types of isomerisms.	K1, K2 & K3
CLO 2	Explain the basics of organic chemistry and interpret the types of reactions.	K1, K2 & K3
CLO 3	Describe the cleavage of covalent bonds and explain about the reaction intermediates.	K1, K2 & K3
CLO 4	Illustrate the basics of catalysis and define and demonstrate the laws of photochemistry	K1, K2 & K3
CLO 5	Interpret and demonstrate basics of titrimetry	K1, K2 & K3

K<sub>1</sub>-Remembering

K<sub>2</sub>-Understanding

K<sub>3</sub>-Applying

### Mapping of CO with PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	1	1	1	1	1	3
CLO 2	3	1	1	1	1	1	3
CLO 3	3	1	1	1	1	1	3
CLO 4	3	1	1	1	1	1	3
CLO 5	3	1	1	1	1	1	3
	15	5	5	5	5	5	15

Note:

Mapping Score:- Strong- 9, Medium-3 and Low-1

### Mapping of CO with PSO

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CLO 1	-	-	-	-	-
CLO 2	1	1	3	3	-
CLO 3	1	1	3	3	-
CLO 4	-	3	3	1	-
CLO 5	-	-	1	3	-
	2	5	10	10	-

Note:

Mapping Score:- Strong- 9, Medium-3 and Low-1

## Syllabus

### UNIT-I: ORGANIC BASIC PRINCIPLES - I

Empirical formula, molecular formula, structural formula – calculation of empirical formula and molecular formula from percentage composition – isomerism, structural isomerism- chain isomerism, position isomerism, functional isomerism and metamerism – stereoisomerism – geometrical isomerism (cis & trans of alkenes) – optical isomerism.

### UNIT-II: ORGANIC BASIC PRINCIPLES - II

Electrophiles, nucleophiles and their types – types of organic reactions, substitution, addition, elimination, rearrangement, and polymerization (definition and examples only) – resonance and tautomerism – differences between resonance and tautomerism.

### UNIT-III: ORGANIC BASIC PRINCIPLES – III

Valency of carbon atom – hybridization of carbon in methane – tetrahedral arrangement of carbon in methane – fission of a covalent bond, homolytic and heterolytic fission, difference between homolytic and heterolytic cleavage – Intermediates: Definition, formation and stability of carbocation, carbanion and free radical.

### UNIT-IV: CATALYSIS AND PHOTOCHEMISTRY

**Catalysis:** Introduction – homogeneous and heterogeneous catalysis – characteristics of catalyst – catalytic promoters – catalytic poisoning – autocatalysis – acid-base catalysis – enzyme catalysis and its characteristics.

**Photochemistry:** Introduction – comparison of thermal and photochemical reactions – Jablonski diagram, internal conversion, intersystem crossing, fluorescence and phosphorescence – chemiluminescence and bioluminescence.

### UNIT-V: GENERAL PRINCIPLES OF TITRIMETRY

Mole concept – molecular weight – formula weight – equivalent weight – concentrations terms, molarity, normality and weight percentage – indicator, analyte, titrant, end point – principle of titrimetry – primary and secondary standards – preparing standard solutions – standardizing the secondary standard solutions.

### Text Book

1. Bahl, A and Bahl, B.S. *Advanced Organic Chemistry*, S. Chand Publishing Company Ltd, New Delhi, 2012.
2. Arun bahl, Bahl B.S. and Tuli, G.D. *Essentials of Physical chemistry*, New Delhi.

### Reference Books

1. Morrison, R.T. and Boyd, R.N. *Organic chemistry*, 6<sup>th</sup> Ed., Prentice Hall Private Ltd, New Delhi, 1997.
2. Soni, P.L. *Text Book of Organic Chemistry*, Sultan Chand, New Delhi, 2005.
3. Puri. B.R., Sharma L.R. and Pathania M.S. *Principles of Physical chemistry*, 30<sup>th</sup> Ed., Vishal publication, Jalandhar-Delhi, 2007.

### E - Resources

1. <https://www.youtube.com/watch?v=nP0gDV0xDLY>
2. <https://www.youtube.com/watch?v=2NDOL11d6no>
3. <https://www.youtube.com/watch?v=LrtDlc6BfaE>
4. <https://www.youtube.com/watch?v=wRAo-M8xBHM>
5. [https://www.youtube.com/watch?v=Mjck01ao9Mw&list=PLj\\_Alq7xw30kL1S84P\\_SMO2wSfkTeN6n](https://www.youtube.com/watch?v=Mjck01ao9Mw&list=PLj_Alq7xw30kL1S84P_SMO2wSfkTeN6n)

### Pedagogy

Chalk & Talk, Group Discussion, PPT

### Teaching Aids

Green Board, LCD Projector, Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III : <b>Generic Elective Course</b>		SEMESTER - I
Course Title : <b>HUMAN ANATOMY</b>		
Course Code: <b>09GE11</b>	Hours per week: <b>2</b>	Credits: <b>2</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

### Objectives

- Study of various human tissues and skeletal systems
- Understand structure and functions of selected organs and organ systems
- Highlights human reproductive system

### Syllabus

#### Unit –I

Types of Tissues, Exoskeleton – Skin and hair  
Endoskeleton- Skull, fore limb and hind limb

#### Unit –II

Structure of Tooth and alimentary canal  
Structure of Kidney and Nephron

#### Unit-III

Structure of lungs  
Structure of heart, blood and blood groups

#### Unit-IV

Structure of brain  
Structure of eye and ear

#### Unit-V

Endocrine glands and their secretions  
Male and female reproductive system

### Text book

Best and Taylor – 1965. The living body – Chapman & Hall, London

### Reference Book

Marieb, M. 2006. Human Anatomy & Physiology, Dorling Kindersley (India) Pvt. Ltd., Delhi.  
P.S. Verma and V. K. Agarwal 1985. Animal physiology, S. Chand & Company, New Delhi.

### E - Resources

- <https://www.slideshare.net/usmanshams10/types-of-human-tissues>
- <https://www.slideshare.net/maruthishanskeli3/cosmetic-science-hair-and-skin>
- <https://www.slideshare.net/NurFauziah99/the-structure-of-the-kidney>
- <https://www.slideshare.net/deanlr55/structure-and-function-of-the-lungs>
- <https://www.slideshare.net/KJSCCETR/circulatory-system-7896806>
- <https://www.slideshare.net/ananthatiger/eye-ear>
- <https://youtu.be/N6VanIUF6f4>
- <https://youtu.be/YxSrahHzw gw>
- <https://www.slideshare.net/somallul/human-reproductive-system-75945327>
- <https://www.slideshare.net/ArunAnimangalam/structure-of-ear-power-point>

### Pedagogy

Chalk & Talk, Group Discussion, PPT

### Teaching Aids

Green Board, LCD Projector, Interactive White Board

தமிழ்த்துறை, விவேகானந்த கல்லூரி, திருவேடகம் மேற்கு.  
 Programme : B.A., BSc., (CBCS and LOCF)  
 (For those students admitted during the Academic Year 2021 – 2022 and after)  
 பாடத்திட்டத்தின் கட்டமைப்பு (PROGRAMME STRUCTURE)

UG Language PART – I TAMIL		SEMESTER: II
Subject Title: இடைக்கால இலக்கியமும் நாடகமும்		
Course Code: P1LT21/P1CT21	Hours per week: 18	Credit: 03
CIA Marks: 25	ESE Marks: 75	Total Marks: 100

### Preamble

1. பக்தி இலக்கியத்தின் வாயிலாக சமயம் மற்றும் வழிபாட்டு நெறிகளை உணர்த்துதல்.
2. சிற்றிலக்கியங்களின் வாயிலாக குடிமக்களின் வாழ்வியல் நெறிமுறைகளை வெளிக்கொணர்தல்.
3. நாடக இலக்கியம் வாயிலாக மனித வாழ்க்கையின் எதார்த்த நிகழ்வுகளைப் புலப்படுத்துதல்.
4. கணினிச் சொற்களின் வகைமைகளை அறிவித்தல்.
5. சைவ - வைணவ, சிற்றிலக்கியம், நாடகம் - ஆகியவற்றின் வரலாற்றினைத் தெளிவுபடுத்துதல்.

### Course Outcomes (COs)

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

NO	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	பக்தி இலக்கியங்களின் வாயிலாக வழிபாட்டு முறைகள், இறை நம்பிக்கைகள் குறித்ததன்மையினை வரையறை செய்வர்.	K <sub>1</sub> , K <sub>2</sub>
CLO 2	சிற்றிலக்கியங்களின் வாயிலாக குடிமக்களின் வாழ்வியல் குறித்த செய்திகளைக் கலந்துரையாடுவர்.	K <sub>2</sub> , K <sub>3</sub>
CLO 3	குறுநாடகங்களின் வாயிலாக மக்களின் எதார்த்த வாழ்வியல் முறைகளையும், நாடக உத்திமுறைகளையும் அறிவர்.	K <sub>2</sub> , K <sub>3</sub>
CLO 4	பேயர் - வினை, வினா - விடை, வேற்றுமை, தொகைகள் ஆகியன குறித்த தெளிவும், அவற்றை வகைப்படுத்தும் தன்மைகளையும் வெளிப்படுத்துவர்.	K <sub>2</sub>
CLO 5	கணினியில் தமிழ் மொழியின் பயன்பாட்டுத் தன்மைகளையும், சைவம் - வைணவம், சிற்றிலக்கியம், நாடகம் போன்ற இலக்கியத்தின் தன்மைகளையும், அதனைப் படைத்த படைப்பாளர்களின் வரலாற்றினையும் விவரிப்பர்.	K <sub>1</sub> , K <sub>2</sub> , K <sub>3</sub>

K<sub>1</sub>-Knowledge

K<sub>2</sub>-Understand

K<sub>3</sub>-Apply

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
CLO 1	9	3	3	9	9	3	9
CLO 2	9	3	9	9	9	3	9
CLO 3	9	1	3	9	9	3	9
CLO 4	9	-	3	9	9	-	9
CLO 5	9	-	3	3	3	-	9
	45	07	21	39	39	09	45

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### பாடத்திட்டம்(Syllabus)

சைவ இலக்கியம் - வைணவ இலக்கியம் 2.1 தேவாரம் - திருவேடகப்பதிகம் திருஞானசம்பந்தர்
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அலகு - 1	2.2 திருவாசகம் - பிடித்த பத்து மாணிக்கவாசகர் 2.3 திருப்பாவை - 1,2,3,4,5,6,17,24,25,29 ஆகிய 10 பாசுரங்கள் ஆண்டாள் 2.4 பெருமாள் திருமொழி (ஊனேறு செல்வத்து உடல் பிறவி... 11பாடல்கள்) குலசேகரஆழ்வார்	(18மணிநேரம்)
அலகு - 2	சிற்றிலக்கியம் 1.முக்கூடற் பள்ளு (முக்கூடலின் சிறப்பு, முக்கூடல் வளம்) 2.2 நந்திக்கலம்பகம் (1.திறையிடுமி னன்றி மதில்விடுமி னுங்கள்.... 2. வானுறு மதியை யடைந்ததுன் வதனம்....) 2.3 கலிங்கத்துப்பரணி - செயங்கொண்டார் (1.போரின் பேரொலி 2.வீரர்களும் அரசர்களும்) 2.4 தமிழ்விடுதாது ( 4 கண்ணிகள் ) 2.5 மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - குமரகுருபரர் (அம்புலிப் பருவம்) 2.6 குற்றாலக்குறவஞ்சி-திரிகூடராசப்பக்கவிராயர் (1.வானரங்கள் கனிகொடுத்து மந்தியொடு.... 2. ஓடக் காண்பது பூம் புனல் வெள்ளம்...)	(18மணிநேரம்)
அலகு - 3	நாடக இலக்கியம் 1. 'வைகையில் வெள்ளம் வரும்' - சேதுபதி	(18மணிநேரம்)
அலகு - 4	தமிழ் இலக்கணம் - சொல் 4.1 பெயர்ச்சொல் - வினைச் சொல் 4.2 வினா - விடை வகைகள் 4.3 வேற்றுமைகள் 4.4 தொகைகள்	(18மணிநேரம்)
அலகு - 5	தமிழ் இலக்கிய வரலாறும் பயன்பாட்டுத்தமிழும் 5.1 பக்தி இலக்கியத்தின் தோற்றமும் வளர்ச்சியும். 5.2 சிற்றிலக்கியத்தின் தோற்றமும் வளர்ச்சியும். 5.3 நாடகத்தின் தோற்றமும் வளர்ச்சியும் 5.4 கணினித்தமிழ் அறிமுகம் - கணினி ஆங்கிலச்சொல்லுக்கு நிகரான தமிழ்ச் சொல் அறிதல்.	(18மணிநேரம்)

#### பாட நூல்கள்

- செய்யுட் தொகுப்பு, தமிழ்த்துறை வெளியீடு. விவேகானந்த கல்லூரி, திருவேடகம் மேற்கு.
- வைகையில் வெள்ளம் வரும்(குறு நாடகங்கள்) சொ.சேதுபதி, பாவை பப்ளிகேஷன்ஸ், 142, ஜானி ஜான் கான் சாலை, இராயப்பேட்டை, சென்னை - 600 014.

#### பார்வை நூல்

- தமிழ் இலக்கிய வரலாறு முனைவர் கி.இராசா நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட், 41-பி, சிட்கோ இண்டஸ்டிரியல் எஸ்டேட், அம்பத்தூர், சென்னை- 600 098.

#### கற்பிக்கும் முறைகள்(Pedagogy)

விரிவுரை கொடுத்தல்,கலந்துரையாடல், காட்சிப் பதிவுகளின் வழியாக புலப்படுத்துதல்.

#### கற்பிக்க உதவுதல் (Teaching Aids)

கரும்பலகை பயன்படுத்துதல், காட்சி திரைவழியாகப் புலப்படுத்துதல்.

## DEPARTMENT SANSKRIT

Programme: B.A./ B.Sc. (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2022-23 and after)

PART – I: Sanskrit		SEMESTER – II
Course Title: <b>POETRY, GRAMMAR AND HISTORY OF LITERATURE – LYRICS</b>		
Course Code: <b>P1LS21</b>	Hours per week: <b>6</b>	Credits: <b>3</b>
CIA Marks: <b>25 Marks</b>	ESE Marks: <b>75 Marks</b>	Total Marks: <b>100 Marks</b>

### Preamble:

Sanskrit is offered as an alternative language under Part –I for B.A./ B.Sc students during first four semesters the above column explains the scheme of the II semester.

### Course Outcomes (COs)

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

	Statement	Knowledge Level
<b>CLO 1</b>	Understand Sanskrit poetry literature	K1, K2
<b>CLO 2</b>	Comparing literature with modern life	K2
<b>CLO 3</b>	Classify and discuss the importance of Sanskrit literature	K2
<b>CLO 4</b>	Describe and defend history of early Sanskrit literature	K2
<b>CLO 5</b>	Practice Creativity and Demonstrate different aspects of life as portrayed in Sanskrit literature	K2, K3

K1-Knowledge

K2-Understand

K3-Apply

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	3	9	9	9	9	1	9
<b>CLO 2</b>	9	9	3	9	9	-	9
<b>CLO 3</b>	3	3	9	9	9	-	9
<b>CLO 4</b>	9	9	9	9	3	-	9
<b>CLO 5</b>	9	9	9	9	3	-	9
	<b>33</b>	<b>39</b>	<b>39</b>	<b>45</b>	<b>33</b>	<b>1</b>	<b>45</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

**Unit 1:** Introduction to Sanskrit poetry literature such as Gnostic, Didactic and devotional. and its contents.

**Unit 2:** Kalividambanam- scholars - teachers- Astrologers.

**Unit 3:** Kalividambanam- Physicians - Relatives- Pseudo Monks.

**Unit 4:** Sabhārañjanaśatakam -Wisdom and its acquisition

**Unit 5:** Sabhārañjanaśatakam- Poetry

### Text Book(s)

1. Kalividambanam and Sabhārañjanaśatakam of Nīlakṣṇadhāṅkṣita Translated into English by Dr. Srinivasa Sharma and Prof C.R. Anantaraman pub. Sri Sadguna Publication, Chidambaram- 2. Yr. 2014.
2. A Short History of Sanskrit Literature, by T.K. Ramachandra Aiyar, published by R.S. Vadhyar & Sons, Kalpathi, Palakkad -678003

### Reference Books

A History of Sanskrit Literature, compiled by Dr. S. Jagadisan, Published by AMG Publications, Madurai -625010. Year of publication 1996.

**Pedagogy**

Chalk & Talk, Group Discussion, PPT

**Teaching Aids**

Green Board, LCD Projector, Interactive White Board

## DEPARTMENT OF ENGLISH

**Programme:** B.A., B.Sc., B.Com., & B.Com. (CA) (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021-22 onwards)

PART – II : English		SEMESTER - II
Subject Title : ENGLISH FOR ADVANCED COMMUNICATION SKILLS		
Course Code: P2LE21/P2CE21	Hours per week: 6	Credit: 3
CIA Marks: 25	ESE Marks: 75	Total Marks: 100

### Preamble

The students are expected to inculcate English language proficiency and its socio-linguistic competency.

### Course Outcome (CO):

On the successful completion of the course, the students would be able to:

No	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO1	Interpret philosophical thoughts and language mastery found in the poetry	K1, K2, K3
CLO2	Repeat listening, and reading proficiency through the prose discourses	K1, K2, K3
CLO3	Discuss the socio-linguistic and psychological behaviour of author, and characters found in the drama/play	K1, K2, K3
CLO4	Examine the properties of listening, speaking, reading, and writing activities to enhance English grammar usages	K1, K2, K3
CLO5	Exercise LSRW skills	K1, K2, K3

**K1 – Remembering    K2–Understanding    K3 – Applying**

### Mapping of CO and PO

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	9	9	3	9	9	9
CLO2	9	9	9	9	9	1	9
CLO3	9	9	9	9	9	3	9
CLO4	9	9	3	-	-	-	9
CLO5	9	9	9	3	9	-	9
	45	45	39	24	36	13	45

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

#### Unit-1 Poetry

1. Alfred, Lord Tennyson – *Ulysses*
2. Nissim Ezekiel – *Night of the Scorpion*
3. Robert Frost – *Stopping by Woods on a Snowy Evening*

#### Unit-2 Prose

1. Swami Vivekananda – *Sisters and Brothers of America*
2. Martin Luther King Jr. – *I Have a Dream*
3. Francis Bacon – *Of Friendship*

#### Unit-3 Drama

William Shakespeare – *The Merchant of Venice*  
(For the three Continuous Internal Assessment [CIA] Tests)

#### Unit-4 Grammar

1. Auxiliary (Helping) and Modal Verbs
2. Tenses
3. Question Tags

### Unit-5 Oral & Written Communication

1. **Listening** – Comprehension practice from Poetry, Prose, Drama /Online Voice Practice, observing/viewing E-content (with subtitles), Guest/Invited Lectures, Conference/Seminar Presentations & Tests, and BBC, CNN, DD National News Live, VOA etc
2. **Speaking** – In Group Discussion Forum, speak about Theatrical/Dramatic Enactment, Body- Language, Mock-Interview, Seminar Presentations on Classroom-Assignments, and Peer-Team-interactions/AIF in Class-room
3. **Reading** – Intonation practice and its enhancement from Poetry, Prose, Drama, News-Paper, and Individual-Assignments
4. **Writing** – *Writing Formal Letters/Résumé Preparation*, Transcoding (graphs, diagrams, Charts and data), and *Report Writing*.\*

### Text Books

1. Anderson et al. *Elements of Literature: Fourth Course Literature of the United States*. Florida: HRW Inc. 1993. (or) Vinay Harwadker, and A.K.Ramanujan, ed. *The Oxford Anthology of Modern Indian Poetry*. New Delhi: OUP, 1994. *The Norton Anthology English Literature*. New York/London: W.W.Norton, 2012. (or) Dr.M.Moovendhan, ed. *Wings of Poesy*. Chennai: Thamarai Publications, 2018. (or)  
<<https://www.poemhunter.com/poem/night-of-the-scorpion/>>  
<<https://www.poetryfoundation.org/poems/44475/la-belle-dame-sans-merci-a-ballad>>  
<<https://poets.org/poem/stopping-woods-snowy-evening>>
  2. Swami Vivekananda. *Sisters and Brothers of America*, (Chicago address at the World Parliament of Religions, 11th Sep, 1893.) <<http://www.advaitayoga.org/advaitayogaarticles/svchicagoadd.html>>
  3. Dr.P.C.James Daniel, ed. *Gateway to English: An Anthology of Prose*. Chennai: Harrows Publications, 2018.
  4. William Shakespeare. *The Merchant of Venice*. Ed. John Russell Brown. London: Methuen & Co., 1905. <<https://archive.org/details/in.ernet.dli.2015.126032/page/n7/mode/2up>> (or) Peter Alexander. *William Shakespeare: The Complete Works*. London: The English Language Book Society and Collins, 1964.
  5. Michael Swan and Catherine Walter. *How English Works: A Grammar Practice Book*. Oxford: OUP, 1997. (or) Wren and Martin. *High School English Grammar and Composition*. New Delhi: S.Chand& Company LTD.1935.
  6. Owen Hargie, David Dickson, and Dennis Tourish. *Communication Skills for Effective Management*. New York: Palgrave Macmillan, 2004. (or)
  7. British Council | LearnEnglish<<https://learnenglish.britishcouncil.org/skills>>
  8. BBC News <<https://www.bbc.com/news>>
  9. VOA Learning English <<https://learningenglish.voanews.com/>>
  10. University Grants Commission (UGC), New Delhi <<https://www.ugc.ac.in/subpage/EContent-URL.aspx>>
  11. British Council | LearnEnglish<<https://www.youtube.com/channel/UCOtnu-KKoAbN47IuYMeDPOg>> Cambridge Assessment English <<https://www.cambridgeenglish.org/test-your-english/>>
  12. CLIL ( Content & Language Integrated Learning ) – Module by TANSICHE
- NOTE: (Text: Prescribed chapters or pages will be given to the students by the department and the college)

### Reference Books

1. Eileen Thompson et al. *Prentice Hall Literature: The English Tradition*. 2.Ed. New Jersey: Prentice-Hall Inc., 1989. (or) John Pfordresher et al. *England in Literature*. Illinois: Scott, Foresman& Co., 1989. (or) Steuart H King, ed. *New Vistas in English Prose*. Bombay: Blackie & Sons Publishers,1980.
2. The Art Institute of Chicago, “Sisters and Brothers of America!” <<https://www.artic.edu/articles/710/sisters-and-brothers-of-america>>

3. Dr.A.Shanmugakani, ed. *Prose for Communication: An Anthology of Prose*. Madurai: Manimekala Publishing House, 2008.
4. William James Craig, ed. *The Complete Works of William Shakespeare*. London: Oxford University Press, 1914.
5. William Shakespeare. *The Merchant of Venice*. London: J.Tonson, 1734.  
<[https://archive.org/details/merchantofvenice00shak\\_11/page/36/mode/2up](https://archive.org/details/merchantofvenice00shak_11/page/36/mode/2up)>
6. George Yule. *Oxford Practice Grammar Advanced*. Oxford: OUP, 2006.
7. L.G.Alexander. *Longman English Grammar Practice for Intermediate Students*. Harlow (UK): Longman, 1990.
8. Roger Berry. *English Grammar: A Resource Book for Students*. London: Routledge, 2012.
9. K.V.Joseph. *A Textbook of English Grammar and Usage*. New Delhi: TATA McGraw Hill Education Private Limited, 2012.
10. Mary Ellen Guffey, and Richard Almonte. *Essentials of Business Communication*. Toronto: Nelson Education, 2007.

## **E Resources and References**

### **Unit-1 Poetry**

<https://www.litcharts.com/poetry/alfred-lord-tennyson/ulysses>

<https://www.poetryfoundation.org/poems/45392/ulysses>

<https://owlcation.com/humanities/Analysis-of-Poem-The-Night-of-the-Scorpion-by-Nissim-Ezekiel>

<https://literaryyog.com/night-scorpion-nissim-ezekiel/>

<https://www.poetryfoundation.org/poems/42891/stopping-by-woods-on-a-snowy-evening>

<https://studymoose.com/analysis-of-stopping-by-woods-on-a-snowy-evening-by-robert-frost-essay>

### **Unit-2 Prose**

<https://thejeshgn.com/wiki/great-speeches/sisters-and-brothers-of-america-swami-vivekananda/>

<https://www.ukessays.com/essays/english-language/speech-analysis-martin-luther-kings-i-have-a-dream-speech-7887.php>

<https://litpriest.com/essays/of-friendship-summary-analysis-francis-bacon/>

### **Unit-3 Drama**

<https://www.shakespeare.org.uk/explore-shakespeare/shakespeadia/shakespeares-plays/merchant-venice/>

<https://www.rsc.org.uk/the-merchant-of-venice/about-the-play/famous-quotes>

<https://www.litcharts.com/lit/the-merchant-of-venice/characters>

<https://www.slideshare.net/ciaffaroni/the-merchant-of-venice-62390271>

### **Unit-4 Grammar**

<https://www.gingersoftware.com/content/grammar-rules/verbs/auxiliary-or-helping-verbs/>

[https://www.englisch-hilfen.de/en/grammar/english\\_tenses.htm](https://www.englisch-hilfen.de/en/grammar/english_tenses.htm)

[https://www.grammar.cl/Intermediate/Question\\_Tags.htm](https://www.grammar.cl/Intermediate/Question_Tags.htm)

### **Unit-5 Oral & Written Communication**

<https://content.byui.edu/file/b8b83119-9acc-4a7b-bc84-efac9043998/1/Writing-2-5-2.html>

<https://www.towson.edu/careercenter/students/careerskills/communication.html>

<https://www.slideshare.net/shahbaazahmed15/bc-communication>

## **Pedagogy**

Teacher made aids and Mechanical (ITC) Aids, Chalk and Talk with interactive session.

Note: (Additional online sources, presentation, and test will be given by the respective teachers in the English Language Lab)

## **Teaching Aids**

Course Texts, Reference books, Writing Board, Guest Lecture/Invited Lecture, Group Discussion Forum and Online Sources.

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III : Core Course</b>		<b>SEMESTER - II</b>
<b>Course Title : CHORDATES - I</b>		
Course Code: <b>09CT21</b>	Hours per week: <b>4</b>	Credits: <b>4</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

To enable the students acquire knowledge on general features, classification and evolution of chordates and study of organs and organ systems to understand their functional aspects

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Learn the general characteristics, classification with common examples of chordates, Prochordates specialized characters and peculiar development	K1, K2, K3
<b>CLO 2</b>	Understand the comparative external features of various vertebrates	K1, K2, K3
<b>CLO 3</b>	Knowledge on morphological and anatomical features of vertebrates	K1, K2, K3
<b>CLO 4</b>	Acquire knowledge on organs of communicative and sensory systems of vertebrates	K1, K2, K3
<b>CLO 5</b>	Understand the structural organization of skeletal system in vertebrates	K1, K2, K3

K<sub>1</sub>-RememberingK<sub>2</sub>-UnderstandingK<sub>3</sub>-Applying**Mapping of CO with PO**

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	3	-	-	3	-	-
<b>CLO 2</b>	9	1	1	-	-	-	-
<b>CLO 3</b>	9	1	-	-	-	-	-
<b>CLO 4</b>	9	1	-	-	3	-	-
<b>CLO 5</b>	9	1	-	-	3	-	-
	45	7	1	-	9	-	-

**Mapping of CO with PSO**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	9	-	-	1	-
<b>CLO 2</b>	-	9	-	-	-
<b>CLO 3</b>	1	9	-	-	-
<b>CLO 4</b>	1	9	-	3	-
<b>CLO 5</b>	1	9	-	3	-
	<b>12</b>	<b>36</b>	-	<b>7</b>	-

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus**

<b>UNIT-I:</b>	<b>Protochordata</b> General characters and classification with examples – Amphioxus - Detailed study, General characters of Balanoglossus and Ascidian. Affinities of Balanoglossus, Retrogressive Metamorphosis in Ascidian	<b>(12 Hrs)</b>
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<b>UNIT-II:</b>	<b>Vertebrata</b> General characters and classification upto classes with examples Agnatha – salient features of Petromyzon External characters of Scoliodon, Frog, Calotes, Pigeon and Rabbit	<b>(12 Hrs)</b>
<b>UNIT- III:</b>	Comparative anatomy in Vertebrates - Integumentary system, Digestive system and Respiratory system	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	Comparative anatomy in Vertebrates - Circulatory system, Nervous system and Receptor organs	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	Endoskeleton (Frog only) and Endocrine glands Comparative anatomy of Urinogenital system	<b>(12 Hrs)</b>

#### **Text Books**

Ekambaranatha Ayyar, M. and Ananthkrishnan, T.N. 2013 – A Manual of Zoology Part II (Chordata) S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai.

#### **Reference Books**

- Gupta R.C and Girish Chopra, 2003 - Comparative Anatomy of Chordates – R.Chand& Co, New Delhi
- Jordan E.L, 2003 – Chordate zoology – S. Chand & Co, Chennai
- Kotpal, R.L. 2004 – Modern Text Book of Zoology Vertebrates, Second Edition, Rastogi Publications, Meerut.
- Harvey Pough F., Heifer, J.B. and McFarland, W.N. 1985 vertebrate life, Macmillan Pub. Co. New York.

#### **E Resources**

<https://www.slideshare.net/RameshPandi4/comparative-anatomy-of-digestive-system-of-vertebrates>  
<https://www.slideshare.net/RameshPandi4/comparative-anatomy-of-respiratory-system-of-vertebrates>  
<https://www.womenscollegesamastipur.org/Department/Online-study/zoology/Retrogressive-Metamorphosis.pdf> accessed on 20.07.2019.  
<https://www.notesonzoology.com/frog/endoskeleton-of-indian-frog-with-diagram-chordata-zoology/8261>

#### **Pedagogy**

Chalk & Talk, Group Discussion, PPT

#### **Teaching Aids**

Green Board, LCD Projector, Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III : Core Course</b>		<b>SEMESTER - II</b>
<b>Course Title: CHORDATES - II</b>		
Course Code: <b>09CT22</b>	Hours per week: <b>4</b>	Credits: <b>4</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

To enable the students basic understanding and the study of salient features, Origin, organization, comparative anatomy and trace the evolution

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Study the origin, ancestors and descendents of chordates	K1, K2, K3
<b>CLO 2</b>	Understand the adaptive characters and accessory organs of vertebrates	K1, K2, K3
<b>CLO 3</b>	Study the specialized features of Amphibians, identification features of poisonous and non-poisonous snakes	K1, K2, K3
<b>CLO 4</b>	Study the structures, its mechanisms and adaptation in Aves	K1, K2, K3
<b>CLO 5</b>	Study the mammalia through origin, aquatic adaptations and feeding accessories	K1, K2, K3

K<sub>1</sub>-RememberingK<sub>2</sub>-UnderstandingK<sub>3</sub>-Applying**Mapping of CO with PO**

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	-	-	-	3	3	3
<b>CLO 2</b>	9	-	-	-	3	3	1
<b>CLO 3</b>	9	-	9	3	9	9	-
<b>CLO 4</b>	9	-	3	-	3	9	-
<b>CLO 5</b>	9	-	-	-	-	3	-
	45	-	12	3	18	27	4

**Mapping of CO with PSO**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	3	9	-	9	-
<b>CLO 2</b>	1	9	-	-	-
<b>CLO 3</b>	9	-	-	9	-
<b>CLO 4</b>	1	9	-	-	-
<b>CLO 5</b>	1	3	-	-	-
	<b>15</b>	<b>30</b>	-	<b>18</b>	-

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus**

<b>UNIT-I:</b>	Origin and Phylogeny of Vertebrates, Amphibia, Reptilia and Birds	<b>(12 Hrs)</b>
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<b>UNIT-II:</b>	Parental care in fishes, Migration in fishes and Accessory respiratory organs in fishes	<b>(12 Hrs)</b>
<b>UNIT- III:</b>	Parental care in Amphibia, Neoteny in Amphibia and Poisonous and non-poisonous snakes of South India	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	Flight adaptation and mechanism of flight in birds, Migration in birds and Flightless birds	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	Prototherians, Metatherians and Eutherians, Dentition in mammals, Aquatic mammals and Origin of mammals.	<b>(12 Hrs)</b>

#### **Text Books**

Jordan, E.L. and Verma, P.S. 2011. Chordate Zoology, S.Chand & Co Ltd

#### **Reference Books**

Kotpal, R.L. 2011. Vertebrates, Rastogi Publications

Gupta R.C and Girish Chopra, 2003 - Comparative Anatomy of Chordates – R.Chand & Co, New Delhi

Newmann, 1981, The Phylum chordata, Biology of vertebrates and their kin, Satish Book Enterprises, Agra.

#### **E Resources**

<https://youtu.be/1Wzwk2IKUnk>

<https://youtu.be/BxSWSBxEZC8>

<https://www.slideshare.net/SameerChebbi1/parantal-care-in-fishes>

<https://www.slideshare.net/vidhyakalaivani29/parental-care-of-fishes>

<https://www.slideshare.net/nusratperween2/poisonous-and-non-poisonous-snakes-127080149>

<https://www.slideshare.net/vidhyakalaivani29/identification-of-poisonous-snakes>

<https://www.scribd.com/document/294867426/PROTOTHERIA>

<https://www.slideshare.net/JohnMathyamuthan/mammals-132043413>

<http://www.bio.sdsu.edu/faculty/archibald/Archibald01Eutheria.pdf>

#### **Pedagogy**

Chalk & Talk, Group Discussion, PPT

#### **Teaching Aids**

Green Board, LCD Projector, Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III : Core Lab</b>		<b>SEMESTER - II</b>
<b>Course Title: PRACTICAL - I</b>		
Course Code: <b>09CP23</b>	Hours per week: <b>2</b>	Credits: <b>4</b>
CIA: <b>40 Marks</b>	ESE: <b>60 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

Visualize and assimilate morphological and anatomical features by dissection demonstration, preserved specimens, charts and models and observe animals at their habitat & understand their biodiversity.

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CO 1</b>	Student will understand the dissection and mounting of organism, organs through demonstration	K1, K2, K3
<b>CO 2</b>	Perform mounting of body parts, locomotory parts and also perform simulated models of dissection through computers.	K1, K2, K3
<b>CO 3</b>	Identify the anatomical and special features from the prepared models and charts.	K1, K2, K3
<b>CO 4</b>	Identify morphological and special characteristics of animals through various phylum and classes	K1, K2, K3
<b>CO 5</b>	Locate, mark and collect the diversity species in agriculture, apiary and marine habitats.	K1, K2, K3

**K<sub>1</sub>**-Remembering**K<sub>2</sub>**-Understanding**K<sub>3</sub>**-Applying**Mapping of CO with PO**

	<b>PLO 1</b>	<b>PLO 2</b>	<b>PLO 3</b>	<b>PLO 4</b>	<b>PLO 5</b>	<b>PLO 6</b>	<b>PLO 7</b>
<b>CLO 1</b>	9	-	-	-	3	-	3
<b>CLO 2</b>	9	9	-	-	3	-	3
<b>CLO 3</b>	9	3	-	-	-	-	-
<b>CLO 4</b>	9	3	-	-	-	-	-
<b>CLO 5</b>	9	-	-	-	-	9	9
	45	15	-	-	6	9	15

**Mapping of CO with PSO**

	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CLO 1</b>	3	-	-	-	-
<b>CLO 2</b>	3	-	3	-	-
<b>CLO 3</b>	1	-	-	-	-
<b>CLO 4</b>	9	1	-	3	-
<b>CLO 5</b>	9	-	-	3	9
	<b>25</b>	<b>1</b>	<b>3</b>	<b>6</b>	<b>9</b>

**Note:** Mapping Score Strong-9, Medium- 3 and Low-1

## Syllabus

### A. Demonstration

Cockroach- Dissection - Digestive system, Nervous systems & Reproductive system  
Mounting - Mouth parts and Salivary glands  
Earthworm – Dissection - Digestive and Nervous systems  
Mounting - Body setae and Penial setae  
House fly - Mounting -Mouthparts  
Virtual Dissection – Earthworm, Cockroach, Honey bee, Housefly, Mosquito using softwares

### B. Chart/Models

Pila - Digestive system and Nervous system  
Freshwater mussel - Digestive system

### C. Spotters

Protozoa *Amoeba, Plasmodium, Paramecium* Entire and conjugation.  
Porifera Gemmules and Spicules.  
Coelenterata *Obelia* Colony, Medusa, *Physalia*, Any One Coral, Sea Anemone.  
Helminthes Liverfluke-Entire, *Taenia*(Entire and Scolex).  
Nematoda *Ascaris* Male and Female.  
Annelida *Nereis*, Leech .  
Arthropoda *Zoea, Nauplius*, Millipede and Centipede  
Mollusca *Chiton, Sepia, Nautilus*, Octopus.  
Echinodermata Starfish, Sea urchin , Sea cucumber.

### D. Field Visit

Observation and identification of insect pests of agricultural crops.  
Vist to Vermifarm and observaci3n of Earthworm species  
Visit to Apiary

## Chordates

### A. Dissection and mounting

Fish – Dissection and observation of visceral organs  
Shark- Mounting of Placoid Scales

B. Virtual Dissection - Frog, Calotes and Chick using softwares.

### C. Chart/Models

Frog - Arterial system and Venous system, brain and spinal nerves

### D. Spotters

*Amphioxus, Balanoglossus, Ascidian, Petromyzon*  
*Narcine, Anabas, Echines, Hippocampus*, Eel  
*Rhacophorus* and *Alytes*

Krait, Cobra, Viper, *Typhlops, Enhydrina, Draco* and Chaemeleon

Beaks and feet in birds, Ant eater and Bat

Osteology of Rabbit – Skull, Typical Vertebra, Pectoral and pelvic girdle – Fore limb and Hind limb

### E. Field visit

Rameshwaram, Kurusadai Island & Mandapam, Tuticorin - Biodiversity study of marine animals.

(12 Hrs)

## Text Books

Kapoor, 2014 Practical Zoology, Silver Line Publications, Allahabad, Uttarpradesh

## Reference Books

- Pechenik, Jan A 2014 – Biology of the Invertebrates, Tata Mcgraw – Hill Pub. Company Ltd., New Delhi
- Vasantika Kashyap, 2013, Life of Invertebrates, Second Revised Edition, Vikas Pub. House Pvt. Ltd., New Delhi
- Kotpal, R.L. 2012. Modern Text Book of Zoology, Invertebrates (Animal diversity – I), Rastogi Publications, Meerut
- Barnes, R.D. 2006, Invertebrate Zoology, IV Edition, Holf Saunders International edition
- Ekambaranatha Ayyar and Ananthkrishnan, T.N. 2005, A manual of Zoology, volume I, Invertebrate, Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai
- Kotpal, R.L. 2011. Vertebrates, Rastogi Publications

- Gupta R.C and Girish Chopra, 2003 - Comparative Anatomy of Chordates – R.Chand & Co, New Delhi
- Newmann, 1981, The Phylum chordata, Biology of vertebrates and their kin, Satish Book Enterprises, Agra.

### **Pedagogy**

Chalk and talk, Charts and models, smart board, Group Discussion, PPT, Preserved animals, slides and Field visit

### **Teaching Aids**

Green Board, LCD Projector, Interactive White Board, Microscope – Dissection, Compound, Deep vision and Phase Contrast Microscope.

**DEPARTMENT OF CHEMISTRY**

Programme: B.Sc. Chemistry, (CBCS and Outcome Based Education (OBE)

(For those students admitted during the Academic Year 2018-19 and after)

PART – III : Allied Theory		SEMESTER - II
Course Title : Chemistry for Biologist-II		
Course Code: 07ATB2/07AEZ2	Hours per week: 2	Credits: 4
CIA Marks: 25	ESE Marks: 75	Total Marks: 100

**Preamble**

Students are enabled to,

- ✓ understand the concept of acids and bases and chemical bonding
- ✓ acquire knowledge about aminoacid, proteins and vitamins and their functions
- ✓ study and assess the effect of selected pesticides, fungicides and polutions

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	Learn the historical development for the definitions of acid and base.	K1
CLO 2	Understand the different approaches to types of chemical bonding	K2
CLO 3	Acquire knowledge of aminoacids, proteins and vitamins and their biological functions	K2&K3
CLO 4	Learn and assess the effect of selected pesticides, fungicides and polutions	K1&K2
CLO 5	Obtained the knowledge of different types of air polution	K1& k2

**K1-Knowledge****K2-Understand****K3-Apply****Mapping of CO with PO**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	1	1	1	1	1	3
CLO 2	3	1	1	1	1	1	3
CLO 3	3	1	1	1	1	1	3
CLO 4	3	1	1	1	1	9	3
CLO 5	3	1	1	1	1	9	9
	15	5	5	5	5	21	21

**Mapping of CO with PSO**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CLO 1	1	3	3	1	-
CLO 2	-	3	3	3	-
CLO 3	-	9	3	9	1
CLO 4	-	1	3	9	1
CLO 5	-	1	1	1	-
	1	17	13	23	2

**Note:** Strong- 9 Medium-3 Low- 1**Syllabus****UNIT-I: ACIDS AND BASES**

Introduction– Arrhenius concept –Bronsted-Lowry concept –Lewis concept – Cady, Elsey concept – Lux-Flood concept – Usanovich concept –pH concept.

## UNIT-II: CHEMICAL BONDING

Ionic Bond – lattice energy – Born-Haber cycle – properties of ionic compounds - covalent bond, polar covalent bond – characteristics of covalent bond – Fajan's Rule – metallic bond – hydrogen bond and its types.

## UNIT- III: AMINOACIDS, PROTEINS AND VITAMINS

Preparation (Gabriel Phthalimide and Strucker synthesis) – properties of amino acids and glycine – zwitter ion – polypeptides – proteins, classification. Vitamins: classification and biological functions of vitamins A, B<sub>6</sub>, B<sub>12</sub>, C, D, E and K (Structural elucidation not required)

## UNIT- IV: PESTICIDES AND FUNGICIDES

**Pesticides:** Introduction – classification – organic and inorganic pesticides – characteristics – safe handling of pesticides – impact of pesticides on and environment

**Fungicides:** Introduction – classification – sulfur, copper, mercury containing compounds

## UNIT- V: POLLUTIONS

**Air pollution:** Introduction – composition of air – chemical reactions occurring in air due to sunlight – sources of air pollution – classification and effects of air pollutants – Effects of CFC – Ozone layer – depletion Greenhouse effect and its causes.

**Water pollution:** Types, sources, sewage, industrial effluents, inorganic pollutants – control – water treatment.

**Soil pollution:** Definition – importance of soil – pH of soil – acidity & alkalinity and their causes (6 causes – emphasis towards industrial waste).

### Text Books

1. Ancillary chemistry K. Ratinamuthu (Study material will be provided) Semester – I and II

### Reference Books

1. Bahl & Arun Bahl *Advanced Organic Chemistry* by, S.Chand & Company Ltd, New Delhi, 2012 Edition.
2. Soni P.L. Mohan Katyal *Text book of Inorganic Chemistry* by, Sultan Chand & Sons, New Delhi, 2010 Edition.
3. Arun Bahl, Bhal B.S & Tuli G.D *Essentials of Physical chemistry* S.Chand Publishing Company, New Delhi, 2010 Edition.

### Pedagogy

Chalk & Talk, Group Discussion, PPT

### Teaching Aids

Green Board, LCD Projector, Interactive White Board

## DEPARTMENT OF CHEMISTRY

Programme: B.Sc. Botany / B.Sc. Zoology/Physics (CBCS and LOCF)  
(For those students who admitted during the Academic Year 2021-22 and after)

PART – III: <b>Ability Enhancement Course</b>		SEMESTER I
Course Title: <b>VOLUMETRIC ESTIMATION</b>		
Course Code: <b>07APZ3</b>	Hours per week: <b>2</b>	Credits: -
CIA Marks: -	ESE Marks:-	Total Marks: -

### Preamble

Students are enabled to

- ✓ Make solutions of different concentration and understand the principles behind volumetric analysis.
- ✓ Experience hands on training in volumetric titration

### Course Outcomes (CO)

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Anticipate, recognize, and respond properly to potential hazards in laboratory procedures	K1, K2 & K3
<b>CLO 2</b>	Perform accurate quantitative measurements	K1, K2 & K3
<b>CLO 3</b>	Interpret experimental results and draw reasonable conclusions	K1, K2 & K3
<b>CLO 4</b>	Keep accurate and complete experimental records	K1, K2 & K3
<b>CLO 5</b>	Interpret experimental results and draw reasonable conclusions & Communicate effectively through oral and written reports	K1, K2 & K3

**K<sub>1</sub>**-Remembering                      **K<sub>2</sub>**-Understanding                      **K<sub>3</sub>**-Applying

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	1	1	3	1	3	3	1
<b>CLO 2</b>	9	1	9	1	3	3	1
<b>CLO 3</b>	3	1	9	1	3	3	1
<b>CLO 4</b>	3	1	9	1	3	3	1
<b>CLO 5</b>	3	1	9	1	3	3	1
	<b>19</b>	<b>5</b>	<b>45</b>	<b>5</b>	<b>15</b>	<b>15</b>	<b>5</b>

### Mapping of CO with PSO

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	1	3	3	1	-
<b>CLO 2</b>	-	1	3	3	-
<b>CLO 3</b>	-	1	1	1	-
<b>CLO 4</b>	3	3	3	1	-
<b>CLO 5</b>	3	3	3	1	1
	<b>7</b>	<b>11</b>	<b>13</b>	<b>7</b>	<b>1</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

## Syllabus

### UNIT-I:

Concepts of molecular formula, molecular weight, equivalent weight, normality, molality, molarity and weight percentage – problems related to preparation of different concentrations of solutions – list of lab apparatus and their uses.

### UNIT-II:

Principle of volumetric estimation – definitions of titration, standard solution, analyte, titrant, indicator, end point, equivalent point – primary standard and secondary standard – preparation of standard solution.

### UNIT-III: ACIDIMETRY AND ALKALIMETRY

1. Estimation of Sodium Hydroxide

(Standard sodium carbonate vs. Link sulphuric acid vs. Given sodium hydroxide)

2. Estimation of Sodium Carbonate

(Standard sodium hydroxide vs. Link hydrochloric acid vs. Given sodium carbonate)

3. Estimation of Sulphuric acid

(Standard oxalic acid vs. Link sodium hydroxide vs. Given sulphuric acid)

4. Estimation of Hydrochloric acid

(Standard oxalic acid vs. Link sodium hydroxide vs. Given sodium hydrochloric acid)

### UNIT-IV: REDOX TITRATIONS

#### PERMANGANOMETRY

1. Estimation of oxalic acid

(Standard ferrous sulphate vs. Link potassium permanganate vs. Given oxalic acid)

2. Estimation of potassium permanganate

(Standard sodium hydroxide vs. Link oxalic acid vs. Given potassium permanganate)

3. Estimation of ferrous sulphate

(Standard oxalic acid vs. Link potassium permanganate vs. Given ferrous sulphate)

4. Estimation of ferrous ammonium sulphate

(Standard ferrous sulphate vs. Link potassium permanganate vs. Given ferrous ammonium sulphate)

#### UNIT-V: DICHROMETRY

Estimation of Potassium dichromate

(Potassium permanganate vs. Link ferrous ammonium sulphate vs. Given potassium dichromate)

## Text Book

1. Venkateswaran, V., Veerasamy, R. and Kulandaivelu, A.R. *Basic Principles of Practical Chemistry*, 2<sup>nd</sup> Ed., Sultan Chand & Sons, New Delhi, 2017.
2. Thomas, A.O. *B.Sc. Main Practical Chemistry*, Scientific Book Centre, Cannanore, 2003.

## Reference Books

1. Gnanaprakasam, N.S. and Ramamurthy, G. *Organic Chemistry Lab Manual*, S. Viswanathan Pvt. Ltd, 2007.
2. Jeffery, G.H., Basset, J. and others, *Vogel's Textbook of Quantitative Chemical Analysis*, ELBS, 5<sup>th</sup> Ed., London, 1989.

## E - Resources

1. <https://www.youtube.com/watch?v=KyZtyEF6kqk>
2. <https://www.youtube.com/watch?v=ka62KfMgRv8>
3. <https://www.youtube.com/watch?v=hxYorBeMhnc>
4. <https://www.youtube.com/watch?v=xOQ6tweyWuE>
5. <https://www.youtube.com/watch?v=bHkFSavcU5I>
6. <https://www.youtube.com/watch?v=gSauVhYtVIU>

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>Part – IV : Generic Elective Course</b>		
Subject Title : <b>FOOD AND NUTRITION</b>		
Course Code: <b>09GE21</b>	Hours per week: <b>2</b>	Credits: <b>2</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

### Objectives

- Reveal the types, sources and importances of nutrients
- Expose disorders of malnutrition and food born diseases
- Inculcate importance of sanitation and hygiene for societal welfare

### Syllabus

#### Unit-I

**Food as a source of nutrients** – Definition- functions of food- recommended daily allowances for nutrients- nutritive value of foods- Balanced diet.

#### Unit-II

**Nutrients** – Health benefits of Carbohydrates, Proteins Fats, Minerals Vitamins and Pigments.

#### Unit-III

**Disorders of Malnutrition** – Kwashiorkor – Marasmus – Obesity – Anaemia -Epidemic dropsy and Deficiency diseases.

#### Unit-IV

**Food sanitation and Hygiene** – Water- Food- food spoilage- Preservation- Control of Insects and Rodents

#### Unit-V

**Food Borne Diseases** – Food poisoning-Poisoning organisms – Bacteria, Mold and Yeast.

### Text book

Fundamentals of Foods and Nutrition – R. Mudambi and V.Rajagopal – Wiley Eastern Limited – New Delhi.

### E Resources

<https://www.slideshare.net/DrVandanaMahajani/functions-of-food-and-definitions>

<https://www.slideshare.net/JayantSidhdhapara/balanced-diet-54291330>

<https://youtu.be/FLx-oQ0IR3s>

<https://www.slideshare.net/fitango/nutritional-disorders-19033485>

<https://youtu.be/baV84Udrbsw>

<https://www.slideshare.net/waleedfoad/3rd-lecture-signs-of-food-spoilage-54186694>

<https://www.slideshare.net/yvonneangelynalias/control-of-rodents-and-insects>

<https://youtu.be/EOOsBE5dqv8>

விவேகானந்த கல்லூரி, திருவேடகம் மேற்கு-625 243

தமிழ்த்துறை

Programme: B.A., B.Sc. (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 2022 and after)

PART – I TAMIL		SEMESTER : III
Course Title : : காப்பிய இலக்கியமும் உரைநடை இலக்கியமும்		
Course Code : P1LT31	Hours per week : 6	Credits : 3
CIA : 25 Marks	ESE : 75 Marks	Total: 100 Marks

**முன்னுரை**

1. வாழ்க்கையின் உறுதிப்பொருள்களான அறம், பொருள், இன்பம் வீடுபேறு ஆகியனவற்றை உணர்த்துதல்.
2. இறைவழிபாட்டு சிந்தனைகளை வளர்த்தல்.
3. உரைநடை இலக்கியத்தின் வாயிலாக தனிமனித ஒழுக்க நிலைகளை எடுத்துக்காட்டல்.
4. மரபுக்கவிதைகளின் வகைமைகளை அறிதல்.
5. காப்பியம் மற்றும் உரைநடை இலக்கியத்தின் வரலாற்றினை அறிவித்தல்.

**பாடதிட்டத்தின் முடிவுகள்**

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

NO.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	காப்பிய இலக்கியங்களின் வாயிலாக அறம், பொருள், இன்பம், வீடுபேறு என்ற வாழ்க்கையின் உறுதிப்பொருட்கள், எவ்வுயிரையும் தம்முயிர்போல மதித்தல், பிறர் மனை நோக்கா நிலை, பகைமை பாராட்டாத தன்மை, ஆணவம் இல்லா வாழ்க்கை போன்றவைகளை வரையறை செய்த தன்மைகளை உணர்த்துதல்.	K1, K2
CLO 2	மரபு இலக்கணங்களான அணிகள், பாவகைகளின் வாயிலாக மாணவர்களின் இலக்கியச்சுவை உணர்வினை வளர்த்து, கற்பனைத் திறன்களை அறிவித்தல்.	K2, K3
CLO 3	உரைநடை இலக்கியங்களின் வாயிலாக இறைவழிபாட்டுச் சிந்தனைகளை தனிமனித வாழ்க்கை நிகழ்வுகளின் வழி வெளிப்படுத்தி, உலக இயல்புகளை மொழிந்து, பரம்பொருளை அடையக்கூடிய வழிவகைகளையும், சமரச சன்மார்க்க நெறிகளையும் தெளிவுறுத்துதல்.	K2, K3
CLO 4	புராண, இதிகாசங்களின் வழி அக்காலகட்ட மக்களின் சமூக நிலைகளைக் கலந்துரையாட செய்தல்.	K2
CLO 5	காப்பியம் மற்றும் உரைநடை இலக்கியம் தோன்றிய காலகட்ட வரலாற்றினை விவரித்தல். கணிணிக்கு தமிழ் அறிமுகமான நிலைகள், அதற்குப் பயன்படுத்தக் கூடிய கணிணித் தமிழ்ச்சொற்கள் ஆகியன குறித்து விவரித்தல்	K1, K2, K3

K<sub>1</sub>-Remembering

K<sub>2</sub>-Understanding

K<sub>3</sub>-Applying

**Mapping of CLO and PLO**

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	9	9	9	9	3	9
CLO2	9	9	9	9	9	3	9
CLO3	9	9	9	9	9	3	9
CLO4	9	3	3	3	9	-	9
CLO5	9	3	9	9	9	-	9
	45	33	39	39	45	09	45

Note: Mapping Score Strong-9, Medium- 3 and Low-1

## பாடத்திட்டம்

அலகு - 1	<b>காப்பிய இலக்கியம்</b> 1. சிலப்பதிகாரம் - (கனாத்திறம் உரைத்த காதை) 2. மணிமேகலை (ஆதிரை பிச்சையிட்ட காதை) 3. சீவகசிந்தாமணி (குணமாலையார் இலம்பகம்)	18மணிநேரம்
அலகு - 2	<b>இதிகாச இலக்கியம்</b> 1. கம்பராமாயணம் (குகப்படலம்) 2. மகாபாரதம் (கண்ணன் தூதுச் சருக்கம்) 3. ஸ்ரீகந்த புராணம் - தேவகாண்டம் (தெய்வாணை, வள்ளி திருமணம்)	
அலகு - 3	<b>உரைநடை இலக்கியம்</b> 1. சித்பவானந்த சிந்தனைகள்	18மணிநேரம்
அலகு - 4	<b>தமிழ் இலக்கணம்</b> 1.அணிகள் - உவமை - உருவகம் - பிறிது மொழிதல் - தற்குறிப்பேற்றம் - வஞ்சப்புக்கழ்ச்சி அணி 2.பாவகைகள் - வெண்பா - ஆசிரியப்பா 3.மடல் வரைதல் - விண்ணப்பம் - புகார்க் கடிதம் - பாராட்டுக் கடிதம்	18மணிநேரம்
அலகு - 5	<b>தமிழ் இலக்கிய வரலாறும் பயன்பாட்டுத் தமிழும்</b> 1. காப்பிய இலக்கிய வரலாறு 2. உரைநடை இலக்கிய வரலாறு 3. செய்தித்தாள் தொடங்கும் வழிமுறைகள் செய்தித்தாளின் நிர்வாக அமைப்பு - பேட்டி	18மணிநேரம்

## பாட நூல்கள்

1. தமிழ்ச் செய்யுட் தொகுப்பு - தமிழ்த்துறை வெளியீடு
2. நாடகம் - வைகையில் வெள்ளம் வரும்- சதுபதி. பாவை பப்ளிகேஷன்ஸ்- சென்னை - 14

## பார்வை நூல்கள்

- 1.தமிழ் இலக்கிய வரலாறு - பேரா.முனைவர் பாக்யமேரி, நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட்,41-பி, சிட்கோ இண்டஸ்டிரியல் எஸ்டேட், அம்பத்தூர், சென்னை- 600 098.
- 2.தமிழ் இலக்கிய வரலாறு- மு.வரதராசனார் சாகித்திய அக்காதெமி,தலைமை அலுவலகம்,ரவீந்திர பவன், 35,பெரோஸ்ஷா சாலை,புதுதில்லி.

## E-Resources

1. <https://www.youtube.com/watch?v=JRkZ1W4V7e4>
2. <https://www.youtube.com/watch?v=svvgz4Bt3Vo>
3. <https://www.youtube.com/watch?v=PSG4fuuHruo>
4. <https://www.youtube.com/watch?v=yFGkSYyhsRA>
5. [https://www.tamildigitalibrary.in/admin/assets/book/TVA\\_BOK\\_0002569\\_%E0%AE%B5%E0%AE%BF%E0%AE%B2%E0%AF%8D%E0%AE%B2%E0%AE%BF%E0%AE%AA%E0%AF%81%E0%AE%A4%E0%AF%8D%E0%AE%A4%E0%AF%82%E0%AE%B0%E0%AE%BE%E0%AE%B0%E0%AF%8D\\_%E0%AE%AA%E0%AE%BE%E0%AE%B0%E0%AE%A4%E0%AE%AE%E0%AF%8D.pdf](https://www.tamildigitalibrary.in/admin/assets/book/TVA_BOK_0002569_%E0%AE%B5%E0%AE%BF%E0%AE%B2%E0%AF%8D%E0%AE%B2%E0%AE%BF%E0%AE%AA%E0%AF%81%E0%AE%A4%E0%AF%8D%E0%AE%A4%E0%AF%82%E0%AE%B0%E0%AE%BE%E0%AE%B0%E0%AF%8D_%E0%AE%AA%E0%AE%BE%E0%AE%B0%E0%AE%A4%E0%AE%AE%E0%AF%8D.pdf)
6. <https://www.youtube.com/watch?v=Oa7RKkVyVHA>
7. <http://www.shakthibharathi.com/uploads/%E0%AE%95%E0%AE%BE%E0%AE%AA%E0%AF%8D%E0%AE%AA%E0%AE%BF%E0%AE%AF%20%E0%AE%87%E0%AE%B2%E0%AE%95%E0%AF%8D%E0%AE%95%E0%AE%BF%E0%AE%AF%20%E0%AE%B5%E0%AE%B0%E0%AE%B2%E0%AE%BE%E0%AE%B1%E0%AF%81.pdf>
8. [https://www.gunathamizh.com/2020/05/blog-post\\_30.html](https://www.gunathamizh.com/2020/05/blog-post_30.html)

## **கற்பிக்கும் முறைகள்**

விரிவுரை கொடுத்தல், கலந்துரையாடல், காட்சிப் பதிவுகளின் வழியாக புலப்படுத்துதல்.

## **கற்பிக்க உதவுதல்**

கரும்பலகை பயன்படுத்துதல், காட்சி திரைவழியாகப் புலப்படுத்துதல்.

## DEPARTMENT SANSKRIT

Programme: B.A./ B.Sc. (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021-22 and after)

PART – I : Sanskrit		SEMESTER – III
Course Title : PROSE, POETICS AND HISTORY OF SANSKRIT LITERATURE –III		
Course Code: P1LS31	Hours per week: 6	Credits: 3
CIA Marks: 25 Marks	ESE Marks: 75 Marks	Total Marks: 100 Marks

### Preamble:

Sanskrit is offered as an alternative language under Part –I for B.A./ B.Sc students during first four semesters the above column explains the scheme of the III semester.

### Course Outcomes (COs)

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

Number	Statement	Knowledge Level
CLO1	Understand the important aspects of prose literature	K2
CLO2	Discriminate spirituality in Literature	K2
CLO3	Basic knowledge of Sanskrit poetics	K1
CLO4	Describe and defend history of early Sanskrit literature	K2
CLO5	Practice Creativity and Demonstrate various culture of world	K2, K3

K1-Knowledge

K2-Understand

K3-Apply

### Mapping of CO and PO

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO 6	PLO 7
CLO1	9	9	9	3	9	-	9
CLO2	9	9	9	9	3	-	3
CLO3	3	3	9	9	9	1	3
CLO4	9	9	9	9	9	-	9
CLO5	9	9	9	9	3	-	3
	39	39	45	39	33	1	27

Strong -9

Medium -3

Low -1

### Syllabus

**Unit 1:** Prose -Gurubhakti, poetics –Upamā, Ullekhā. History of Sanskrit Literature – Gadya Kāvya- introduction to Gadya Kāvya- structure of Gadya Kāvya- Kathā and Ākhyāyikā

**Unit 2:** Prose –Śukānasopadeśa, poetics –Rūpaka, Apahnuti. History of Sanskrit Literature – Daśakumāracaritam of Daṇḍin, Vāsavadatta of Subandhu. Popular tales

**Unit 3:** Prose - Samsargajādasagunābhavanti, poetics –Utprekṣā, Atiśayokti. History of Sanskrit Literature- Kādambarī of Bāṇabhaṭṭa- structure of Kādambarī. Historical Kāvya- Harṣacaritam of Bāṇabhaṭṭa.

**Unit 4:** Prose - Pañcatantra (introduction), poetics –Dīpaka, Arthāntaranyāsa. History of Sanskrit Literature- works of Vākpati, Bilhana, Kalhana, Vāmananabhaṭṭabāna.

**Unit 5:** Prose –Vāsudevautyam, poetics – Śleṣa, Vyatireka. History of Sanskrit Literature- History of Campū-literature – works of Trivikramabhaṭṭa, Somadeva, Bhoja, Abhinavakālidāsa, Anantabhaṭṭa, Cidambara-kavi, Rājāśarabhoji, Nīlakaṇṭhadīkṣita, Venkaṭādri.

### Text Book(s)

1. Sāhityarasakaṇa, compiled by Dr. S. Jagadisan, Published by AMG Publications, Madurai - 625010. Year of publication 1996.

2. A History of Sanskrit Literature, compiled by Dr. S. Jagadisan, Published by AMG Publications, Madurai -625010. Year of publication 1996.

### **Reference Books**

1. A Short History of Sanskrit Literature, by T.K. Ramachandra Aiyar, published by R.S. Vadhyar & Sons, Kalpathi, Palakkad -678003
2. A History of Sanskrit Literature, by A. Berriedale Keith, published by Motilal Banarsidass Publishers Private Limited, Delhi, 2017.

### **Pedagogy**

Chalk & Talk, Group Discussion, PPT

### **Teaching Aids**

Green Board, LCD Projector, Interactive White Board

## DEPARTMENT OF ENGLISH

Programme: B.A., & B.Sc., (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021-22 onwards)

PART – II : English		SEMESTER – III
Subject Title : ENGLISH FOR ACADEMIC EXCELLENCE AND SUCCESS		
Course Code: P2LE31/P2CE31	Hours per week: 6	Credit: 3
CIA Marks: 25	ESE Marks: 75	Total Marks: 100

### Preamble:

The students are expected to inculcate English language proficiency and its socio-linguistic competency.

### Course Outcome (CO):

On the successful completion of the course, the students would be able to:

No	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Develop comprehension skills of poetic diction/usage through the poetry	K1, K2, K3
CO2	Appraise various authors' socio-linguistic values through the prose discourses	K1, K2, K3
CO3	Critique the views of the author, and characters from their discourses found in the novel	K1, K2, K3
CO4	Examine the properties of listening, speaking, reading, and writing activities to enhance English grammar usages	K1, K2, K3
CO5	Exercise LSRW skills	K1, K2, K3

**K1-Remembering**

**K2- Understanding**

**K3 –Applying**

### Mapping of CO and PO

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	9	9	3	9	3	9
CLO2	9	9	9	9	9	-	9
CLO3	9	9	9	9	9	3	9
CLO4	9	9	3	-	-	-	9
CLO5	9	9	9	3	3	-	9
	<b>45</b>	<b>45</b>	<b>39</b>	<b>24</b>	<b>30</b>	<b>06</b>	<b>45</b>

Strong-9

Medium -3

Low -1

### Syllabus

#### Unit-1 Poetry

1. *The Soul's Prayer* – Sarojini Naidu
2. *La Belle Dame Sans Merci* – John Keats
3. *The Lotus* – Toru Dutt

#### Unit-2 Prose

1. *Women Not the Weaker Sex* – Mahatma Gandhi
2. *The Lady, or the Tiger?* – Frank R. Stockton
3. *Educating the Adult* (Chapter-I) *The Indian National Education* – Swami Chidbhananda

#### Unit-3 Novel

*Oliver Twist* – Charles Dickens [Abridged]

(For the three Continuous Internal Assessment [CIA] Tests)

#### Unit-4 Grammar

1. Active Voice and Passive Voice
2. Direct Speech and Indirect Speech

### 3. Sentence Connectors and Linkers

#### Unit-5 Oral & Written Communication

1. **Listening** – Comprehension practice from Poetry, Prose, Novel/Online Voice Practice, observing/viewing E-content (with subtitles), Guest/Invited Lectures, Conference/Seminar Presentations & Tests, and DD National News Live, BBC, CNN, VOA etc
2. **Speaking** – In Group Discussion Forum, participate in the Turn Taking, and Conversation Management, Debating, Defending/Mock Viva-Voice, Seminar Presentations on Classroom-Assignments, and Peer-Team-interactions/AIF in Class-room
3. **Reading** – Different Reading Strategies in Poetry, Prose, Novel, Newspaper etc
4. **Writing** – *Dialogue/Conversation Writing, Advertisement Writing, and Creative Writing (autobiography, article etc.) for publication in Mass Media.\**

#### Text Books

1. Vinay Harwadker, and A.K.Ramanujan, ed. *The Oxford Anthology of Modern Indian Poetry*. New Delhi:OUP, 1994. (or)  
*The Norton Anthology English Literature*. New York/London: W.W.Norton, 2012. (or)  
Dr.M.Moovendhan, ed. *Wings of Poesy*. Chennai: Thamarai Publications, 2018 (or)
2. <<https://www.poemhunter.com/poem/the-soul-s-prayer/>>
3. <[https://en.wikisource.org/wiki/The\\_Bengali\\_Book\\_of\\_English\\_Verse/The\\_Lotus\\_\(Toru\\_Dutt\)](https://en.wikisource.org/wiki/The_Bengali_Book_of_English_Verse/The_Lotus_(Toru_Dutt))>
4. <<https://www.poetryfoundation.org/poems/45392/ulysses>>
5. Swami Chidbhavananda. *The Indian National Education*. Tirupparaithurai: Sri Ramakrishna Tapovanam, 2017.  
<[http://www.rktapovanam.org/book\\_details.php?book\\_id=MjE=](http://www.rktapovanam.org/book_details.php?book_id=MjE=)>
6. Dr.P.C. James Daniel, ed. *Gateway to English: An Anthology of Prose*. Chennai: Harrows Publications, 2018.
7. Abhijit Acharijee, and Rakesh Ramamoorthy, ed. *Frontiers of Communication: An Anthology of Short Stories and Prose*. Chennai: Cambridge University Press, 2018.
8. Charles Dickens. *Oliver Twist*. Chennai: Nestling Books, 2018. (or)
9. Charles Dickens. *Oliver Twist (the Parish Boy's Progress)*. London: Richard Bentley, 1839.  
<<https://ia800204.us.archive.org/34/items/olivertwist01dickrich/olivertwist01dickrich.pdf>>
10. Michael Swan and Catherine Walter. *How English Works: A Grammar Practice Book*. Oxford: OUP, 1997. (or) Wren and Martin. *High School English Grammar and Composition*. New Delhi: S.Chand & Company LTD.1935.
11. Owen Hargie, David Dickson, and Dennis Tourish. *Communication Skills for Effective Management*. New York: Palgrave Macmillan, 2004. (or)
12. British Council | LearnEnglish<<https://learnenglish.britishcouncil.org/skills>>
13. BBC News <<https://www.bbc.com/news>>VOA LearningEnglish
14. <<https://learningenglish.voanews.com/>>
15. University Grants Commission (UGC), New Delhi <<https://www.ugc.ac.in/subpage/EContent-URL.aspx>> British Council | LearnEnglish<<https://www.youtube.com/channel/UCOtnu-KKoAbN47IuYMeDPOg>> Cambridge Assessment English<<https://www.cambridgeenglish.org/test-your-english/>>
16. CLIL ( Content & Language Integrated Learning ) – Module by TANSCHENOTE: (*Text: Prescribed chapters or pages will be given to the students by the department and the college*)

#### Reference Books

1. Eileen Thompson et al. *Prentice Hall Literature: The English Tradition*. 2.Ed. New Jersey: Prentice-Hall Inc., 1989. (or) John Pfordresher et al. *England in Literature*. Illinois: Scott, Foresman& Co., 1989.
2. Swami Chidbhavananda. *Vedanta Society*.<<https://sfvedanta.org/authors/swami-chidbhavananda/>>

3. Dr.A.Shanmugakani, ed. *Prose for Communication: An Anthology of Prose*. Madurai: Manimekala Publishing House, 2008.
4. Charles Dickens. *Oliver Twist*. London: Wordsworth Classic, 1992.
5. J. C.Nesfield. *Manual of English Grammar and Composition*. London: Macmillan, 1908.
6. John Eastwood. *Oxford Practice Grammar*. Oxford: OUP, 1945.
7. Dennis Freeborn. *A Course Book in English Grammar*. London: Macmillan, 1987.
8. K.V.Joseph. *A Textbook of English Grammar and Usage*. New Delhi: TATA McGraw Hill Education Private Limited, 2012.
9. J. Thomson, and A. V. Martinet. *A Practical English Grammar*. New Delhi: OUP, 1986.
10. Mary Ellen Guffey, and Richard Almonte. *Essentials of Business Communication*. Toronto: Nelson Education, 2007.
11. Edgar Thorpe, and Showick Thorpe. *Objective English for Competitive Examinations*. New Delhi: Pearson India Education, 2017.
12. Mary Ellen Guffey, and Richard Almonte. *Essentials of Business Communication*. Toronto: Nelson Education, 2007.

## E Resources and References

### Unit-1 Poetry

<https://www.sajeepedia.com/naidus-the-souls-prayer/>

<https://www.criticalbuzzz.co.in/critical-analysis-of-the-souls-prayer-by-sarojini-naidu/>

<https://www.poetryfoundation.org/articles/69748/john-keats-la-belle-dame-sans-merci>

<https://www.cliffsnotes.com/literature/k/keats-poems/summary-and-analysis/la-belle-dame-sans-merci-original-version>

<https://www.literaturewise.in/mdl/mod/page/view.php?id=142>

<https://www.slideshare.net/stmaryspg2014/the-lotus-toru-dutt>

### Unit-2 Prose

<https://degmateng.wordpress.com/2017/03/31/unit-2-prose-ls-1-women-not-the-weaker-sex-m-k-gandhi/>

<https://www.mkgandhi.org/momgandhi/chap60.htm>

<https://www.eastoftheweb.com/short-stories/UBooks/LadyTige.shtml>

<https://www.supersummary.com/the-lady-or-the-tiger/summary>

<https://www.slideshare.net/BharathiRaja6/part2-english-educating-the-adult-chapteri-taken-from-indian-national-education-written-by-srimath-swami-chidbhavananda>

### Unit-3 Novel

<https://www.booksummary.net/oliver-twist-charles-dickens/>

<https://www.cliffsnotes.com/literature/o/oliver-twist/character-list>

[https://www.studypool.com/studyGuides/Oliver\\_Twist/Themes#:~:text=Oliver%20Twist%20is%20a%20story,all%20the%20obstacles%20between%20them.](https://www.studypool.com/studyGuides/Oliver_Twist/Themes#:~:text=Oliver%20Twist%20is%20a%20story,all%20the%20obstacles%20between%20them.)

### Unit-4 Grammar

<https://www.edudose.com/english/active-and-passive-voice-rules/>

<https://www.perfect-english-grammar.com/reported-speech.html>

<https://linguapress.com/grammar/conjunctions.htm>

### Unit-5 Oral & Written Communication

<https://content.byui.edu/file/b8b83119-9acc-4a7b-bc84-efacf9043998/1/Writing-2-5-2.html>

<https://www.towson.edu/careercenter/students/careerskills/communication.html>

<https://www.slideshare.net/shahbaazahmed15/bc-communication>

## Pedagogy

Teacher made aids and Mechanical (ITC) Aids, Chalk and Talk with interactive session.

Note: (Additional online sources, presentation, and test will be given by the respective teachers in the English Language Lab)

## Teaching Aids

Course Texts, Reference books, Writing Board, Guest Lecture/Invited Lecture, Group Discussion Forum and Online Sources.

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III : Core Course		SEMESTER - III
Course Title: CELL BIOLOGY		
Course Code: 09CT31	Hours per week: 4	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

### Preamble

To enable the students to acquire knowledge on organisational arrangements of cellular organelles of prokaryotes and eukaryotes, their structural setup and their biological functions.

### Course Outcomes (CO)

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	Inculcate knowledge on working principles of microscopes, cell fractionation, staining and identification of cell types	K1,K2,K3
CLO 2	Get deeper understanding on organisation and functional aspects of cellular organelles, plasma membrane, endoplasmic reticulum, golgi body and lysosomes.	K1,K2,K3
CLO 3	Comprehends on morphological, chemical composition, structure and functions of synthesising organelles of mitochondria and ribosomes.	K1,K2,K3
CLO 4	Develop analyse on structure of oncogenes and nucleus, differentiation of chromosomes, different types of cell division	K1,K2,K3
CLO 5	Appreciate through principles of microscopes the organisation of DNA, RNA types, its role in gene regulation and protein synthesis.	K1,K2,K3

K<sub>1</sub>-Remembering

K<sub>2</sub>-Understanding

K<sub>3</sub>-Applying

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
CLO 1	9	-	-	-	1	-	9
CLO 2	9	-	-	-	3	-	3
CLO 3	9	-	-	-	3	-	3
CLO 4	9	-	3	-	3	3	3
CLO 5	9	-	-	-	3	-	9
	45	-	3	-	13	3	27

### Mapping of CO with PSO

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CLO 1	3	9	3	-	-
CLO 2	-	9	-	3	-
CLO 3	-	9	-	3	-
CLO 4	-	9	-	9	-
CLO 5	-	-	9	-	-
	3	36	12	15	-

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

<b>UNIT-I:</b>	Microscopy: Principles of light, phase contrast and electron microscopes. Cell as the basic unit of living organism – Cell theory – isolation of cellular components – Homogenisation – fractionation – Centrifugation – Fundamentals of fixation – Staining methods	<b>(12 Hrs)</b>
<b>UNIT-II:</b>	Plasma Membrane: Ultra structure – Chemical composition and functions, Endoplasmic reticulum: Structure, types and functions Golgi complex: Structure, Composition and functions Lysosome: Structure, forms, functions and origin	<b>(12 Hrs)</b>
<b>UNIT- III:</b>	Mitochondria: Structure, Chemical composition – Functions – Kreb’s cycle – Oxidative phosphorylation, Ribosome: Structure – Chemical composition – Functions and origin	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	Nucleus & Nucleolus: Structure and functions, Chromosome: Structure Giant Chromosomes - Cell Cycle: Cell division – Mitosis & Meiosis - Cancer Cells – types and properties - Cell aging - events	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	Nucleic Acids: Molecular Structure of DNA & RNA – Types of RNA & DNA replication, Role of RNA and ribosome in protein synthesis, Regulation of protein synthesis (Lac Operon).	<b>(12 Hrs)</b>

### Text Books

Cytology, Verma P.S. & Agarwal V.K. (2008) .S.Chand & Co. New Delhi.

### Reference Books

- De Robertis E.D.P. & De Robertis (2001). Cell and Molecular Biology, E.M.F.
- David M.Prescott (1988).CELLS- Principles of Molecular Structure and Functions, Jones and Bartlett Publications
- Gerald Karp (1985). Cell Biology, McGraw Hill Book Co..

### E Resources

<https://www.slideshare.net/ananthatiger/microbiology-lab-2-5503111>

<https://youtu.be/upcg971WoRU>

<https://www.slideshare.net/purakichha/structure-and-functions-of-endoplasmic-reticulum>

[http://www.powershow.com/view/3e184a-YTVkY/Lysosomes\\_powerpoint\\_ppt\\_presentation](http://www.powershow.com/view/3e184a-YTVkY/Lysosomes_powerpoint_ppt_presentation)

[http://www.powershow.com/view1/571cc-ZDc1Z/Mitochondria\\_powerpoint\\_ppt\\_presentation](http://www.powershow.com/view1/571cc-ZDc1Z/Mitochondria_powerpoint_ppt_presentation)

<https://www.slideshare.net/prakashtu/ribosome-mitochondria-and-lysosome>

<https://youtu.be/THz3kss3NO4>

<https://youtu.be/A-mFPZLLbHI>

<https://www.slideshare.net/artsandscience/prokaryotic-gene-regulation-9817286>

<https://www.slideshare.net/Jay818/nucleic-acid-41523679>

### Pedagogy

Chalk & Talk, Group Discussion, PPT

### Teaching Aids

Green Board, LCD Projector, Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III : Core Course</b>		<b>SEMESTER - III</b>
<b>Course Title : GENETICS</b>		
Course Code: <b>09CT32</b>	Hours per week: <b>4</b>	Credits: <b>4</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

To enable the students to acquire knowledge on principles of genetic mechanism, determination of sex and diseases related to genetics.

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Get overall idea of Mendelian works on inheritance and the deviation from Mendelian concepts.	K1,K2,K3
<b>CLO 2</b>	Understand the architect of differential inheritance due to multiple allelism, polygene and their associated problems.	K1,K2,K3
<b>CLO 3</b>	Impart knowledge on the deviation of Mendelian concepts through the linkage and crossing over and also mapping of chromosome.	K1,K2,K3
<b>CLO 4</b>	Find out the methods of sex determinations, factors, and also acquire how sex related diseases and their transmission.	K1,K2,K3
<b>CLO 5</b>	Trace and identify the mechanism of non-genetic inheritance, genetic diseases and pedigree. Promotional methods of genetic mechanism through qualitative traits.	K1,K2,K3

K<sub>1</sub>-RememberingK<sub>2</sub>-UnderstandingK<sub>3</sub>-Applying**Mapping of CO with PO**

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	-	1	-	3	-	-
<b>CLO 2</b>	9	-	9	-	9	-	3
<b>CLO 3</b>	9	-	3	-	3	-	3
<b>CLO 4</b>	9	-	9	3	9	-	3
<b>CLO 5</b>	9	-	9	3	9	-	9
	45	-	31	6	33	-	18

**Mapping of CO with PSO**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	-	9	-	1	-
<b>CLO 2</b>	-	3	-	1	-
<b>CLO 3</b>	-	9	3	3	-
<b>CLO 4</b>	-	3	-	9	-
<b>CLO 5</b>	-	9	-	9	-
	-	<b>33</b>	<b>3</b>	<b>23</b>	-

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus**

<b>UNIT-I:</b>	Principles of Inheritance- Interaction of genes (Factor hypothesis)	<b>(12 Hrs)</b>
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	<p>a) Historical ideas- Mendel's work- Mendel's laws of inheritance- Mendelian ratio- Test cross- Back cross- Pleiotropism- Penetrance and expressivity.</p> <p>b) Non-allelic interactions- Complementary genes, Epistasis, Supplementary genes, duplicate genes, Collaborator genes and Lethal genes.</p>	
<b>UNIT-II:</b>	<p>Polygenic inheritance and Multiple allelism</p> <p>a) Definition- Mode of inheritance of Kernel colour in Wheat and Skin colour in Man- Difference between Polygenic and Mendelian inheritance;</p> <p>b) Multiple allele - Definition- Mode of inheritance of Coat colour in Rabbit and ABO- blood groups in Man- Problems relating to inheritance of ABO- blood groups - Genetics of MN blood group.</p> <p>c) Genetic basis of Rh- Blood groups and their significance</p>	<b>(12 Hrs)</b>
<b>UNIT- III:</b>	<p>Linkage and Crossing-over</p> <p>a) Definition- Linkage- Linkage groups- Kinds of Linkage- Detection of linkage- Significance.</p> <p>b) Crossing over- Significance and evidences of Crossing over.</p> <p>c) Chromosomal Mapping- types</p>	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	<p>Sex determination and sex linkage</p> <p>a) Mechanism of Sex determination- various theories- Role of hormone and environment in sex determination.</p> <p>b) Sex linked inheritance in Man- Colour blindness, Haemophilia and Eye colour in <i>Drosophila</i>- inheritance of sex limited and sex influenced genes- holandric genes.</p>	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	<p>a) Extra- chromosomal inheritance- inheritance of Shell coiling in Snail, Kappa particles in <i>Paramecium</i> and Sigma particles in <i>Drosophila</i>.</p> <p>b) Inborn errors of Metabolism - Phenylketonuria, Alkaptonuria, Albinism, Muscular dystrophy</p> <p>c) Human genetics- Role of Pedigree analysis- Twin study- Syndromes- Turner syndrome, Down syndrome, Klinefelter syndrome, Cri du Chat Syndrome and Wolf syndrome Genetic counselling- Eugenics, Euthenics and Euphenics.</p>	<b>(12 Hrs)</b>

#### Text Books

Genetics – Verma P.S. & VK Agarwal (2008) S. Chand & Co.

#### Reference Books

- Principles of Genetics- Sinnott, Dunn and Dobzhansky, Mc.GrawHill Pub. Co.
- Principles of Genetics- E.J. Gardner et al (1991), Wiley Eastern & Co
- Human Genetics- E.A. Carlson ,(1985) Mc.Graw Hill Pub. Co.
- Genetics – S. Sambamurthy (2005) Narosa Publication.

#### E Resources

<https://www.slideshare.net/theanatomist/mendelism>

<https://www.slideshare.net/Nischithalraj/interaction-of-genes>

<https://www.slideshare.net/HiwrHastear/genetic-linkage-and-crossing-over>

<https://www.youtube.com/watch?v=ygeuA3T9neM> ( Sex Linked Inheritance)

<https://slideplayer.com/slide/8503320/> (Inborn errors of Metabolism)

<https://www.slideshare.net/sindhujojo/genetic-counselling-31973729>

#### Pedagogy

Chalk & Talk, Group Discussion, PPT

#### Teaching Aids

Green Board, LCD Projector, Interactive White Board

**DEPARTMENT OF BOTANY**

Programme: B.Sc. Zoology (CBCS and LOCF)

(For those students admitted during the 2021- 2022 and after)

<b>PART – III : Ability Enhancement Course</b>		SEMESTER - III
Course Title: <b>Plant Diversity</b>		
Course Code: 08AE01	Hours per week:4	Credit:4
CIA Marks: 25	ESE Marks: 75	Total Marks: 100

**Preamble**

- ❖ To understand the life history of cryptogams
- ❖ To understand the evolution of plants
- ❖ To identify the different groups studied

**Course Outcome**

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

CO Number	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
<b>CLO1</b>	To understand the morphology, variation, life cycle and importances of the selected forms of Algae	K1,K2 & K3
<b>CLO2</b>	To learn the morphology, life cycle and apply the uses of fungi in day to day life	K1,K2 & K3
<b>CLO3</b>	To remember the various forms, characteristics and reproduction of Bryophytes	K1,K2 & K3
<b>CLO4</b>	To gain the basic knowledge of Pteridophytes	K1,K2 & K3
<b>CLO5</b>	To acquire the characteristics of Gymnosperms	K1,K2 & K3

**K1 – Knowledge****K2 – Understand****K3 – Apply****Mapping of CLO with PLO**

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
<b>CLO1</b>	9	1	1	3	3	1	1
<b>CLO2</b>	9	1	1	9	9	9	9
<b>CLO3</b>	9	1	1	3	3	3	3
<b>CLO4</b>	9	1	1	9	9	9	9
<b>CLO5</b>	9	1	1	3	1	9	9
	<b>45</b>	<b>5</b>	<b>5</b>	<b>27</b>	<b>24</b>	<b>31</b>	<b>31</b>

3-Strong; 2-Medium; 1-Low

**Mapping of CLO with PSO**

	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CLO1</b>	1	3	1	9	2
<b>CLO2</b>	1	1	-	3	1
<b>CLO3</b>	-	3	3	3	1
<b>CLO4</b>	-	1	3	3	1
<b>CLO5</b>	-	1	1	3	1
	<b>2</b>	<b>9</b>	<b>8</b>	<b>21</b>	<b>6</b>

3-Strong; 2-Medium; 1-Low

## Syllabus

UNIT NO	CONTENT	HOURS
Unit – I	<b>ALGAE:</b> General characteristics of Algae - Fritsch Classification of Algae (Class level only) – Occurrence, distribution, thallus structures life history of <i>Nostoc</i> and <i>Sargassum</i> – Economic Importance of Algae	12
Unit – II	<b>FUNGI:</b> General characteristics of Fungi - Alexopolous and Mims Classification of Fungi - Structure and Reproduction <i>Puccinia</i> – Economic Importance of Fungi - <i>Lichens</i> : Nature of association, habit and habitat, classification and morphology of lichen thallus. (Reproduction need not be discussed)	12
Unit – III	<b>BRYOPHYTES:</b> General characteristics of Bryophytes – Structure, Reproduction and life cycle of <i>Funaria</i> .	12
Unit – IV	<b>PTERIDOPHYTES</b> - General characteristics of Pteridophytes – Morphological and internal structure, Stellar variation, Reproduction and life cycle of <i>Lycopodium</i> .	12
Unit – V	<b>GYMNOSPERMS</b> - General characteristics of Gymnosperms – Morphological, Anatomical Structure and life cycle of <i>Cycas</i> (Excluding the Developmental Studies) - Economic Importance of Gymnosperms	12

### Text Books:

1. An introduction to Embryophyta –Pteridophytes - N.S. Parihar, Surjeet Publications, Delhi, 2012 Ed.
2. Introduction to Mycology - C.J.Alexopoulos, Willey Eastern Pvt. Ltd, 2013 Ed.
3. Botany for Degree Students Gymnosperms - P.C. Vashishta, S.Chand & Company Ltd, Delhi, 2014 Ed.

### Reference books

1. Morphology of Gymnosperms – Coulter, M. Jhon, Surjeet Publications, Delhi, 2014 Ed.
2. Botany for Degree Students Algae – P.C. Vashishta, S.Chand & Company Ltd, Delhi, 2014 Ed.
3. An introduction to Embryophyta –Bryophytes - N.S. Parihar, Surjeet Publications, Delhi, 2013 Ed.

### Online Resources:

1. <https://www.slideshare.net/gkumarimahesh/algae-115147367>  
<https://www.slideshare.net/VaniYadla/oedogoniumyv-autosavedyvppt> (*Oedogonium*)
2. <https://www.slideshare.net/vivekaiden/algae-sargassam-porphyra-and-diatoms> (*Sargassum*)
3. <https://www.slideshare.net/khushbo0/fungi-44385809> (Fungi)
4. <https://www.slideshare.net/Eva983/the-bryophytes-61776435> (Bryophytes)
5. <https://www.slideshare.net/AnkitaThakur52/funaria-80239528> (*Funaria*)
6. <https://www.slideshare.net/EasyBiologyClassEBC/pteridophytes-general-characteristics-ppt-by-easybiologyclass> (Pteridophytes)
7. <https://www.slideshare.net/SARASilpi/gymnosperms-10047007> (Gymnosperms)
8. <https://www.slideshare.net/SyedaFari2/cycas> (*Cycas*)

### Pedagogy

Chalk & Talk, PPT, Experiment

### Teaching Aids

Black Board, Green Board, Chart, Specimen, Plant Material, Permanent Slide, LCD Projector, Online virtual Lab & Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>Part – IV : Skill Enhancement Course</b>		
Subject Title : <b>PUBLIC HEALTH AND HYGIENE</b>		
Course Code: <b>09SE31</b>	Hours per week: <b>2</b>	Credits: <b>2</b>
CIA Marks: <b>25</b>	ESE Marks: <b>75</b>	Total Marks: <b>100</b>

### Objectives

- Inculcate the importance of public health and hygiene
- Consciousness on importance, source and quality of water
- Awareness on certain important human diseases and their preventive measures
- Focus on health planning and health programme

### Syllabus

**UNIT I:** Scope of Public Health and Hygiene – Concepts of Health and Disease – Classification of foods – Nutritional deficiencies — Balanced diet – Nutritional requirements of special groups.

**UNIT II:** Environment and Health: Water-sources – Water quality standards– Solid waste and excreta disposal.

**UNIT III:** Communicable diseases: 1. Respiratory infections: Diphtheria, COVID-19 2. Intestinal infections: Typhoid 3. Arthropod infections: Dengue, 4. Zoonosis: Plague, Japanese encephalitis 5. Surface infections: Tetanus, Leprosy.

**UNIT IV:** Non-Communicable Diseases: Coronary Heart Disease – Hypertension – Diabetes – Obesity – Blindness – Stroke. Occupational Health Hazards: Physical, Chemical, Mechanical, Biological and Psychological. Mental health: Causes of mental ill-health-alcoholism and Drug dependence.

**UNIT V:** Health Education: Health planning in India – Health programmes in India – WHO – Non-governmental Voluntary Health Organizations. Personal hygiene, splinting, First aid and Nursing: Methods – Dressing – care — Preparations.

### Text books

Park and Park, 1995. Text Book of Preventive and Social Medicine M/s. Banarsidas Bhanot Publishers, Jabalpur.

Verma S. 1998. Medical Zoology, Rastogi Publications, New Delhi.

### Reference Book

- C. Gopalan, 1985, Nutritive values of Indian foods, ICMR, New Delhi
- Rajvir Bhawar, 2008. Text Book of Public Health and Community Medicines, Published by Armed Forces Medical College, Pune.

### E - Resources

<https://www.slideshare.net/jaya12/indian-nutrition-scenario-dr-k-vijayraghavan>

<https://youtu.be/hn6q5iqCVnw>

<https://www.slideshare.net/JYOTIDEVENDRA/sources-and-effects-of-water-pollutants-on-human-health-quality-standards-for-drinking-water-and-waste-water-treatment>

<https://youtu.be/s8IVjQg7yno>

[http://www.powershow.com/view4/75ef8e-NjA3N/Measles\\_and\\_Measles\\_Vaccine\\_powerpoint\\_ppt\\_presentation](http://www.powershow.com/view4/75ef8e-NjA3N/Measles_and_Measles_Vaccine_powerpoint_ppt_presentation)

<https://www.slideshare.net/SakshiSharma323/aids-125292940>

<https://www.slideshare.net/vanshraina1/hypertension-75716018>

<https://www.slideshare.net/sameekshabhardwaj1/occupational-health-occupational-hazards>

<https://www.slideshare.net/VibhutiPatel/planning-in-india-health-policy-26-307>

[https://youtu.be/EMUVVS6M\\_uk](https://youtu.be/EMUVVS6M_uk)

### Pedagogy

Chalk & Talk, PPT, Experiment

### Teaching Aids

Black Board, Green Board, & Interactive White Board

விவேகானந்த கல்லூரி, திருவேடகம் மேற்கு-625 243

தமிழ்த்துறை

Programme: B.A., B.Sc. (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 2022 and after)

PART – I TAMIL		SEMESTER : IV
Course Title : சங்க இலக்கியமும் நீதி இலக்கியமும்		
Course Code : P1LT41	Hours per week : 6	Credits : 03
CIA : 25 Marks	ESE : 75 Marks	Total: 100 Marks

**முன்னுரை**

1. பண்டைத் தமிழர்களில் ஒரு சமூகம் சார்ந்த வாழ்க்கை முறையினை உணர்த்துதல்.
2. தனிமனித வாழ்க்கைகளின் வழி களவு- கற்பு ஒழுக்க நெறிமுறைகளை வெளிப்படுத்துதல்.
3. வாழ்வில் கடைபிடிக்க வேண்டிய நீதிநெறிகளைப் புகட்டுதல்.
4. அகம், புறம் சார்ந்த வாழ்க்கைக்கான இலக்கண வரம்புகளை தெளிவுபடுத்துதல்.
5. சங்கஇலக்கிய மற்றும் நீதிஇலக்கிய காலகட்டங்களின் வரலாற்றினை விவரித்தல்.

**பாடத்திட்டத்தின் முடிவுகள்**

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

NO.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	பண்டைத் தமிழர்களில் ஒரு சமூகம் சார்ந்த ஒழுக்கங்கள் குறித்த நிலையினை வரையறை செய்தல்.	K1, K2
CLO 2	ஐந்திணை மக்களின் அகஒழுக்கங்கள் குறித்த செய்திகளை கலந்துரையாடுதல்.	K2, K3
CLO 3	சங்க இலக்கியம் மற்றும் நீதி இலக்கிய காலகட்டங்களில் வாழ்ந்த மக்கள் மற்றும் அவர்களின் வாழ்க்கையினை பதிவுசெய்த படைப்பாளர்கள் ஆகியோரின் வரலாற்றினை விவரித்தல்.	K2, K3
CLO 4	பழங்கால மக்களின் அகம், புறம் தொடர்பான வாழ்க்கை நிகழ்வுகளின் மரபுநிலைகள் குறித்த திறன்களை அறிவித்தல்.	K2
CLO 5	வாக்கியங்களைக் கண்டறிதல், சொற்களை ஒழுங்குபடுத்துதல், ஆங்கிலத்திற்கு நிகரான தமிழ்ச்சொற்களை கண்டறிதல், வழுவச்சொற்களை நீக்குதல் போன்ற ஒரு மொழியின் பயன்பாட்டுத் தன்மையை தெளிவுறுத்தல்.	K1, K2, K3

K<sub>1</sub>-Remembering

K<sub>2</sub>-Understanding

K<sub>3</sub>-Applying

**Mapping of CLO with PLO**

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	3	9	9	9	9	9
CLO2	9	9	9	9	9	3	9
CLO3	9	9	9	9	9	9	9
CLO4	9	3	3	9	9	9	9
CLO5	9	3	9	9	9	3	9
	45	27	39	45	45	33	45

3-Strong; 2-Medium; 1-Low

**பாடத்திட்டம்**

அலகு - 1	தமிழ்ச் சங்க இலக்கியம் (பத்துப்பாட்டு) 1. முல்லைப்பாட்டு	(18 மணிநேரம்)
அலகு - 2	தமிழ்ச் சங்க இலக்கியம் (எட்டுத்தொகை) 1.நற்றிணை - (3பாடல்கள்) 2.குறுந்தொகை - (5பாடல்கள்) 3.கலித்தொகை - (2பாடல்கள்) 4.அகநானூறு - (2பாடல்கள்) 5.புறநானூறு - (3பாடல்கள்)	(18 மணிநேரம்)
அலகு - 3	தமிழ் நீதி இலக்கியம் 1. திருக்குறள் (செய்நன்றி அறிதல், காலம் அறிதல்,	(18 மணிநேரம்)

	குறிப்பு அறிதல்) 2. பழமொழி நானூறு (கல்வி அதிகாரம்) 3. கொன்றை வேந்தன் ( 10 பாடல்கள்) 4. மூதுரை (10 பாடல்கள்)	
<b>அலகு - 4</b>	தமிழ் இலக்கணம் - பொருள் 1. அகப்பொருள் (அகத்திணைகள் - முதல், கரு, உரிப்பொருள்)  2. புறப்பொருள் (புறத்திணைகள் - வெட்சி முதல் பெருந்திணை வரையுள்ள 12திணைகள்) 3. மரபியல் (பெயர் மரபுகள் - ஆண்பால்பெயர், பெண்பால்பெயர், இளமைப்பெயர்)	<b>(18 மணிநேரம்)</b>
<b>அலகு - 5</b>	தமிழ் இலக்கிய வரலாறும் பயன்பாட்டுத்தமிழும் 1. சங்க இலக்கிய வரலாறு 2. நீதி இலக்கிய வரலாறு 3. புத்தக மதிப்புரை, தமிழ்த் திரைப்பட விமர்சனம், கவிதை படைத்தல்.	<b>(18 மணிநேரம்)</b>

#### பாட நூல்கள்

1.தமிழ் செய்யுட் தொகுப்பு (தமிழ்த்துறை வெளியீடு)

#### பார்வை நூல்கள்

1. தமிழ் இலக்கிய வரலாறு - சி.சேதுராமன்,பாவை பப்ளிகேஷன்ஸ்,16(142)ஜானிஜான்கான் சாலை,இராயப்பேட்டை, சென்னை - 600014.
2. தமிழ் இலக்கிய வரலாறு - முனைவர்பாக்யமேரி, நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட்,41-பி, சிட்கோ இண்டஸ்ட்ரியல் எஸ்டேட்,அம்பத்தூர், சென்னை- 600 098.

#### E-Resource

1. <http://www.tamilvu.org/library/nationalized/pdf/17-kagovindan/mullaippattuoruvilakkam.pdf>
2. <https://www.keetru.com/index.php/2014-03-08-04-35-27/2014-03-08-12-18-14/2826-2010-01-29-08-13-35>
3. <https://www.youtube.com/watch?v=rDIzpWkbzn8>
4. [https://www.youtube.com/watch?v=ZHNH\\_jlgznc](https://www.youtube.com/watch?v=ZHNH_jlgznc)
5. <https://www.youtube.com/watch?v=fQxJBfGOxgk>
6. <https://www.youtube.com/watch?v=fiK782BcyhY>

#### கற்பிக்கும் முறைகள்

விரிவுரை கொடுத்தல், கலந்துரையாடல், காட்சிப் பதிவுகளின் வழியாக புலப்படுத்துதல், பயிற்சி கொடுத்தல்.

#### கற்பிக்க உதவுதல்

கரும்பலகை பயன்படுத்துதல், காட்சி திரைவழியாக புலப்படுத்துதல்;

## DEPARTMENT OF SANSKRIT

Programme: B.A./ B.Sc. (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2022-23 and after)

PART – I : Sanskrit		SEMESTER – IV
Course Title: <b>DRAMA AND HISTORY OF LITERATURE – DRAMAS</b>		
Course Code: <b>P1LS41</b>	Hours per week: <b>6</b>	Credits: <b>3</b>
CIA Marks: <b>25 Marks</b>	ESE Marks: <b>75 Marks</b>	Total Marks: <b>100 Marks</b>

### Preamble:

Sanskrit is offered as an alternative language under Part –I for B.A./ B.Sc students during first four semesters the above column explains the scheme of the IV semester.

### Course Outcomes (COs)

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

Number	Statement	Knowledge Level
<b>CLO 1</b>	Understand Sanskrit drama literature	K1, K2
<b>CLO 2</b>	Compare drama with modern life	K2
<b>CLO 3</b>	Classify and discuss the importance of Sanskrit drama literature	K2
<b>CLO 4</b>	Describe and defend history of early Sanskrit literature	K2
<b>CLO 5</b>	Practice Creativity and Demonstrate different aspects of spoken Sanskrit	K2, K3

**K1**-Knowledge

**K2**-Understand

**K3**-Apply

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	9	9	9	3	-	3
<b>CLO 2</b>	9	9	3	9	3	3	3
<b>CLO 3</b>	9	9	3	9	9	-	3
<b>CLO 4</b>	3	9	9	9	9	-	3
<b>CLO 5</b>	9	9	9	9	9	3	3
	39	45	33	45	33	6	15

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

**Unit 1:** Introduction to Sanskrit drama literature, introduction and scope of spoken Sanskrit.

**Unit 2:** Characteristics features of Sanskrit dramas and Varieties of Sanskrit dramas, spoken Sanskrit for personal use.

**Unit 3:** Abhijñānaśākuntalam Act –IV, up to arrival of sage Kaṇva to hermitage, Dramas of Bhāsa, spoken Sanskrit for Educational purpose

**Unit 4:** Abhijñānaśākuntalam Act –IV, advice of sage Kaṇva to Śakuntala, Dramas of Kālidāsa, Moral and social aspects of dramas of Kālidāsa, spoken Sanskrit for commercial purpose.

**Unit 5:** Abhijñānaśākuntalam Act –IV, up to the end of Act –IV, Dramas of Bhavahūti, Moral and social aspects of dramas of Bhavahūti and other dramas,

### Text Book(s)

1. Abhijñānaśākuntalam of Kālidāsa, ed. And translated in to English by M.R. Kale, pub. By Motilal Banarasidas, Delhi 2010.
2. A History of Sanskrit Literature, compiled by Dr. S. Jagadisan, Published by AMG Publications, Madurai -625010. Year of publication 1996.

### Reference Books

1. A Short History of Sanskrit Literature, by T.K. Ramachandra Aiyar, published by R.S. Vadhyar & Sons, Kalpathi, Palakkad -678003.
2. A History of Sanskrit Literature, by A. Berriedale Keith, published by Mothilal Banarsidass Publishers Private Limited, Delhi, 2017.

**Pedagogy**

Chalk & Talk, Group Discussion, PPT

**Teaching Aids**

Green Board, LCD Projector, Interactive White Board

**DEPARTMENT OF ENGLISH**  
(For the students of the Academic Year 2022-23 onwards)

**Programme: B.A., & B.Sc.,**

<b>PART – II : English</b>		<b>SEMESTER–IV</b>
<b>Course Title: English for Environmental Communication Skills</b>		
Course Code: <b>P2LE41/ P2CE41</b>	Hours per week: <b>6</b>	Credit: <b>3</b>
CIA Marks: <b>25</b>	ESE Marks: <b>75</b>	Total Marks: <b>100</b>

**Preamble:**

The students are expected to inculcate English language proficiency and its socio-linguistic competency along with environmental consciousness.

**Course Outcome (CO):**

On the successful completion of the course, the students would be able to:

	<b>Course Outcome</b>	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Appraise various authors' socio-linguistic and environmental values through the prose discourses	K1, K2, K3
<b>CLO 2</b>	Develop comprehension skills of poetic diction/usage through the poetry which are concerned with nature	K1, K2, K3
<b>CLO 3</b>	Discuss the socio-linguistic and Environmental observation of author, and other natural elements found in the Environmental Writing	K1, K2, K3
<b>CLO 4</b>	Examine the functions of English language and its grammar in transactions	K1, K2, K3
<b>CLO 5</b>	Execute and exercise LSRW skills in everyday interactions	K1, K2, K3

**K1-Remembering**

**K2 – Understanding**

**K3 –Applying**

**Mapping of CO with PO**

	<b>PLO 1</b>	<b>PLO 2</b>	<b>PLO 3</b>	<b>PLO 4</b>	<b>PLO 5</b>	<b>PLO6</b>	<b>PLO7</b>
<b>CLO 1</b>	9	9	9	9	9	9	9
<b>CLO 2</b>	9	9	9	9	9	9	9
<b>CLO 3</b>	9	9	9	9	9	9	9
<b>CLO 4</b>	9	9	3	-	-	-	9
<b>CLO 5</b>	9	9	3	-	3	1	9
	45	45	33	27	30	28	45

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus**

**Unit-1 Prose**

1. The Teacher (Chapter-IV)
2. The Student (Chapter-V)
3. University Education on the Gurukula Pattern (Chapter-VI)  
Swami Chidbhavananda – *The Indian National Education* (Text)

**Unit-2 Drama**

William Shakespeare-*The Tempest*  
(for the three Continuous Internal Assessment [CIA] Tests)

**Unit-3 Soft-Skills for Capacity Building**

1. Interpersonal skills (Greetings and Leave-taking etc.)
2. Group Discussion for placement/career
3. Interview Skills for placement/career

**Unit-4 English for Competitive Examinations**

1. Spotting Errors (Articles & Tenses)
2. Analogy and One-Word Substitution
3. Synonyms and Antonyms

### Unit-5 Oral & Written Communication

1. **Listening** – Comprehension practice from Prose, Drama etc /Online Voice Practice, observing/viewing E-content (with subtitles), Guest/Invited Lectures, Conference/Seminar Presentations & Tests, and DD National News Live, BBC, CNN, VOA etc
2. **Speaking** – In Group Discussion Forum, speak about Negotiation, Role-Play, Seminar Presentations on Classroom-Assignments, and Peer-Team-interactions/AIF in Classroom
3. **Reading** – Extensive Reading of Prose, (Film with subtitles), and Individual-Classroom-Assignments
4. **Writing** – *Writing and editing Public Speech like Welcome Address/Vote of Thanks, Introducing a Speaker/Keynote Speech/Address, Master of Ceremony/Anchoring etc.\**

### Text Books

1. Swami Chidbhavananda. *The Indian National Education*. Tirupparaithurai: Sri Ramakrishna Tapovanam, 2017.  
<[http://www.rktapovanam.org/book\\_details.php?book\\_id=MjE](http://www.rktapovanam.org/book_details.php?book_id=MjE)>
2. William Shakespeare. *The Tempest*. Ed. Morton Luce. London: Methuen & Co, 1919.
3. Cary J Green. *Leadership and Soft Skills for Students*. Indiana: Dog Ear Publishing. 2015. (or) Bruce Tulgan. *Bridging the Soft Skills Gap: How to Teach the Missing Basics to Today's Young Talent*. New Jersey: John Wiley & Sons Inc., 2015. (or) Owen Hargie, David Dickson, and Dennis Tourish. *Communication Skills for Effective Management*. New York: Palgrave Macmillan, 2004. (or) Dale Carnegie. *The Art of Public Speaking*. Massachusetts: Wyatt North Publishing, 2013.
4. Hari Mohan Prasad, and Uma Rani Sinha. *Objective English for Competitive Examinations*. New Delhi: McGrawHill Education, 2016. (or)  
British Council | LearnEnglish <<https://learnenglish.britishcouncil.org/skills>>
5. BBC News <<https://www.bbc.com/news>> VOA Learning English  
<<https://learningenglish.voanews.com/>>  
University Grants Commission (UGC), New Delhi <<https://www.ugc.ac.in/subpage/EContent-URL.aspx>> British Council | LearnEnglish <<https://www.youtube.com/channel/UCOtnu-KKoAbN47IuYMeDPOg>> Cambridge Assessment English <<https://www.cambridgeenglish.org/test-your-english/>>
6. CLIL ( Content & Language Integrated Learning ) – Module by TANSCHÉ  
NOTE: (Text: Prescribed chapters or pages will be given to the students by the department and the college)

### Reference Books

1. Swami Chidbhavananda. *Vedanta Society*. <<https://sfvedanta.org/authors/swami-chidbhavananda/>>
2. Raman, Meenakshi and Sangeeta Sharma. *Technical Communication: Principles and Practice*. New Delhi, OUP, 2011.
3. Stephen E Lucal. *The Art of Public Speaking*. New York: McGraw-Hill Education, 2015.
4. Elaine Walker and Steve Elsworth. *Grammar Practice for Elementary Students*. Harlow (UK): Pearson, 2000.
5. Mary Ellen Guffey, and Richard Almonte. *Essentials of Business Communication*. Toronto: Nelson Education, 2007.
6. K.V. Joseph. *A Textbook of English Grammar and Usage*. New Delhi: TATA McGraw Hill Education Private Limited, 2012.
7. Edgar Thorpe, and Showick Thorpe. *Objective English for Competitive Examinations*. New Delhi: Pearson India Education, 2017.

### E Resources and References

#### Unit-1 Prose

<https://www.slideshare.net/BharathiRaja6/the-teacher-taken-from-indian-national-education-by-srimath-swami-chidbhavananda>

<https://www.slideshare.net/BharathiRaja6/the-student-theory-on-students-role-in-gurukulam>

<https://www.slideshare.net/BharathiRaja6/part2-english-university-education-on-the-gurukula-pattern-taken-from-indian-national-education-by-srimath-swami-chidbhavananda-drsbharathiraja-assistant-professor-headic-department-of-english-vivekananda-college8870518474>

## **Unit-2 Drama**

William Shakespeare-The Tempest

(for the three Continuous Internal Assessment [CIA] Tests)

## **Unit-3 Soft-Skills for Capacity Building**

<http://ignou.ac.in/userfiles/Unit%201.pdf>

GREETINGS AND INTRODUCTION - IGNOU

<http://egyankosh.ac.in/bitstream/123456789/60752/1/Unit-1.pdf>

<http://bankatswamicollege.org/sites/default/files/upload/study%20material1.pdf>

<https://www.reed.co.uk/career-advice/group-interview-tips-dos-and-donts/>

<https://www.teachingenglish.org.uk/article/group-discussion-skills>

<https://www.interview-skills.co.uk/free-information/interview-guide/group-tasks-discussions>

<https://www.mheducation.co.in/placement-interviews-skills-for-success-9789351340140-india>

<https://www.prospects.ac.uk/careers-advice/interview-tips/how-to-prepare-for-an-interview>

## **Unit-4 English for Competitive Examinations**

<https://www.tgct.gov.in/tgportal/staffcollege/DR%20ACTOs%2017.01.2020%20to%2018.02.2020/February%20->

[https://www.tgct.gov.in/tgportal/staffcollege/DR%20ACTOs%2017.01.2020%20to%2018.02.2020/February%20-%202020%20PDF's/05.02.2020,%204.%20Smt.Suma%20Bindu%20Madam,%20Asst.Professor%20and%20Trainer%20@CELT%20\(O.U\),%20SPOTTING%20ERRORS%202.pdf](https://www.tgct.gov.in/tgportal/staffcollege/DR%20ACTOs%2017.01.2020%20to%2018.02.2020/February%20-%202020%20PDF's/05.02.2020,%204.%20Smt.Suma%20Bindu%20Madam,%20Asst.Professor%20and%20Trainer%20@CELT%20(O.U),%20SPOTTING%20ERRORS%202.pdf)

<http://www.grammarinenglish.com/spottingerrors/>

<https://www.jagranjosh.com/articles/important-one-word-substitution-questions-for-ssc-cgl-exam-1531479845-1>

<https://www.englishclub.com/vocabulary/synonyms-antonyms.htm>

## **Unit-5 Oral & Written Communication**

<https://content.byui.edu/file/b8b83119-9acc-4a7b-bc84-efacf9043998/1/Writing-2-5-2.html>

<https://www.towson.edu/careercenter/students/careerskills/communication.html>

<https://www.slideshare.net/shahbaazahmed15/bc-communication>

## **Pedagogy**

Teacher made aids and Mechanical (ITC) Aids, Chalk and Talk with interactive session.

Note: (Additional online sources, presentation, and test will be given by the respective teachers in the English Language Lab)

## **Teaching Aids**

Course Texts, Reference books, Writing Board, Guest Lecture/Invited Lecture, Group Discussion Forum and Online Sources.

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III : Core Course		SEMESTER - IV
Course Title : <b>DEVELOPMENTAL BIOLOGY</b>		
Course Code: <b>09CT41</b>	Hours per week: <b>4</b>	Credits: <b>4</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

### Preamble

To enable the students to acquire knowledge on right from the genesis of the embryo organisation of cells and tissues leading to structure, developmental complexity with in organisations and their interactions.

### Course Outcomes (CO)

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Understand the historical theories of development and understand the origin shapes and types of gametes.	K1, K2, K3
<b>CLO 2</b>	Acquire knowledge on events of the fertilization, cleavage pattern and causes for the cellular differentiation of blastomeres.	K1, K2, K3
<b>CLO 3</b>	Understand the differential modifications and functions of developmental and embryonic cells and the process of development of brain, heart, eye and kidney.	K1, K2, K3
<b>CLO 4</b>	Analyse the reproductive cycles and events of human reproduction, mechanism of various metamorphosis and regeneration.	K1, K2, K3
<b>CLO 5</b>	Trace the applications and methods of human welfare in embryology.	K1, K2, K3

**K<sub>1</sub>**-Remembering

**K<sub>2</sub>**-Understanding

**K<sub>3</sub>**-Applying

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	-	-	3	3	-	-
<b>CLO 2</b>	9	-	-	1	-	-	-
<b>CLO 3</b>	9	-	-	-	-	-	3
<b>CLO 4</b>	9	-	-	-	-	-	3
<b>CLO 5</b>	9	-	9	9	9	-	3
	45	-	9	13	12	-	9

### Mapping of CO with PSO

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	-	-	3	9	1
<b>CLO 2</b>	1	9	3	3	1
<b>CLO 3</b>	1	3	3	9	1
<b>CLO 4</b>	3	3	3	9	1
<b>CLO 5</b>	1	1	1	9	3
	<b>6</b>	<b>16</b>	<b>13</b>	<b>39</b>	<b>7</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

<b>UNIT-I:</b>	a) Historical reviews-Theory of Preformation, Theory of Epigenesis, Baer's law and Biogenetic law b) Gametogenesis- Spermatogenesis, Oogenesis c) Types of eggs -structure of spermatozoa and ovum in mammals.	<b>(12 Hrs)</b>
<b>UNIT-II:</b>	a) Fertilization: Acrosomal reaction, Cortical reaction, Physiological and biochemical changes, significance-Parthenogenesis. b) Planes and types of cleavage patterns. c) Fate maps in Amphioxus, Frog and Chick	<b>(12 Hrs)</b>
<b>UNIT- III:</b>	a) Blastulation and Gastrulation in Amphioxus, Frog and Chick. b) Organogenesis: Derivatives of Ectoderm, Mesoderm and Endoderm- Development of Brain, Eye, Heart and Kidney. c) Foetal membranes in Chick	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	a) Human reproduction; Menstrual cycle-Menopause, pregnancy- Parturition – lactation - hormonal control -Types and Functions of Placenta. b). Amphibian metamorphosis: Anatomical and Biochemical changes, role of hormones in metamorphosis, types of insect metamorphosis and role of hormones in Insect metamorphosis. c) Regeneration: Definition –mechanism and types- factors controlling regeneration	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	a) Gradient theory- Organizer- Concept, Spemann's experiment, Mechanism of Induction- Nuclear transplantation experiments in <i>Acetabularia</i> . b) Differentiation- Types, processes, competence- Nucleo cytoplasmic interaction c) Human welfare and Embryology- Birth control, Infertility, Test tube Baby - Intra cytoplasmic Sperm injection (ICSI) and Intra Uterine Insemination (IUI) and Teratogenesis	<b>(12 Hrs)</b>

#### Text Books

Verma, S and Agarwal, V.K, 2005, Chordate Embryology, S.Chand & Co, New Delhi.

#### Reference Books

- Balinsky, B.I, 1981, An Introduction to Embryology, Holt Saunders, New York.
- 2. Berrill, N.J, 1986, Developmental Biology, McGraw Hill, New Delhi.

#### E - Resources

<https://www.slideshare.net/anikaramyasupriya/preformation-supriya>  
[https://www.slideshare.net/dr\\_ansari2000/gametogenesis-and-fertilization](https://www.slideshare.net/dr_ansari2000/gametogenesis-and-fertilization)  
<https://www.slideshare.net/msp4889/gametogenesis-53071426>  
<https://www.slideshare.net/DrRiteshshiwakoti/fertilization-process>  
<https://www.slideshare.net/borhanihm/human-fertilization-46719858>  
<https://www.slideshare.net/Armanfiroz1/fertilization-notes>  
<https://www.biologydiscussion.com/embryology/cleavage-meaning-planes-and-types-embryology/59904>  
<https://www.slideshare.net/ShoebAhmad7/cleavage-143221474>  
<https://www.slideshare.net/KomalParmar4/blastulation-77199344>  
<https://www.slideshare.net/chet08/blastulation>  
[https://www.slideshare.net/farhan\\_aq91/development-of-brain](https://www.slideshare.net/farhan_aq91/development-of-brain)  
<https://www.slideshare.net/devashishkonar/evolution-of-human-brain-mind>  
<https://www.slideshare.net/elnashar/teratogenesis-37809344>  
<https://www.slideshare.net/vksprasath/teratogenesis-causing-of-congenital-anomalies>

#### Pedagogy

Chalk & Talk, Group Discussion, PPT

#### Teaching Aids

Green Board, LCD Projector, Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III : Core Course		SEMESTER - IV
Course Title : <b>PHYSIOLOGY</b>		
Course Code: <b>09CT42</b>	Hours per week: <b>4</b>	Credits: <b>4</b>
CIA Marks: <b>25 Marks</b>	ESE Marks: <b>75 Marks</b>	Total Marks: <b>100 Marks</b>

### Preamble

To enable the students to understand the knowledge on structure and functions physiology of various organ systems. And to create awareness on nutritional deficiencies.

### Course Outcomes (CO)

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Acquire knowledge on physiological role of major and minor nutrient.	K1, K2, K3
<b>CLO 2</b>	Impart knowledge on structure and physiology of circulatory and respiratory systems in animals.	K1, K2, K3
<b>CLO 3</b>	Analyse the physiology of excretion, ionic balance and chemical coordination in animals.	K1, K2, K3
<b>CLO 4</b>	Obtain knowledge on types and constructions, physiological and chemical coordination of neuromuscular system.	K1, K2, K3
<b>CLO 5</b>	Gain the knowledge on structure and physiology of receptors (ear and eye) and endocrine glands and circadian rhythm	K1, K2, K3

**K<sub>1</sub>**-Remembering

**K<sub>2</sub>**-Understanding

**K<sub>3</sub>**-Applying

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	-	9	-	-	-	3
<b>CLO 2</b>	9	-	3	-	3	-	3
<b>CLO 3</b>	9	-	-	-	-	3	1
<b>CLO 4</b>	9	-	3	-	-	-	3
<b>CLO 5</b>	9	-	3	3	3	3	3
	45	-	18	3	6	6	13

### Mapping of CO with PSO

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	3	3	-	3	3
<b>CLO 2</b>	3	3	3	3	-
<b>CLO 3</b>	-	3	3	3	-
<b>CLO 4</b>	-	3	3	9	-
<b>CLO 5</b>	3	3	9	9	-
	<b>9</b>	<b>15</b>	<b>15</b>	<b>27</b>	<b>3</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

<b>UNIT-I:</b>	a) Definition and brief history of Physiology - the fields and branches of physiology. Nutrition and types - Food- composition, classification - the physiological role of major nutrient and minerals; Vitamins- classification and their role in animal life. b) Digestion and absorption of carbohydrate, protein and lipids in man, role of	<b>(12 Hrs)</b>
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	probiotic in digestion.	
<b>UNIT-II:</b>	a) Circulation- types of circulatory system, circulatory media found in animals, types of heart, structure of human heart, origin and conduction of heart beat, composition of blood, general functions of blood, blood clotting mechanisms, blood transfusion, blood volume and blood pressure. b) Respiration -- Respiratory pigments, transport of respiratory gases-Oxygen dissociation curve, respiratory quotient.	<b>(12 Hrs)</b>
<b>UNIT- III:</b>	a) Excretion- major excretory substances- classification of animals based on excretory products, structure of human kidney, nephron and its ultra-structure, mechanism of urine formation and excretion – hormonal control. b) Osmoregulation – definition, Osmoregulators, osmoconformers, stenohaline and euryhaline organisms, Osmoregulation in fishes Thermoregulation – Suspended animation – Hibernation, Aestivation, Diapause.	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	a) Nervous system- Central Nervous system and Autonomous Nervous system- physiological role of sympathetic and parasympathetic Nervous system- Ultra structure of a typical neuron, concept of synapse- nerve impulse conduction- neuro muscular junction- reflex action- reflex arc. b) Muscular system- ultra structure of skeletal fibres- general properties of muscle fibre contractile proteins- mechanism of muscle contraction, biochemical changes during muscle contraction.	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	a) Receptors- types - structure and functioning of phonoreceptor (Human ear) and photoreceptor (Human eye) b) Endocrine system- structure, hormones and role of pituitary gland, thyroid gland, Para-thyroid gland, adrenal gland and Islets of Langerhans. Chronobiology- biological rhythms, and biological clock – definitions only	<b>(12 Hrs)</b>

#### Text Books

- Essentials of Animal Physiology – S.C Rastogi ,2002, Wiley Easernt Ltd. New Delhi.
- General physiology- A.Mariakuttikan & N. Arumugam 2006,Saras Pub,Nagercoil.

#### Reference Books

- General & comparative Animal physiology – William S. Hoar 2004.,Prentice-Hall
- Animal physiology - Kunt Schmidt ,2000-Eastern Economy Ed.
- Comparative Animal physiology - C.L Prosser and F.A.Brown 1965,W.B.Saunders's Co
- Animal physiology and related Biochemistry – R.C. Dalela Verma,1995. Jai Prakash Nath and Co.

#### E - Resources

<https://youtu.be/S49u-msy9UM>  
[https://youtu.be/Uf\\_4uNxujRs](https://youtu.be/Uf_4uNxujRs)  
<https://youtu.be/LTKjFD5iBtQ>  
<https://www.slideshare.net/alohagayquimba/urine-formation>  
<https://www.slideshare.net/baeudy/osmoregulation-10434653>  
<https://youtu.be/44B0ms3XPKU>  
<https://www.slideshare.net/JohnykuttyJoseph/johnys-ap-endocrine-system>

#### Pedagogy

Chalk & Talk, Group Discussion, PPT

#### Teaching Aids

Green Board, LCD Projector, Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III: Core Practical		SEMESTER - II
Course Title: PRACTICAL - II		
Course Code: 09CP43	Hours per week: 2	Credits: 4
CIA: 40 Marks	ESE: 60 Marks	Total: 100 Marks

### Preamble

Visualize and analyse the morphology and anatomy of cell types, cell division, its methods of genetic inheritance and diseases, developmental stages of embryo and its associated structural and physiological activities and excretory products of animals.

### Course Outcomes (CO)

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	Acquire knowledge on cell types, cell division, identification of genetic materials and perform micro technique.	K1, K2, K3
CLO 2	Demonstrate the principles of Mendelian and non-Mendelian inheritance.	K1, K2, K3
CLO 3	Observe genetic modification, differential inheritance due to multiple allelism, polygene and their associated problems.	K1, K2, K3
CLO 4	Identify, analyse and prepare various developmental stages of embryo and its associated structures.	K1, K2, K3
CLO 5	Trace the excretory products of physiological activities and their testing techniques in animals.	K1, K2, K3

K<sub>1</sub>-Remembering

K<sub>2</sub>-Understanding

K<sub>3</sub>-Applying

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
CLO 1	9	-	-	-	3	-	3
CLO 2	3	-	3	-	3	-	3
CLO 3	3	-	3	3	3	-	3
CLO 4	9	-	-	-	9	3	3
CLO 5	9	-	-	-	3	3	9
	33	-	6	3	21	6	21

### Mapping of CO with PSO

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CLO 1	1	9	9	3	-
CLO 2	1	9	3	3	-
CLO 3	1	9	3	3	-
CLO 4	1	9	3	9	-
CLO 5	-	1	3	3	-
	4	37	21	21	-

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

## CELL BIOLOGY

1. Study of Cell types – Observation of prepared slides
2. Study of buccal epithelium in human and Onion peeling
3. Mitosis – Study of stages in Onion root tip meristem
4. Meiosis – Study of stages of grass hopper testis –squash
5. Micro technique- Preparation of permanent slides (Demonstration only).
6. Identification of the genetic material(chromosome)by simple staining – Giant chromosome in *Chironomus* larva
7. Spotters
  - I. Watson and Crick model of DNA
  - II. DNA Replication
  - III. Lac Operon
  - IV. Clover leaf model of tRNA
  - V. Coding dictionary

## GENETICS

1. Survey of simple Mendelian traits in man in small population.
2. Use of beads to study Monohybrid, Dihybrid and Test crosses.
3. Distribution of tasters and non-tasters in the class population (PTC tasting).
4. Polygenic inheritance of quantitative traits – observations and graphical representations may be made using height and weight of the students.
5. Genetic basis and significance of
  - a) Gynandromorphism
  - b) Shell coiling in *Limnaea*.
  - c) Klinefelters, Down and Turner's Syndromes
  - d) Colour blindness and Hypertrichosis.
6. Fraternal, identical and Siamese twins
7. *Drosophila* culture and identification of various stages.

## DEVELOPMENTAL BIOLOGY

1. Study of structure of egg of an insect, frog and Chick.
2. Temporary mounting of Chick blastoderm.
3. Effect of Thyroxine in tadpoles of Frog (Demonstration only)

## SPOTTERS

- a) Observation of cleavage, Blastula and Gastrula of Frog (Slides).
- b) Whole mount of 24 Hours and 48 Hours chick embryo (Slides)
- c) Placental types – Observation

## PHYSIOLOGY

1. Effect of temperature on the opercular movement of fish.
2. Study of oxygen consumption by a fish
3. Test for the detection of excretory products (Ammonia, Urea and Uric acid).
4. Study of blood corpuscles- Preparation of blood smear and counting of blood corpuscles using haemocytometer.
5. A study on ECG strip and report
6. Effect of activities on blood pressure in Man.

## Pedagogy

Chalk and talk, Charts and models, Smart board, Group Discussion, PPT, Preserved animals, slides and Field visit

## Teaching Aids

Green Board, LCD Projector, Interactive White Board, Microscope – Dissection, Compound, and Phase Contrast Microscopes.

**DEPARTMENT OF BOTANY**

Programme: B.Sc. Zoology (CBCS and LOCF)

(For those students admitted during the 2021 - 22 and after)

PART – III: <b>Ability Enhancement Course</b>		SEMESTER - IV
Course Title: <b>TAXONOMY OF ANGIOSPERMS &amp; PLANT PHYSIOLOGY</b>		
Course Code: <b>08AE02</b>	Hours per week:4	Credit:4
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

- ❖ To understand the life history of angiosperms
- ❖ To know the mechanism of some metabolic activities of plants
- ❖ To know the various kinds of hormones involved in plants growth

**Course Outcome**

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

CO Number	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	To understand and distinguish the morphology of angiosperms To identify the higher plants	K1, K2 & K3
CO2	To appreciate and differentiate the morphology of selected angiosperms To apply the uses of economic important higher plants in their day to day life	K1, K2 & K3
CO3	To know and understand the biological mechanisms of water absorption and transpiration	K1, K2 & K3
CO4	To know and understand the biological mechanisms of food and energy synthesis in plants	K1, K2 & K3
CO5	To know and realize the growth and flowering of higher plants To apply the techniques of growth and flowering in their higher studies and research	K1, K2 & K3

K<sub>1</sub>-RememberingK<sub>2</sub>-UnderstandingK<sub>3</sub>-Applying**Mapping of CO with PO**

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
CLO 1	9	1	1	3	1	3	3
CLO 2	9	1	1	3	3	3	9
CLO 3	9	1	1	3	3	3	3
CLO 4	9	1	1	1	1	1	1
CLO 5	9	1	1	3	3	3	3
	<b>45</b>	<b>5</b>	<b>5</b>	<b>13</b>	<b>11</b>	<b>13</b>	<b>19</b>

**Mapping of CO with PSO**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CLO 1	-	3	1	3	1
CLO 2	-	1	1	3	-
CLO 3	-	-	1	1	1
CLO 4	-	1	9	3	3
CLO 5	-	1	9	9	1
	-	<b>6</b>	<b>21</b>	<b>19</b>	<b>6</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

## Syllabus

UNIT NO	CONTENT	HOURS
Unit – I	Outline classification of Bentham and Hooker's classification & merits and demerits – ICBN - Botanical survey of India - Important technologies in morphological features	12
Unit – II	Vegetative, floral characters and Economic importance of Annonaceae, Caesalpiniaceae, Asclepiadaceae, Lamiaceae, Euphorbiaceae, Poaceae.	12
Unit – III	<b>Plants and water relations:</b> Osmosis – water potential concept – Plasmolysis – Mechanism of Absorption of water - transpiration and Guttation.	12
Unit – IV	<b>Photosynthesis:</b> Structure of chloroplast – Light reaction – Z pigment system - Cyclic and Non - cyclic photophosphorylation - Dark reaction – C <sub>3</sub> and C <sub>4</sub> cycles.	12
Unit – V	<b>Plant Growth Regulators:</b> Auxins, Cytokinins Gibberellins, Ethylene and ABA (Excluding Biosynthesis) - Physiology of flowering – Photoperiodism and Vernalization.	12

### Text Books:

1. Plant Taxonomy, Saxena and Saxena, A Pragti Edition, Pragati PVT Ltd, Meerut, 2017 Ed.
2. Economic Botany, V Singh, PC Pande and DK Jain, Rastogi Publications, 2015 Ed.
3. Fundamentals of Plant Physiology – VK Jain, S Chand and Company Ltd. New Delhi, 2017 Ed.

### Reference books

1. Taxonomy of Angiosperms- B.P. Pandey, S.Chand & Company Ltd, Delhi, 2014 Ed.
2. Economic Botany- A Comprehensive Study, SL Kochhar, Cambridge University Press, 2016 Ed.
3. Plant Physiology – Suraj Mandal, Campus Books, New Delhi, 2014 Ed.

### E - Resources

1. <https://www.slideshare.net/Wabworld/angiosperms-flowering-plants-powerpoint-presentation> (Taxonomy of angiosperms)
2. [https://www.slideshare.net/bisharifa/botanical-nomenclature?next\\_slideshow=1](https://www.slideshare.net/bisharifa/botanical-nomenclature?next_slideshow=1) (Binomial nomenclature)
3. <https://www.slideshare.net/DrRaviPrasadRaoBoyin/angiosperm-classifications> (Angiosperms classification)
4. <https://www.slideshare.net/ManojJoshi12/bentham-and-hooker-classification> (Bentham and Hooker classification)
5. <https://www.slideshare.net/SoheilRana53/osmosis-47313134> (Osmosis)
6. <https://slideplayer.com/slide/13358261/> (Absorption of water)
7. <https://www.slideshare.net/RAFIULALAM006/transpiration-107149875> (Transpiration)
8. <https://www.slideshare.net/utmang/photosynthesis-process-light-and-dark-reactions> (Photosynthesis)
9. <https://www.slideshare.net/mhnsathish/krebs-cycle-72882839> (C<sub>3</sub> Cycle)
10. <https://www.slideshare.net/SudheerKandibanda/plant-growth-regulators-56599895> (Growth hormones)

### Pedagogy

Chalk & Talk, PPT, Experiment

### Teaching Aids

Black Board, Green Board, Chart, Specimen, Plant Material, Permanent Slide, LCD Projector, Online virtual Lab & Interactive White Board

## DEPARTMENT OF BOTANY

Programme: B.Sc. Zoology (CBCS and LOCF)

(For those students admitted during the 2021 - 22 and after)

<b>PART – III : Ability Enhancement Course</b>		<b>SEMESTER - IV</b>
<b>Course Title: ALGAE, FUNGI, BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS, TAXONOMY AND PLANT PHYSIOLOGY</b>		
Course Code: <b>08AP03</b>	Hours per week: <b>2</b>	Credit: <b>2</b>
CIA: <b>40 Marks</b>	ESE: <b>60 Marks</b>	Total : <b>100 Marks</b>

### Preamble

- ❖ To understand the plant diversity and thallus construction of selected forms
- ❖ To get hands on knowledge on identification of angiosperms
- ❖ To understand the basic physiological activities of higher plants.

### Course Outcomes (CO)

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

CO Number	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
<b>CLO 1</b>	To revise the morphology and reproductive structures in Algae, Fungi and Lichens Bryophytes, Pteridophytes and Gymnosperms.	K1, K2 & K3
<b>CLO 2</b>	To familiarize the internal structures, spore bearing parts of selected plant forms, Lichens, and Bryophyte. To identify macro micro algae, fungal colonies, lichen forms and fossil plants	K1, K2 & K3
<b>CLO 3</b>	To compare the life cycles of Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms	K1, K2 & K3
<b>CLO 4</b>	To understand and Become a expert for higher plant identification	K1, K2 & K3
<b>CLO 5</b>	To understand the mechanism physiological activities of higher plants.	K1, K2 & K3

K<sub>1</sub>-Remembering

K<sub>2</sub>-Understanding

K<sub>3</sub>-Applying

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	1	1	3	3	1	1
<b>CLO 2</b>	9	1	1	3	3	1	1
<b>CLO 3</b>	9	1	1	3	3	1	1
<b>CLO 4</b>	9	1	1	1	1	1	1
<b>CLO 5</b>	9	1	1	1	1	1	1
	45	5	5	11	11	5	5

### Mapping of CO with PSO

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	-	-	3	3	1
<b>CLO 2</b>	-	-	-	3	-
<b>CLO 3</b>	-	-	3	9	-
<b>CLO 4</b>	-	1	3	9	-
<b>CLO 5</b>	-	3	1	9	1
	-	4	10	30	2

Note: Mapping Score Strong-9, Medium- 3 and Low-1

## Syllabus

UNIT NO	CONTENT	HOURS
Unit – I	Micropreparation of types prescribed in <i>Nostoc</i> , <i>Sargassum</i> , <i>Puccinia</i> and Lichens	6
Unit – II	Micropreparation of types prescribed in <i>Funaria</i> & <i>Lycopodium</i>	6
Unit – III	Micropreparation of types prescribed in <i>Cycas</i>	6
Unit – IV	Identifying, observing and sketching the floral parts of the plants and economic importance of Annonaceae, Caesalpiniaceae, Asclepiadaceae, Lamiaceae, Euphorbiaceae and Poaceae.	6
Unit – V	Demonstration of the following physiological experiments: Four leaf experiment, Foliar Transpiration, Ganong's Light screen, Ganong's Potometer, Mohl's half leaf experiment, Evolution of O <sub>2</sub> during photosynthesis, Arc Auxanometer, Clinostat, Phototropism, Kuhne's fermentation vessel	6

### Text Books:

1. Botany for Degree Students Gymnosperms - P.C. Vashishta, S.Chand & Company Ltd, Delhi, 2014 Ed.
2. Practical Taxonomy of Angiosperms – R.K. Singha, Inter. Publishing House, Delhi, 2013 Ed.
3. Plant Physiology - Jain, V.K, S.Chand & Company Ltd, Delhi, 2013 Ed.

### Reference books

1. Taxonomy of Angiosperms- B.P. Pandey, S.Chand & Company Ltd, Delhi, 2014 Ed.
2. College Botany – Ganfule Hirendra (Chandra) Vol. I, New centre book agency, London, 2013 Ed.
3. The structure and reproduction of Algae Vol. I & II - F.E.Fritsch, Cambridge University Press.

### Pedagogy

Chalk & Talk, PPT, Experiment

### Teaching Aids

Black Board, Green Board, Chart, Specimen, Plant Material, Permanent Slide, Online virtual Lab & Interactive White Board

Black Board, Green Board, Chart, Specimen, Plant Material, Permanent Slide, Online virtual Lab & Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>Part – IV: Skill Enhancement Course</b>		
Subject Title: <b>MEDICAL LAB TECHNOLOGY</b>		
Course Code: <b>09SE41</b>	Hours per week: <b>2</b>	Credits: <b>2</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

### Objectives

- Principles, applications and working mechanisms of biomedical instruments
- Importance of blood grouping
- Functions of ECG and EEG
- Examination of semen and stools

### Syllabus

#### UNIT I

##### BIOMEDICAL DIAGNOSTIC LABORATORY-1:

Laboratory bio safety – general plan and organization –biomedical waste management, Applications of autoclave, centrifuge, microscope,

#### UNIT II

##### BIOMEDICAL DIAGNOSTIC LABORATORY -2

Electrophoresis, Colorimeter, Ultra Sound scan, X-ray, Doppler scan, CT scan, MRI scan.

#### UNIT III

##### HEMATOLOGICAL TECHNIQUES 1:

Blood – composition - counting of blood cells – blood smear – staining- ABO and Rh Blood grouping – Transfusion strategies.

#### UNIT IV

##### HEMATOLOGICAL TECHNIQUES 2

Haemoglobin estimation - Haemoglobinometer, Haemocytometer, ECG, EEG – ESR — Blood bank.

#### UNIT V

##### BIOMEDICAL STANDARDS AND DISORDERS:

Lipid profile, enzyme profile, urine profile, semen analysis, stool examination; anemia, diabetes, jaundice, bleeding disorders, CHD, Arthritis, COVID-19. Procedure for applying licence from concerned authorities.

### Text Book

- Medical Laboratory Technology - Volume I, II & III – L. Mukherjee, 1989 – McGraw Hill Publ. Co.

### E - Resources

- <https://www.slideshare.net/selvarajselva1/mri-ct-scan>
- <https://www.slideshare.net/rahul1387/autoclave-sterilizers>
- <https://www.slideshare.net/selvarajselva1/chromatography-232656725>
- <https://www.slideshare.net/selvarajselva1/ultra-sound-scan-doppler-scan>
- <https://youtu.be/KSs0SMfERuA>
- <https://youtu.be/xIZQRjkwV9Q>
- [http://www.powershow.com/view1/51879-ZDc1Z/Composition\\_of\\_Blood\\_powerpoint\\_ppt\\_presentation](http://www.powershow.com/view1/51879-ZDc1Z/Composition_of_Blood_powerpoint_ppt_presentation)
- <https://www.slideshare.net/vivekkatoch123/blood-bank-7576490>
- <https://www.slideshare.net/richabinani/lipid-profile-test-in-delhi-88103546>
- <https://www.slideshare.net/drsudeesh/stool-examination>

### Pedagogy

Chalk & Talk, PPT, Experiment

### Teaching Aids

Black Board, Green Board, & Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III : Core Course		SEMESTER - V
Course Title : <b>BIOCHEMISTRY AND BIOPHYSICS</b>		
Course Code: <b>09CT51</b>	Hours per week: <b>5</b>	Credits: <b>4</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

To enable the students to understand the broad spectrum of bio- molecules in their structure, metabolism and functions. They are also made awareness of biophysical properties among the living systems

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Acquire knowledge in biomolecule structure, classification and biophysical principles.	K1,K2 & K3
<b>CLO 2</b>	Understand the properties of biomolecules and various law's bio-physical principles.	K1,K2 & K3
<b>CLO 3</b>	Explore the metabolic pathways and their products in the living system.	K1,K2 & K3
<b>CLO 4</b>	Apply the biophysical principles in the living systems.	K1,K2 & K3
<b>CLO 5</b>	Analyse the products of biomolecules and biophysical principles in living system.	K1,K2 & K3

**K<sub>1</sub>**-Remembering**K<sub>2</sub>**-Understanding**K<sub>3</sub>**-Applying**Mapping of CO with PO**

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	-	-	-	-	-	3
<b>CLO 2</b>	9	-	-	-	-	-	3
<b>CLO 3</b>	9	-	3	-	-	3	3
<b>CLO 4</b>	3	-	3	-	3	-	3
<b>CLO 5</b>	3	-	3	-	1	-	3
	<b>33</b>	<b>-</b>	<b>9</b>	<b>-</b>	<b>4</b>	<b>3</b>	<b>15</b>

**Mapping of CO with PSO**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	3	9	3	9	-
<b>CLO 2</b>	3	9	3	9	-
<b>CLO 3</b>	3	9	3	9	-
<b>CLO 4</b>	-	3	3	-	3
<b>CLO 5</b>	-	3	3	3	3
	<b>9</b>	<b>33</b>	<b>15</b>	<b>30</b>	<b>6</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus****UNIT-I****12 Hours**

a. Acids, Bases, Dissociation constant, indicators,  $p^H$ , Buffers, Electrolytes, isotopes, isomerism.

- b. Biologically important chemical bonds and their importance.  
c. Classification, structure and properties of Carbohydrates, Lipids, Protein.

#### **UNIT-II**

**12 Hours**

- a. Structure and function of cholesterol, biosynthesis of cholesterol.  
b. Enzymes and Co enzymes: Classification and properties of enzymes-factors affecting enzyme action.  
c. Theories of enzyme action-Mechanism of enzyme action- Role of Coenzymes and isoenzymes.

#### **UNIT-III**

**12 Hours**

- a. Metabolism of carbohydrates (Glycolysis, Glycogenesis, Gluconeogenesis and Glycogenolysis)  
b. Metabolism of Protein (deamination, transamination, transdeamination and urea synthesis)  
c. Metabolism of Lipid ( $\beta$ -oxidation, biosynthesis of glycerol)

#### **UNIT-IV**

**12 Hours**

- a. Biological oxidation: Definition- The respiratory chain-Oxidative phosphorylation  
b. Production of ATP and energy budget in the metabolism of major nutrients.  
c. High energy compounds-definition-biologically important high energy compounds.

#### **UNIT-V**

**12 Hours**

- a. Colloids –introduction. Types of colloidal solution-general properties of colloidal solution, Brownian movement, Osmotic pressure, dialysis, Donnan membrane equilibrium. Surface tension  
b. Thermodynamics-definitions of different terms, Free energy, heat energy, enthalpy, entropy, exothermic and endothermic reactions.  
c. Bioelectricity - definition and measurement-action potential-membrane potential, Redox potential.

#### **Text Books**

- Deb A.C. 2003. Fundamentals of Biochemistry, New central book agency, Kolkatta
- Subramanian, M.A. 2005. Biophysics- Principles and Techniques, M.J.P. Publication, Chennai.

#### **Reference Books**

- Ambika Shanmugam 2003. Fundamentals of Biochemistry, Madras Medical College, Chennai
- Lehninger 2008. Biochemistry, Kalyani Publications, New Delhi
- R.N. Roy 2006. Biophysics, Kolkatta
- Salil Bose 1982. Elementary Biophysics, Jyothi books, Madurai.
- 

#### **E - Resources**

<https://www.slideshare.net/lwolberg/the-chemistry-of-the-cell>

<https://www.slideshare.net/GauravSaxena79/biomolecules-246078352>

[https://youtu.be/s\\_AvDEqluqs](https://youtu.be/s_AvDEqluqs)

[http://www.powershow.com/view/14e7b1-ZmFhY/Enzymes\\_powerpoint\\_ppt\\_presentation](http://www.powershow.com/view/14e7b1-ZmFhY/Enzymes_powerpoint_ppt_presentation)

<https://youtu.be/8NS7cBiSoBA>

[http://www.powershow.com/view3/41a876-NjMxM/Carbohydrates\\_Metabolism\\_powerpoint\\_ppt\\_presentation](http://www.powershow.com/view3/41a876-NjMxM/Carbohydrates_Metabolism_powerpoint_ppt_presentation)

<https://youtu.be/MSsVrzYibI8>

<https://www.slideshare.net/ashokktt/biological-oxidation-part-iii-oxidative-phosphorylation>

<https://youtu.be/8sz4CdY3v0k>

<https://www.slideshare.net/LALITSHARMA172/chemical-thermodynamics-58132284>

#### **Pedagogy**

Chalk & Talk, PPT, Experiment

#### **Teaching Aids**

Green Board, & Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III : Core Course		SEMESTER - V
Course Title : BIOTECHNOLOGY		
Course Code: 09CT52	Hours per week: 5	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

### Preamble

Enable the students to understand the basic knowledge on concepts, tools, techniques and applications of biotechnology.

### Course Outcomes (CO)

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	Acquire knowledge on concepts and various tools and techniques in biotechnology	K1,K2
CLO 2	Understand the functions of the tools under various disciplines of biotechnology	K2,K3
CLO 3	Explore the culture techniques, gene modification, gene amplification and environmental bioremedies using in biotechnology	K2,K3
CLO 4	Gain knowledge on the principles and applications of various molecular techniques	K2, K3
CLO 5	Inculcate the entrepreneurial skills using the tools and techniques in biotechnology	K1, K2, K3

K<sub>1</sub>-Remembering

K<sub>2</sub>-Understanding

K<sub>3</sub>-Applying

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
CLO 1	9	-	3	-	9	3	9
CLO 2	9	-	3	-	9	3	9
CLO 3	9	-	3	-	3	9	9
CLO 4	9	-	3	-	9	3	9
CLO 5	3	-	3	-	1	3	9
	39	-	15	-	31	21	45

### Mapping of CO with PSO

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CLO 1	-	1	9	9	1
CLO 2	-	1	9	9	1
CLO 3	-	3	9	9	-
CLO 4	-	3	9	9	3
CLO 5	-	1	9	9	9
	-	9	45	45	14

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

#### Unit: I Introduction and Molecular Tools

- a. **Definition** – Scope and importance- Biotechnology as an interdisciplinary pursuit - Intellectual Property Right (IPR) and Ethics in biotechnology

- b. **Enzymes** – Restriction endonucleases (Type I, II & III ), DNA-ligase, Reverse transcriptase, DNA polymerase, Terminal transferase - Linkers and Adaptors
- c. **Vectors** – pBR322, Ti plasmid, SV40 - Basic ideas about Phagemid, Cosmid, Bacterial Artificial Chromosome (BAC), Yeast Artificial Chromosome (YAC), Transposons as vectors, Shuttle and Expression vectors.

#### Unit-II Recombinant DNA Technology

- a. Gene cloning in Prokaryotes - DNA-gene library, genomic library - cDNA library
- b. Integration of DNA fragments into vector - Transfer of rDNA into bacterial cell
- c. Screening of recombinants - Selection of recombinants - DNA- sequencing

#### Unit: III Techniques

- a. **Molecular techniques-** Agarose Gel Electrophoresis – RFLP, RAPD, Polymerase Chain Reaction (PCR) – Blotting Techniques- Molecular probes and Hybridization- DNA finger Printing- Microarray
- b. **Animal Cell culture techniques:** Basic aspects of Animal cell, tissue and organ culture - Immobilized cell culture - Insect cell culture-Whole embryo culture
- c. **Plant cell culture techniques:** *In vitro* culture technique – Introduction for plant cell, tissue and organ culture

#### Unit-IV Applied Biotechnology

- a. **Animal-**Transgenic animals-Sheep& Fish- Animal bioreactor and molecular farming - Products from animal cell culture - Tissue plasminogen activator (tPA), blood factor VIII, Erythropoietin (EPO)
- b. **Plant-**Disease resistant plant production-Production of stress resistant plants – Insect resistant transgenic plants
- c. **Microbes-**Biofertilizers, Biopesticides, Primary and secondary metabolites-Ethanol production-Single cell protein (SCP) - Biogas production- Biohydrogen- Mushroom culture

#### Unit - V Biotechnology in Medicine and Environment

- a. **Medicine:** Recombinant vaccines - Improved contraceptives & Vaccines to control fertility- Antibiotic production- Penicillin., Monoclonal antibody production and its applications
- b. DNA probes in diagnosis of diseases- Production of Human peptide hormones and insulin- Gene therapy
- c. **Environment:** Genetically Modified Organisms (GMOs) for the management of environmental wastes - Bioremediation – *in situ* and *ex situ* process- Microbial degradation of Xenobiotics – Biomining and Ore leaching.

#### Text Books

- Dubey R.C. 2012. A text book of Biotechnology, S .Chand and Company Ltd., New Delhi

#### Reference Books

- Das H.K. 2007. Text Books of Biotechnology, Wiley Precise text books.
- Channarayappa, 2006. Molecular Biotechnology Principles and practices, University Press.
- Satyanarayana U. 2008. Biotechnology, Books and Allied, Kolkatta
- Lohar S. 2005. Biotechnology Praksh MJP publications Chennai.

#### E - Resources

- <https://www.slideshare.net/raiuniversity/b-sc-biotech-i-fob-unit-1-introduction-to-biotechnology>
- <https://youtu.be/qHDodu0s2F0>
- <https://www.slideshare.net/abdullahabobakr7/dna-library-lecturegene-libraries-and-screening>
- <https://www.slideshare.net/RameshPandi4/polymerase-chain-reaction-pcr-249256818>
- <https://www.slideshare.net/RameshPandi4/rflp-249275716>
- [https://bio.libretexts.org/Bookshelves/Cell\\_and\\_Molecular\\_Biology/Book%3A\\_Basic\\_Cell\\_and\\_Molecular\\_Biology\\_\(Bergtrom\)/15%3A\\_DNA\\_Technologies/15.04%3A\\_Genomic\\_Libraries](https://bio.libretexts.org/Bookshelves/Cell_and_Molecular_Biology/Book%3A_Basic_Cell_and_Molecular_Biology_(Bergtrom)/15%3A_DNA_Technologies/15.04%3A_Genomic_Libraries)
- <https://www.webmd.com/a-to-z-guides/dna-fingerprinting-overview>
- <https://www.slideshare.net/FIRDOUS88/single-cell-protein>
- <https://www.slideshare.net/RameshPandi4/production-of-biogas>
- <https://www.slideshare.net/sardar1109/biomining-bioleaching>

**Pedagogy**

Chalk & Talk, PPT Presentation

**Teaching Aids**

Green Board, & Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III : Core Course		SEMESTER - V
Course Title : <b>MICROBIOLOGY AND IMMUNOLOGY</b>		
Course Code: <b>09CT53</b>	Hours per week: <b>5</b>	Credits: <b>4</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

Enable the students to understand the basic knowledge on microbes, their structures and behaviour. To study the immune system and basic immunotechniques

**Course outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Acquire knowledge on basic concepts of microbiology and immunology	K1&K2
<b>CLO 2</b>	Understand the classification , structure and behaviour of microbes and immune system	K1&K2
<b>CLO 3</b>	Analyze the microbial physiology in various media and the cellular morphology of immune system	K1&K2&K3
<b>CLO 4</b>	Explore the impact of microbes in different media and to gain the knowledge on types and response of different immune system	K1&K2&K3
<b>CLO 5</b>	Impart the knowledge on microbes in daily life and to empower to develop the skills in immunotechniques	K1&K2&K3

**K<sub>1</sub>**-Remembering**K<sub>2</sub>**-Understanding**K<sub>3</sub>**-Applying**Mapping of CO with PO**

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	-	3	3	9	3	9
<b>CLO 2</b>	9	-	3	3	9	3	9
<b>CLO 3</b>	9	-	3	3	9	3	9
<b>CLO 4</b>	9	-	3	3	3	1	9
<b>CLO 5</b>	9	-	3	3	3	1	9
	<b>45</b>	<b>-</b>	<b>15</b>	<b>15</b>	<b>33</b>	<b>14</b>	<b>45</b>

**Mapping of CO with PSO**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	9	-	-	-	-
<b>CLO 2</b>	-	3	9	-	-
<b>CLO 3</b>	-	3	9	-	-
<b>CLO 4</b>	-	3	9	3	3
<b>CLO 5</b>	-	3	9	3	3
	<b>9</b>	<b>12</b>	<b>36</b>	<b>6</b>	<b>6</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus****UNIT-I****12 Hours**

- History and scope of Microbiology: Classification of microorganisms- Structural features of Bacteria, Virus, Actinomycetes and Fungi: Reproduction of Viruses (T4 Phage and HIV)
- Bacterial growth and nutritional requirements: Culture of Microorganisms – Types of culture media, Cultural characteristics of bacteria
- Isolation and enumeration, methods and maintenance of culture; preservation of microbes, reproduction in Bacteria – Conjugation, Transformation and Transduction

#### Unit II

**12 Hours**

- Food Microbiology: Fermented food, Food spoilage, Food poisoning, physical and chemical methods in food preservation.
- Soil Microbiology: Common soil microbes; symbiotic and asymbiotic organisms; physiology of nitrogen fixation.
- Water Microbiology: Coliform bacteria and MPN, Estimation of Total Plate Count, Index, Faecal Streptococci.

#### Unit III

**12 Hours**

- Study of common bacterial and viral diseases of man – Causative organisms, mode of transmission, pathogenicity, symptoms and their preventive measures
- Diseases of Gastro – enteric System – Cholera, Typhoid. Respiratory System – Diphtheria, Tuberculosis, COVID-19.
- Nervous System – Leprosy, Polio and Rabies – Genital System – AIDS, Fungal Diseases

#### Unit IV

**12 Hours**

- Immune system – Types of Immunity – Innate and acquired immunity: Passive and active
- Lymphoid organs – Primary and secondary organs, GALT & BALT. Lymphocytes – Sub-Population of T&B Cells
- Immunoglobulin – Types, structure and functions-Antigen-Antibody reactions – Vaccination principles – Vaccines – Preparations and immunization

#### Unit V

**12 Hours**

- Immune Response – Acquired immune response – Humoral immunity and Cell Mediated Immunity – Complements – classical and alternate pathway – MHC and HLA – Structure and function.
- Immune techniques – principles of precipitation – VDRL slide test, Double immuno diffusion and Immuno-electrophoresis – ELISA and Radio Immuno Assay.
- Hypersensitivity, transplantation – grafting – immune deficiency-Types and diseases.

#### Text Books

- Michael J. Pelczar, J.R. Ecschan, Noel R Krieg 2010. Microbiology an Application Based Approach, Tata McGraw Hill Education Private Ltd, New Delhi
- Ananthnarayanan, & Jayaram Panicker, 2010. Text Book of Microbiology, Universities Press

#### Reference Books

- Gangal S. and Sontakke, S. 2013 Text Book of Basic and Clinical Immunology, University Press (India) Pvt, Ltd, Hyderabad
- Hannigan B.M., Moore, C.B.T. and Quinn, D.G. (2010). Immunology, Viva books, New Delhi
- Sharma, P.D. 1998. Microbiology, Rastogi Publications
- Meena Kumari S. 2005 Microbial Physiology, M.J.P. Publishers, Chennai
- Vijaya Ramesh, K. 2005, Environmental Microbiology, M.J.P. Publishers Chennai
- Kuby, T. 1994. Immunology, P.G. Publishing Pvt., Ltd., New Delhi
- Tizard I.R. 1995. Immunology – An Introduction IV ED. Saunders College Publications, Philadelphia

#### E - Resources

<https://www.slideshare.net/Periowiki/general-microbiology-246979245>

[https://youtu.be/n7Z5-mRB\\_gI](https://youtu.be/n7Z5-mRB_gI)

[http://www.powershow.com/view4/52e29e-](http://www.powershow.com/view4/52e29e-ZDNIZ/FOOD_MICROBIOLOGY_powerpoint_ppt_presentation)

[ZDNIZ/FOOD\\_MICROBIOLOGY\\_powerpoint\\_ppt\\_presentation](http://www.powershow.com/view4/52e29e-ZDNIZ/FOOD_MICROBIOLOGY_powerpoint_ppt_presentation)

<https://youtu.be/csi82oWy7hM>

<https://www.slideshare.net/pathologybasics/gastrointestinal-infections-bacteriology>

<https://www.slideshare.net/childrendentistry/aids-10090624>

[http://www.powershow.com/view4/80e617-YTZIM/Types\\_of\\_Immunity\\_powerpoint\\_ppt\\_presentation](http://www.powershow.com/view4/80e617-YTZIM/Types_of_Immunity_powerpoint_ppt_presentation)

<https://youtu.be/YIKLpQEWILg>

<https://www.slideshare.net/rajukaiti/immuniy-antigen-and-antibody-hypersensitivity-reactions-and-ocular-corelation-by-raju>

<https://www.slideshare.net/rabbibaidoo/immunodeficiency-group-3>

### **Pedagogy**

Chalk & Talk, PPT Presentation

### **Teaching Aids**

Green Board, & Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III : Discipline Specific Elective</b>		<b>SEMESTER - V</b>
<b>Course Title : BIostatistics, Computer Application &amp; Bioinformatics</b>		
<b>Course Code: 09DS5A</b>	<b>Hours per week: 5</b>	<b>Credits: 5</b>
<b>CIA: 25 Marks</b>	<b>ESE: 75 Marks</b>	<b>Total: 100 Marks</b>

**Preamble**

Enable the students to acquire knowledge on principle, methods, analysis and interpretation of biology data through statistical and computational techniques.

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	To acquire knowledge on history, data and instruments of statistics and bioinformatics	K1,K2 &K3
<b>CLO 2</b>	To retrieve, present and evaluate the data using statistics and computational tools	K1,K2 &K3
<b>CLO 3</b>	Interpret and analyze data using methods, techniques through soft packages and statistical tools	K1,K2 &K3
<b>CLO 4</b>	Explore, predict and to study the applications of statistical and computational biology	K1,K2 &K3
<b>CLO 5</b>	To develop the skills in computational biology and computer data based works by using concepts, tools and techniques	K1,K2 &K3

K<sub>1</sub>-RememberingK<sub>2</sub>-UnderstandingK<sub>3</sub>-Applying**Mapping of CO with PO**

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7
<b>CLO 1</b>	3	1	-	-	-	-	3
<b>CLO 2</b>	9	3	3	-	-	-	3
<b>CLO 3</b>	9	3	3	-	-	-	3
<b>CLO 4</b>	3	3	3	-	-	-	9
<b>CLO 5</b>	3	3	3	-	-	-	9
	<b>27</b>	<b>13</b>	<b>12</b>	-	-	-	<b>27</b>

**Mapping of CO with PSO**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	-	-	3	-	9
<b>CLO 2</b>	-	3	9	-	9
<b>CLO 3</b>	-	1	9	-	9
<b>CLO 4</b>	-	1	9	-	9
<b>CLO 5</b>	-	1	9	-	9
	-	<b>6</b>	<b>39</b>	-	<b>45</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus****UNIT- I****12 Hours**

- Scope of Biostatistics- Types of Data- Importance of data collection
- Classification, tabulation and frequency distribution.

- c. Representation of data- Diagrammatic and graphical methods – Bar (Simple, Composite and Percentage) Pie, Histogram and Frequency curve.

#### UNIT – II

12 Hours

- a. Measures of Central tendency- calculation of Mean, (Arithmetic, Geometric, Harmonic) Median and Mode- Their merits and demerits.  
b. Measures of Dispersion – Calculation of range, Quartile deviation, mean deviation, standard deviation  
c. Variance and co-efficient of variation

#### UNIT-III

12 Hours

- a. Chi- square analysis- Calculation of gene frequency in a Mendelian population  
b. Probability- Theorem and calculation  
c. Students t- test and its significance

#### UNIT IV

12 Hours

- a. History, Classifications of computer-main frame, mini, micro and super computer  
b. Number systems -Decimal to binary. Popular software packages- MS word, power point, MS Excel  
c. Web and multimedia-Web browsers, E-mail-creating ID, management of mail.

#### UNIT V

12 Hours

- a. History and concepts of Bioinformatics, Biological databases; Types of databases.  
b. Basic and functional genomics - gene alignment, BLAST, Tools in BLAST. Multiple sequence alignment, CLUSTAL W  
c. Phylogenetic analysis, SwissProt- Expasy- Proteomic tools.

#### Text Books

- Palanichamy S.and Manoharan. S. 2003. Statistical methods for Biologists, Paramount Pub, Palani
- Ignacimuthu, 2006. Basic Bioinformatics, Narosa Publishers, New Delhi

#### Reference Books

- An Introduction to Biostatistics, 2004, S.Sundar Rao and J.Richard, Prentice Hall of India Private Ltd, New Delhi
- Introductory Practical Biostatistics, B.N.Misra *et al.*, 1983, Naya Prakash, Kolkatta
- Bioinformatics- D.R Westhead, J.H. Parish and R.M. Twyman 2003. Viva Books, Pvt.Ltd, New Delhi.
- Bioinformatics, Lohar, P.S 2009, MJP Publishers, Chennai
- Fundamental concept of Bioinformatics- Dan E. Krane & Michael L. Raymer, 2003. Pearson.Edu. New Delhi.
- Recent advances in Bioinformatics-Irfar A.Khan. Atiya Khanum, 2002, Ukaz. Pub. Hyderabad.

#### E - Resources

<https://www.slideshare.net/drnareshgill/biostatstics-type-and-presentation-of-data>

[https://www.slideshare.net/CasperWendy/measures-of-central-tendency-mean-median-mode?next\\_slideshow=1](https://www.slideshare.net/CasperWendy/measures-of-central-tendency-mean-median-mode?next_slideshow=1)

<https://www.slideshare.net/parth241989/chi-square-test-16093013>

<https://www.slideshare.net/enuekweisrael/classification-of-computer-71915019>

<http://www.mgcub.ac.in/pdf/material/20200406015739416c3962e5.pdf> (Introduction of Bioinformatics)

<https://www.slideshare.net/dilshadkarim1/phylogenetic-data-analysis>

#### Pedagogy

Chalk & Talk, PPT Presentation

#### Teaching Aids

Green Board, & Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III : Discipline Specific Elective</b>		<b>SEMESTER - V</b>
<b>Course Title : ANIMAL BEHAVIOUR AND CHRONOBIOLOGY</b>		
Course Code: <b>09DS5B</b>	Hours per week: <b>5</b>	Credits: <b>5</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

The course provides a broad vision on the animal behaviour and biological clock. The syllabus offers origin, patterns of behaviour, historical developments, types of biological clock and their significant characteristics in animal.

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Discuss the origin and history of Ethology, methods and recording of animal behaviour.	K1,K2&K3
<b>CLO 2</b>	Understand the different patterns of animal behaviour	K1,K2 & K3
<b>CLO 3</b>	Emphasize and compare the social and sexual behaviour in animals	K1,K2 & K3
<b>CLO 4</b>	Explain the historical developments and adaptive significance of biological clocks.	K1,K2 & K3
<b>CLO 5</b>	Analyze the different kinds of biological rhythms and their significant characteristics	K1,K2 & K3

K1-Remembering; K2-Understanding; K3-Applying

**Mapping of CO with PO**

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7
<b>CLO 1</b>	3	-	3	-	1	3	3
<b>CLO 2</b>	3	-	3	-	-	3	3
<b>CLO 3</b>	9	-	3	3	1	9	3
<b>CLO 4</b>	3	-	3	-	-	3	3
<b>CLO 5</b>	3	-	3	-	-	3	3
	21	-	15	3	2	21	15

**Mapping of CO with PSO**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	3	3	9	3	-
<b>CLO 2</b>	1	3	3	9	-
<b>CLO 3</b>	1	3	-	9	-
<b>CLO 4</b>	1	1	1	9	-
<b>CLO 5</b>	1	1	1	9	-
	7	11	14	39	-

Note: Mapping Score Strong-9, Medium- 3 and Low-1

## Syllabus

UNIT-I	Introduction to Animal Behaviour-Origin and history of Ethology; Brief profiles of Karl Von Frish, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen, Proximate and ultimate causes of behaviour, Methods and recording of a behaviour	(18Hrs)
UNIT-II	Patterns of Behaviour Stereotyped Behaviours (Orientation, Reflexes); Individual Behavioural patterns; Instinct vs. Learnt Behaviour; Associative learning, classical and operant conditioning, Habituation, Imprinting.	(18Hrs)
UNIT-III	Social and Sexual Behaviour Social Behaviour: Concept of Society; Communication and the senses; Altruism; Insects' society with Honey bee as example; Foraging in honey bee and advantages of the waggle dance. Sexual Behaviour: Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Sexual conflict in parental care.	(18Hrs)
UNIT-IV	Introduction to Chronobiology - Historical developments in chronobiology; Biological oscillation: the concept of Average, amplitude, phase and period. Adaptive significance of biological clocks.	(18Hrs)
UNIT-V	Biological Rhythm Types and characteristics of biological rhythms: Short and Long- term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms; Concept of synchronization and masking; Photic and non-photic zeitgebers; Circannual rhythms; Photoperiod and regulation, seasonal reproduction of vertebrates; Role of melatonin.	(18Hrs)

### Text Books

- Fatik Baran Mandal (2010). Text book of Animal Behaviour, PHI Learning private limited, New Delhi

### Reference Books

- John Brady (1979). Biological Clocks, The Camelot Press Ltd, Southampton
- CChandrashekar (1985). Biological Rhythms, Madras Science Foundation, Madras
- JJerny Weiner (1987). Behavioral Science, A Wiley Medical Publication, John Wiley & Sons, Singapore

### E - Resources

<https://www.copley-fairlawn.org/cms/lib/OH01001067/Centricity/Domain/329/Ch%2051%20Notes.ppt>  
<https://www.cabarrus.k12.nc.us/cms/lib/NC01910456/Centricity/Domain/7718/animal%20behavior.pptx>  
<https://www.slideshare.net/ISFCPISFCollegeofPha/chronobiology-102582617>  
<https://www.slideshare.net/VInSekhar/chrono-biology>  
<https://youtu.be/aCTnmxE9NQ>  
<https://youtu.be/5oLFeE4j6RQ>

### Pedagogy

Chalk & Talk, PPT Presentation

### Teaching Aids

Green Board, & Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

Part – IV : Skill Enhancement Course		
Subject Title : SERICULTURE		
Course Code: <b>09SE51</b>	Hours per week: <b>2</b>	Credits: <b>2</b>
CIA Marks: <b>25</b>	ESE Marks: <b>75</b>	Total Marks: <b>100</b>

### Objectives

- Understand sericulture as a cottage industry and exposure to silkworm rearing
- Mulberry cultivation and pathology
- Awareness creation to make them an entrepreneur

### Syllabus

#### UNIT I:

History of Sericulture – Sericulture as cottage industry - Types of Silk worms – Mulberry and Non-mulberry– Economic importance of silk and its by products (4 Hours)

#### UNIT II:

Mulberry cultivation – Methods of propagation – Irrigation – Manuring - Diseases and Pests of Mulberry – Control measures. (6 Hours)

#### UNIT III:

Life cycle of *Bombyx mori* – Voltinism - Silk gland – Rearing House and appliances – Rearing methods- Pathology of silk worm and control. (6 Hours)

#### UNIT IV:

Characteristics of Cocoons – Stiffling – Process of Silk reeling (4 Hours)

#### UNIT V:

Identification of silk worm larvae, pupa and Imago, Morphology of silk gland, DFL, Rearing appliances and Chandrika Procedure for getting financial assistance from Agencies and schemes (4 Hours)

### Text Books

An Introduction to Sericulture, 2006, G. Ganga of J. Sulochana Chetty, Oxford & IBH, Publishing Company, New Delhi

### Reference books

Principles of Sericulture, 1996, H.Aruga, Oxford & IBH, Publishing Company, New Delhi

### E - Resources

<https://www.slideshare.net/medaramesh/sericulture-loukya-meda>

<https://youtu.be/IIq30bgIIYw>

<https://youtu.be/txCNv0j54Bs>

<https://www.slideshare.net/uoyogn/life-cycle-of-silkworm>

<https://youtu.be/ISfoEXDSSs8>

<https://youtu.be/-HZZJe2HFpw>

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## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>Part – IV: Common Subject Theory</b>		
Course Title: <b>ENVIRONMENTAL STUDIES</b>		
Course Code: <b>ESUG51</b>	Hours per week: <b>2</b>	Credits: <b>2</b>
CIA: <b>25 Marks</b>	ESE Marks: <b>75</b>	Total Marks: <b>100</b>

### Objectives

- Disseminate information of Environment of national and international issues
- Environmental consciousness creation among the students
- Facilitation of environmental leadership among students

### Syllabus

#### Unit-I

**5 hrs**

Introduction – Nature, scope and importance of Environmental studies – Natural Resources and conservation – forest, water and energy.

#### Unit-II

**5 hrs**

Ecosystem – concept – structure and function, energy flow, food chain, food web and ecological pyramids

#### Unit-III

**5hrs**

Biodiversity – definition, types – values – India, a mega diversity zone – Hotspots – Endangered and endemic species – threat to biodiversity and conservation

#### Unit-IV

**5 hrs**

Environmental pollution – Air pollution- causes and effect – Ozone depletion – Global warming – acid rain – Water pollution – Noise pollution – Solid waste management – Nuclear hazard

#### Unit-V

**4hrs**

Human population and the environment – Population growth – variation among nations – effects of population explosion – family welfare programme – environment and human health.

### Text books

Environment studies – R.Murugesan (2009), Milleneum Pub. Madurai-16

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**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III: Core Course</b>		<b>SEMESTER - VI</b>
<b>Course Title: EVOLUTION</b>		
Course Code: <b>09CT61</b>	Hours per week: <b>6</b>	Credits: <b>4</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

To acquire knowledge in theories of origin of life and evolution. To study various evolutionary forces, radiation and phylogeny in species.

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Acquire knowledge on process of evolution through principles, theories and evidences	K1,K2, & K3
<b>CLO 2</b>	Understand the basic concept of evolution through various evolutionary processes.	K1,K2, & K3
<b>CLO 3</b>	Ensure the progress, barriers and attainments in the events of evolutionary processes.	K1,K2, & K3
<b>CLO 4</b>	Analyse the structure and outcomes of the evolutionary processes of speciation	K1,K2, & K3
<b>CLO 5</b>	Impart the knowledge on fossil and fossilization and also in evolutionary sequences / ancestral behaviours of mammals.	K1,K2, & K3

**K<sub>1</sub>**-Remembering**K<sub>2</sub>**-Understanding**K<sub>3</sub>**-Applying**Mapping of CO with PO**

	<b>PLO 1</b>	<b>PLO 2</b>	<b>PLO 3</b>	<b>PLO 4</b>	<b>PLO 5</b>	<b>PLO6</b>	<b>PLO7</b>
<b>CLO 1</b>	3	-	3	-	-	3	-
<b>CLO 2</b>	3	-	-	-	-	3	1
<b>CLO 3</b>	3	-	-	-	-	3	1
<b>CLO 4</b>	3	-	-	-	-	3	3
<b>CLO 5</b>	3	-	1	-	-	9	3
	<b>15</b>	<b>-</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>21</b>	<b>8</b>

**Mapping of CO with PSO**

	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CLO 1</b>	1	9	1	3	-
<b>CLO 2</b>	1	9	3	3	-
<b>CLO 3</b>	1	9	3	3	-
<b>CLO 4</b>	1	9	1	3	-
<b>CLO 5</b>	1	9	3	3	-
	<b>5</b>	<b>45</b>	<b>11</b>	<b>15</b>	<b>-</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus****Unit – I****12 Hours**

- a) Origin of Life: Oparin-Haldane Theory,
- b) Evidences for Evolution from Morphology and comparative anatomy, Embryology, Physiology and Biochemistry.
- c) Lamarckism and Neo-Lamarckism

#### **Unit – II**

**12 Hours**

- a) Darwinism: Natural selection, Neo-Darwinism – Types of selection- Experimental evidences.
- b) Modern synthetic theory- Hardy-Weinberg's Law – Behaviour of genes in natural population
- c) Genetic Drift – Evolutionary Significance.

#### **Unit - III**

**12 Hours**

- a) Species Concept – Sub Species and Sibling Species, Allopatric and Sympatric Speciation, Isolating Mechanism – Types and Examples
- b) Distribution of Animals – Barriers – Continental Drift Hypothesis Extinction – Types and causes
- c) Mimicry and colouration.

#### **Unit – IV**

**12 Hours**

- a) The Geological Records – Geological time scale– Survey of Geological periods
- b) Fossils: methods of fossilisation –types
- c) Methods of detection - Lead and Carbon Method.

#### **Unit –V**

**12 Hours**

- a) Adaptive Radiation in Mammals.
- b) Evolution of Man- Biological and cultural.
- c) Evolution of horse- Orthogenesis.

#### **Text Book**

- VeeraBala Rastogi, 2005. Organic Evolution, Kedarnath Ramnath Pub.

#### **Reference Books**

- Strickberger, 1994. Evolution, ELBS Publishers.
- Moody P.A.1995. Introduction to evolution, Kalyani Pub, New Delhi.
- Dobzhansky, Th., Ayala, F. J., Stebbins, G. Ledyard & Valentine, J. W., 1977. Evolution W. H. Freeman and Company, San Francisco
- Chattopadhyay, 2002. Life – origin, Evolution and adaptation, Books and Allied P Ltd, Kolkata.

#### **E - Resources**

<https://www.slideshare.net/RameshPandi4/animal-distribution-on-earth>  
<https://www.slideshare.net/RameshPandi4/geological-time-scale-232477869>  
<https://www.livescience.com/474-controversy-evolution-works.html>

#### **Pedagogy**

Chalk & Talk, PPT Presentation

#### **Teaching Aids**

Green Board, & Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III: Core Lab</b>		<b>SEMESTER - II</b>
<b>Course Title: PRACTICAL - III</b>		
Course Code: <b>09CP62</b>	Hours per week: <b>6</b>	Credits: <b>4</b>
CIA: <b>40 Marks</b>	ESE: <b>60 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

To enable the students to have hands on experiments in the field of biochemical, Microbiological, Biotechnological tools and Biophysical process. They are further made to analyse the environmental parameters and process also analyse these with appropriate statistical tools. They are also exposed to the different packages in genome analysis and protein designing further they are exposed to the various aspects of Microbiology, Immunology and Dairy science in the evolutionary prospects.

**Course Outcomes (CO)**

On the successful completion the students are enable

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Acquire knowledge on the principles of biophysical, biochemical, biotechnological tools and also to certain the analytical methods of environments, statistics using computer system	K1, K2, K3
<b>CLO 2</b>	Understand the basis of biological experiment using different principles and methodology	K1, K2, K3
<b>CLO 3</b>	Analyse the results of various biological, ecological and parameter measurements through the statistical tools	K1, K2, K3
<b>CLO 4</b>	Ensure the applications of the biological experiment in the prospects of evolutionary aspects	K1, K2, K3
<b>CLO 5</b>	Trace the employing, marketing and development strategies in the Microbiological and Dairying	K1, K2, K3

**K<sub>1</sub>**-Remembering**K<sub>2</sub>**-Understanding**K<sub>3</sub>**-Applying**Mapping of CO with PO**

	<b>PLO 1</b>	<b>PLO 2</b>	<b>PLO 3</b>	<b>PLO 4</b>	<b>PLO 5</b>	<b>PLO6</b>	<b>PLO7</b>
<b>CLO 1</b>	3	3	3	-	3	3	3
<b>CLO 2</b>	3	-	3	-	3	3	3
<b>CLO 3</b>	9	-	3	-	3	3	3
<b>CLO 4</b>	3	-	1	-	-	3	1
<b>CLO 5</b>	3	3	3	-	3	1	3
	21	6	13	-	12	13	13

**Mapping of CO with PSO**

	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CLO 1</b>	3	3	9	1	-
<b>CLO 2</b>	1	1	9	9	--
<b>CLO 3</b>	1	1	9	9	-
<b>CLO 4</b>	1	3	9	9	-
<b>CLO 5</b>	3	3	3	3	9
	<b>9</b>	<b>11</b>	<b>39</b>	<b>31</b>	<b>9</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

## Syllabus

### Biochemistry & Biophysics, Biotechnology, Microbiology and Immunology Biostatistics, Computer Applications and Bioinformatics

#### Biochemistry & Biophysics

##### Objectives

###### To enable the students to

- Experiments to observe certain physiological aspects
  - Analysis of blood and water samples
1. Study of salivary amylase enzyme activity. Effect of temperature and  $p^H$
  2. Tests for albumen, Sugar and Urea in Urine.
  3. Qualitative tests for carbohydrate, protein and lipid.
  4. Study of  $p^H$  meter and measurement of  $p^H$  of various water samples.
  5. Estimation of Ascorbic acid (Vitamin-C)
  6. Analysis of Slide Preparation: Haemin and Uric acid crystals.

#### Biotechnology

##### Objectives

###### To enable the students to

- Screen industrially important microbes
- Isolation of genomic and plasmid DNA
  1. Primary screening of industrially important microbes
  2. Isolation of Genomic DNA
  3. Isolation of Plasmid DNA
  4. Demonstration of Agarose gel Electrophoresis
  5. Immobilization of yeast cells
  6. PCR demonstration
  7. Spotters - Typical gene cloning experiment, Electrophoretic apparatus, Southern blotting, Northern blotting and DNA sequencing

#### Microbiology and Immunology

##### Objectives

###### To enable the students to

- Introduction of basic techniques in microbiology
- Principles and uses of microbiological instruments
- Dissection & observation of lymphoid organs
- Introduction of basic techniques in Immunology
  1. Cleaning of glass wares – Sterilizing media and equipment's
  2. Preparation of media for Microbes.
  3. Distribution of microbes in Nature- Soil, Water and in Air.
  4. Cultural characterization of Bacteria
  5. Simple staining of bacteria
  6. Differential staining of bacteria – Gram staining.
  7. Microscopic examination of live bacterial population.  
Hanging drop technique
  8. Spotters: Autoclave/ pressure cooker and Colony counter.
  9. Dissection to show lymphoid organs in Chick.
  10. Observation of spleen cells-Slide.
  11. Bleeding and serum separation.
  12. Demonstration of agglutination by blood group antigen.
  13. Demonstration of R.B.C. and W.B.C. count.
  14. Spotters : Various Lymphoid organs in chick and human

#### Biostatistics, Computer Applications and Bioinformatics

##### Objectives

###### To enable the students to

- Apply statistical Programmes in biological Studies
- Handle the various basic tools of bioinformatics

## **Biostatistics**

2. Collection of Data
3. Frequency Distribution (with number of Seed Pods)
4. Calculation of Mean, Median, Mode and Standard Deviation
5. Chi-Square analysis for Mendelian Cross (Monohybrid & Dihybrid)
6. Probability with tossing of coins.

## **Computer Applications**

1. MS Word and its applications
2. Excel – Bar diagram, Pie diagram and Histogram
3. PowerPoint
4. Data base retrieval from internet
5. Email Creation and sending documents

## **Bioinformatics**

1. Browsing the internet using websites
2. Browsing the internet using search Engines
3. Searching the data bases
  - a. in NCBI
  - b. in PDB
  - c. in Swiss – Prot
4. Getting gene sequences from data bank
  - a. Nucleotide sequences
  - b. Protein sequences
5. Analyzing Protein sequences using ROSMOL and JMOL
  - a. Structure
  - b. Bond length between molecules
  - c. Bond angle between molecules

## **SEMESTER – VI**

### **Evolution, Dairy Farming and Environmental biology**

#### **Evolution**

#### **Objectives**

##### **To enable the students to**

- Finger print study and experiments with beads to understand evolutionary concepts
- Principles of natural selection and genetic drift in large and small population
  1. Variation in finger prints in Man.
  2. Experiment with beads to illustrate gene pool concept & production of genotypes
  3. Experiment to study natural selection in large population
  4. Experiment to study principles of genetic drift in small population.
  5. Spotters- Homologous and Analogous organs, Evolutionary importance of *Peripatus*, *Limulus* and *Nautilus*, Study of vestigial organs, Petrified fossils (Stone fossil)

#### **Dairy Farming**

#### **Objectives**

##### **To enable the students to**

- **Observe of Dairy process, testing and identification of breeds**
- **Detect the quality of milk**
  1. Identification of breeds of Cow and exotic cows
  2. Computation of ration for calf and pregnant cow
  3. Experiment to identify the specific gravity of milk using Lactometer
  4. detection of adulteration using MBR test, alcohol test and H<sub>2</sub>SO<sub>4</sub> tests
  5. Visit to dairy processing Centre and Veterinary hospital

#### **Environmental biology**

#### **Objectives**

**To enable the students to**

- **Observation of eco system**
- **Estimation of ecological parameters**
  1. Morphometric study of fresh water pond
  2. Food web and Food chain
  3. Identification of fresh water and marine plankton
  4. Animal association
  5. Estimation of dissolved oxygen in water samples
  6. Measurement of soil temperature, pH and moisture

**Pedagogy**

Hands on Lab experiments, Chalk and talk, Group Discussion and PPT

**Teaching Aids**

Lab manuals, glasswares, Green Board, LCD Projector, Interactive White Board, Microscope – Dissection, Compound.

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III: Discipline Specific Elective</b>		<b>SEMESTER - VI</b>
<b>Course Title: DAIRY FARMING</b>		
Course Code: <b>09DS6A</b>	Hours per week: <b>5</b>	Credits: <b>5</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

To gain knowledge in breeds, physiology and management in dairy and dairy farm.

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Acquire knowledge on the dairy breed animals, their digestive physiology and ingredients.	K1,K2,K3
<b>CLO 2</b>	Understand the modern techniques in breeding and management of dairy animals at various stages.	K1,K2,K3
<b>CLO 3</b>	Impart knowledge on management of dairy products, its production and by-products	K1,K2,K3
<b>CLO 4</b>	Analyze the quality production of dairy animals and dairy products	K1,K2,K3
<b>CLO 5</b>	Trace the employability and marketing methods using dairy techniques and through field visits.	K1,K2,K3

**K<sub>1</sub>**-Remembering**K<sub>2</sub>**-Understanding**K<sub>3</sub>**-Applying**Mapping of CO with PO**

	<b>PLO 1</b>	<b>PLO 2</b>	<b>PLO 3</b>	<b>PLO 4</b>	<b>PLO 5</b>	<b>PLO6</b>	<b>PLO7</b>
<b>CLO 1</b>	3	-	3	1	3	3	3
<b>CLO 2</b>	3	-	9	-	9	3	3
<b>CLO 3</b>	3	-	9	-	9	3	3
<b>CLO 4</b>	3	-	9	-	9	3	3
<b>CLO 5</b>	3	1	3	-	3	3	3
	<b>15</b>	<b>1</b>	<b>33</b>	<b>1</b>	<b>33</b>	<b>15</b>	<b>15</b>

**Mapping of CO with PSO**

	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CLO 1</b>	3	3	3	9	-
<b>CLO 2</b>	3	3	9	3	3
<b>CLO 3</b>	3	3	9	9	9
<b>CLO 4</b>	3	3	3	9	3
<b>CLO 5</b>	3	3	9	9	9
	<b>15</b>	<b>15</b>	<b>33</b>	<b>39</b>	<b>24</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus**

<b>UNIT-I:</b>	a. Scope of Dairy farming, Dairy breeds of India- Cow and Buffalo b. Exotic breeds-Cow c. Systems of breeding – Hybrid vigour – grading up merits and	<b>(12 Hrs)</b>
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	demerits of inbreeding and outbreeding.	
<b>UNIT-II:</b>	a. Digestive system of Cow and glands related to digestion b. Common cattle feed – their nutritive value – minerals- Feed additives and silage preparation. c. Feeding and management of pregnant cow and calf	<b>(12 Hrs)</b>
<b>UNIT- III:</b>	a. Viral diseases – rinderpest, Foot and mouth disease b. Bacterial diseases – Mastitis, Anthrax, Haemorrhagic – septicaemia c. Metabolic diseases – Milk fever and blood.	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	a. Anatomy of udder and physiology of milk production b. Milk – composition, Pasteurization and Nutritive value, Colostrum and their importance, Techniques to produce quality milk- Techniques to detect milk adulteration, Spoilage of milk c. Preparation of Dahi, Butter, Ghee, Gova, Flavoured milk, butter milk, ice cream .	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	a. Housing and equipments for dairy cows- Records to be maintained in a Dairy b. Artificial insemination – Semen collection and storage c. Role of co-operative societies in milk production and Marketing.	<b>(12 Hrs)</b>

#### **Text Books**

- G.C. Banerjee 2012 - A Text book of Animal Husbandry – Oxford & IBH Publication, New Delhi.

#### **Reference Books**

- Sukumar De, 2008. Outline of Dairy technology, Oxford University Press
- Handbook of Animal husbandry, 2000. Publication and information division- ICAR, New Delhi

#### **E - Resources**

- [https://youtu.be/1LK4F\\_zPaZQ](https://youtu.be/1LK4F_zPaZQ)
- <https://www.slideshare.net/DrMuhammadAshiq/characteristics-of-exotic-and-crossbred-dairy-animals>
- [http://www.powershow.com/view/3b2de2-ZDg1Y/ANIMAL\\_FEEDING\\_OPERATION\\_REGS\\_powerpoint\\_ppt\\_presentation](http://www.powershow.com/view/3b2de2-ZDg1Y/ANIMAL_FEEDING_OPERATION_REGS_powerpoint_ppt_presentation)
- <https://youtu.be/5gpuAVMQDyE>
- <https://www.slideshare.net/RabieFayed/cattle-management-46010700>
- <https://youtu.be/DvWR47nOVYI>
- <https://youtu.be/Yn8CC-A7NRA>
- [http://www.powershow.com/view4/6820ea-OWY2O/MILK\\_powerpoint\\_ppt\\_presentation](http://www.powershow.com/view4/6820ea-OWY2O/MILK_powerpoint_ppt_presentation)
- <https://www.slideshare.net/selvarajselva1/housing-equipments-for-dairy-cows>
- <https://www.slideshare.net/selvarajselva1/role-of-co-operative-society-in-milk-production-and-marketing>
- <https://www.slideshare.net/selvarajselva1/dairy-farming-232478761>

#### **Pedagogy**

Chalk & Talk, PPT Presentation

#### **Teaching Aids**

Green Board, & Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III : Discipline Specific Elective</b>		<b>SEMESTER - VI</b>
<b>Course Title : APICULTURE</b>		
Course Code: <b>09DS6B</b>	Hours per week: <b>5</b>	Credits: <b>5</b>
CIA Marks: <b>25 Marks</b>	ESE Marks: <b>75 Marks</b>	Total Marks: <b>100 Marks</b>

**Preamble**

To acquire knowledge on medicinal and economic values of honey bees and honey.

To establish the entrepreneurial opportunities to the learners.

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	To acquire knowledge on history, diversity, social organization of honeybees, and architecture of beehive.	K1,K2 &K3
<b>CLO 2</b>	To learn different methods of bee keeping and application of appliances, and discrimination of wild and domestic species.	K1,K2 &K3
<b>CLO 3</b>	To analyze the chemical composition of honey, and types of rearing beehives.	K1,K2 &K3
<b>CLO 4</b>	To examine the honeybees for selection for rearing.	K1,K2 &K3
<b>CLO 5</b>	To gather the information on marketing of honey products, economic importance, and funding agencies for apiculture.	K1,K2 &K3

**K<sub>1</sub>**-Remembering**K<sub>2</sub>**-Understanding**K<sub>3</sub>**-Applying**Mapping of CO with PO**

	<b>PLO 1</b>	<b>PLO 2</b>	<b>PLO 3</b>	<b>PLO 4</b>	<b>PLO 5</b>	<b>PLO6</b>	<b>PLO7</b>
<b>CLO 1</b>	3	-	3	1	-	3	3
<b>CLO 2</b>	9	-	3	3	-	3	3
<b>CLO 3</b>	3	-	3	-	3	3	3
<b>CLO 4</b>	3	3	3	3	3	3	3
<b>CLO 5</b>	3	3	3	3	3	3	3
	21	3	12	10	7	15	15

**Mapping of CO with PSO**

	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CLO 1</b>	3	1	9	9	9
<b>CLO 2</b>	3	1	9	9	9
<b>CLO 3</b>	-	3	9	9	9
<b>CLO 4</b>	3	3	9	9	9
<b>CLO 5</b>	3	3	9	9	9
	12	11	45	45	45

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus****UNIT- I****12 Hours**

- d. History of apiculture, Diversity of honeybees in different environments, Morphology of honeybees.
- e. Social organization and communication among bees in a honeybee colony.
- f. Architecture of beehive.

#### **UNIT – II**

**12 Hours**

- d. Bee keeping methods – Traditional and modern methods.
- e. Appliances of apiculture, Establishment of flowering gardens.
- f. Species of honeybee – Wild and domesticated species

#### **UNIT-III**

**12 Hours**

- d. Chemical composition of honey.
- e. Flower dependent ingredients in honey.
- f. Types of rearing beehives - Suitable beehives for urban and backyard rearing

#### **UNIT IV**

**12 Hours**

- d. Selection of species of honeybees for rearing.
- e. Rearing methods of honeybees.
- f. Value added products of honey..

#### **UNIT V**

**12 Hours**

- d. Marketing of honey products.
- e. Medicinal and economic importance of honeys and honey.
- f. Guidance and funding agencies for apiculture.

#### **Text Books**

- Apiculture Dr. J. K. Gupta, Dr. V. V. Belavadi and Sh. Mohinder Singh, Agri Moon.com Online Publication, 1st Edition, 2016.

#### **Reference Books**

- Prospective in Indian Apiculture - R.C. Mishra - Agrobios Publications
- Bee Keeping in India - G. K. Ghosh, APH Publishing, 1994
- Technology and value addition of Honey - Dr. D. M. Wakhle and K. D. Kamble.
- Agro Botanica, 4E 176, J.N. Vyas Nagar, Bikaner (Rajasthan), India.

#### **E - Resources**

<http://ecoursesonline.iasri.res.in/mod/page/view.php?id=16175>

<https://old.mu.ac.in/wp-content/uploads/2016/06/4.93-Certificte-Course-in-Honey-Bee-processing-for-approval.pdf>

<https://webservices.scientificnet.org/rest/uisdata/api/v1/coursedescriptions/68257>

<http://www.gdcbaramulla.edu.in/Syllabus/ZO318S1.PDF>

<http://ecoursesonline.iasri.res.in/course/view.php?id=166>

<http://ecoursesonline.iasri.res.in/course/view.php?id=613>

#### **Pedagogy**

Chalk & Talk, PPT Presentation

#### **Teaching Aids**

Green Board, & Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III : Discipline Specific Elective</b>		<b>SEMESTER - VI</b>
<b>Course Title : ENVIRONMENTAL BIOLOGY</b>		
Course Code: <b>09DS6C</b>	Hours per week: <b>5</b>	Credits: <b>5</b>
CIA Marks: <b>25 Marks</b>	ESE Marks: <b>75 Marks</b>	Total Marks: <b>100 Marks</b>

**Preamble**

To obtain knowledge an environmental factor, structure, barriers. Its measurement and management

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Acquire knowledge on fundamental concepts, structure and types of ecosystem	K1,K2,K3
<b>CLO 2</b>	Understand the behavioral patterns found in organisms at different ecological levels.	K1,K2,K3
<b>CLO 3</b>	Ensure the reciprocal relationship and impact between organisms and environment.	K1,K2,K3
<b>CLO 4</b>	Trace the problems of adverse environment and its management	K1,K2,K3
<b>CLO 5</b>	Create awareness on protects patterns, conservation and management of environment	K1,K2,K3

**K<sub>1</sub>**-Remembering**K<sub>2</sub>**-Understanding**K<sub>3</sub>**-Applying**Mapping of CO with PO**

	<b>PLO 1</b>	<b>PLO 2</b>	<b>PLO 3</b>	<b>PLO 4</b>	<b>PLO 5</b>	<b>PLO6</b>	<b>PLO7</b>
<b>CLO 1</b>	3	-	-	-	-	3	-
<b>CLO 2</b>	3	-	-	-	-	3	-
<b>CLO 3</b>	3	-	-	-	-	3	-
<b>CLO 4</b>	3	-	3	-	3	3	-
<b>CLO 5</b>	3	-	3	3	3	3	9
	<b>15</b>	<b>-</b>	<b>6</b>	<b>3</b>	<b>6</b>	<b>15</b>	<b>9</b>

**Mapping of CO with PSO**

	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CLO 1</b>	3	-	-	1	-
<b>CLO 2</b>	3	3	-	9	-
<b>CLO 3</b>	-	-	-	9	-
<b>CLO 4</b>	-	-	3	9	-
<b>CLO 5</b>	3	-	3	9	-
	<b>9</b>	<b>3</b>	<b>6</b>	<b>37</b>	<b>-</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus****UNIT-I****12 Hours**

- Introduction and scope - Soil profile and fauna: Water- properties, water problem in terrestrial habitat.

- b. Light- light in relation to aquatic habitat, effect on organisms
- c. Temperature-range, thermal stratification, tolerance, homeothermic, Poikilothermic animals, adaptations to extremes of temperature and effects on organisms.

#### **UNIT-II**

**12 Hours**

- a. Interspecific relationship- Symbiosis- Mutualism and Commensalism, Antibiosis, Parasitism, Predation and Competition- Intraspecific relationship- Colonisation, aggregation and social organization.
- b. Ecosystem- Definition, components, Pond and forest as an ecosystem- trophic levels, Food chain and Food web- Ecological pyramids, energy flow and productivity
- c. Biogeochemical cycles- Carbon, Nitrogen and Phosphorous.

#### **UNIT-III**

**12 Hours**

- a. Community- Definition, structure and characteristics- Ecotone, edge effect and ecological niche
- b. Community dynamics- ecological succession and climax community.
- c. Population ecology- characteristics- Nataly, Mortality, Dispersal, age pyramid, population estimation- Regulation and dynamics of population.

#### **UNIT-IV**

**12 Hours**

- a. Characteristics, Zonation and fauna and adaptations of fresh water, marine and estuary habitats
- b. Terrestrial habitats- forests, deserts, caves, fauna and their adaptations
- c. Parasitic adaptations- Ecto and endo

#### **UNIT-V**

**12 Hours**

- a. Environmental pollutants- Types- Air pollution- Sources, Effects and control measure
- b. Water pollution- Sources, Effects and control measures- Radioactive and Noise pollution
- c. Natural Resources-Wild life - Conservation and management.

#### **Text Books**

- Verma, P.S and Agarwal, V.K 2000. Environmental biology, S.Chand & Co, New Delhi.
- Rastogi, V.B and Jayaraj, M.S, 1984. Animal Ecology and distribution of animals, Kedarnath, Ramnath, Meerut.

#### **Reference Books**

- Arora, M.P. 2011. Ecology, Himalaya Publishing house, New Delhi
- Rana, S.V.S. 2009. Essentials of Ecology and Environmental science, Prentice- Hall of India, New Delhi.
- Odum, E.P 1983. Basic Ecology, Saunder's College Publishing, New York.

#### **E - Resources**

<https://www.slideshare.net/jayanshugundaniya9/ecology-and-ecosystem-41045015>  
<https://www.slideshare.net/alirazaansari100/light-and-temperature-of-an-ecosystem>  
<https://www.slideshare.net/nandapalit/ecological-succession-34231619>  
<https://www.slideshare.net/RashmiYadav45/biogeochemical-cycle-71015487>  
<https://www.slideshare.net/pipe69/environmental-pollution-14379215>  
<https://slideplayer.com/slide/5706624/> (Wildlife Conservation and Management)

#### **Pedagogy**

Chalk & Talk, PPT Presentation

#### **Teaching Aids**

Green Board, & Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III : <b>Discipline Specific Elective</b>		SEMESTER - VI
Course Title: <b>TOXICOLOGY</b>		
Course Code: <b>09DS6D</b>	Hours per week: <b>5</b>	Credits: <b>5</b>
CIA Marks: <b>25 Marks</b>	ESE Marks: <b>75 Marks</b>	Total Marks: <b>100 Marks</b>

**Preamble**

To enable the students acquire knowledge on basic concepts of toxicology, various toxicology testing methods and study the biomonitoring of toxic chemicals and environmental legislation and chemical safety evaluation.

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Acquire knowledge on basic concepts of toxicology including toxicants and toxicity, factors affecting the environmental concentration of toxicants.	K1, K2
<b>CLO 2</b>	Understand the various toxicology testing methods	K2
<b>CLO 3</b>	Study the Toxicants of public health hazard such as toxic chemicals, toxic effects, Automobile emissions and heavy metals, Health hazards of food additives, Radioactive substances and Biological effects of radiations.	K2, K3
<b>CLO 4</b>	Trace the biomagnification and toxic materials in environment including Pesticides, Metals, and Radioactive substance.	K2,, K3
<b>CLO 5</b>	Apply the knowledge on biomonitoring of toxic chemicals and environmental legislation and chemical safety evaluation	K3

**K1-knowledge****K2-Understand****K3-Apply****Mapping of CO with PO**

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	3	-	3	3	1	9	3
<b>CLO 2</b>	3	-	3	3	3	3	9
<b>CLO 3</b>	9	-	9	3	3	9	9
<b>CLO 4</b>	3	-	3	3	3	9	3
<b>CLO 5</b>	3	3	3	3	3	3	3
	31	3	21	15	13	33	27

**Mapping of CO with PSO**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	-	-	9	3	3
<b>CLO 2</b>	-	-	9	3	3
<b>CLO 3</b>	-	-	9	3	3
<b>CLO 4</b>	-	-	9	3	3
<b>CLO 5</b>	-	-	9	9	3
	-	-	45	21	15

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus**

<b>UNIT-I:</b>	<b>Basic concepts of Toxicology</b> Toxicants and toxicity, factors affecting the environmental concentration of toxicants, factors influencing the toxicity, Dose- response relationships, toxicity curves, toxicity of chemical mixtures, toxicity testing.	<b>(12 Hrs)</b>
<b>UNIT-II:</b>	<b>Toxicology testing methods</b> General test design, Single species tests, Multispecies tests, Acute toxicity tests, Subacute toxicity tests, Chronic toxicity test, Bioassay in toxicity testing.	<b>(12 Hrs)</b>
<b>UNIT-III:</b>	<b>Toxicants of public health hazard</b> Toxic chemicals, Toxic effects, Pesticides, Automobile emissions, Heavy metals, Fertilisers, Food additives, Health hazards of food additives, Radioactive substances , Biological effects of radiations.	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	<b>Biological magnification of toxic material</b> Biomagnification, Toxic materials in environment- Pesticides, Metals, Radioactive substance. Microcosms (Test models), Compartment models- One compartment model and two compartment model.	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	<b>Biomonitoring of toxic chemicals and environmental legislation and chemical safety evaluation</b> Objectives of biomonitoring, Biological monitoring programme, Parameters in biomonitoring, Bioindicators and environmental monitoring, Applications of bioassay in toxicology, Environmental legislation and chemical safety evaluation.	<b>(12 Hrs)</b>

### Text Book

Sharma, P.D. 2017. Environmental Biology and Toxicology, Rastogi publications, Meerut.

### Reference Books

- Misra, S.P and Pandey, S.N, 2008. Essential Environmental studies, Ane Books India, New Delhi.
- Baldwin, J.H. 1985. Environmental Planning and management, International Book distributors, Dehradun.
- Ghose, 2005. A Text Book of Environmental chemistry, Dominant publishers and distributors, New Delhi.
- De, A.K. 1986. Environmental chemistry, Wiley Eastern Ltd., New Delhi.
- Tyagi, O.D and Mehra, M.1990. A Text book of Environmental chemistry, Anmol publications, New Delhi.
- Dutt, N.H.G.2005. Environmental pollution and control, Neelkamal publications PVT. Ltd., Hyderabad.

### E-Resources

1. <https://www.slideshare.net/MalavikaMR/basic-concepts-of-toxicology>
2. <https://www.slideshare.net/ParasuramanParasuraman/toxicological-screening>
3. <https://youtu.be/cEb-i-VKdBc>
4. <https://youtu.be/ZCKHwY37gNc>
5. <https://www.slideshare.net/AmitBhojvia/cpcb-report-59919951>
6. <https://www.slideshare.net/mwaurah/environmental-audit-methodology>

### Pedagogy

Chalk & Talk, PPT Presentation

### Teaching Aids

Green Board, & Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021-22 and after)

Part – IV: Skill Enhancement Course		
Course Title: <b>FISH CULTURE AND VERMITECHNOLOGY</b>		
Course Code: <b>09SE61</b>	Hours per week: <b>2</b>	Credits: <b>2</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

### Objectives

- Impart the knowledge on common food fishes and enhancement of fish productivity
- Management and maintenance of fish pond and various types of fish culture
- Common fish diseases, treatment and control measures
- Role of vermitechology for sustainable agriculture and environmental management
- Product from the vermitechology.

### Syllabus

#### UNIT I:

Scope and importance of aquaculture – Physical and chemical characteristic features of water bodies – Types of culture systems (Traditional, intensive, semi-intensive and extensive) (5 Hours)

#### UNIT II:

Selection of cultivable species – Site selection for fish farming – construction of fish ponds – Types of fish ponds – Maintenance and management of ponds. Fish Feeds (5 Hours)

#### UNIT III:

Types of fish culture – Monoculture, Monosex-culture and Poly culture, Common fish diseases - Prevention and treatment (5 Hours)

#### UNIT IV:

Rearing and culturing of earthworm – Vermicompost unit – vermibed preparation, Precomposting – composting by earthworms – methods – management – harvesting of vermicast. (4 Hours)

#### UNIT V:

Vermicast – characteristics – quality analysis – vermish – characteristics, Earthworm as food and medicinal importance – Role of KVIC and NABARD. (5 Hours)

### Text Books

Fish Culture 1993 G. Santhanakumar, JJ publications

**Vermiculture**, 2012 M.Seetha Lekshmy and R.Santhi, Saras Publication

### Reference books

- An introduction to fishes 2011 S.Khanna, Silver line publications
- Fish & Fisheries 2010 Pandey & Shukla, Rastogi Publications A manual of Fresh water Aqua culture 1997 R. Santhanam, Oxford and IBH Pub.
- Vermicomposting for sustainable agriculture (2003): BK Gupta – Agrobios

### E - Resources

<https://www.slideshare.net/BishwasKafle/fish-culture-system>

<https://www.slideshare.net/BalwantSingh16/construction-and-maintenance-of-a-fish-farm>

<https://www.youtube.com/watch?v=au2f5QzkuJ4> (Induced Breeding)

<http://www.authorstream.com/Presentation/munawarzaidi-2077225-fish-diseases/>

[http://oms.bdu.ac.in/ec/admin/contents/316\\_16SNMEZO2\\_2020052104361175.pdf](http://oms.bdu.ac.in/ec/admin/contents/316_16SNMEZO2_2020052104361175.pdf) (Ornamental Fish Farming)

<https://youtu.be/HySDWOdWfoQ>

<https://youtu.be/6Ejq4pbANww>

<https://www.slideshare.net/vermicompostfertilizer/organic-vermicompostfertilizer>

<https://www.slideshare.net/careindia/vermiculture-37599940>

<https://youtu.be/uFKaD6NFjDQ>

<https://youtu.be/YxmIaXtKeI>

### Pedagogy

Chalk & Talk, PPT Presentation

### Teaching Aids

Green Board, & Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>Part – IV: Skill Enhancement Course</b>		
Subject Title: <b>PROJECT</b>		
Course Code: <b>09SE62</b>	Hours per week: <b>2</b>	Credits: <b>2</b>
CIA Marks: <b>25</b>	ESE Marks: <b>75</b>	Total Marks: <b>100</b>

### Course learning outcomes:

On completion of the course, the students are able to

- ✓ know how to develop an aptitude for research in zoology.
- ✓ know how to learn research methodology and literature review
- ✓ learn to identify the appropriate research topic and presentation

### Procedure:

- Topics of zoological interest can be selected for the project. Project is to be done by a group not exceeding 5 students.
- Every student should submit typed (A4 paper, 12 Font, 1.5 Space, 20- 30 pages), spirally bind project report duly attested by the supervising teacher and the Head of the Department on the day of practical examination before a board of two Examiners for viva voce examination. The viva-voce based on the project is conducted individually.
- Project topic once chosen shall not be repeated by any later batches of students. List of projects submitted year wise is to be maintained in a register and submitted before the examiners if requested.
- The project report contains the following components:
  1. Preliminary (Title page, declaration, certificate of the supervising teacher, content etc.)
  2. Introduction with relevant literature review and objective
  3. Material and Methods
  4. Results
  5. Discussion
  6. Conclusion / Summary
  7. References.

### TOUR VISIT

Study tour and field / institutional visit, Students are directed to visit one research institute/ preferably within the state of Tamil Nadu. Scientifically prepared hand written/typed study tour report along with photographs of candidate at the places of visit must be submitted by each student during summative examination for evaluation. The board of examiners can decide the scheme of evaluation of project, study tour report and viva voce.

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

Part – IV: Skill Enhancement Course		
Subject Title : ZOOLOGY FOR COMPETITIVE EXAMINATIONS		
Course Code: <b>09SE63</b>	Hours per week: <b>2</b>	Credits: <b>2</b>
CIA Marks: <b>25</b>	ESE Marks: <b>75</b>	Total Marks: <b>100</b>

### To enable students to

- Appear for competitive exams
- Have overall subject knowledge essential for employment

### Syllabus

#### UNIT I

(5 Hours)

a) Non - Chordata:- General organisation - Classification with diagnostic features up to classes. Protozoa:- Structure, reproduction and life history of Amoeba Paramecium, Trypanosoma, Plasmodium, Monocystis, Leishmania - locomotion, nutrition, economic importance. Porifera: Sponges canal system, skeleton, reproduction and economic importance. Coelenterata:- Diploblastic organization - life history of obelia and Aurelia, Metagenesis - Polymorphism in Hydrozoa Corals and Croal formation - relationships of Cnidaria and Acnidaria. Helminthes:- Structure and life history of Planaria, Fasciola, Teania, Ascaris and Wucheraria - parasitic adaptations - Helminthes in relation to man. Annelida:- Neries, earthworm and leech - Coelom and metamerism - modes of life in polychactes. Onychophora:- Structure, affinities and distribution of Peripatus. Arthropoda:- Prawn, Scorpion and Cockroach - Larval forms and parasitism in Crustacea - Mouth parts, vision, respiration and excretion Metamorphosis and social life in insects. Mollusca:- Freshwater mussel, pila, sepia - oyster culture and pearl formation. Echinodermata:- General organisation - Water vascular system Larval forms and affinities.

b) Prochordata:- Amphioxus, Balanoglossus - Ascidian retrogressive Metamorphosis, neoteny and affinities. Chordata:- General Organisation - Characters, Outline classification Up to class level. Pisces:- Locomotion, migration, respiration, economic importance structure and affinities of Dipnoi. Amphibia:- Origin of Amphibians - Parental care - South Indian amphibians. Reptiles:- Origin - Conquest of land - adaptations to live on land Adaptive radiation - Temporal Vacuties - identification of poisonous and non-poisonous snakes - poison apparatus - south Indian examples. Birds:- Origin - flight adaptations - mechanism of flight - double respiration - migration - Flightless birds, their structure and distribution. Mammals:- Dentition, skin derivatives - distribution - adaptive radiation - Prototheria and Metatheria, their Phylogenetic relationship - South Indian examples.

#### UNIT II

(5 Hours)

a) Cell and Molecular Biology:- Cellular Organeles - Structure and function - Plasma membrane, mitochondria, golgi bodies, endoplasmic reticulum and ribosomes - Nucleolus and nucleus - Chloroplast - Cell division (Mitosis & meiosis) - Chromosomes - DNA structure and function, replication of DNA, Genetic code - RNA and protein synthesis. Gene expression - Recombinant DNA, Genetic cloning - Genetic engineering, its uses in agriculture, biology and medicine - Sex chromosomes and sex determination.

b) Genetics:- Laws of inheritance - Linkage, principle of gene mapping multiple alleles, blood groups - mutation (Natural and induced) Sex Linked and Sex Limited inheritance - Chromosome number and form ploidy - cytoplasmic inheritance - Karyotypes - Normal and abnormal genetic disorder - Bio-chemical genetics - regulation of gene expression in prokaryotes and Eukaryotes - population genetics - Eugenics. Mean, Median and standard deviation.

#### UNIT III

(5 Hours)

a) Bio Chemistry:- Structure of carbohydrates, amino acids, proteins lipids - Glycolysis and Kreb's cycle - oxidation, reduction - oxidative phosphorylation - energy conservation and release, cyclic AMP, ATP enzymes – mechanism. Hormones, their classification biosynthesis and function. Physiology:- with reference to mammals, digestion, nutrition, balanced diet in man - assimilation, intermediary/metabolism. Composition of blood - Coagulation, Transport of oxygen, Carbondioxide, Blood pigments, Mechanism of respiration, Muscles, mechanism of muscle contraction, Temperature regulation, Acid base balance and homeostasis, Nerve impluses and conduction, neurotransmitters. Receptors, photo, phono and chemoreception. Nephron and urine formation, Endocrine glands, ovary and pituitary organs and their inter relationship, Physiology of reproduction in humans, Normal Zoology development in insects and

pheromones. Bioluminescence, Biological rhythms, Physiology of immune response Antigens - Immunoglobulins, humoral and cell mediated immunity. T & B cells, mechanism of antibody formation - AIDS.

b) Development Biology:- Gametogenesis - fertilization - type of eggs - blastulation and gastrulation in Amphioxus, frog and chick morphogenetic movements - organizer potency, organogenesis with reference to heart, eye kidney brain - Formation and fate of extra embryonic membranes in chick. Placenta, types, functions, Regeneration - Aging and senescence - metamorphosis in Frog - Cancerous growth.

#### **UNIT IV**

**(5 Hours)**

a) Environmental Biology:- Biotic and abiotic factors, their role, Intra and interspecific association. Biogeochemical cycles. Ecosystem, concept and components - energy flow, food chain, food web, trophic levels. Ecological succession, Community structure - Stratification. Population and Population dynamic - Habitat, ecology, adaptations in marine fresh water and terrestrial habitats. Wild life, need for conservation management and methods of conservation. Sanctuaries with special reference to Tamil Nadu. Pollution - air, water and land - Perspective policy planning for the environment.

b) Evolution:- Origin of life - Evolutionary thought - Contributions of Lamarck Darwin and De Varies - present status of Darwinism and Lamarckism - modern synthetic concept - Hardy Weinberg Law - Polymorphism and mimicry in evolution. Speciation, species concept - Isolation mechanisms and their role, role of hybridization in evolution. Fossils and Fossilization Origin and evolution of man - Cultural evolution and Biochemical evolution.

#### **UNIT V**

**(5 Hours)**

a) Animal distribution: Zoogeographical distribution - Continental and island fauna - Continental drift - Discontinuous distribution adaptive radiation. Natural resources and their conservation. Alternative sources of energy.

b) Economic Zoology:- Parasitism and Commensalism - Protozoan Parasites and diseases, helminth parasites and diseases of man and domestic animals - Beneficial and destructive insects Insect pests on crops and stored products - Control methods. Sericulture, apiculture, poultry, pisciculture and induced breeding, Shell fisheries, Aquaculture practices in Tamil Nadu and their impact on the environment and on agriculture.

#### **E - Resources**

<https://www.slideshare.net/guest5024e5c/u01-basis-of-life>

<https://www.slideshare.net/jessidildy/phylum-echinodermata-2016>

<https://youtu.be/MPwXzV58eIY>

<https://youtu.be/ld7NUAHGS7U>

<https://www.slideshare.net/janardanchaudhary3/gametogenesis-fertilization-implantation-and-1st-wk-development>

<https://www.slideshare.net/selvarajselva1/developmental-biology-232262057>

<https://www.slideshare.net/arielroth/5-darwin-and-the-eye-part-2-11697529>

<https://www.slideshare.net/selvarajselva1/zoology-for-competitive-examinations>

<https://youtu.be/mk8tOD0t8M0>

<http://www.authorstream.com/Presentation/santhanamselvaraj-4174676-human-excretory-system/>

#### **Pedagogy**

Chalk & Talk, PPT Presentation

#### **Teaching Aids**

Green Board, & Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – IV : Common Course Theory</b>		
<b>Course Title: VALUE EDUCATION</b>		
Course Code: <b>VEUG61</b>	Hours per week: <b>2</b>	Credits: <b>2</b>
<b>CIA Marks: 25</b>	<b>ESE Marks: 75</b>	<b>Total Marks: 100</b>

### Syllabus

**UNIT I:** The heart of Education:

Introduction – Eternal Value – Integrated approach to value education - one for all and all for one – Responsibilities of a citizen – Habit Vs wisdom – purifying mind pollution – Respect for all Religions – Parents, teachers and fellow students – The need and benefit of exercise and meditation for students.

**UNIT II:** The Value of Body and Life Energy

Introduction – what are the causes for pain, Disease and death? Three Basic needs for all living Beings – Personal Hygiene Five Factors of Balance in Life – The need and benefits of physical Exercise – The value and Base of Life energy – The value and Base of Bio-magnetism - You are your own best caretaker.

The Marvelous nature of mind

Introduction- Bio-magnetism – The base of the mind – characterisation of the Genetic Centre – metal frequency – practice for a creative mind - benefits of meditation.

**UNIT III:** Analysis of Thought

Introduction – An Exposition on the nature of thought– six roots for thoughts – Introspection for analysis of thoughts-practical techniques for analysis of thoughts. Benefits of Blessings

Effects of good vibrations – Make Blessing a Daily Habit

**UNIT IV:** Moralisation of Desire

Introduction – moralization of desire - Analyse your desires – Summary of practice.

Neutralisation of Anger:

Introduction – meaning – characteristics of Anger – Anger is a Destructive emotion – Anger spoils our relationship with others – Some common misconception about anger – will power and method success through awareness – method of neutralisation of anger.

**UNIT V:** Eradication of Worries

Worry is a mental disease – Nature's Law of cause and effect – factors beyond our control – How to deal with problems – analyse your problem and eradicate worry Harmonious Relationships

Introduction – Three angles of life – The value of harmony in personal relations – Love and Compassion – pleasant face and loving words – appreciation and gratitude to parents and teachers – Bringing needed reforms in educational institutions Why should we serve others? Brotherhood – A scientific Basis for Universal Brotherhood protection of the environment – non-violence and the five fold moral culture.

**Text Book: Value Education for Health, Happiness and Harmony**

Based on the Philosophy and Teachings of Swami Vethanthiri Maharisi) Published By: Brain Trust, Aliyar A Wing of World Community Service Centre

### Pedagogy

Chalk & Talk, PPT Presentation

### Teaching Aids

Green Board, & Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – V: Common Course Theory</b>		
<b>Course Title: EXTENSION ACTIVITIES</b>		
Course Code: <b>EAUG61</b>	Hours per week:	Credits: <b>1</b>
<b>CIA Marks: 25</b>	<b>ESE Marks: 75</b>	<b>Total Marks: 100</b>

### Syllabus

#### UNIT-I:

**Community Development-I:** definition – structure and composition – community based issues – need for awareness – Developmental Programmes.

#### UNIT – II:

**Community Development–II:** Rural Scenario – need of the Community – need for the community service – role of youth in community building – communal harmony – literacy – Educational Recreation.

#### UNIT – III:

**Volunteer Empowerment:** Women's Emancipation – formation of Youth Clubs – Self-Help Groups – Youth and Development.

#### UNIT – IV:

**Social Analysis:** Social issues – cultural invasion – media infiltration – human rights Education/Consumer Awareness – Adolescents Reproductive – HIV/AIDS/STD – Social harmony/National integration – Blood Donation.

#### UNIT – V:

**Introduction to NSS:** Basic Concepts – profile – aims – objectives – symbol – Motto – structure – Regular activities – Special Camping Programme – Adventure Programme – National Days and Celebrations.(Applicable to NSS Students)

(OR)

**NCC-** Origin – Organisation – Ministry of Defence – Armed forces – commands – Defence establishments in Tamil Nadu

Civil Defence – Aid to civil authorities – Disaster management – Leadership – Man management – Adventure activities – Social service

### Reference:

National Service Scheme Manual (Revised), Ministry of Human Resources Development, government of India.

### Pedagogy

Chalk & Talk, PPT Presentation

### Teaching Aids

Green Board, & Interactive White Board

**DEPARTMENT OF ZOOLOGY**

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III: Ability Enhancement Course</b>		<b>SEMESTER - III</b>
<b>Course Title: ANIMAL ORGANISATION</b>		
Course Code: <b>09AE01</b>	Hours per week: <b>4</b>	Credits: <b>4</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

Students are able to gain basic knowledge on taxonomical methods, outline classification of animals, morphological, anatomical and functional features of representative animals.

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Inculcate knowledge on animal classification and taxonomical methods with suitable examples.	K1
<b>CLO 2</b>	Understand the structure ingestion and egestion of bioprocesses in feeding and respiration of representative animals.	K2
<b>CLO 3</b>	Make awareness on movement of fluids, body and structural in invertebrates and chordates representatives.	K2
<b>CLO 4</b>	Observe a structure and functional aspects of nervous system, receptors in earthworm, insects and human.	K2
<b>CLO 5</b>	Trace the structure and processes of excretion, reproduction in selected invertebrates and chordates.	K3

**K<sub>1</sub>**-Remembering**K<sub>2</sub>**-Understanding**K<sub>3</sub>**-Applying**Mapping of CO with PO**

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	9	3	-	3	9	9	3
<b>CLO 2</b>	9	1	3	3	3	9	3
<b>CLO 3</b>	9	1	9	3	9	3	3
<b>CLO 4</b>	9	1	9	3	3	3	3
<b>CLO 5</b>	9	1	9	9	9	9	3
	45	7	30	21	33	33	15

**Mapping of CO with PSO**

Department	Botany					Chemistry				
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	1	3	1	9	2	3	-	1	1	-
<b>CLO 2</b>	1	1	-	3	1	3	-	-	-	-
<b>CLO 3</b>	-	3	2	3	1	1	1	-	1	-
<b>CLO 4</b>	-	1	3	2	1	-	-	-	-	-
<b>CLO 5</b>	-	1	1	3	1	-	-	1	-	-
	<b>2</b>	<b>9</b>	<b>6</b>	<b>20</b>	<b>6</b>	<b>8</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>-</b>

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus**

<b>UNIT-I:</b>	1. Principles of taxonomy – Binomial nomenclature - Animal Organisation – body types – protozoa – metazoa – types of coelom – types of symmetry 2. Outline classification of Invertebrates and the salient features of the Phyla with examples. Outline classification of Chordates upto classes giving examples	<b>(12 Hrs)</b>
<b>UNIT-II:</b>	1. Feeding and digestion in Amoeba and Frog. 2. Respiration in Amoeba, Cockroach, Gills in Fish and Lungs in bird.	<b>(12 Hrs)</b>
<b>UNIT- III:</b>	1. Circulatory system in Earthworm and Calotes. 2. Locomotion in Amoeba and Earthworm: Flight mechanism in Pigeon.	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	1. Nervous system of Earthworm and Frog. 2. Receptors – photoreceptors of insects and man. Human ear.	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	1. Excretion in Amoeba, Earthworm and Frog. 2. Reproductive system of Rabbit.	<b>(12 Hrs)</b>

#### **Text Books**

- A Text Book of Invertebrates –2004. Nair *et al.*, Saras Publications.
- A Text Book of Chordates – 2004. Thangamani, *et.a.l.*, Saras Publications

#### **Reference Books**

- A Manual of Zoology, Vol. I- Invertebrata, 1982. Ekambaranatha Ayyar and Ananthakrishnan.
- A Manual of Zoology, Vol. II – Chordata – 1982. Ekambaranatha Ayyar and Ananthakrishnan.

#### **E - Resources**

<https://www.slideshare.net/badshah77/zoologic-al-nomenclatures-5>  
<https://www.slideshare.net/badshah77/ist-lecture-1>  
<https://www.slideserve.com/remington/principles-of-taxonomy>  
<https://www.slideshare.net/alice91827/nutrition-in-amoeba-46887840>  
<https://www.slideshare.net/sabidasamad93/nutrition-in-amoeba-53683796>  
<https://www.slideshare.net/ayesahn1951/paramecium-61896792>  
<https://www.microscopemaster.com/paramecium.html>  
<https://www.slideshare.net/manishdash1/flight-adaptation-and-mechanism-of-flight-in-birds>  
<https://www.biologydiscussion.com/zoology/birds/flight-mechanism-in-pigeons-discussed-birds/41214>  
<https://microbiologynotes.com/nervous-system-of-earthworm/>  
<https://www.studyandscore.com/studymaterial-detail/earthworm-nervous-system-and-sense-organs>  
<https://www.biologydiscussion.com/invertebrate-zoology/protozoa/euglena-viridis-habitat-structure-and-locomotion-protozoa/28141>

#### **Pedagogy**

Chalk & Talk, PPT Presentation

#### **Teaching Aids**

Green Board, & Interactive White Board

## DEPARTMENT OF ZOOLOGY

Programme: B.Sc., Zoology, (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III: Ability Enhancement Course</b>		<b>SEMESTER - IV</b>
<b>Course Title: BIOLOGY AND HUMAN WELFARE</b>		
Course Code: <b>09AE02</b>	Hours per week: <b>4</b>	Credits: <b>4</b>
CIA: <b>25 Marks</b>	ESE: <b>75 Marks</b>	Total: <b>100 Marks</b>

### Preamble

To enable the students to develop knowledge on various diseases, transmission and remedies. Also develop knowledge on entrepreneurial avenues in biology.

### Course Outcomes (CO)

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Acquire knowledge on structure, mode of infection, development and remedies of virus and viral diseases.	K1
<b>CLO 2</b>	Understand the structure, mode of infections, biology and remedies of bacteria and bacterial diseases.	K2
<b>CLO 3</b>	Impart knowledge on differential diseases caused by fungal, protozoan and helminthes.	K2
<b>CLO 4</b>	Explore the avenues, opportunities and limitations of sericulture, fish culture and vermiculture	K2
<b>CLO 5</b>	Trace the organisation, characteristics, candidates, culture and entrepreneurial values of biogas, mushroom culture, apiculture.	K3

K<sub>1</sub>-Remembering

K<sub>2</sub>-Understanding

K<sub>3</sub>-Applying

### Mapping of CO with PO

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO6	PLO7
<b>CLO 1</b>	3	-	9	3	3	1	1
<b>CLO 2</b>	3	-	9	3	3	1	1
<b>CLO 3</b>	3	-	9	3	3	1	-
<b>CLO 4</b>	3	-	3	1	-	9	3
<b>CLO 5</b>	3	-	3	1	-	9	3
	15	-	33	11	9	21	8

### Mapping of CO with PSO

Department	Botany					Chemistry				
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	-	3	1	2	1	3	-	-	1	-
<b>CLO 2</b>	-	1	1	3	-	3	-	-	-	-
<b>CLO 3</b>	-	-	1	1	1	1	-	-	1	-
<b>CLO 4</b>	-	1	9	3	3	-	-	-	1	-
<b>CLO 5</b>	-	1	9	9	1	-	-	-	-	-
	-	6	21	18	6	7	-	-	3	-

Note: Mapping Score Strong-9, Medium- 3 and Low-1

### Syllabus

**DEPARTMENT OF ZOOLOGY, VIVEKANADA COLLEGE, TIRUVEDAKAM WEST-625234**

<b>UNIT-I:</b>	a. Structure of a typical virus b. Brief account on Viral diseases c. Polio, Rabies AIDS and COVID-19	<b>(12 Hrs)</b>
<b>UNIT-II:</b>	a. Structure of typical Bacteria b. Brief account on Bacterial diseases c. Cholera, Tuberculosis and Tetanus	<b>(12 Hrs)</b>
<b>UNIT- III:</b>	a. Fungal diseases – Ringworm and Black piedra b. Protozoan diseases – Amoebic dysentery and Malaria c. Helminth parasites – Ancylostoma and Wucheraria	<b>(12 Hrs)</b>
<b>UNIT- IV:</b>	a. Sericulture – Scope – Silkworm biology – Life cycle – common diseases and control – silkworm rearing methods. b. Fish culture – Scope and Importance – types of culture – diseases and control – maintenance of fish pond. c. Vermiculture – Features of exotic and indigenous species – rearing and culturing – Characteristics of Vermicast and Vermiwash – Economics of vermiculture	<b>(12 Hrs)</b>
<b>UNIT- V:</b>	a. Biogas production – characteristic features of biogas – production of biogas – uses b. Mushroom culture – nutritive and medicinal value – Morphology of Indian oyster mushroom – cultivation of paddy straw mushroom – Advantages. c. Apiculture – biology of honey bee – bee hive – honey extraction – medicinal value – bee wax and bee venom.	<b>(12 Hrs)</b>

#### **Text Books**

- Text Book of Clinical Protozoology – N.S. Ruprah, Oxonian Press.
- Text Book of Microbiology – 2004 Ananthanarayanan, Orient Longman.

#### **Reference Books**

- Text Book of Preventive and Social Medicines – Park and Davis.
- Handbook on Mushrooms – 1988. Nita Bahi, Oxford and IBH.
- Biogas Technology- A Practical Handbook – Khandelwal & S.S. Mahdi.
- An Introduction to Sericulture Ganga shetty, Oxford and IBH.
- Vermicomposting for sustainable agriculture 2005 Gupta, Agrobios.

#### **E - Resources**

<https://www.slideshare.net/Punjabia/virus-61954814>  
<https://youtu.be/i0ZabxXmH4Y>  
<https://www.slideshare.net/jrudyr/bacteria-2652076>  
<https://www.slideshare.net/EmmanuelItighise/nematode-221702914>  
<https://www.slideshare.net/tintujohnson77/sericulture-41012739>  
<https://www.slideshare.net/BishwasKafle/fish-culture-system>  
[https://youtu.be/MYj13FB\\_Iac](https://youtu.be/MYj13FB_Iac)  
<https://www.slideshare.net/chanthirasekarSekar/apiculture-232840908>

#### **Pedagogy**

Chalk & Talk, PPT Presentation

#### **Teaching Aids**

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**DEPARTMENT OF ZOOLOGY**

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(For those students admitted during the Academic Year 2021 - 22 and after)

<b>PART – III: Ability Enhancement Course</b>		<b>SEMESTER - II</b>
<b>Course Title: PRACTICAL - I</b>		
Course Code: <b>09AP03</b>	Hours per week: <b>2</b>	Credits: <b>4</b>
CIA: <b>40 Marks</b>	ESE: <b>60 Marks</b>	Total: <b>100 Marks</b>

**Preamble**

Visualize, analyse and observe the various types of organisms in microbes, invertebrata and chordata, their organ systems, adaptations, their diversity and behavioral patterns.

**Course Outcomes (CO)**

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
<b>CLO 1</b>	Acquire knowledge on the body systems in the representative animals	K1,K2,K3
<b>CLO 2</b>	Notify the specific characters, identifying structures in the preserved, stuffed and dried animals.	K1,K2,K3
<b>CLO 3</b>	Observe the microscopic organisms to analyse their survival skills.	K1,K2,K3
<b>CLO 4</b>	Demonstrate the staining and mounting techniques in microbes and representative insects.	K1,K2,K3
<b>CLO 5</b>	Trace the entrepreneurial skills, biodiversity, habitat, environment through the field visit.	K1,K2,K3

**K<sub>1</sub>**-Remembering**K<sub>2</sub>**-Understanding**K<sub>3</sub>**-Applying**Mapping of CO with PO**

	<b>PLO 1</b>	<b>PLO 2</b>	<b>PLO 3</b>	<b>PLO 4</b>	<b>PLO 5</b>	<b>PLO6</b>	<b>PLO7</b>
<b>CLO 1</b>	3	-	-	-	3	3	1
<b>CLO 2</b>	3	-	-	-	3	9	3
<b>CLO 3</b>	1	-	-	1	3	3	1
<b>CLO 4</b>	1	-	-	1	1	3	3
<b>CLO 5</b>	-	-	9	3	3	9	3
	8	-	9	5	13	27	11

**Mapping of CO with PSO**

Department	Botany					Chemistry				
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CLO 1</b>	-	3	1	3	1	1	-	1	1	1
<b>CLO 2</b>	-	1	1	3	-	1	-	-	3	1
<b>CLO 3</b>	-	-	1	1	1	-	-	1	1	1
<b>CLO 4</b>	-	1	9	3	3	-	-	-	-	3
<b>CLO 5</b>	-	1	9	9	1	1	-	-	-	-
	-	6	21	19	6	3	-	2	5	6

Note: Mapping Score Strong-9, Medium- 3 and Low-1

**Syllabus**

1. Observation of the following -Spotters

(12 Hrs)

- Paramoecium conjugation
- Obelia (entire)
- Hydra (entire)
- Taenia (entire)
- Scolex of Taenia
- Ascaris male and female
- Neries (entire)
- Penaeus
- Pila (entire) and shell of Fresh water mussel)
- Starfish (entire)
- Amphioxus, Balanoglossus, Scoliodon
- Cobra, Viper, Pigeon
- Skull of Pigeon dorsal and ventral view
- Pectoral girdle of pigeon
- Fore and hind limb of Frog
- Symsacrum of bird

2. Simple staining of Bacteria from milk and sewage water.
3. Mounting of mouth parts of Mosquito, Housefly and Honey bee.
4. Identification of Ascaris (male & female) and Tapeworm.
5. Identification of egg, larva, pupa and adult of silk moth.
6. Dissection to show silk glands.
7. Common appliances used in silkworm rearing and apiculture.
8. Visit to Biogas production, Mushroom culture and Fish culture centres.

#### Text Books

Kapoor, 2014 Practical Zoology, Silver Line Publications, Allahabad, Uttarpradesh

#### Reference Books

- Pechenik, Jan A 2014 – Biology of the Invertebrates, Tata Mcgraw – Hill Pub. Company Ltd., New Delhi
- Vasantika Kashyap, 2013, Life of Invertebrates, Second Revised Edition, Vikas Pub. House Pvt. Ltd., New Delhi
- Kotpal, R.L. 2012. Modern Text Book of Zoology, Invertebrates (Animal diversity – I), Rastogi Publications, Meerut
- Barnes, R.D. 2006, Invertebrate Zoology, IV Edition, Holf Saunders International edition
- Ekambaranatha Ayyar and Ananthkrishnan, T.N. 2005, A manual of Zoology, volume I, Invertebrate, Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai
- Kotpal, R.L. 2011. Vertebrates, Rastogi Publications
- Gupta R.C and Girish Chopra, 2003 - Comparative Anatomy of Chordates – R.Chand & Co, New Delhi
- Newmann, 1981, The Phylum chordata, Biology of vertebrates and their kin, Satish Book Enterprises, Agra.

#### Pedagogy

Chalk & Talk, PPT Presentation

#### Teaching Aids

Green Board, & Interactive White Board