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Undergraduate Programme

Curriculum and Syllabus for

B.Sc. Biochemistry

(With effect from the Academic Year 2023-24)

JUNE 2023

Note: The Board of Studies in Biochemistry (Common) designed the syllabus as per Common Model Syllabus provided by TANSCHE based on Learning Outcome based Curriculum Framework (LOCF) as prescribed by the UGC.

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THE REGULATIONS ON LEARNING OUTCOMES BASED CURRICULUM FRAME WORK FOR UNDERGRADUATE EDUCATION

1. Preamble

Biochemistry is the cross over scientific discipline that integrates the living world and chemistry. It involves the study of the structure of biomolecules and explores the biological processes at molecular level in the living organisms. It is the laboratory science that has several domains like cell biology, molecular biology, clinical biology, enzymology, immunology, physiology, pharmacology etc., It has enlightened many aspects of health and diseases and paved the way for many interdisciplinary technological innovations like metabolomics, genomics and proteomics. There is a continuous demand for biochemists in public and private health care sectors, agriculture, medical and forensic departments. Almost all food, pharmaceuticals, health and beauty care etc required quality control and safety checks for which experts in the field of Biochemistry are always in need. The syllabi for the three year B.Sc., degree programme in Biochemistry was framed in such a way that at the end of the course they could apply the knowledge and expertise in industries, diagnostic laboratories and various research fields

The programme endeavours to provide students a broad based training in biochemistry with a solid background of basic concepts as well as exposing them to the exciting advancements in the field. In addition to theoretical knowledge, significant emphasis has been given to provide hands on experience to the students in the forefront areas of experimental biochemistry. A multidisciplinary approach has been employed to provide the best leverage to students to enable them to move into frontier areas of biological research in the future.

The course defines clearly the objectives and the learning outcomes, enabling students to choose the elective subjects for broadening their skills. The course also offers skills to pursue research in the field of Biological Chemistry and thus would produce best minds to meet the demands of society.

Biochemistry, today is considered as an application oriented integrated basic science. It's an interdisciplinary science that has emerged by the confluence of principles of Chemistry, Physics and Mathematics to Biology. Advances in Biochemistry have immense positive implications on the understanding of biochemical interactions, cellular communications, hormonal mechanisms and the cross talks between them. The research in Biochemistry has been translational and there is a shift from hypothesis driven research to data dependent research that promises translational, product oriented research. Much of the advancement in Biochemistry is in the advancement of Biotechnology, as a basic science discipline Biochemistry led to Biotechnological advancement.

Considering its pivotal role in biological sciences, it is imperative to strengthen the fundamental concepts of Biochemistry.

TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR UNDERGRADUATE EDUCATION	
Programme:	**B.Sc. Biochemistry**
Programme Code:	
Duration:	**3 years [UG]**
Programme Outcomes:	**PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study **PO2: Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. **PO3: Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO4: Problem solving: Capacity** to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations. **PO5: Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints. **PO6: Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation **PO7: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the

	interests of a common cause and work efficiently as a member of a team **PO8: Scientific reasoning**: Ability to analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. **PO9: Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. **PO10 Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. **PO 11 Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO 12 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. **PO 13: Moral and ethical awareness/reasoning**: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. **PO 14: Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. **PO 15: Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.
Programme Specific Outcomes:	**PSO1 – Placement:** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions. **PSO 2 - Entrepreneur:** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations

	PSO3 – Research and Development: Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development. **PSO4 – Contribution to Business World:** To produce employable, ethical and innovative professionals to sustain in the dynamic business world. **PSO 5 – Contribution to the Society:** To contribute to the development of the society by collaborating with stakeholders for mutual benefit

PROGRAM OUTCOMES

PO1	Acquire knowledge in Biochemistry and apply the knowledge in their day to day life for betterment of self and society
PO2	Develop critical, analytical thinking and problem solving skills
PO3	Develop research related skills in defining the problem, formulate and test the hypothesis, analyse, interpret and draw conclusion from data
PO4	Address and develop solutions for societal and environmental needs of local, regional and national development
PO5	Work independently and engage in lifelong learning and enduring proficient progress
PO6	Provoke employability and entrepreneurship among students along with ethics and communication skills

PROGRAM SPECIFIC OUTCOMES

PSO1	Comprehend the knowledge in the biochemical, analytical, biostatistical and computational areas
PSO2	Ability to understand the technical aspects of existing technologies that help in addressing the biological and medical challenges faced by human kind
PSO3	Acquiring analytical and hands on skills to perform research in multidisciplinary environments
PSO4	Use library search tools and online databases and sources to locate and retrieve scientific information about a topic and techniques related to biochemistry

Eligibility for admission

Candidate for admission to the first year of B.Sc. Degree Course in Bio-Chemistry shall be required to have passed the Higher Secondary Examination with Chemistry and Biology or Chemistry, Botany and Zoology or Biochemistry and Chemistry.

3.Highlights of the Revamped Curriculum

- The curriculum is created to improve the relationship between business and academia
- Every semester, practical based on the course taken that semester will aid students in applying what they have learned
- Students will benefit from the introduction of skill based elective courses including Bioinformatics, Nanobiotechnology, Therapeutic nutrition, and Medical Laboratory technology as they keep up with technological advancements in their fields of study
- The fourth semester internship will give students a chance to apply what they have learned in class to a real world working experiment
- Skill enhancement courses help students venture new platforms in career.
- Equip students with employability skills, generate self employment and small scale entrepreneurs.

4.Value additions in the Revamped Curriculum:

Semester	**Newly introduced Components**	**Outcome / Benefits**
I	**Foundation Course** It depicts the overview of entry education and makes the students assimilate with the biochemistry course. This course will inculcate knowledge of the academic skills, laboratory skills and research	It gives a strong determination to undergo the course. Be committed and interested in learning the subject
I, II, III, IV	**Skill Enhancement papers (Discipline centric/ Generic/ Entrepreneurial)**	Improve employability Develop the skill as Laboratory Analyst To make students compete with industrial expectations.
		Incorporating the interest on health, diet, lifestyle

		diseases will enable the students gain knowledge to get exposed themselves in medical field
		Biomedical Instrumentation skills will aid the students gain knowledge on the various instruments used in the field of medical laboratory and research.
		Entrepreneurial skill training will increase the chance to build their career independently. Learning this skills will encourage the students to enhance creativity, innovation and collaboration
		Discipline /subject specific skill will serve as a route for employability
V & VI	**Elective papers-** An open choice of topics categorized under Generic and Discipline Centric	It reinforces additional knowledge inputs along with core course. Students are familiarized with multi-disciplinary, cross disciplinary and inter disciplinary subjects. It broadens the knowledge on immunological aspects, pharmacology and research. Additional Employability skills are facilitated through computational biology and Bio-entrepreneurship.
V semester Vacation activity	**Internship/ Industrial visit/Field visit**	Hand on training in Medical Labs/ Industry/ Research centres enable the students to explore the practical aspects in career path. They gain confident to fix their career.
VI Semester	**Project with Viva – voce**	Self-learning is enhanced· It serves as a platform to express their innovative ideas in a practical way, which serves as a pathway to enter in the field of research.
VI Semester	**Introduction of Professional Competency skill**	The revamped curriculum caters the education to all category of learners; Learning multidisciplinary papers, updated in the curriculum will help the students to fix their career in the fields of Medical, pharmaceutical, forensic, nutritional, diagnostic coding ,etc ·Students are trained in the field of research to bring out the progress in the field of Medical, Agriculture ,Nutrition ,etc which will be a back bone for health and wealth creation and improve the quality of life
Extra Credits: For Advanced Learners / Honours degree		ETo cater to the needs of peer learners / research aspirants

Skills acquired from the Courses	Analytical, Laboratory operating, Predicting, Experimenting, Critical thinking, Problem solving, Communication, Interpersonal, Time management and Multi-tasking Skills

Credit Distribution for UG Programmes

Sem I	Credit	H	Sem II	Credit	H	Sem III	Credit	H	Sem IV	Credit	H	Sem V	Credit	H	Sem VI	Credit	H
Part 1. Language – Tamil - I	3	6	Part 1 Language – Tamil - II	3	6	Part 1 Language – Tamil –III	3	6	Part.1. Language – Tamil –IV	3	6	5.1 Core Course – \CC IX Enzymes	4	5	6.1 Core Course – CC XIII Molecular Biology	4	6
Part.2 English –I	3	6	Part.2 English –II	3	6	Part 2 English –III	3	6	Part.2 English –IV	3	6	5.2 Core Course – CC X Intermediary Metabolism	4	5	6.2 Core Course – CC XIV Human Physiology	4	6
1. Core Course – CC I Nutritional Biochemistry	5	5	2..3 Core Course – CC III Cell Biology	5	5	3.3 Core Course – CC V Biomolecules	5	5	4.3 Core Course – CC VII Biochemical techniques	5	5	5. 3. Core Course CC -XI Clinical Biochemistry	4	5	6.3 Core Course – CC XV Project with viva-voce	4	6
1.4 Core Course – CC II Core Practical I - Nutritional Biochemistry	5	5	2.4 Core Course – CC IV Core Practical II -Cell Biology	5	5	3.4 Core Course – CC VI Core Practical III Biomolecules	5	5	4.4 Core Course CC VIII Core Practical IV- Biochemical Techniques	5	5	5. 4. Core Course - XII Practical V - Clinical Biochemistry	4	5	6.4 Elective -VII Generic/ Discipline Specific	3	5
*1.5 Elective I Chemistry I	3	4	*2.5 Elective II Chemistry II	3	4	*3.5 Elective III One among the specified	3	4	*4.5 Elective IV One among the specified	3	3	*5.5 Elective V Generic/ Discipline Specific	3	4	*6.5 Elective VIII Generic/ Discipline Specific Plant Biochemistry & Plant therapeutics	3	5
1.6 Skill Enhancement Course SEC-1 NME I	2	2	2.6 Skill Enhancement Course SEC-2 NMEII	2	2	3.6 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	1	4.6 Skill Enhancement Course SEC-6 Discipline/ subject specific)	2	2	5.6 Elective VI Generic/ Discipline Specific	3	4	6.6 Extension Activity	1	-
1.7 Skill Enhancement - (Foundation Course)	2	2	2.7 Skill Enhancement Course –SEC-3 Discipline/Subject specific)	2	2	3.7 Skill Enhancement Course SEC-5 Discipline/ subject specific)	2	2	4.7 Skill Enhancement Course SEC-7 Discipline/ subject specific	2	2	5.7 Value Education	2	2	6.7 Professional Competency Skill	2	2
						3.8 E.V.S.	-	1	4.8 E. V. S	2	1	5.8 Summer Internship /Industrial Training	2				
	23	**30**		**23**	**30**		**22**	**30**		**25**	**30**		**26**	**30**		**21**	**30**
Total – 140 Credits																	

* If Electives with practical is opted by the college/ student, the elective credits shall be divided as follows.
Theory – 2 credits (3 hours) and Practical – 1 credit (3hours). Arrangement to satisfy the credit hours shall be made internally by the college.
Elective Practical Examination shall be conducted at the end of the academic year and the mark sheets shall bear 2 credits for the practical.

Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credit and Hours Distribution System for all UG courses including Lab Hours

First Year – Semester-I

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses [in Total]	13	14
Part-4	Skill Enhancement Course SEC-1	2	2
	Foundation Course	2	2
		23	**30**

Semester-II

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	14
Part-4	Skill Enhancement Course -SEC-2	2	2
	Skill Enhancement Course -SEC-3 (Discipline / Subject Specific)	2	2
		23	**30**

Second Year – Semester-III

Part	List of Courses	Credit	No. of Hours
Part-1	Language - Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	14
Part-4	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	1	1
	Skill Enhancement Course -SEC-5 (Discipline / Subject Specific)	2	2
	E.V.S	-	1
		22	**30**

Semester-IV

Part	List of Courses	Credit	No. of Hours
Part-1	Language - Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	13
Part-4	Skill Enhancement Course -SEC-6 (Discipline / Subject Specific)	2	2
	Skill Enhancement Course -SEC-7 (Discipline / Subject Specific)	2	2
	E.V.S	2	1
		25	**30**

Third Year
Semester-V

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project / Elective Based	22	28
Part-4	Value Education	2	2
	Internship / Industrial Visit / Field Visit	2	-
		26	**30**

Semester-VI

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project / Elective Based & LAB	18	28
Part-4	Extension Activity	1	-
	Professional Competency Skill	2	2
		21	**30**

Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	13	13	13	13	22	18	92
Part IV	4	4	3	6	4	1	22
Part V	-	-	-	-	-	2	2
Total	23	23	22	25	26	21	**140**

***Part I, II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall(K1)	Simple definitions, MCQ, Recall steps, concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview	
Application (K3)	Suggest idea/concept with examples, suggest formulae, Solve problems, Observe, Explain	
Analyze(K4)	Problem-solving questions, finish a procedure in many steps, Differentiate	
	Between various ideas, Map knowledge	
Evaluate(K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create(K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

8. Illustration for B.Sc. Biochemistry Curriculum Design

First Year

Semester-I

Part	List of Courses	Credit	Hours per week (L/T/P)
Part-I	Language –Tamil	3	6
Part-II	English	3	6
Part-III	Nutritional Biochemistry (Core Course - I)	5	5
	Practical I – Nutritional Biochemistry (Core Course - II)	5	5
	Chemistry I (Elective)	2	4/6*
	Chemistry Practical (Elective)	1#	
Part-IV	Skill Enhancement Course -1 (Non-Major Elective)	2	2
	Foundation Course FC Bridge course	2	2
		23	**30**

Semester-II

Part	List of Courses	Credit	Hours per week(L/T/P)
Part-I	Language - Tamil	3	6
Part-II	English	3	6
Part-III	Cell Biology (Core Course - III)	5	5
	Chemistry- II (Elective)	2	4/6*
	Chemistry Practical (Elective)	1#	
	Practical II -Cell Biology (Core Course - IV)	5	5
Part-IV	Skill Enhancement Course -2 Data Analytic Skills	2	2
	Skill Enhancement Course-3 (Discipline / Subject Specific) – Computational Mathematics	2	2
		23	**30**

Second Year: Semester-III

Part	List of Courses	Credit	Hours per week(L/T/P)
Part-I	Language -Tamil	3	6
Part-II	English	3	6
Part-III	Biomolecules (Core Course - V)	5	5
	Practical III Biomolecules (Core Course - VI)	5	5
	Elective Paper III	2	4/6*
	Elective Practical	1#	
Part-IV	Skill Enhancement Course-4 (Entrepreneurial Based)	1	1
	Skill Enhancement Course -SEC-5	2	2
	Environmental Studies	-	1
		22	**30**

Second Year: Semester-IV

Part	List of Courses	Credit	Hours per week (L/T/P)
Part-I	Language - Tamil	3	6
Part-II	English	3	6
Part-III	Biochemical techniques (Core Course - VII)	5	5
	Practical IV -Biochemical Techniques (Core Course - VIII)	5	5
	Elective Paper IV	2	3/6*
	Elective Practical	1#	
Part-IV	Skill Enhancement Course -6	2	2
	Skill Enhancement Course - 7	2	2
	Environmental Studies	2	1
		25	**30**

Third Year: Semester-V

Part	List of Courses	Credit	Hours per week (L/T/P)
Part-III	Enzymes (Core Course - IX)	4	5
	Intermediary Metabolism (Core Course - X)	4	5
	Clinical Biochemistry (Core Course - XI)	4	5
	Practical V -Clinical Biochemistry (Core Course - XII)	4	5
	Elective Paper V	3	4
	Elective Paper VI	3	4
Part-IV	Value Education	2	2
	Internship / Industrial Training (Summer vacation at the end of IV semester activity)	2	
		26	**30**

Third Year: Semester-VI

Part	List of Courses	Credit	Hours per week (L/T/P)
Part-III	Molecular Biology (Core Course - XIII)	4	6
	Human Physiology (Core Course - XIV)	4	6
	Project (Core Course - XV)	4	6
	Elective paper VII Biotechnology/ Bioinformatics/Bio-Entrepreneurship	3	5
	Elective paper VIII - Plant Biochemistry and Plant Therapeutics	3	5
Part-IV	Professional Competency Skill	2	2
Part -V	Extension Activity	1	-
		21	**30**

Total Credits: 140

***** To be adjusted internally. If electives without practical is opted, 3 credits will be awarded for theory
# Examination will be conducted at the end of the academic year

9.Suggestive Topics in Core Component

- Nutritional Biochemistry
- Cell Biology
- Biomolecules
- Biochemical techniques
- Enzymes
- Intermediary metabolism
- Clinical Biochemistry
- Molecular Biology
- Human Physiology

10.Suggestive Topics in skill enhancement courses (NME))

- Medicinal Diet
- Lifestyle Diseases
- Health and Nutrition

11.Suggestive Elective Courses (Discipline-centric)

I year - Chemistry (I and II Semesters)
II year - Microbiology/Zoology/Botany/Biotechnology/Biostatistics (III and IV Semesters)
III year – Elective papers

- Immunology
- Biochemical pharmacology
- Research methodology
- Bio-entrepreneurship
- Bioinformatics
- Biotechnology
- Plant Biochemistry and Plant therapeutics

12. Suggestive Topics in Skill Enhancement Courses (SEC)

- Biomedical Instrumentation
- First Aid
- Basics of forensic science
- Medical Laboratory technology
- Tissue culture
- Medical coding
- Microbial techniques

FIRST YEAR: SEMESTER I

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
I	Language	Tamil and Other Languages–I	2	1	0	0	3	6	25	75	100
II	Language	100L1Z: English–I	2	1	0	0	3	6	25	75	100
III	CC-I	122C1A: Nutritional Biochemistry	3	2	0	0	5	5	25	75	100
	CC-II	122C11: Nutritional Biochemistry Practical-I	0	0	5	0	5	5	40	60	100
	EC-I	122E1A: Chemistry for Biological Science – I	1	1	0	0	2	2	25	75	100
	EP-I	122E11: Chemistry Practical for Physical and Biological Science – I	0	0	1	0	-	2	Examination conduct in II Semester		
IV	SEC-1	(Any one) 122S1A: Health and Nutrition 122S1B: Lifestyle Diseases 122S1C: Medicinal Diet	1	1	0	0	2	2	25	75	100
	FC	122B1A: Basics Of Biochemistry For Beginners – Scope & Applications	1	1	0	0	2	2	25	75	100
Total							**23**	**30**			

FIRST YEAR: SEMESTER II

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
I	Language	Tamil and Other Languages-II	2	1	0	0	3	6	25	75	100
II	Language	100L2Z: English–II	2	1	0	0	3	6	25	75	100
III	CC 3	122C2A: Cell Biology	3	2	0	0	5	5	25	75	100
	CC 4	122C21: Cell Biology Practical-II	0	0	5	0	5	5	40	60	100
	EC 2	122E2A: Chemistry for Biological Science – II	1	1	0	0	2	2	25	75	100
	EP 2	122E21: Chemistry Practical for Physical and Biological Sciences – I & II	0	0	1	0	1	2*	40	60	100
IV	SEC-2	122S2A: Choose from the list%	1	1	0	0	2	2	25	75	100
	SEC-3	122S2B: Choose from the list%	1	1	0	0	2	2	25	75	100
Total							**23**	**30**			

Skill Enhancement Course (NME / Discipline / Sub Specific) – (Basket of Courses)

SECOND YEAR: SEMESTER III

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
I	Language	Tamil and Other Languages-III	2	1	0	0	3	6	25	75	100
II	Language	200L3Z: English–III	2	1	0	0	3	6	25	75	100
III	CC 5	222C3A: Biomolecules	3	2	0	0	5	5	25	75	100
	CC 6	222C31: Biomolecules - (Core Practical-III)	0	0	5	0	5	5	40	60	100
	EC 3	(CHOOSE ANY ONE) 222E3A:Elective: Botany – I (Theory) 222E3B: Elective Zoology – I (Theory) 222E3C: Elective Biotechnology – I (Theory)	1	1	0	0	2	2	25	75	100
		222E3D: Elective Microbiology – I 222E3E: Elective Biostatistics – I	2	1	0	0	3	4	25	75	100
		CHOOSE ANY RELEVANT ONE Elective Botany – I (Practical) Elective Zoology- I (Practical) Elective Biotechnology – I (Practical)	0	0	0	0	-	2	-	-	-
IV	SEC-4	222S3A: Choose from the list%	1	0	0	0	1	1	25	75	100
	SEC-5	222S3B: Choose from the list%	1	1	0	0	2	2	25	75	100
	Environmental Studies						-	1	25	75	100
Total							**24**	**34**			

SECOND YEAR: SEMESTER IV

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
I	Language	Tamil and Other Languages-IV	2	1	0	0	3	6	25	75	100
II	Language	200L4Z: English–IV	2	1	0	0	3	6	25	75	100
III	CC 7	222C4A: Biochemical techniques	3	2	0	0	5	5	25	75	100
	CC 8	222C41: Biochemical Techniques (CORE Practical-IV)	0	0	5	0	5	5	40	60	100
	EC4 - Elective	(CHOOSE ANY ONE) 222E4A: Elective Botany – II (Theory) 222E4B: Elective Zoology II (Theory) 222E4C: Elective Biotechnology II (Theory)	1	1	0	0	2	2	25	75	100
		222E4D: Elective Microbiology – II 222E4E: Elective Biostatistics –II	2	1	0	0	3	3	25	75	100
		CHOOSE ANY RELEVANT ONE 222E41: Elective Botany – I & II (Practical) 222E42:Elective Zoology I & II (Practical) 222E43Elective Biotechnology –I &II (Practical)	0	0	1	0	2	1	40	60	100
IV	SEC-6	222S4A: Choose from the list%	1	1	0	0	2	2	25	75	100
	SEC-7	222S4B: Choose from the list%	1	1	0	0	2	2	25	75	100
	222V4A: Environmental Studies		1	1	0	0	2	1	25	75	100
Total							**29**	**33**			

THIRD YEAR: SEMESTER V

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
III	CC 9	322C5A: Enzymes	3	1	0	0	4	5	25	75	100
	CC 10	322C5B: Intermediary Metabolism	3	1	0	0	4	5	25	75	100
	CC 11	322C5C: Clinical Biochemistry	3	1	0	0	4	5	25	75	100
	EC 5	322E5A: Immunology	2	1	0	0	3	4	25	75	100
	EC 6	322E5B: Biochemical Pharmacology OR 322E5C: Research Methodology	2	1	0	0	3	4	25	75	100
	CC 12	322C51: Clinical Biochemistry Practical-V	0	0	4	0	4	5	40	60	100
IV	322V5A: Value Education		1	1	0	0	2	2	25	75	100
	322V5B: Internship/ Industrial visit/Field visit		0	1	1	0	2		25	75	100
Total							**26**	**30**			

THIRD YEAR: SEMESTER VI

Part	Course Category	Course	Credit Distribution				Over all Credits	Total Contact hours	Marks		
			L	T	P	S			CIA	ESE	Total
III	CC 13	322C6A: Molecular Biology	3	1	0	0	4	6	25	75	100
	CC 14	322C6B: Human Physiology	3	1	0	0	4	6	25	75	100
	CC 15	322C61: Project	0	0	4	0	4	6	40	60	100
	EC 7	322E6A: Biotechnology (or) 322E6B: Bioinformatics (or) 322E6C: Bioentrepreneurs	2	1	0	0	3	5	25	75	100
	EC 8	322E6D: Plant Biochemistry and Plant Therapeutics	1	2	0	0	3	5	25	75	100
1V	SEPC	322S6A: Professional Competency Skill					2	2			
V	322V6A: Extension Activity						1				
Total							**21**	**30**			

Remarks: English Soft Skill - **2 hours** will be handled by English Teachers. (4+2=6)

%Skill Enhancement Courses (SEC)

22SEC1 Basics of Forensic Science
22SEC2 Biomedical Instrumentation
22SEC3 First Aid
22SEC4 Medical Coding
22SEC5 Medical Laboratory Technology
22SEC6 Microbial Techniques
22SEC7 Tissue Culture

சென்னைப் பல்கலைக்கழகம்
University of Madras

Part-I

பொதுத் தமிழ் - பாடத்திட்டம்

General Tamil - Syllabus

4 பருவங்கள் (முதல் பருவம்)

(B.A., B.Sc., B.Com., BCA., BBA)

2023-24

பொதுத்தமிழ்-1

தமிழ் இலக்கிய வரலாறு -1

முதலாம் ஆண்டு – முதற் பருவம்

Course Code	Course Name	category	L	T	P	S	Credits	Ins.Hrs	CIA	External	Total
100L1AU	பொதுத்தமிழ் -1 தமிழ் இலக்கிய வரலாறு -1	Supportive	Y	-	-	-	3	6	25	75	100

Learning Objectives

- முதலாமாண்டுப் பட்ட வகுப்பு மாணவர்களுக்குத் தமிழ் மொழி இலக்கியங்களை அறிமுகம் செய்தல்
- தமிழ் இலக்கியப் போக்குகளையும், இலக்கணங்களையும் மாணவர் அறியுமாறு செய்து அவர்களின் படைப்பாற்றலைத் தூண்டுதல்
- தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்

Expected Course Outcomes

On the Sucessful completion of the Course, Students will be able to

இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்

CO 1	சங்க இலக்கியத்தில் காணப்பெறும் வாழ்வியல் சிந்தனைகளை அறிந்து கொள்வர்	K4
CO 2	அற இலக்கியம் மற்றும் தமிழ் காப்பியங்களின்வழி வாழ்வியல் சிந்தனையைப் பெறுவர்	K5, K6
CO 3	பக்தி இலக்கியங்களைக் கற்பதன் மூலம் பக்தி நெறியினையும், பகுத்தறிவு இலக்கியங்களைக் கற்பதன் வழி நல்லிணக்கத்தையும் தெரிந்து பின்பற்றுவர்	K3
CO 4	மொழியறிவோடு சிந்தனைத்திறனைப் பெறுவர்	K3
CO 5	மொழிப்பயிற்சிக்குத் தேவையான இலக்கணங்களைக் கற்பர்.	K2

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

அலகு-1	தமிழ் இலக்கிய, இலக்கண வரலாறு அறிமுகம்.

1. இலக்கணம்;

அ.தொல்காப்பியம், இறையனார் களவியல் உரை , நம்பியகப் பொருள், புறப்பொருள் வெண்பா மாலை, நன்னூல், தண்டியலங்காரம், யாப்பருங்கலக்காரிகை- நூல்கள்

ஆ.மொழிப் பயிற்சி- ஒற்றுப்பிழை தவிர்த்தல்

- வல்லினம் மிகும் இடங்கள்
- வல்லினம் மிகா இடங்கள்

- ஈரொற்று வரும் இடங்கள்
- ஒரு, ஓர் வரும் இடங்கள்
- அது, அஃது வரும் இடங்கள்
- தான், தாம் வரும் இடங்கள்

பயிற்சி : வல்லினம் மிகும் இடங்கள், மிகா இடங்கள் தவறாக வரும்வகையில் ஒரு பத்தி கொடுத்து ஒற்றுப் பிழை திருத்தி எழுதச் செய்தல்.

2. சங்க இலக்கியம் - எட்டுத்தொகை, பத்துப்பாட்டு
3. அற இலக்கியம்-பதினெண்கீழ்கணக்கு நூல்கள்
4. காப்பிய இலக்கியம் - ஐம்பெருங் காப்பியங்கள், ஐஞ்சிறு காப்பியங்கள், சமயக் காப்பியங்கள்
5. பக்தி இலக்கியமும் (பன்னிரு திருமுறைகள், நாலாயிர திவ்வியப் பிரபந்தம் -- பகுத்தறிவு இலக்கியமும் (சித்தர் இலக்கியங்கள், புலவர் குழந்தையின் இராவண காவியம்)

அலகு-2	சங்க இலக்கியம்

எட்டுத்தொகை ;எ

1. நற்றிணை-முதல் பாடல் -நின்ற சொல்லர்
2. குறுந்தொகை 3 ஆம் பாடல் -நிலத்தினும் பெரிதே
3. ஐங்குறுநூறு –நெல் பல பொலிக! பொன் பெரிது சிறக்க!' (முதல் பாடல்)-வேட்கைப் பத்து
4. கலித்தொகை- 51 - சுடர்த்தொடீஇக் கேளாய் -குறிஞ்சிக் கலி
5. புறநானூறு -189 தெண்கடல் வளாகம் பொதுமையின்றி, நாடா கொன்றோ -187

பத்துப்பாட்டு;

1. முல்லைப்பாட்டு (முழுவதும்)

அலகு-3	அற இலக்கியம்

1.திருக்குறள் -அறன் வலியுறுத்தல் அதிகாரம்

2.நாலடியார்-பாடல்: 131 (குஞ்சியழகும்)

3.நான்மணிக்கடிகை-நிலத்துக்கு அணியென்ப

4.பழமொழி நானூறு- தம் நடை நோக்கார்

5.இனியவை நாற்பது- 37. இளமையை மூப்பு என்று

அலகு-4	காப்பிய இலக்கியம்

1. சிலப்பதிகாரம் – வழக்குரைகாதை
2. மணிமேகலை- பாத்திரம் பெற்ற காதை
3. பெரியபுராணம் - பூசலார் நாயனார்புராணம்
4. கம்பராமாயணம்- குகப் படலம்
5. சீறாப்புராணம் – மானுக்குப் பிணை நின்ற படலம்

6. இயேசு காவியம் -ஊதாரிப்பிள்ளை	
அலகு-5	பக்தி இலக்கியமும், பகுத்தறிவு இலக்கியமும்

பக்தி இலக்கியம்;

1. திருநாவுக்கரசர் தேவாரம் - நாமார்க்கும் குடியல்லேம் எனத் தொடங்கும் பாடல் மட்டும்
2. மாணிக்கவாசகர் திருவாசகம் - நமச்சிவாய வாஅழ்க நாதன்தாள் வாழ்க முதல் சிரம்குவிவார் ஓங்குவிக்கும் சீரோன் கழல் வெல்க வரை
3. பொய்கையாழ்வார்-வையந் தகளியா வார்கடலே
4. பூதத்தாழ்வார்-அன்பே தகளியா
5. பேயாழ்வார்-திருக்கண்டேன் பொன்மேனி கண்டேன்
6. ஆண்டாள் – திருப்பாவை மார்கழித் திங்கள் (முதல் பாடல்)

பகுத்தறிவு இலக்கியம்;

- திருமூலர் – திருமந்திரம் (270,271, 274, 275 285)
- பட்டினத்தார் -திருவிடை மருதூர் (காடே திரிந்து – எனத் தொடங்கும் பாடல் பா.எண ;.279, 280)
- கடுவெளி சித்தர் - பாபஞ்செய் யாதிரு *மனமே* (பாடல் முழுவதும்)
- இராவண காவியம் – தாய்மொழிப் படலம் - 18. ஏடுகை யில்லா ரில்லை முதல் - 22. செந்தமிழ் வளர்த்தார். வரை

Text books	
•	.

Reference Books

- மு. வரதராசன், தமிழ் இலக்கிய வரலாறு, சாகித்ய அக்காதெமி, புதுடெல்லி.
- மது. ச. விமலானந்தன், தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
- தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
- தமிழ் இலக்கிய வரலாறு –முனைவர்.சிற்பி பாலசுப்ரமணியம், முனைவர்.சொ.சேதுபதி
- புதிய தமிழ் இலக்கிய வரலாறு– முனைவர்.சிற்பி பாலசுப்ரமணியம்,நீல.பத்மநாபன்
- தமிழ் இலக்கிய வரலாறு - டாக்டர்.அ.கா.பெருமாள்
- தமிழ் இலக்கிய வரலாறு –முனைவர். ப.ச.ஏசுதாசன்
- தமிழ் இலக்கிய வரலாறு – ஸ்ரீ குமார்
- வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு–பாக்கியமேரி
- தமிழ் பயிற்றும் முறை, பேராசிரியர் ந. சுப்புரெட்டியார் - மணிவாசகர் பதிப்பகம், சிதம்பரம்

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

Web Sources

- https://www.chennailibrary.com/
- https://www.sirukathaigal.com
- https://www.tamilvirtualuniversity.org
- https://www.noolulagam.com
- https://www.katuraitamilblogspot.com

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4		3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	3	3	2	2	2	3	3

Strong -3,Medium-2,Low-1

1.

UNIVERSITY OF MADRAS

FOUNDATION COURSE: TELUGU

SYLLABUS WITH EFFECT FROM 2023-2024

Semester - I

Course I	**Core/Elective/Soft Skill**
Title of the Course:	**Paper –I, CLASSICAL POETRY**
Course Code	**100L1B**
Credits:	**3**
Pre-requisites, if any:	**Knowledge in Telugu Classical Literature**
Course Outcomes (Use verbs like interpret, calculate, employ, generalise, evaluate, differentiate, critically assess, review, enumerate, identify, state, describe, explain, outline, select, recall, understand, compare and contrast, evaluate, critique, revise, summarise, demonstrate, draft, report, explain, obtain, recognise, respond, display)	● 1. To understand ancient, medieval & modern literary text in Telugu ● 2. To describe text and context of ancient, medieval & modern Telugu Classical literature. ● 3. To evaluate the difference between the ancient, medieval & Modern style of writing. ● 4. To describe about the style of the author. ● 5. To narrate the poetry and improve the grammatical skill of writing
UNITS	
I	**Kumarastra Vidya Pradarshanam – Nannayya (Adiparvam, Sashtamaswasam Poems 1 to 64)**
II	**Prahlada Charitra – Potana (Saptamaskandam, Poems 115-186)**
III	**Pravarakhyuni Vruttantam – Allasani Peddana (Prathamaswaasam, Poems 48-84)**

IV	**Drowpadi Paridevanamu – Tikkana** **(Udyogaparvam, Trutiyaswasam Poems 100-125)**
V	**Tinnani Vrttantam - Durjati** **(Sri Kalahasteeswaramahatyam, Trutiyaswasam Poems 54-120)**
Reading List (Print and Online)	1. Andhramahabharatham – Nannayya – TTD Publications, Tirupati 2. Andhramahabharatham – Nannayya – TTD Publications, Tirupati 3. Andhramahabhagavatham – Pothana – TTD Publications, Tirupati
Recommended Texts	1. Andhramahabharatham – Nannayya – TTD Publications, Tirupati 2. Andhramahabhagavatham – Pothana – TTD Publications, Tirupati 3. Manucharitra – Allasaani Peddana 4. Andhramahabharatham – Tikkana – TTD Publications, Tirupati 6. Sri Kalahasteeswaramahatyam - Durjati 6. Poetry Selections : Classical & Modern Poetry – University of Madras, Chennai

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

EXISTING SYLLABUS (22-23) FOLLOWED FOR THE ACADEMIC YEAR 2023-2024

FOUNDATION COURSE: PART-I HINDI PAPER-I

100L1E

Inst.Hrs. : 6 **Year : I**
Credits : 3 **Semester : I**

Programme:	U.G. – FOUNDATION COURSE – PART-I HINDI
Programme Outcomes:	1. Identify the literary trends, prose forms and nature of functional Hindi and its applications 2. Understand the roll of literature and importance of Functional Hindi 3. Obtain the practical knowledge of critical study of Literature, thinking, writing and expressional skills. 4. Obtain official noting, drafting and Business and personal, semi official letter writing methods and techniques 5. Employ the evaluating, summerising and differentiate contextual meanings.
Programme Specific Outcomes:	1. Basic knowledge for higher studies 2. Obtain Basic professional skills i.e. business and official Correspondence and applications 3. Language application and writing skills 4. Basic idea of evaluation critical and analytical study of literature. 5. Develops ideas of creative thinking and writing

Course Objectives	1. Identify the theme and aims of prose lessons and functional Hindi	K1
	2. Understand and summarise the theme	K2
	3. Explain the ideology of literary works and writers	K3
	4. Interpret the contextual meaning and differentiation	K4
	5. Evaluate on the basis of elements, features and trends of prose	K5
	6. Conceive the knowledge of literary themes and practice of functional Hindi	K6

Title of the Course:	PAPER – I - PROSE, FUNCTIONAL HINDI & LETTER WRITING
Pre-requisites, if any:	Basic Knowledge of Hindi Prose forms and prose writers
UNITS	
I	1. Sabhyata ka Rahasya 2. Personal Applications 3. Leave Letters 4. Introduction to office procedures 5. Official letter 6. Demi Official Letter
II	1. Mitrata 2. Letter to the Editor 3. Opening an A/C

	4. Demi Official Letter 5. Office Order 6. Administrative Terminology English to Hindi (30 Words)
III	1. Yuvavon Se 2. Application for Withdrawal 3. Circular 4. Memo 5. Enquiry 6. Administrative Terminology Hindi to English (30 Words)
IV	1. Paramanu Oorja evam Khadya Padarth Sanrakshan 2. Transfer of an A/C 3. Missing of Pass Book / Cheque Leaf 4. Official Memo 5. Resolution and Notice 6. Administrative Terminology English to Hindi (30 Words)
V	1. Yougyata aur Vyavasay ka Chunav 2. Complaints 3. Ordering for Books 4. Notification 5. Official Noting Hindi to English (25 Phrases) 6. Official Noting English to Hindi (25 Phrases)

Course Outcomes	1. Explains the nature, features, elements of prose forms and Functional Hindi 2. Understand the theme, aim of lessons and obtain application skills. 3. Evaluate the thought, ideology, expressional and artistic skills of writers. 4. Obtain skills of critical analysis of Literary forms and drafting skills of personal letters, business letters, noting and drafting skills 5. Learn to Employ the obtained skills in enriching the bright future.

Reading List (Print and Online)	1. Sarkari karyalayon mein Hindi ka Prayog, Written by Gopinath Srivatav, Lokbharati Prakashan, 15,A, Gandhi Mrag, Allabad – 1 2. Hi.wikypedia.org/wiki.आधुनिक_हिन्दी_गद्य _ का_इतिहास 3. https://www.infosrf.com/blog-single.php?MnBv=494
Recommended Texts	• HINDI GADHYA MALA Ed. by Dr. Syed Rahamathulla, Poornima Prakashan 4/7-B, Begum III Street, Royapettah, Chennai – 14. • Karyalayeen Tippaniya :Kendriya Hindi Sansthan, Agra • Prayojan Moolak Hindi : Dr. Syed Rahamathulla, Poornima Prakashan, 4/7, Begum III Street, Royapettah, Chennai – 14

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

	POS1	POS 2	POS 3	POS 4	POS 5
CO 1	S	S	M	S	M
CO 2	S	S	S	S	S
CO 3	S	S	S	S	S
CO 4	S	S	S	S	S
CO 5	S	S	S	S	S

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

SYLLABUS WITH EFFECT FROM 2022-2023

EXISTING SYLLABUS (22-23) FOLLOWED FROM THE ACADEMIC YEAR 2023-2024

Programme:	**I & II UG – Second Language - SANSKRIT**
Programme Code:	**BFC-LS22**
Duration:	**2 years**
Programme Outcomes:	After successful completion of the course, learners will be able to: 1. Create simple sentences using different grammatical tenses 2. Sensitize the students to the functioning of the language 3. Know the historical and cultural perspective of literary trends and movements in Sanskrit and in its literature 4. Define the origin of Sanskrit Literature 5. Demonstrate different teaching methodologies 6. Translate simple passages 7. Consolidate their communication skills in both spoken and written Sanskrit.
Programme Specific Outcomes:	1. Understand and appreciate the aesthetical, social, political, cultural, etc., values expressed in various prescribed texts 2. Apply different grammatical rules to their reading and writing assignments 3. Identify the base words of nouns and different tenses 4. Read, understand, write and speak in simple Sanskrit 5. Translate simple sentences related to the themes given

List of Courses:

Semester	Course Code	Title of the Course	Core/Elective/ Soft Skill	Credits
I	BFC-LS001	Paper I – Poetry, Grammar and History of Sanskrit Literature	C	3
II	BFC-LS002	Paper II – Prose, Grammar and History of Sanskrit Literature	C	3
III	BFC-LS003	Paper III – Drama, Grammar and History of Sanskrit Literature	C	3
IV	BFC-LS004	Paper IV – Alankara, Didactic & Modern literatures and Translation	C	3

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

SYLLABUS WITH EFFECT FROM 2022-2023

EXISTING SYLLABUS (22-23) FOLLOWED FROM THE ACADEMIC YEAR 2023-2024

100L1G

FOUNDATION COURSE: PART-I SANSKRIT PAPER-I

Inst.Hrs. : 6 **Year : I**
Credits : 3 **Semester : I**

Paper I – Poetry, Grammar and History of Sanskrit Literature

Course Outcomes	1. Remember the usage of grammatical tenses in constructing sentences in dialogue. 2. Apply the rules of usage in practice exercises and identify errors 3. Explain the nuances in the usage of various grammatical tenses and aspects 4. Demonstrate knowledge of various expressions of opinion, emotions, cause, effect, purpose, and hypothesis in French 5. Communicate in French and summarize the given text	
Course Objectives	Understand the basic Sanskrit sentence structure	K1
	To provide the glimpses of the rich Sanskrit literary tradition through reading the literary composition	K2
	Explain the language of this Mahakavya which is highly elaborate and polished with continual play upon words and variety of metres	K3
	Analyse and interpret expressions of cause, effect, purpose, and opposition in Sanskrit	K4
	Evaluate grammatical nature of verses	K5
Units		
I	Introduction to Sanskrit (Alphabets, Two letter words and three letter words) Grammar: *akārāntaḥ puṁliṅgaḥ śabda-s* - 1. बाल (*Bāl a*) and 2. देव (*Deva*) *ākārāntaḥ strīliṅgaḥ śabda-s* - 1. बाला (*Bāl ā*) and 2. लता (*Lat ā*) *akārāntaḥ napuṁsakaliṅgaḥ śabda-s* - 1. फल (*Phal a*) and 2. वन (*Vana*)	
II	Introduction to *Rāmāyana, Kālidāsa* and his poetic works Text: *Raghuvaṁśa* (Canto I) Verses 1-15	
III	Introduction to the works of *Bhāravi* - Text: *Raghuvaṁśa* (canto I) Verses 16-30	
IV	Introduction to the works of *Śrī Harṣha* - Text: *Raghuvaṁśa* (Canto I) Verses 31-45	
V	Grammar: Conjugations - *Laṭ lakāra-s* – (Present tense) (i) गच्छति (*Gacchat i*) (ii) तिष्ठति (*Tiṣṭhat i*) (iii) पठति	

	(*Paṭhati*) (iv) नृत्यति (*Nṛtyati*) (v) कुप्यति (*Kupyati*) (vi) कथयति (*Kathayati*) (vii) गणयति (*Gaṇayati*) (viii) अस्ति (*Asti*) (ix) करोति (*Karoti*) (x) शृणोति (*Śṛṇoti*) Indeclinables (Avyayaani) - अपि (*api*), कदा (*kadā*), च (*ca*), अद्य (*adya*), विना (*vinā*), सह (*saha*), तत्र (*tatra*), किम् (*kim*), यदि (*yadi*) - तर्हि (*tarhi*), यथा (*yathā*) - तथा (*tathā*) Prefixes (*Upasargas*) - आङ् (*ā*), वि (*vi*), परि (*pari*), अनु (*anu*), अधि (*adhi*), उत् (*ut*), प्रति (*prati*), उप (*upa*), प्र (*pra*) निर् (*nir*)
Book recommended for Reference	*Kalāśālā-Saṁskṛta-Sukhabodhinī - I* **To be Published by: University of Madras, Chennai - 5**

Mapping with Programme Outcomes:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	M	S	S
CO 2	S	S	S	S	S
CO 3	S	S	M	M	S
CO 4	S	S	M	S	S
CO 5	S	S	S	S	S

S-Strong M-Medium L-Low

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

SYLLABUS WITH EFFECT FROM 2022-2023

EXISTING SYLLABUS (22-23) FOLLOWED FROM THE ACADEMIC YEAR 2023-2024

100L2G

FOUNDATION COURSE: PART-I SANSKRIT PAPER-II

Inst.Hrs. : 6 **Year : I**
Credits : 3 **Semester : II**

Paper II – Prose, Grammar and History of Sanskrit Literature

Course Outcomes	1. Understand and apply grammatical concepts in drafting sentences and paragraphs 2. Apply the rules and regulations in handling usage of Lrt lakara and Asmad Sabdah, practice exercises and identify errors 3. Form an idea of the aesthetic expressions that make Sanskrit composition get the position of pride in world literature 4. Demonstrate knowledge of various expressions of opinion, emotions, cause, effect, purpose, and hypothesis in Sanskrit 5. Appreciate the art of employment of Alankaras in a prose form of poetry	
Course Objectives	Provide acquaintance with prose literature in Sanskrit through a study of one of the best texts of prose, which would pave the way for gaining sufficient grounding in the language	K1
	Enumerate various grammatical tenses and use them to communicate in Sanskrit language	K2
	Summarize the stories of Panchatantra and discuss in	K3
	Analyze and interpret expressions of cause, effect, purpose, and opposition in Sanskrit	K4
	Evaluate and comprehend text passages	K5
Units		
I	Introduction to Prose literature in Sanskrit Grammar: *ikārāntaḥ puṁliṅgāḥ śabdāḥ* - 1. कवि (*Kavi*) and 2. रवि (*Ravi*) *ikārāntaḥ strīliṅgaḥ śabdaḥ* - 1. मति (*Mati*) *īkārāntaḥ strīliṅgaḥ śabdaḥ* - 1. नदी (*Nadī*) *ikārāntaḥ napuṁsakaliṅgaḥ śabdaḥ* 1. वारि (*Vāri*)	
II	Introduction to *Māhābhārata,* the author of बालरामायणम् *(Bālarāmāyaṇam)* and his works Text: *Bālakāṇḍam* of *Bālarāmāyaṇam*	
III	Introduction to the works of *Baṇa* (*Kādambarī* and *Harṣacaritam*), *Daṇḍin* (*Daśakumāracaritam* and *Avantisundarīkathā*) and *Subandhu* (*Vāsavadattā*)	
IV	Introduction to Historical *Kāvyas* in Sanskrit - The works of *Kalhaṇaḥ, Bilhaṇaḥ, Bāṇaḥ* and *Pravarasenaḥ*	

V	Grammar: Conjugations - *Laṅ lakāraḥ* (Past tense) (i) अगच्छत् (*Agacchat*) (ii) अतिष्ठत् (*Atiṣṭhat*) (iii) अपठत् (*Apaṭhat*) (iv) अनृत्यत् (*Anṛtyat*) (v) अकुप्यत् (*Akupyat*) (vi) अकथयत् (*Akathayat*) (vii) अगणयत् (*Agaṇayat*) (viii) आसीत् (*Asīt*) (ix) अकरोत् (*Akarot*) (x) अशृणोत् (*Aśṛṇot*) Indeclinables: (a) तुमुन् (*Tumun*) suffix ended words (Infinitive forms) (i) गन्तुम् (*Gantum*) (ii) स्थातुम् (*Sthātum*) (iii) पठितुम् (*Paṭhitum*) (iv) नर्तितुम् (*Nartitum*) (v) कोपितुम् (*Kopitum*) (vi) कथयितुम् (*Kathayitum*) (vii) गणयितुम् (*Gaṇayitum*) (viii) भवितुम् (*Bhavitum*) (ix) कर्तुम् (*Kartum*) (x) श्रोतुम् (*Śrotum*) (b) क्त्वा (*Ktvā*) suffix ended words (Past passive participles) (i) गत्वा (*Gatvā*) (ii) स्मृत्वा (*Smṛtvā*) (iii) गणयित्वा (*Gaṇayitvā*) (iv) पठित्वा (*Patitvā*) (v) कृत्वा (*Kṛtvā*) (c) ल्यप् (*Lyap*) suffix ended words (Past passive participles) (i) आगत्य (*Āgatya*) (ii) विस्मृत्य (*Vismṛtya*) (iii) विगणय्य (*Vigaṇayya*) (iv) प्रपठ्य (*Prapaṭhya*) (v) अनुकृत्य (*Anukṛtya*)
Book recommended for Reference	*Kalāśālā-Saṁskṛta-Sukhabodhinī - II* **To be Published by: University of Madras, Chennai - 5**

Mapping with Programme Outcomes:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	S	M	S
CO 2	S	M	S	S	S
CO 3	S	S	S	M	S
CO 4	S	S	M	S	S
CO 5	S	S	S	S	S

S-Strong M-Medium L-Low

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

SYLLABUS WITH EFFECT FROM 2022-2023

EXISTING SYLLABUS (22-23) FOLLOWED FROM THE ACADEMIC YEAR 2023-2024

200L3G

FOUNDATION COURSE: PART-I SANSKRIT PAPER-III

Inst.Hrs. : 6 **Year : II**
Credits : 3 **Semester : III**

Paper III – Drama, Grammar and History of Sanskrit Literature

Course Outcomes	1. Be familiar with the style of the great Sanskrit Dramatist Bhasa 2. Be able to appreciate the aesthetical, social, political, cultural, etc., values expressed in prescribed composition 3. Understand the structural patterns of Sanskrit dramatic composition 4. Develop the finer and minor nuances of Nataka form of drama 5. Analyze the literary texts
UNITS	
I	Introduction to Dramaturgy – Ten types of Drama - Characteristics and features (*Nāndī, Sūtradhāra, Sthāpanā* and *Bharatavākyam*) of Sanskrit Dramas. Prose Text: *Karṇabhāram* - Page. 01 - 10 (till 10 *Slokās*)
II	Characteristics and features (*Vastu, Netā* and *Rasas*) of Sanskrit Drama - Prose Text: *Karṇabhāram* - Page. 11 - 20 (till 17 *Slokās*)
III	Authorship of 13 Trivandrum play of *Bhāsa* - Introduction to the Dramas of *Kālidāsa, Bhavabhūti, Harṣavardhana* and *Rājaśekhara* Text: *Karṇabhāram* - Page. 21 - 32 (Upto the end)
IV	Introduction to the dramatic works of *Viśākhadatta, Śūdraka, Bhaṭṭanārāyaṇa* and *Murāri* - Introduction to Allegorical dramas 1. *Prabodhacandrodaya* and 2. *Saṅkalpasūryodaya*
V	Introduction to *Campū* literature 1. *Bhojacampū* 2. *Viśvaguṇādarśacampū* and 3. *Nalacampū* Grammar – *Lṛṭ lakārāḥ* (Future tense) (i) गमिष्यति (*Gamiṣyati*) (ii) स्थास्यति (*Sthāsyati*) (iii) पठिष्यति (*Paṭhiṣyati*) (iv) नर्तिष्यति (*Nartiṣyati*) (v) कोपिष्यति (*Kopiṣyati*) (vi) कथयिष्यति (*Kathayiṣyati*) (vii) गणयिष्यति (*Gaṇayiṣyati*) (viii) भविष्यति (*Bhaviṣyati*) (ix) करिष्यति (*Kariṣyati*) (x) श्रोष्यति (*Śroṣyati*) Declensions: (*Sarvanāmaśabdāḥ*) - 1. तद् शब्दः (*Tad śabdaḥ*) in all genders 2. अस्मद् शब्दः (*Asmad śabdaḥ*) 3. युष्मद् शब्दः (*Yuṣmad śabdaḥ*)

Course Objectives	Understand the structure and use of different phrases and Idioms in Sanskrit Drama and grammatical aspects of *Karṇabhāram*	K2
	Enhance one's ability to converse freely in the language, which is considered to be a specialized skill as far as the Sanskrit Language goes	K2
	Draft and summarize the literary texts	K3
	Identify and apply different grammatical peculiarities	K3
	Analyze and critically assess the literary texts	K4

Book recommended for Reference	*Kalāśālā-Saṁskṛta-Sukhabodhinī - III* **To be Published by: University of Madras, Chennai - 5**

Mapping with Programme Outcomes:

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	S	M	M	S	S
CO 2	S	S	S	S	S
CO 3	S	M	M	S	S
CO 4	S	S	M	S	S
CO 5	S	S	S	S	S

S-Strong M-Medium L-Low

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

SYLLABUS WITH EFFECT FROM 2022-2023

EXISTING SYLLABUS (22-23) FOLLOWED FROM THE ACADEMIC YEAR 2023-2024

200L4G

FOUNDATION COURSE: PART-I SANSKRIT PAPER-IV

Inst.Hrs. : 6 **Year : II**
Credits : 3 **Semester : IV**

Paper IV – Alankara, Didactic & Modern literatures and Translation

Course Outcome	1. Apply the usage of compound words 2. Differentiate the alankaras 3. Translate the prose passages prescribed 4. Identify and apply different grammatical tenses of "Mahabharata" related translation 5. Analyze and critically assess the literary texts
	UNITS
I	Introduction to Didactic literature (*Pañcatantram* and *Hitopadeśaḥ*) Text: The lion and the hare शशकसिंहकथा (*Śaśakasiṃhakathā*) from Pañcatantram and The jackal and the elephant शृगालहस्तिकथा (*Śṛgālahastikathā*) a story from *Mitralābhaḥ* of *Hitopadeśaḥ*
II	*Alaṅkārāḥ - i. Upamā, ii. Rūpakam, iii. Ullekhaḥ, iv. Utprekṣā and v. Vyatirekaḥ*
III	Introduction to Modern literature - Introduction to अर्थशास्त्रम् (*Artha śāstram*) of चाणक्यः (*Cāṇakyaḥ*) - Introduction to मयमतम् (*Mayamatam*) - Introduction to नीतिद्विषष्ठिका (*Nīti dvi ṣaṣṭ hi kā*) - *Slokās* - 1 to 10 - Introduction to the life history of श्रीआदिशङ्कराचार्यः (*Śrī -Ādi śaṅkar ācār yaḥ*), श्रीरामाजानुचार्यः (*Śrī Rāmānuj ācār yaḥ*) and श्रीमध्वाचार्यः (*Śrī Madhvācār yaḥ*)
IV	Introduction to Modern literature in Sanskrit - Text: तिरुक्कुरळ् संस्कृतानुवादः(Sanskrit translation of Tirukkural) *Slokās* 1 to 10 ईश्वरवन्दनम् (*Kaḍavuḻ Vāzhththu*) by कलियन् रामानुजजीयर् (*Kaliyan Rāmānujajīyar*) नालडियार् (*Nāladiyār*) translated by श्री एस्. एन्. रामदेशिकः (*Śrī S. N Rāmadeśi ka*) - *Slokās*: 1 to 5
V	Translation from prose section Unit - I stories Grammar: Conjugation - *Loṭ lakārāḥ* (Imperative mood) (i) गच्छतु (*Gacchat u*) (i i) तिष्ठतु (*Ti ṣṭ hat u*) (i i i) पठतु (*Paṭ hat u*) (i v) शृणोतु (*Śṛ ṇot u*) (v) करोतु (*Kar ot u*)

Course Objectives	Demonstrate the usage of connecting words	K2
	Understand the alankaras which are used in devotional lyrics	K2
	Draft and summarize the literary texts	K3
	Identify the meaning, types of figure of speech of the prescribed text	K3
	Analyze and critically assess the literary texts	K4

Book recommended for Reference	*Kalāśālā-Saṁskṛta-Sukhabodhinī - IV* **To be Published by: University of Madras, Chennai - 5**

Mapping with Programme Outcomes:

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	M	S	S
CO2	S	S	M	S	S
CO3	S	S	M	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	M

S-Strong M-Medium L-Low

UNIVERSITY OF MADRAS

U.G. AND FIVE YEAR INTEGRATED PG DEGREE PROGRAMS

FOUNDATION COURSE: PART I – ARABIC

(EXISTING SYLLABUS (22-23) FOLLOWED FROM THE ACADEMIC YEAR 2023-2024)

Programme:	**U.G. AND FIVE YEAR INTEGRATED P.G. DEGREE PROGRAMS** **FOUNDATION COURSE: PART I – ARABIC**
Programme Code:	BFC-LA23
Duration:	**4 Semesters**
On successful completion of this program, the graduates are expected to achieve the following:	
Programme Outcomes:	1. Acquire the knowledge of the structure of Arabic words 2. Acquaint with the knowledge of basic Arabic grammar 3. Become familiar with the knowledge of phonetic system of Arabic language 4. Able to communicate in Arabic 5. Have the knowledge of moral values in the light of Quran and Hadith
Programme Specific Outcomes:	1. Understand the sounds and phrasing of Arabic language. 2. Learn the basic Arabic grammar 3. Develop communication skills in Arabic 4. Acquire new vocabulary in Arabic 5. Learn the moral values of the Holy Quran and Sunnah

List of Courses:

Semester	Course Code	Title of the Course	Foundation Course	Credits
I	100L1H	Paper I : Prose	FC	3
II	100L2H	Paper II : Grammar	FC	3
III	200L3H	Paper III : Communication Skill in Arabic	FC	3
IV	200L4H	Paper IV : Quran and Hadith	FC	3

Course I	Course Code	Title of the Course	Credits
FC	100L1H	Paper I : Prose	3

Course Outcomes	1. Understand the correct pronunciation of Arabic letters 2. Understand the structure-based composition. 3. Acquire new vocabulary in Arabic 4. Read the Arabic sentences without diacritical marks 5. Able to write the simple sentences in Arabic without errors.
Pre-requisites, if any:	Nil
Course Objectives	1. Understand basic Arabic grammar. 2. Understand the structure of Arabic language. 3. Employ sentence making. 4. Enhance vocabulary. 5. Improve reading and writing skills.

Units	
I	(دروس اللغة العربية لغير الناطقين بها، الجزء الأول، الدكتور ف. عبد الرحيم) من الدرس الأول إلى الدرس الرابع
II	من الدرس الخامس إلى الدرس الثامن
III	من الدرس التاسع إلى الدرس الثالث عشر
IV	من الدرس الرابع عشر إلى الدرس الثامن عشر
V	من الدرس التاسع عشر إلى الدرس الثالث والعشرين

Prescribed Text Book	دروس اللغة العربية لغير الناطقين بها، الجزء الأول، الدكتور ف. عبد الرحيم Duroos Al-Lugha Al-Arabiyya – Part I, By Dr. V. Abdur Rahim
Reading List (Print and online)	معجم الكلمات الواردة في دروس اللغة العربية لغير الناطقين بها مفتاح دروس اللغة العربية لغير الناطقين بها القراءة الراشدة – الشيخ أبو الحسن علي الحسني الندوي القراءة المفيدة – الدكتور محمد يوسف كوكن العمري منهاج العربية – السيد النبي حيدرآبادي www.alnahw.com

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO	3	3	3	2	1

3-Strong 2-Medium 1-Low

Course II	**Course Code**	**Title of the Course**	**Credits**
FC	100L2H	Paper II : Grammar	3

Course Outcomes	1. Able to use basic grammatical structure. 2. Develop reading skills and reading speed 3. Acquire new vocabulary in Arabic 4. Understand the different types of sentences. 5. Able to construct simple sentences in Arabic
Pre-requisites, if any:	Nil
Course Objectives	1. Understand basic Arabic grammar. 2. Understand the correct usage of Arabic grammar. 3. Employ sentence making. 4. Enhance vocabulary. 5. Improve reading and writing skills.
Units	
I	(قواعد اللغة العربية الأساسية، الدكتور سيد رحمة الله) من الدرس الأول إلى الدرس الرابع
II	من الدرس الخامس إلى الدرس الثامن
III	من الدرس التاسع إلى الدرس الثاني عشر

IV	من الدرس الثالث عشر إلى السادس عشر
V	من الدرس السابع عشر إلى الدرس العشرين
Prescribed Text Book	قواعد اللغة العربية الأساسية، الدكتور سيد رحمة الله Basic Arabic Grammar, By Dr. Syed Rahmathullah
Reading List (Print and online)	النحو الواضح – علي الجارم ومصطفى أمين دليل النحو الواضح – الدكتور بشير أحمد جمالي سهل العوامل _ الدكتور تاج الدين المناني النحو الميسر للكبار والصغار – علي محمود عقيلي القواعد التطبيقية في اللغة العربية – الدكتور نديم دعكور www.alnahw.com

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO	3	3	3	3	1

3-Strong 2-Medium 1-Low

Course III	**Course Code**	**Title of the Course**	**Credits**
FC	200L3H	Paper III : Communication Skill in Arabic	3

Course Outcomes	1. Understand the basics of Arabic language. 2. Learn the structure of Arabic words. 3. Familiarize with the phonetic system of Arabic. 4. Able to communicate in Arabic 5. Able to translate from Arabic to English and vice versa
Pre-requisites, if any:	Nil
Course Objectives	1. Understand the sounds and phrasing of Arabic language. 2. Acquire new vocabulary and apply in context. 3. Develop communication skills in Arabic. 4. Understand the different aspects of communication. 5. Learn to communicate in everyday interactions.
Units	
I	(الكتاب الأساسي في تعليم اللغة العربية لغير الناطقين بها، الجزء الأول – السعيد محمد بدوي وفتحي علي يونس) التعارف – في المطار (١)
II	في الفندق – في المطعم
III	في البنك – عند الطبيب (١)

IV	في الطريق – في مكتب البريد
V	في السوق (١) – في السوق (٢)
Prescribed Text Book	الكتاب الأساسي في تعليم اللغة العربية لغير الناطقين بها، الجزء الأول – السعيد محمد بدوي وفتحي علي يونس Al Kitaab Al Asaasi Fi Taleem Al Lugha Al Arabiyya Li Ghair An Naatiqeena Biha - Part I, By Sayeed Muhaamad Badawi and Fathi Ali Yunus
Reading List (Print and online)	A Practice Book on Gulf Arabic, By Dr. Abdul Jaleel. T Arabic Conversation Book, By Mohd. Harun Rashid and Khalid Perwez A Hand book of Commercial Arabic by Dr. Aboobacker K.P العربية لغير العرب – د. مصطفى حسن الريس، الأزهر العربية للحياة – جامعة الملك سعود القراءة العربية لغير العرب – وزارة التربية بالكويت www.talkinarabic.com

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**
CO	3	3	3	2	1

3-Strong 2-Medium 1-Low

Course IV	**Course Code**	**Title of the Course**	**Credits**
FC	200L4H	Paper IV : Quran and Hadith	3

Course Outcome	1. Know the principal textual sources of the Islamic tradition: The Qur'an and the Hadith. 2. Know the role of Quran and Hadith in the synthesis of Islamic faith and practice. 3. Understand the structure of Arabic grammar through Quran and Hadith. 4. Understand the methodology of translation of Quran and Hadith. 5. Understand the moral values of Quran and Hadith
Pre-requisites, if any:	Nil
Course Objectives	1. Know the importance of Quran and Hadith. 2. Understand the style of Quran and Hadith. 3. Understand the role of Quran and Hadith in the Islamic faith and law.

	4. Know the structure of Arabic grammar through the examples from Quran and Hadith. 5. Learn the cultural and moral values.
Units	
I	(١. سورة لقمان من القرآن الكريم ٢. أحاديث سهلة للدكتور ف. عبد الرحيم) سورة لقمان من الآية ١ إلى الآية ١٠
II	من الآية ١١ إلى ٢٠
III	من الآية ٢١ إلى ٣٤
IV	أحاديث سهلة من الحديث ١ إلى الحديث ١٠
V	من الحديث ١١ إلى الحديث ٢٠
Prescribed Text Book	١. سورة لقمان من القرآن الكريم ٢. أحاديث سهلة للدكتور ف. عبد الرحيم 1) Sooratu Luqman 2) Ahadeeth Sahlah By Dr. V. Abdur Rahim
Reading List (Print and online)	Tafsir Al-Jalalain The Noble Quran, Dr. Muhammad Muhsin Khan and Muhammad Taqi-Ud-Dhin Al-Hilali الأربعون النووية نصوص من الحديث النبوي الشريف، الدكتور ف. عبد الرحيم

	شرح أحاديث سهلة، الدكتور ش. عبد المالك https://quran.com/ https://sunnah.com/nawawi40

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO	1	2	3	3	3

3-Strong 2-Medium 1-Low

UNIVERSITY OF MADRAS

FOUNDATION COURSE: FRENCH

SYLLABUS WITH EFFECT FROM 2023-2024

UG & 5 Year PG Integrated - SEMESTER – I

Foundation Course in French: Prescribed Text and Grammar-I

Course Outcomes	1. Introduce oneself and talk about one's likes and dislikes 2. Invite someone, to accept or deny an invitation 3. Making purchases at the market 4. Recall and remember the usage of grammatical tenses in constructing sentences in a dialogue. 5. Apply the learnt grammar rules in practice exercises to improve their understanding		
Course	Foundation Course in French	**Course Code**	100L1K
Title of the Course:	Prescribed Text and Grammar-I		
Credits:	3		
Pre-requisites, if any:	---		
Course Objectives	Identify the basic French sentence structure		K1
	Define and describe the various grammatical tenses and use them to communicate in French		K2
	Examine the various documents presented and discuss and reply to the questions asked on it		K2 and K3
	Analyze and interpret expressions used to convey the cause, the effect, the purpose, and the opposition in French		K4
	Evaluate the grammatical nature present in passages		K5
Units			
I	Unité 1: Salut ! Unité 2: Enchanté!		
II	Unité 3: J'adore !		
III	Unité 4: Tu veux bien ?		
IV	Unité 5: On se voit quand ?		
V	Unité 6: Bonne idée !		
Prescribed Text	Régine Mérieux & Yves Loiseau, **Units 1-6** of ***Latitudes* 1** (A1 /A2), méthode de français, Didier, 2017 (Indian Edition)		

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	L	S	M	L	S	S	S	M	S	M
CO2	S	M	M	L	M	M	L	S	S	S	S	S	M
CO3	M	S	S	M	M	M	L	S	M	M	M	S	M
CO4	S	M	M	L	S	M	L	S	S	S	M	S	M
CO5	S	M	M	L	M	M	L	S	S	S	S	S	M

S-Strong M-Medium L-Low

UNIVERSITY OF MADRAS

FOUNDATION COURSE: FRENCH

SYLLABUS WITH EFFECT FROM 2023-2024

SEMESTER I

Title of the Paper : Prescribed Text and Grammar-I

Prescribed textbook : Régine Mérieux & Yves Loiseau, **Units 1-6** *of Latitudes 1 (*Indian Edition), Paris, Didier, 2017**.**

Questions not to be asked from the Autoévaluation and Préparation au DELF

Paper setters are to strictly adhere to the syllabus and ask questions only from the pages included in the syllabus. Questions should cover the entire syllabus.

QUESTION PAPER PATTERN

Time : 3 Hours Maximum Marks : 75

Section A (10 x 2 = 20 Marks)

Answer any TEN questions

15 questions to be asked on cultural / civilisational aspects found in the prescribed textbook

Section B (5 x 5 = 25 Marks)

Answer any FIVE questions

8 Grammar exercises to be given from the prescribed textbook

Section C (3 x 10 = 30 Marks)

Answer any THREE

3 must be answered out of 5 topics (1 dialogue writing, 1 letter /email writing, 1 composition, 1 comprehension, 1 translation)

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UNIVERSITY OF MADRAS

FOUNDATION COURSE: ENGLISH

SYLLABUS WITH EFFECT FROM 2023-2024

FIRST YEAR - SEMESTER I

PAPER II –GENERAL ENGLISH

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
100L1ZU	**Part II**	Y	Y	-	-	3	6	25	75	100

Learning Objectives		
LO1	To enable learners to acquireself awareness and positive thinking required in various life situations.	
LO2	To help them acquire the attribute of empathy	
LO3	To assist them in acquiring creative and critical thinking abilities	
LO4	To enable them to learn the basic grammar	
LO5	To assist them in developing LSRW skills	
Unit No.	**Unit Title & Text**	**No. of Periods for the Unit**
I	**SELF-AWARENESS(WHO)&POSITIVE THINKING(UNICEF)** **Life Story** 1.1 Chapter 1 from MalalaYousafzai, I am Malala 1.2 An Autobiography or The Story of My Experiments with Truth (Chapters 1, 2 & 3) M.K.Gandhi **Poem** 1.3 Where the Mind is Without Fear – Gitanjali 35 – Rabindranath Tagore 1.4 Love Cycle – Chinua Achebe	20
II	**EMPATHY** **Poem** 2.1 Nine Gold Medals – David Roth 2.2 Alice Fell or poverty – William Wordsworth **Short Story** 2.3 The School for Sympathy – E.V. Lucas 2.4 Barn Burning – William Faulkner	20
III	**CRITICAL & CREATIVE THINKING** **Poem** 3.1 The Things That Haven't Been Done Before – Edgar Guest 3.2 Stopping by the Woods on a Snowy Evening – Robert Frost	20

	Readers Theatre 3.3 The Magic Brocade – A Tale of China 3.4 Stories on Stage – Aaron Shepard (Three Sideway Stories from Wayside School" by Louis Sachar)	
IV	**Part of Speech** 4.1 Articles 4.2 Noun 4.3 Pronoun 4.4 Verb 4.5 Adverb 4.6 Adjective 4.7 Preposition	15
V	**Paragraph and Essay Writing** 5.1 Descriptive 5.2 Expository 5.3 Persuasive 5.4 Narrative **Reading Comprehension**	15

Course Outcomes		
Course Outcomes	On completion of this course,students will:	
CO1	Acquire self awareness and positive thinking required in various life situations	PO1,PO7
CO2	Acquire the attribute of empathy.	PO1,PO2,PO10
CO3	Acquire creative and critical thinking abilities.	PO4,PO6,PO9
CO4	Learn basic grammar	PO4,PO5,PO6
CO5	Development and integrate the use of four language skills i.e., listening, speaking, readingand writing.	PO3,PO8

	Text books (Latest Editions)
1.	MalalaYousafzai. I am Malala, Little, Brown and Company, 2013.
2.	M.K. Gandhi. An Autobiography or The Story of My Experiments with Truth (Chapter – I), Rupa Publications, 2011.
3.	Rabindranath Tagore. "Gitanjali 35" from Gitanjali (Song Offerings): A Collection of Prose Translations Made by the Author from the Original Bengali. MacMillan, 1913.
4.	N.Krishnasamy. Modern English: A Book of Grammar, Usage and Composition Macmillan, 1975.
5.	Aaron Shepard. Stories on Stage, ShepardPublications, 2017.
6.	J.C. Nesfield. English Grammar Composition and Usage, Macmillan, 2019.

Web Resources	
1	MalalaYousafzai. I am Malala (Chapter 1) https://archive.org/details/i-am-malala
2	M.K Gandhi. An Autobiography or The Story of My Experiments with Truth(Chapter-1)- Rupa Publication, 2011 https://www.indiastudychannel.com/resources/146521-Book-Review-An-Autobiography-or-The-story-of-my-experiments-with-Truth.aspx
3	Rabindranath Tagore. "Gitanjali 35" from Gitanjali (Song Offerings)https://www.poetryfoundation.org/poems/45668/gitanjali-35
4	Aaron Shepard.Stories on Stage, Shepard Publications, 2017 https://amzn.eu/d/9rVzlNv
5	J C Nesfield. Manual of English Grammar and Composition. https://archive.org/details/in.ernet.dli.2015.44179

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weightage	15	15	15	15
Weighted percentage of Course Contribution to POS	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

I YEAR: SEMESTER I

NUTRITIONAL BIOCHEMISTRY

Course Code	Course Name	Category	Credits	Inst. Hours	Marks		
					CIA	External	Total
122C1A	**Core-I: Nutritional Biochemistry**	Core	4	4	25	75	100

Learning Objectives

The objectives of this course are to

- Create awareness about the role of nutrients in maintaining proper health
- Understand the nutritional significance of carbohydrates, lipids and proteins.
- Understand the importance of a balanced diet.
- Study the effect of additives, emulsifiers, flavour enhancing substances in food.
- Study the significance of nutraceuticals.

UNIT I: Concepts of food and nutrition. Basic food groups-energy yielding, body building and functional foods.UNITs of energy.Calorific and nutritive value of foods.Measurement of Calories by bomb calorimeter. Basal metabolic rate (BMR)-definition, determination of BMR and factors affecting BMR. Respiratory quotient (RQ) of nutrients and factors affecting the RQ. SDA-definition and determination-Anthropometric measurement and indices – Height,Weight, chest and waist circumference BMI. 12 Hrs

UNIT II: Physiological role and nutritional significance of carbohydrates, lipids and protein. Evaluation of proteins by nitrogen balance method- Biological value of proteins-Digestibility coefficient, , Protein Energy Ratio and Net Protein Utilization. Protein energy malnutrition – Kwashiorkar and Marasmus, Obesity-Types and preventive measures. 12 Hrs

UNIT III: Balanced diet, example of low and high cost balanced diet- for infants, children, adolescents, adults and elderly people. ICMR classification of five food groups and its significance food pyramid. Junk foods- definition and its adverse effects. 12 Hrs

UNIT IV: Food additives: Structure, chemistry, function and application of preservatives, emulsifying agents, buffering agents, stabilizing agents, natural and artificial sweeteners, bleaching, starch modifiers, antimicrobials, food emulsions, fat replacers, viscosity agents, gelling agents and maturing agents. Food colors, flavors, anti-caking agent, antioxidants. Safety assessment of food additives. 12 Hrs

UNIT V: Nutraceuticals and Functional Foods: Definition, properties and function of Nutraceuticals, food Supplements, dietary supplements prebiotics and probiotics, and functional Foods. Food as medicine. Natural pigments from plants– carotenoids, anthocyanins and its benefits. 12 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Cognizance of basic food groups viz. Carbohydrates, proteins and lipids and their nutritional aspects as well as calorific value	PO1,PO5
CO2	Identify and explain nutrients in foods and the specific functions in maintaining health.	PO1
CO3	Classify the food groups and its significance	PO1,PO2
CO4	Understand the effect of food additives	PO1,PO2
CO5	Describe the importance of nutraceuticals and pigments	PO1,PO5,PO6

Text books

1. Gaile Moe, Danita Kelley, Jacqueline Berning and Carol Byrd-Bredbenner. 2013. Wardlaw's Perspectives in Nutrition: A Functional Approach. McGraw-Hill, Inc., NY, USA.
2. M.Swaminadhan (1995) Principles of Nutrition and Dietics. Bappco.
3. Tom Brody(1998). Nutritional Biochemistry (2nded), Academic press, USA
4. Garrow, JS,James WPT and Ralph A (2000). Human nutrition and dietetics(10thed) Churchill Livingstone.
5. Andreas M.Papas(1998). Antioxidant Status, Diet, Nutrition, and Health (1sted) CRC

Reference Books

1. Branen, A.L., Davidson PM &Salminen S. 2001. Food Additives.2nd Ed. Marcel Dekker.
2. Gerorge, A.B. 1996. Encyclopedia of Food and Color Additives. Vol. III. CRC Press.
3. Advances in food biochemistry, FatihYildiz (Editor), CRC Press, Boca Raton, USA, 2010
4. Food biochemistry & food processing, Y.H. Hui (Editor), Blackwell Publishing, Oxford, UK, 2006.
5. Geoffrey Campbell-Platt. 2009. Food Science and Technology. Wiley-Blackwell ,UK.

Web resources

http://old.noise.ac.in/SecHmscicour/english/LESSON O3.pdf

https://study.com/academy/lesson/energy-yielding-nutrients-carbohydratesfat-protein.html.

https://www.nhsinform.scot/healthy-living/food-and-nutrition/eatingwell/vitamins-and-minerals

Mapping with Program Outcomes

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO 1	3				2		3	3	3	3
CO 2	3						3	3		3
CO 3	3	2					3	1		3
CO 4	3	2					3	3		3
CO 5	3				2	2	3	3		3

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

I YEAR: SEMESTER I

PRACTICAL I -NUTRITIONAL BIOCHEMISTRY

Course Code	Course Name	Category	Credits	Inst. Hours	Marks		
					CIA	External	Total
122C11	**Core paper – 2 Practical 1 Nutritional Biochemistry**	Core (Practical)	4	3	40	60	100

Learning objectives

The objectives of this course are to

- Impart hands-on training in the estimation of various constituents by titrimetric method
- Prepare Biochemical preparations
- Determine the ash content and extraction of lipid

TITRIMETRY **20 hrs**

1. Estimation of ascorbic acid in a citrus fruit.
2. Estimation of calcium in milk .
3. Estimation of glucose by Benedict's method in honey.
4. Estimation of phosphorous (Plant source)

BIOCHEMICAL PREPARATIONS **15 Hrs**

Preparation of the following substances and its qualitative tests

5. Lecithin from egg yolk.
6. Starch from potato.
7. Casein and Lactalbumin from milk.

GROUP EXPERIMENT **10 Hrs**

8.Determination of ash content and moisture content in food sample

9.Extraction of lipid by Soxhlet's method.

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Estimate the important biochemical constituents in the food samples.	PO1,PO3
CO2	Prepare the macronutrients from the rich sources.	PO1,PO3
CO3	Determine the ash and moisture content of the food samples	PO1,PO3
CO4	Extract oil from its sources	PO1,PO3,PO6

Text books

1. Laboratory manual in Biochemistry, J. Jayaraman, 2nd edition, NewAge International Publishers, 2011,
2. An Introduction to Practical Biochemistry, David T. Plummer, 3 rd edition, Tata McGraw-Hill Publishing Company Limited, 2001.

Reference books

1. Biochemical Methods, Sadasivam S and Manickam A, 4h edition, NewAge International Publishers, 2016
2. Essentials of Food and Nutrition, Vol. I & II, M.S. Swaminathan.
3. Bowman and Robert M. 2006. Present Knowledge in Nutrition.9th edition, International Life Sciences Publishers.
4. Indrani TK. 2003. Nursing Manual of Nutrition and Therapeutic Diet, 1st edition Jaypee Brothers medical publishers.
5. Martha H. and Marie A. 2012. Biochemical, Physiological, and Molecular Aspects of Human Nutrition.3rd edition.Chand Publishers.

Web resources

1. https://www.elsevier.com/journals/clinical-biochemistry/0009-9120/guide-for-authors
2. http://rajswasthya.nic.in/RHSDP%20Training%20UNITs/Lab.%20Tech/Biochemistry/Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf
3. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y
4. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3		3				3	3	3	3
CO 2	3		3				3	3	3	3
CO 3	3		3				3	3	3	3
CO 4	3		3			3	3	3	3	3

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

<table>
<tr><td>Title of the Course</td><td colspan="7">CHEMISTRY FOR BIOLOGICAL SCIENCES-I
(Other than Physics and Mathematics)</td></tr>
<tr><td>Paper No.</td><td colspan="7">Generic Elective - I Theory</td></tr>
<tr><td>Category</td><td>Generic Elective</td><td>Year
Semester</td><td>I
I</td><td>Credits</td><td>2</td><td>Course Code</td><td>122E1A</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>2</td><td>-</td><td colspan="2">-</td><td colspan="3">2</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher Secondary Chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims at providing knowledge on
basics of atomic orbitals, chemical bonds, hybridization and fundamentals of organic chemistry
nuclear chemistry and industrial chemistry
importance of speciality drugs and
separation and purification techniques.</td></tr>
<tr><td rowspan="3">Course Outline</td><td colspan="7">UNIT I
Chemical Bonding and Nuclear Chemistry
Chemical Bonding: Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. M. O diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties.
Nuclear Chemistry: Fundamental particles - Isotopes, Isobars, Isotones and Isomers-Differences between chemical reactions and nuclear reactions- group displacement law. Nuclear binding energy - mass defect - calculations. Nuclear fission and nuclear fusion - differences.</td></tr>
<tr><td colspan="7">Unit II
Industrial Chemistry
Fuels: Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required).
Silicones: Synthesis, properties and uses of silicones.
Fertilizers: Urea, ammonium sulphate, potassium nitrate NPK fertilizer, superphosphate, triple superphosphate.</td></tr>
<tr><td colspan="7">UNIT III
Fundamental Concepts in Organic Chemistry
Hybridization: Orbital overlap hybridization and geometry of CH_4, C_2H_4, C_2H_2 and C_6H_6. Polar effects: Inductive effect and consequences on Ka and K_b of organic acids and bases, electromeric, mesomeric, hyper conjugation and steric-examples and explanation.
Reaction mechanisms: Types of reactions- aromaticity-aromatic electrophilic substitution; nitration, halogenation, Friedel-Craft’s alkylation and acylation.
Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.</td></tr>
</table>

	UNIT IV **Drugs and Speciality Chemicals** Definition, structure and uses: Antibiotics viz., Penicillin, Chloramphenicol and Streptomycin; Anaesthetics viz., Chloroform and ether; Antipyretics viz., aspirin, paracetamol and ibuprofen; Artificial Sweeteners viz., saccharin, Aspartame and cyclamate; Organic Halogen compounds viz., Freon, Teflon.
	UNIT V: **Analytical Chemistry** Introduction qualitative and quantitative analysis. Principles of volumetric analysis. Separation and purification techniques: extraction, distillation and crystallization. Chromatography: principle and application of column, paper and thin layer chromatography.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, firstedition,2009. 2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications,Karur,2006. 3. ArunBahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty thirdedition,2012. 4. P.L.Soni, H.M.Chawla, Text Book of Inorganic Chemistry; SultanChand&sons,New Delhi, twentyninthedition,2007.
Reference Books	1. P.L.Soni, Mohan Katyal, Text book of Inorganic chemistry; Sultan Chand and Company,NewDelhi,twentiethedition,2007. 2. B.K,Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition,2014. 3. Jayashree gosh, Fundamental Concepts of Applied Chemistry; Sultan & Chand, Edition 2006.

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

CO1: state the theories of chemical bonding,nuclear reactions and its applications.

CO 2: evaluate the efficiencies and uses of various fuels and fertilizers.

CO 3: explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.

CO 4: demonstrate the structure and uses of antibiotics, anaesthetics, antipyretics and artificial sugars.

CO 5: analyse various methods to identify an appropriate method for the separation of chemical components.

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

<table>
<tr><td>Title of the Course</td><td colspan="7">CHEMISTRY PRACTICAL FOR PHYSICAL AND BIOLOGICAL SCIENCES</td></tr>
<tr><td>Paper No.</td><td colspan="7">Generic Elective - I Practical</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Generic Elective</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">1</td><td rowspan="2">Course Code</td><td rowspan="2">122E11</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>-</td><td>-</td><td colspan="2">2</td><td colspan="3">2</td></tr>
<tr><td>Prerequisites</td><td colspan="7"></td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims to provide knowledge on the
• basics of preparation of solutions.
• principles and practical experience of volumetric analysis</td></tr>
<tr><td>Course Outline</td><td colspan="7">VOLUMETRIC ANALYSIS
1. Estimation of sodium hydroxide using standard sodium carbonate.
2. Estimation of hydrochloric acid using standard oxalic acid.
3. Estimation of ferrous sulphate using standard Mohr'ssalt.
4. Estimation of oxalic acid using standard ferrous sulphate.
5. Estimation of potassium permanganate using standard sodium hydroxide.
6. Estimation of magnesium using EDTA.</td></tr>
<tr><td>Reference Books</td><td colspan="7">V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic Principles ofPractical Chemistry; Sultan Chand & sons, Second edition, 1997.</td></tr>
<tr><td colspan="8">Course Learning Outcomes (for Mapping with POs and PSOs)
On completion of the course the students should be able to
CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette.
CO2: design, carryout, record and interpret the results of volumetric titration.
CO 3: apply their skill in the analysis of water/hardness.
CO4: To create the awareness about food adulterants</td></tr>
</table>

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

SKILL ENHANCEMENT COURSE -SEC (NME)

Choose any of the skill enhancement course (NME) for Semester I & II

FIRST YEAR

SEMESTER I/II

HEALTH AND NUTRITION

Course Code	Course Name	Category	Credits	Inst. Hours	Marks		
					CIA	External	Total
122S1A	**NME Paper: Health and Nutrition**	SEC	2	2	25	75	100

Learning Objectives

The main objectives of this course are to

- Gain basic knowledge about health.
- Understand about vitamins.
- Learn about functions of fat on health.
- Understand the types of minerals and its functions
- Know about the importance of carbohydrates and proteins on health

UNIT I: Health – definition, Factors affecting human health. Importance of health care of children, adults and elderly people.Balanced diet and calorific value. 6 Hrs

UNIT II: Vitamins-definition, classification, sources, properties, functions and deficiency symptoms. Recommended daily allowances. 6 Hrs

UNIT III: Sources and functions of dietary fats, role of fats in health and diseases. 6 Hrs

UNIT IV: Minerals- Role of minerals on human health, sources, biological functions, deficiency disorders with special reference to Calcium, Phosphorus, Potassium, Copper, Iron, Zinc and Selenium. Minerals in biological systems and their importance –Iron, Calcium, Phosphorus, Iodine, Copper, Zinc. 6 Hrs

UNIT V: Role of proteins and carbohydrates in health. Functions of protein and carbohydrate and their calorific value. Dietary sources and deficiency disorders – Kwashiorkor and Marasmus – supplementation programs in India and their implications. 6 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Understand about the importance of health and diet	PO1
CO2	Discuss about the classification properties and deficiencies of vitamins	PO1
CO3	Understand about sources and functions of fats and lipids on health	PO1.PO4
CO4	Detail about the different typed of minerals and its role in health	PO1,PO4
CO5	Relatetherole of proteins and carbohydrates on health	PO1,PO4

Text books

1. S.Davidson and J.R.Passmore (1986) Human Nutrition and Dietetics, (8th ed), Churchill Livingstone
2. J. S. Garrow, W. Philip T. James, A. Ralph (2000), Human Nutrition and Dietetics (10th ed), Churchill Livingstone
3. M.Swaminathan (1995) Principles of Nutrition and Dietetics, Bappco

Reference Books

1. Margaret Mc Williams (2012). Food Fundamentals (10th ed), Prentice Hall

Web Resources

1. https://www.universalclass.com/articles/health/nutrition/nutritional-needs-for-differentages.
2. nhp.gov.in/healthyliving/healthydiet
3. www.anme.com.mx/libros/PrinciplesofNutrition.pdf

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3	3		3
CO 2	3						3	3		3
CO 3	3			2			3	3		3
CO 4	3			2			3	3		3
CO5	3			2			3	3		3

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

சென்னைப் பல்கலைக்கழகம்
University of Madras

Part-IV

அடிப்படைத் தமிழ் - பாடத்திட்டம்

Basic Tamil - Syllabus

2 பருவங்கள் (முதல் பருவம்)

(B.A., B.Sc., B.Com., BCA., BBA)

2023-24

பருவம் - I (Semester - I)

அடிப்படைத் தமிழ் - I (Basic Tamil - I)

Course Code	Course Name	Category	L	T	P	S	Credit	Ins. Hours	Marks		
									CIA	External	Total
100S1A	அடிப்படைத் தமிழ் - I Basic Tamil - I	Supportive	2		-	-	2	2	25	75	100
Pre - requisite	தமிழ் கற்கும் ஆர்வம்.										SV 2023

Learning Objectives - **கற்றல் நோக்கங்கள்**

- பிறமொழி மாணவர்களுக்குத் தமிழ்மொழி பயிற்றுவித்தல்.
- தமிழ் எழுத்துகளின் வரிவடிவங்களை அறிவதோடு உச்சரிக்கவும் எழுதவும் பயிற்றுவித்தல்.
- கற்றுக்கொண்ட சொற்களைக் கொண்டு தொடர்களை அமைத்துப் பேசக் கற்றுக்கொள்ளச் செய்தல்.
- தமிழ்பேசும் மக்களிடையே அவர்கள் கலந்துபழகி, தங்கள் வாழ்வைச் சிறப்பாக நடத்தத் தேவையான மொழிவளத்தைப் பெறச் செய்தல்.

Expected Course Outcomes - **எதிர்பார்க்கப்படும் கற்றல் அடைவுகள்**

On the successful completion of the course, students will be able to
இப் பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்.

CO 1	தமிழ் உயிரெழுத்து வடிவங்களை யும் மெய்யெழுத்து வடிவங்களை யும் அறிந்துகொள்வர்.	K1,K2
CO 2	உயிர், மெய், உயிர்மெய்த் துணைக் குறியீடுகளை அறிந்து அவற்றை எழுதும் திறன் பெறுவர்.	K2
CO 3	ஒரு எழுத்துக்கு ஒரு ஒலி, ஒரு ஒலிக்கு ஒரு எழுத்து என்ற தமிழின் உச்சரிப்பு - வரிவடிவத் தொடர்பை உணர்வர்.	K3,K4
CO 4	சில அடிப்படையான மொழி இலக்கண விதிகளை அறிந்து பயன்படுத்துவர்	K3,K5
CO 5	தமிழ்நாட்டுச் சூழலில் அன்றாடத் தேவைகளை நிறைவேற்றிக்கொள்ள ஏற்ற மொழிப் பயன்பாடுகளை அறிவர்.	K4,K6

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

Unit - I	**உயிரெழுத்துகள், மெய்யெழுத்துகள், உயிர்மெய் எழுத்துகள்**
	உயிர், மெய், உயிர்மெய்த் துணைக் குறியீடுகள், குறில்-நெடில், வல்லினம்-மெல்லினம்-இடையினம் - எழுத்துகளின் ஒலிப்பு முறையையும் எழுதும் முறையையும் கற்றல்.
Unit - II	**ஓரெழுத்து ஒருமொழியும் இன்றியமையாத பெரற்சொற்களும்**
	ஓரெழுத்துச் சொற்கள் - பல எழுத்துச் சொற்கள் - சொற்பொருள் அறிதல் - நாள், மாதம், எண் பெயர்கள் அறிதல் - பருவங்கள் அறிதல் - விலங்குகள், தாவரங்கள், உடல் உறுப்புகள், உறவுப் பெயர்கள், ஊர்ப் பெயர்கள், போன்றவற்றை அறிதல்.
Unit - III	**சொல் வகைகளும் சொற்பயன்பாடும்**
	எண் அடை, பெயரடை, வினையடை, இடைச்சொற்கள் இணைப்பு, வேற்றுமை உருபு இணைப்பு போன்ற மொழி விதிகளைக் கற்பித்தல்.
Unit - IV	**பிழையின்றிப் பேசுதலும் எழுதுதலும்**
	திணை-பால்-எண்-இடம்-காலம் ஆகியவற்றை அறிதல். பொதுவாக இவற்றில் ஏற்படும் பிழைகளை உணர்த்திச் சரிசெய்தல்.

Unit - V	மொழிப் பயன்பாட்டு பயிற்சி
	• ஆர்வமூட்டும் நிகழ்ச்சி அல்லது சிறிய கதையைச் சொல்லச் செய்தல் / படிக்கச் செய்தல். • சூழல்சார் (கல்லூரி, நூலகம், உணவகம், பேருந்து-இரயில்-விமான நிலையங்கள், அங்காடிகள்) உரையாடல்களை மாணவர்களிடையே நிகழ்த்துதல். • கதையினைச் சொல்லச் சொல்ல எழுதச் சொல்லுதல். • திரைப்படம் அல்லது திரைப்படப் பாடல் குறித்து மாணவர்களிடையே குழுக் கலந்துரையாடல் செய்யச் சொல்லல்.
Text book (s)	
•	அடிப்படைத் தமிழ்-1 (Basic Tamil-I)
Reference Books / Websites	
•	தமிழில் நாமும் தவறில்லாமல் எழுதலாம் - பொற்கோ, பாரி நிலையம், சென்னை, 2003.
•	www.tamilvu.org/ta/content/சான்றிதழ்
•	www.thamizham.net/kal/ttenglish/cards32-u8.htm
•	www.thamizham.net/kal/ttenglish/index-u8.htm
•	www.ilearntamil.com
•	www.wikihow.com/Learn-Tamil
•	www.ilovelanguages.org/tamil.php
•	www.ling-app.com/learn-tamil
•	www.ilearntamilnow.com
•	www.17-minute-languages.com/en/learn-tamil
•	www.hindustanitongue.com/learn-tamil
•	www.duolingo.com/course/ta/en/Learn-Tamil
•	www.mylanguages.org/learn_tamil.php
•	www.learn101.org/tamil.php
•	www.goethe-verlag.com/book2/EN/ENTA/ENTA002.HTM
•	www.karky.in/payilcourses/index.html
•	www.tamilvu.org/ta/பயணியர்-தமிழ்
•	www.languagetrainers.com/blog/tamil-words/
•	www.thamizham.net/kal/tamil.htm
•	www.worldtamilacademy.com
•	www.outsourcingtranslation.com/resources/phrases/tamil-sentences.php
•	www.ling-app.com/ta/basic-words-in-tamil/
•	www.thirutamil.com/article/20-easy-thirukkural-in-tamil/
•	www.chennailibrary.com/avvai/kondraivendan.html
•	www.tamilvu.org/ta/content/புதிய-பாடத்திட்டம்-2022
•	www.tamilvu.org/ta/content/மின்-கற்றலுக்கான-இணையத்தளம்
•	www.ling-app.com/ta/tamil-culture
•	www.caleidoscope.in/art-culture/tamil-nadu-culture-3

Apps	
•	www.kaniyantamil.com/best-mobile-apps-tamil-learning/
•	Tamil 101 - Learn to Write
•	https://payil.app/tva/ta/
•	https://tamil-101.en.aptoide.com/app
•	Ling - Learn Tamil Language
•	Tamil by Nemo
•	Learn Tamil Quickly

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
CLO 1	3	2	3	2	2	3	2	2	2	2	3	3
CLO 2	2	2	2	3	3	2	2	3	3	2	2	2
CLO 3	3	3	3	2	2	3	3	2	3	3	3	3
CLO 4	3	2	3	3	3	3	2	2	2	2	3	2
CLO 5	2	2	3	3	2	2	3	3	2	3	3	2

Strong - 3, Medium - 2, Low - 1

சென்னைப் பல்கலைக்கழகம்
University of Madras

Part-IV

வளர்நிலைத் தமிழ் - பாடத்திட்டம்

Advanced Tamil - Syllabus

2 பருவங்கள் (முதல் பருவம்)

(B.A., B.Sc., B.Com., BCA., BBA)

2023-24

பருவம் - 1 (Semester - 1)
வளர்நிலைத் தமிழ் - I (Advanced Tamil - I)

Course Code	Course Name	Category	L	T	P	S	Credit	Ins. Hours	Marks		
									CIA	External	Total
100S1B	வளர்நிலைத் தமிழ் - I Advanced Tamil - I	Supportive	2	-	-	-	2	2	25	75	100
Pre - requisite	பத்தாம் வகுப்பு வரை தமிழை மொழிப்பாடமாகப் படித்திருக்க வேண்டும்.										SV 2023

Learning Objectives - கற்றல் நோக்கங்கள்

- இக்கால இலக்கியங்களில் இன்றியமையாத சில வகைமைகளை மாணவர்கள் அறியுமாறு செய்தல்.
- அழியும் நிலையில் உள்ள நாட்டுப்புறப் பாடல்கள் குறித்த விழிப்புணர்வை ஏற்படுத்துதல்.
- உரைநடை வடிவத்தின் குறிப்பிடத்தக்க கூ றான கட்டுரை இலக்கியம் பற்றியும் அதன் சிறப்புகள் குறித்தும் அறியச் செய்தல்.
- தம் உள்ள கருத்துகளை நடப்பு இலக்கிய வடிவங்களைப் பயன்படுத்திச் சமூகத்துக்குப் படைத்தளிக்கத் தூண்டுதல்.
- மொழிப் பிழைகள் நேராமல் தவிர்த்து , பல்வகை ஊடகங்களிலும் வேலை வாய்ப்பு பெற ஊக்கமளித்தல்.

Expected Course Outcomes - எதிர்பார்க்கப்படும் கற்றல் அடைவுகள்

On the successful completion of the course, students will be able to
இப் பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்

CO 1	சமகால இலக்கியங்களின் நோக்குகள்- போக்குகள் குறித்து மாண வர்கள் அறிந்துகொள்வர்.	K2
CO 2	நாட்டுப்புற மக்களின் வாழ்வியல் , அறிவாற்றல், இன்றைய நிலை ஆகியவை குறித்துச் சிந்திப்பர்.	K1,K2
CO 3	தங்கள் கற்பனை வளத்தை மாணவர்கள் பெருக்கிக் கொள்வர்.	K2,K4,K6
CO 4	மொழியில் பிழைகள் நேரா வண்ணம் எழுதக் கற்றுக் கொள்வதோடு , திறனாய்வு செய்யும் ஆற்றல் பெறுவர்.	K5,K4
CO 5	திரைப்படம், சின்னத்திரை, தொலைக்காட்சி உள்ளிட்ட ஊடகங்களில் பாடல், இசை, எழுத்து எனப் பல்வேறு வேலைவாய்ப்புகள் பெறுவர்.	K5,K4,K6

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

Unit - I	**நாட்டுப்புறப் பாடலும் கவிதையும்**
	1. கி.வ.ஜா.வின் மலையருவி அல்லது ஏதேனும் ஒரு நாட்டுப்புறத் தொகுப்பிலிருந்து தேர்ந்தெடுத்துத் தாலாட்டுப் பாடல், சிறுவர் விளையாட்டுப் பாடல், தொழில் பாடல், ஒப்பாரிப் பாடல் ஆகியவற்றை மாணவர்களுக்கு அறிமுகப்படுத்துதல். 2. தமிழ்த்தாய் வாழ்த்து முதல் பாடல் மட்டும். 3. பாரதியாரின் "செந்தமிழ் நாடென்னும் போதினிலே" பாடல்.
Unit - II	**புதுக்கவிதையும் சிறுகதையும்**
	1. "நிலத்தை ஜெயித்த விதை" - வைரமுத்து 2. "தீக்குச்சி" (பித்தன் தொகுப்பு) - அப்துல் ரஹ்மான் 3. "கட்டை விரல்" - கா.ந. அண்ணாதுரை 4. "சனிக்கிழமை" (காகித உறவு தொகுப்பு) - சு.சமுத்திரம்

Unit - III	**கட்டுரையும் குறிப்புகளைக்கொண்டு கட்டுரை எழுதுதலும்**
	1. மு.வ.வின் "நல்வாழ்வு" தொகுப்பிலிருந்து ஏதேனும் ஒரு கட்டுரை. 2. குறிப்புகளைக் கொடுத்துக் கட்டுரை எழுதச் செய்தல்.
Unit - IV	**ம் நேர்காணலும்திறனாய்வு**
	இலக்கியநயம் பாராட்டுதல், நூல் திறனாய்வு, திரைப்படத் திறனாய்வு. நேர்காணல்
Unit - V	**மொழிப் பயிற்சி**
	1. திணை, பால், எண், இடப் பயன்பாடு அறிதல். 2. பொருந்திய சொல் தருதல். 3. பிழை நீக்கி எழுதுதல்.
Text book (s)	
•	
Reference Books / Websites	
•	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
CLO 1	3	2	3	2	2	3	2	2	2	2	3	3
CLO 2	2	2	2	3	3	2	2	3	3	2	2	2
CLO 3	3	3	3	2	2	3	3	2	3	3	3	3
CLO 4	3	2	3	3	3	3	2	2	2	2	3	2
CLO 5	2	2	3	3	2	2	3	3	2	3	3	2

Strong - 3, Medium - 2, Low - 1

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

SKILL ENHANCEMENT COURSE -SEC (NME)

Choose any of the skill enhancement course (NME) for Semester I & II

FIRST YEAR

SEMESTER I/II

LIFE STYLE DISEASES

Course Code	Course Name	Category	Credits	Inst. Hours	Marks		
					CIA	External	Total
122S1B	**Lifestyle Diseases**	SEC	2	2	25	75	100

Learning Objectives

The objectives of this course are to

- Create awareness on lifestyle diseases among adolescents.
- List out the lifestyle diseases.
- Explain the common lifestyle diseases and their prevention.
- Acquint the disorders associated with women's health.
- Impart life skills so as to prevent lifestyle diseases.

UNIT I: Lifestyle diseases: Definition, Factors contributing to lifestyle diseases – Physical in activity, Poor food habits ,disturbed biological clock, sleep deprivation. 6 Hrs

UNIT II: Top lifestyle diseases, Impact of Lifestyle diseases on family, society and economy of country. **6** Hrs

UNIT III: Causes, symptoms**,** types, preventive measures and treatment of Obesity, cardio vascular diseases, diabetes and cancer. 6 Hrs

UNIT IV: Women's lifestyle diseases: Polycystic Ovarian Disease, Infertility, Breast and cervical cancer and Osteoporosis. 6 Hrs

UNIT V: Prevention of lifestyle diseases: Balanced diet, sufficient intake of water, physical activity, sleep-wake cycle, stress management and meditation. 6 Hrs

Course outcomes:

CO	On completion of the course the students will be able to	Program Outcomes
CO1	Define Life style diseases and describe the contributing factors	PO1
CO2	Enumerate the top life style diseases and its impact on life.	PO1,PO4,PO5
CO3	Elaborate the treatment and prevention measures of common lifestyle diseases.	PO1,PO4,PO5
CO4	Highlight the life style diseases that affects the women's health	PO1,PO4,PO5
CO5	Illustrate the various measures for prevention of life style diseases	PO1,PO4,PO5

Textbooks

1. JamesM R,LifestyleMedicine,2ndEdition,CRCPress,2013
2. AkiraMiyazaki,NewFrontiersinLifestyle-RelatedDisease,Springer,2008

Reference books

1. Steyn K, Lifes tyle and related risk factors for chronic diseases
2. Willett WC,Prevention of chronic disease by means of diet and lifestyle.
3. Kumar M & R. Kumar,.Guide to prevention of life style diseases. Deep & Deep publications

Web resources

1. https://youtu.be/jDdL2bMQXfE
2. https://youtu.be/7WnpSB14nDM
3. https://youtu.be/ollz9MqtW-U

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2						3	3		3
CO 2	2			2	3		3	3		3
CO 3	2			2	3		3	3		3
CO 4	2			2	3		3	3		3
CO 5	2			2	3		3	3		3

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

I YEAR: SEMESTER I

FOUNDATION COURSE - BRIDGE COURSE

BASICS OF BIOCHEMISTRY FOR BEGINNERS – SCOPE & APPLICATIONS

Course Code	Course Name	Category	Credits	Inst. Hours	Marks		
					CIA	External	Total
122B1A	**BRIDGE COURSE: BASICS OF BIOCHEMISTRY FOR BEGINNERS – SCOPE & APPLICATIONS**	FOUNDATION COURSE	2	2	25	75	100

Course learning Outcome:

Bridge courses/sessions are conducted for the new students (UG as well as PG) to assist them to achieve expected competencies in their selected courses. The main objective of the course is to bridge the gap between subjects studied at Pre-university level and subjects they would be studying in Graduation. The syllabus for the course is framed in such a way that they get basic knowledge on the subjects which they would be learning through graduation.

- Understanding of Biochemistry as a discipline and milestone discoveries in life sciences that led to establishment of Biochemistry as separate discipline. And basic concepts of biomolecules.
- Learning about micronutrients essential for life..
- Learning the interdisciplinary nature of Biochemistry.
- To create awareness on the scope and applications of Biochemistry.
- Understanding good and safe laboratory practices.

UNIT-I

Introduction – Historical Background of Biochemistry – Chemical composition of living matter – Basic knowledge of – Aminoacids – Purines – Pyrimidines – Simple & Complex Carbohydrates , Proteins , Fat and Nucleic acids

UNIT-II

Basic knowledge of Vitamins – water and fat soluble vitamins - Minerals.- micro and macro minerals .

UNIT-III

Interdisciplinary Nature of Biochemistry. Opportunity for higher education & research in Biochemistry.

UNIT - IV

Applications of Biochemistry in various fields - Industrial applications of Biochemistry – Career prospects – Bio-entrepreneurship.

UNIT-V

Safety measures in laboratories – Preparation of Buffers -Preparation of normal, percentage and molar solutions - and measurement of pH. Good laboratory practices,

CO	On completion of this course, students will be able to	Program Outcomes
CO1	Establishing a stronger foundation in historical background and basic biomolecules of living system	PO1
CO2	Learning about micronutrients required for life	PO1,PO3
CO3	Awareness on the scope & interdisciplinary nature of Biochemistry	PO6
CO4	Knowing Career prospects in Biochemistry	PO6
CO5	Learning safety and good laboratory practices	PO1,PO3

REFERENCES

1. *Biochemical Calculations, 1976, Irwin H. Siegel 2 nd Ed. John Wiley and Sons.*
2. *A biologist's Physical Chemistry, 1976, 2nd Edition, J Gareth Morris, Edward Arnold Ltd.*
3. *Devlin, T.M. (2011). Textbook of Biochemistry with Clinical Correlations (7th ed.). New York, John Wiley & Sons, Inc. ISBN: 978-0-470-28173-4.*
4. *Nelson, D.L., Cox, M.M. (2017). Lehninger: Principles of Biochemistry (7th Ed.). New York, WH: Freeman and Company. ISBN: 13: 978-1-4641-2611-6 / ISBN:10: 1-46412611-9.*
5. *Fundamentals of Biochemistry – J.L.Jain*

Websites:

1. Biochemistry | Definition, History, Examples, Importance, & Facts | Britannica
2. Vitamins and Minerals - HelpGuide.org
3. Scope and Application of Biochemistry (biomadam.com)
4. *https://www.oecd.org/chemicalsafety/testing/good-laboratory-practiceglp.htm*
5. 12 Great Careers in Biochemistry | Indeed.com

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						1	1		3
CO 2	3						1	1		3
CO 3	3					3	3	3	3	3
CO 4	3					3	3	3		3
CO5	3					2	3	3	2	3

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

சென்னைப் பல்கலைக்கழகம்
University of Madras

Part-I

பொதுத் தமிழ் - பாடத்திட்டம்

General Tamil - Syllabus

4 பருவங்கள் (இரண்டாம் பருவம்)

(B.A., B.Sc., B.Com., BCA., BBA)

2023-24

பொதுத்தமிழ்- 2

தமிழ் இலக்கிய வரலாறு -2

முதலாம் ஆண்டு – இரண்டாம் பருவம்

Course Code	Course Name	category	L	T	P	S	Credits	Ins.Hrs	CIA	External	Total
100L2AU	பொதுத்தமிழ் -2 தமிழ் இலக்கிய வரலாறு -2	Supportive	Y	-	-	-	3	6	25	75	100

Learning Objectives

- முதலாமாண்டுப் பட்ட வகுப்பு மாணவர்களுக்குத் தமிழ் மொழி இலக்கியங்களை அறிமுகம் செய்தல்
- தமிழ் இலக்கியப் போக்குகளையும், இலக்கணங்களையும் மாணவர் அறியுமாறு செய்து அவர்களின் படைப்பாற்றலைத் தூண்டுதல்
- தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்

Expected Course Outcomes

On the Sucessful completion of the Course, Students will be able to

இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்

CO 1	சிற்றிலக்கியங்களின்வழி இலக்கியச் சுவையினையும் பண்பாட்டு அறிவினையும் பெறுவர்	K4
CO 2	புதுக்கவிதை வரலாற்றினை அறிந்து கொள்வர்	K5, K6
CO 3	திராவிட இயக்க இலக்கியங்களைக் கற்பதன் மூலம் மொழி உணர்வு , இன உணர்வு, சமத்துவம் சார்ந்த சிந்தனைகளைப் பெறுவர்	K3
CO 4	தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதிய கலைச்சொற்களை உருவாக்கவும் அறிந்து கொள்வர்	K3
CO 5	போட்டித் தேர்வுகளில் வெற்றி பெறுவதற்குத் தமிழ்ப் பாடத்தினைப் பயன்கொள்ளும் வகையில் பயிற்சி பெறுவர்.	K2

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

அலகு-1	தமிழ் இலக்கிய வரலாறு அறிமுகம்.

1. சிற்றிலக்கியம்; குறவஞ்சி, கலம்பகம், உலா, பரணி, பள்ளு, பிள்ளைத்தமிழ், தூது, அந்தாதி.
2. தனிப்பாடல் அறிமுகம்
3. இக்கால இலக்கியம் ;கவிதை, சிறுகதை,நாடகம், உரைநடை. , திராவிட இயக்கம் வளர்த்த தமிழ்.

அலகு-2	சிற்றிலக்கியக்கமும்,தனிப்பாடலும்

சிற்றிலக்கியம்;

- கலிங்கத்து பரணி- விருந்தினரும் வறியவரு நெருங்கி யுண்ணரும் - முதல் - கேட்பாரைக் காண்மின் காண்மின் - வரை
- திருக்குற்றாலக் குறவஞ்சி - வானரங்கள் கனிகொடுத்து
- முக்கூடற் பள்ளு - ஆற்று வெள்ளம் நாளை வரத்
- அபிராமி அந்தாதி- கலையாத கல்வியும் குறையாத வயதும் (பதினாறு செல்வங்கள்)
- திருவரங்கக் கலம்பகம் – மறம் -பிள்ளைப் பெருமாள் ஐயங்கார்-பேசவந்த தூத செல்லரித்த ஓலை செல்லுமோ
- தமிழ்விடு தூது முதல் பத்து கண்ணிகள்

தனிப்பாடல்;

- வான்குருவி யின்கூடு -ஔவையார்
- ஆமணக்குக்கும் யானைக்கும் சிலேடை ;முத்திருக்கும் கொம்பசைக்கும் மூரித்தண் டே - காளமேகப் புலவர்
- இம்பர் வான் எல்லை இராமனையே பாடி -வீரராகவர்
- நாராய் நாராய் -சத்தி முத்தப் புலவர்

அலகு-3	இக்கால இலக்கியம்- 1

1. பாரதியார் பாரத சமுதாயம் வாழ்கவே
2. பாரதிதாசன் - சிறுத்தையே வெளியில் வா
3. நாமக்கல் கவிஞர்-கத்தியின்றி
4. தமிழ் ஒளி – மீன்கள் (அந்தி நிலா பார்க்க வா)
5. ஈரோடு தமிழன்பன் – எட்டாவது சீர் (வணக்கம் வள்ளுவ)

சிறுகதைகள்;_

1. புதுமைப்பித்தன் - கடிதம்
2. ஜெயகாந்தன் -வாய்ச் சொற்கள் (மாலை மயக்கம் தொகுப்பு)
3. ஆர். சூடாமணி - அந்நியர்கள்

உரைநடை ;

1. மு வ கடிதங்கள் - தம்பிக்கு நூலில் முதல் இரண்டு கடிதங்கள்

அலகு-4	இக்கால இலக்கியம்- 2

1. தந்தை பெரியார் – திருக்குறள்(மாநாட்டு) உரை
2. பேரறிஞர் அண்ணா – இரண்டாம் உலகத் தமிழ் மாநாட்டு உரை
3. கலைஞர் மு. கருணாநிதி – தொல்காப்பிய பூங்கா –எழுத்து -முதல் நூற்பா கட்டுரை

நாடகம் / திரைத்தமிழ் :

1. வேலைக்காரி –திரைப்படம்
2. ராஜா ராணி -சாக்ரடீஸ் -ஓரங்க நாடகம்

இதழியல் தமிழ் ;

முரசொலி கடிதம்

1. செம்மொழி வரலாற்றில் சில செப்பேடுகள்

அலகு-5	மொழிப் பயிற்சி

சொல் வேறுபாடு / பிழை தவிர்த்தல்

- வாசிப்பது – வாசிப்பவர்
- சுவர்- சுவரில்
- வயிறு - வயிற்றில்
- கோயில்- கோவில்
- கறுப்பு – கருப்பு
- இயக்குநர்-இயக்குனர்
- சில்லறை-சில்லரை
- முறித்தல் – முரித்தல்
- மனம்-மனசு- மனது
- அருகில்-அருகாமையில்
- அக்கரை- அக்கறை
- மங்கலம்- மங்களம்.

பயிற்சி :

- பிழையான சொற்களை ஒரு பத்தியில் கொடுத்து அந்தப் பிழையான சொற்களைச் சரியாக எழுதச் செய்தல்
- சிறிய பத்தி ஒன்றை ஆங்கிலத்தில் கொடுத்து அதனைத் தமிழில் மொழிபெயர்க்க வைத்தல்.

Text books

•	.

Reference Books

- மு. வரதராசன், தமிழ் இலக்கிய வரலாறு, சாகித்ய அக்காதெமி, புதுடெல்லி.
- மது. ச. விமலானந்தன், தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
- தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
- தமிழ் இலக்கிய வரலாறு –முனைவர்.சிற்பி பாலசுப்ரமணியம், முனைவர்.சொ.சேதுபதி
- புதிய தமிழ் இலக்கிய வரலாறு– முனைவர்.சிற்பி பாலசுப்ரமணியம்,நீல.பத்மநாபன்
- தமிழ் இலக்கிய வரலாறு - டாக்டர்.அ.கா.பெருமாள்
- தமிழ் இலக்கிய வரலாறு –முனைவர். ப.ச.ஏசுதாசன்
- தமிழ் இலக்கிய வரலாறு - ஸ்ரீ குமார்
- வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு–பாக்கியமேரி
- தமிழ் பயிற்றும் முறை, பேராசிரியர் ந. சுப்புரெட்டியார் - மணிவாசகர் பதிப்பகம், சிதம்பரம்

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
Web Sources

- https://www.chennailibrary.com/
- https://www.sirukathaigal.com
- https://www.tamilvirtualuniversity.org
- https://www.noolulagam.com
- https://www.katuraitamilblogspot.com

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4		3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	3	3	2	2	2	3	3

1.

Strong -3,Medium-2,Low-1

UNIVERSITY OF MADRAS

FOUNDATION COURSE: TELUGU

SYLLABUS WITH EFFECT FROM 2023-2024

Course – 2	**Semester-II**	**Course Code: 100L2B**
Title of the Course : Paper – II, MODERN POETRY		
Credits : 03		
Pre- requisites, if any: Knowledge in Contemporary Literature		

Course Outcomes

- 1. To understand the Contemporary literary text in Telugu
- 2. To Explain the nature of Modern Poetry
- 3. To Explain the Contemporary author style of writings
- 4. To evaluate the difference between the ancient and Contemporary Literature.
- 5. To use grammatical styles in writing.

Units

I	**Purnamma – Gurajada Appa Rao**
II	**AmrutamKurisinaratri – Devarakonda Balagangadhara Tilak**
III	**Desacharitralu – Srirangam Srinivasa Rao**
IV	**Shishuvu – Gurram Jashuva**
V	**Rachayita Rayani Natakam - Nagnamuni**
Reading List (Print and Online)	1. Gurajadalu – Guraja Appa Rao, Manasu Foundation 2. Mahaprasthanam – Manasu Foundation 3. Amrutamkurisinaratri – Devarakonda Balagangadhara Tilak 4. Jashuva Sarvalabhya rachanala sankalanamu – Gurram Jashuva
Recommended Texts	1. Gurajadalu – Guraja Appa Rao, Manasu Foundation 2. Mahaprasthanam – Sri Sri, Vishalandhra Publications, Hyderabad 3. Shishuvu – Gurram Jashuva 4. Amrutamkurisinaratri – Devarakonda Balagangadhara Tilak 5. Poetry Selections : Classical & Modern Poetry – University of Madras, Chennai.

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

EXISTING SYLLABUS (22-23) FOLLOWED FOR THE ACADEMIC YEAR 2023-2024

FOUNDATION COURSE: PART-I HINDI PAPER-II

100L2E

Inst.Hrs. : 6 **Year : I**
Credits : 3 **Semester : II**

Paper – II- ONE ACT PLAY, SHORT STORY & TRANSLATION		
Duration:	**1 Semester**	
Programme Outcomes:	1. Identify the features, elements of literary forms i.e. Drama, one act play, Novel and Short Stories, techniques of Translation 2. Understand the Ideology, message and aims of the literary works and writers 3. Obtain the knowledge of method of critical study of Literary works. 4. Obtain the skills of summerise, interpretation of contexts, and practice of translation 5. Employ the knowledge of translation and language and professional skills.	
Programme Specific Outcomes:	1. Basic knowledge for higher studies 2. Basic Knowledge of Hindi literature and its trends 3. Language skills spoken and writing skills 4. Basic idea of critical and analytical study of literature. 5. Obtains knowledge of Translation of different subjects	
Course Objectives	1. Identifies the writers, theme and aims of literary works	K1
	2. Understand and summarise the theme of one act plays and short stories and their techniques	K2
	3. Explains the methods and techniques of Translation of different fields	K2
	4. Evaluate the theme and artistic skills of One Act Plays and short stories and writers	K5
	5. Conceive the basic knowledge of literary themes and translation	K6
Pre-requisites, if any:	Basic Knowledge of Hindi Fiction and Translation	
UNITS		
I	1. Auranzeb ki Aakhiri Raat 2. Mukthidhan 3. Practice of Annotation Writing 4. Practice of Summary and Literary evaluation Writing	
II	1. Laksmi ka Swagat 2. Mithayeewala 3. Practice of Summary and Literary evaluation Writing 4. Translation Practice. (English to Hindi)	

III	1. Basant Ritu ka Natak 2. Seb Aur Dev 3. Practice of Summary and Literary evaluation Writing 4. Introduction to Translation Practice
IV	1. Bahut Bada Sawal 2. Vivah ki Teen Kathayen 3. Practice of Summary and Literary evaluation Writing 4. Translation Practice. (English to Hindi)
V	1. Translation Practice. (English to Hindi)

Course Outcomes	1. Identifies the nature, features, elements of One Act Plays and Short Stories and skills of Translation 2. Understand the theme, aim of lessons and obtain skills of Evaluation. 3. Evaluate the thought, ideology, expressional and artistic skills of writers and contextual meanings 4. Obtain skills of summarizing, evaluating and critical study 5. Employ the techniques and skills of Literature and Translation.

Reading List **(Print and Online)**	1. https://hindisarang.com/hindi-ekaanki-ekaankikar/ 2. https://hi.wikipedia.org/ wiki/हिन्दी_कहानी
Recommended Texts	**1. ONE ACT PLAY** (Detailed Study): **AATH EKANKI** **Edited By:** Devendra Raj Ankur, Mahesh Aanand Vani prakashan, 4695, 21-A Dariyagunj, New Delhi – 110 002 2. **SHORT STORIES** (Non-Detailed Study): **SWARNA MANJARI** **Edited by:** Dr. Chitti. Annapurna, Rajeswari Publications, 21/3, Mothilal Street, (Opp.Ranganathan St.), T.Nagar, Chennai–600017. 3. Prayojan Moolak Hindi : Dr. Syed Rahamathulla, Poornima Prakashan, 4/7 B Begum III Street, Royapettah, Chennai – 14. 4. Anuvad Abhyas Part III : Dakshin Bharat Hindi Prachar Sabha, T. Nagar, Chennai-17.

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	S	S	S
CO 2	S	S	S	S	L
CO 3	M	S	S	S	L
CO 4	M	S	S	S	L
CO 5	S	S	S	S	S

UNIVERSITY OF MADRAS

FOUNDATION COURSE: FRENCH

SYLLABUS WITH EFFECT FROM 2023-2024

UG & 5 Year PG Integrated – SEMESTER – II

Foundation Course in French: Prescribed Text and Grammar-II

Course Outcomes	1. To ask for and give directions. 2. To give orders or commands using *Impératif* 3. To narrate events from the past using *Passé Composé* 4. Cite the ordinal numbers in French 5. Indicate the position of something using prepositions of place		
Course	Foundation Course in French	**Course Code**	**100L2K**
Title of the Course:	Prescribed Text and Grammar-II		
Credits:	3		
Pre-requisites, if any:	-		
Course Objectives	Revise and recall the French sentence structure		K1
	Enumerate the various grammatical tenses and use them to communicate better in French		K2
	Summarize and develop ideas from the documents after discussing it in detail		K2 and K3
	Write and understand dialogues based on the themes done in class		K4
	Evaluate and comprehend text passages		K5
Units			
I	Unité 7: C'est où?		
II	Unité 8: N'oubliez pas !		
III	Unité 9: Belle vue sur la mer !		
IV	Unité 10: Quel beau voyage !		
V	Unité 11: Oh ! joli ! Unité 12: Et après ?		
Prescribed Text	Régine Mérieux & Yves Loiseau, **Units 7-12** of ***Latitudes* 1** (A1 /A2), méthode de français, Didier, 2017 (Indian Edition)		

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	L	M	M	L	S	S	S	M	M	M
CO2	S	M	M	L	M	M	L	S	S	S	S	M	M
CO3	M	S	S	M	S	M	M	S	S	S	M	S	S
CO4	S	S	M	L	S	M	L	S	S	S	S	S	S
CO5	S	S	S	L	M	M	L	S	S	S	M	S	S

S-Strong M-Medium L-Low

UNIVERSITY OF MADRAS

FOUNDATION COURSE: FRENCH

SYLLABUS WITH EFFECT FROM 2023-2024

SEMESTER II

Title of the Paper : Prescribed Text and Grammar-II

Prescribed textbook: Régine Mérieux & Yves Loiseau, **Units 7-12** *of Latitudes 1 (*Indian Edition), Paris, Didier, 2017**.**

Questions not to be asked from the Autoévaluation and Préparation au DELF

Paper setters to strictly adhere to the syllabus and ask questions only from the pages included in the syllabus. Questions should cover the entire syllabus.

QUESTION PAPER PATTERN

Time : 3 Hours Maximum Marks : 75

Section A (10 x 2 = 20 Marks)

Answer any TEN questions

15 questions to be asked on cultural / civilisational aspects found in the prescribed textbook

Section B (5 x 5 = 25 Marks)

Answer any FIVE questions

8 Grammar exercises to be given from the prescribed textbook

Section C (3 x 10 = 30 Marks)

Answer any THREE

3 must be answered out of 5 topics (1 dialogue writing, 1 letter /email writing, 1 composition, 1 comprehension, 1 translation)

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UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

SYLLABUS WITH EFFECT FROM 2022-2023

EXISTING SYLLABUS (22-23) FOLLOWED FROM THE ACADEMIC YEAR 2023-2024

100L2G

FOUNDATION COURSE: PART-I SANSKRIT PAPER-II

Inst.Hrs. : 6 **Year : I**
Credits : 3 **Semester : II**

Paper II – Prose, Grammar and History of Sanskrit Literature

Course Outcomes	1. Understand and apply grammatical concepts in drafting sentences and paragraphs 2. Apply the rules and regulations in handling usage of Lrt lakara and Asmad Sabdah, practice exercises and identify errors 3. Form an idea of the aesthetic expressions that make Sanskrit composition get the position of pride in world literature 4. Demonstrate knowledge of various expressions of opinion, emotions, cause, effect, purpose, and hypothesis in Sanskrit 5. Appreciate the art of employment of Alankaras in a prose form of poetry	
Course Objectives	Provide acquaintance with prose literature in Sanskrit through a study of one of the best texts of prose, which would pave the way for gaining sufficient grounding in the language	K1
	Enumerate various grammatical tenses and use them to communicate in Sanskrit language	K2
	Summarize the stories of Panchatantra and discuss in	K3
	Analyze and interpret expressions of cause, effect, purpose, and opposition in Sanskrit	K4
	Evaluate and comprehend text passages	K5
Units		
I	Introduction to Prose literature in Sanskrit Grammar: *ikārāntaḥ puṁliṅgāḥ śabdāḥ* - 1. कवि (*Kavi*) and 2. रवि (*Ravi*) *ikārāntaḥ strīliṅgaḥ śabdaḥ* - 1. मति (*Mati*) *īkārāntaḥ strīliṅgaḥ śabdaḥ* - 1. नदी (*Nadī*) *ikārāntaḥ napuṁsakaliṅgaḥ śabdaḥ* 1. वारि (*Vāri*)	
II	Introduction to *Māhābhārata,* the author of बालरामायणम् *(Bālarāmāyaṇam)* and his works Text: *Bālakāṇḍam* of *Bālarāmāyaṇam*	
III	Introduction to the works of *Baṇa* (*Kādambarī* and *Harṣacaritam*), *Daṇḍin* (*Daśakumāracaritam* and *Avantisundarīkathā*) and *Subandhu* (*Vāsavadattā*)	
IV	Introduction to Historical *Kāvyas* in Sanskrit - The works of *Kalhaṇaḥ, Bilhaṇaḥ, Bāṇaḥ* and *Pravarasenaḥ*	

V	Grammar: Conjugations - *Laṅ lakāraḥ* (Past tense) (i) अगच्छत् (*Agacchat*) (ii) अतिष्ठत् (*Atiṣṭhat*) (iii) अपठत् (*Apaṭhat*) (iv) अनृत्यत् (*Anṛtyat*) (v) अकुप्यत् (*Akupyat*) (vi) अकथयत् (*Akathayat*) (vii) अगणयत् (*Agaṇayat*) (viii) आसीत् (*Asīt*) (ix) अकरोत् (*Akarot*) (x) अशृणोत् (*Aśṛṇot*) Indeclinables: (a) तुमुन् (*Tumun*) suffix ended words (Infinitive forms) (i) गन्तुम् (*Gantum*) (ii) स्थातुम् (*Sthātum*) (iii) पठितुम् (*Paṭhitum*) (iv) नर्तितुम् (*Nartitum*) (v) कोपितुम् (*Kopitum*) (vi) कथयितुम् (*Kathayitum*) (vii) गणयितुम् (*Gaṇayitum*) (viii) भवितुम् (*Bhavitum*) (ix) कर्तुम् (*Kartum*) (x) श्रोतुम् (*Śrotum*) (b) क्त्वा (*Ktvā*) suffix ended words (Past passive participles) (i) गत्वा (*Gatvā*) (ii) स्मृत्वा (*Smṛtvā*) (iii) गणयित्वा (*Gaṇayitvā*) (iv) पठित्वा (*Patitvā*) (v) कृत्वा (*Kṛtvā*) (c) ल्यप् (*Lyap*) suffix ended words (Past passive participles) (i) आगत्य (*Āgatya*) (ii) विस्मृत्य (*Vismṛtya*) (iii) विगणय्य (*Vigaṇayya*) (iv) प्रपठ्य (*Prapaṭhya*) (v) अनुकृत्य (*Anukṛtya*)
Book recommended for Reference	*Kalāśālā-Saṁskṛta-Sukhabodhinī - II* **To be Published by: University of Madras, Chennai - 5**

Mapping with Programme Outcomes:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	S	M	S
CO 2	S	M	S	S	S
CO 3	S	S	S	M	S
CO 4	S	S	M	S	S
CO 5	S	S	S	S	S

S-Strong M-Medium L-Low

UNIVERSITY OF MADRAS

FOUNDATION COURSE: FRENCH

SYLLABUS WITH EFFECT FROM 2023-2024

UG & 5 Year PG Integrated – SEMESTER – II

Foundation Course in French: Prescribed Text and Grammar-II

Course Outcomes	1. To ask for and give directions. 2. To give orders or commands using *Impératif* 3. To narrate events from the past using *Passé Composé* 4. Cite the ordinal numbers in French 5. Indicate the position of something using prepositions of place		
Course	Foundation Course in French	**Course Code**	**100L2K**
Title of the Course:	Prescribed Text and Grammar-II		
Credits:	3		
Pre-requisites, if any:	-		
Course Objectives	Revise and recall the French sentence structure		K1
	Enumerate the various grammatical tenses and use them to communicate better in French		K2
	Summarize and develop ideas from the documents after discussing it in detail		K2 and K3
	Write and understand dialogues based on the themes done in class		K4
	Evaluate and comprehend text passages		K5
Units			
I	Unité 7: C'est où?		
II	Unité 8: N'oubliez pas !		
III	Unité 9: Belle vue sur la mer !		
IV	Unité 10: Quel beau voyage !		
V	Unité 11: Oh ! joli ! Unité 12: Et après ?		
Prescribed Text	Régine Mérieux & Yves Loiseau, **Units 7-12** of ***Latitudes* 1** (A1 /A2), méthode de français, Didier, 2017 (Indian Edition)		

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	L	M	M	L	S	S	S	M	M	M
CO2	S	M	M	L	M	M	L	S	S	S	S	M	M
CO3	M	S	S	M	S	M	M	S	S	S	M	S	S
CO4	S	S	M	L	S	M	L	S	S	S	S	S	S
CO5	S	S	S	L	M	M	L	S	S	S	M	S	S

S-Strong M-Medium L-Low

UNIVERSITY OF MADRAS

FOUNDATION COURSE: FRENCH

SYLLABUS WITH EFFECT FROM 2023-2024

SEMESTER II

Title of the Paper : Prescribed Text and Grammar-II

Prescribed textbook: Régine Mérieux & Yves Loiseau, **Units 7-12** *of Latitudes 1 (*Indian Edition), Paris, Didier, 2017**.**

Questions not to be asked from the Autoévaluation and Préparation au DELF

Paper setters to strictly adhere to the syllabus and ask questions only from the pages included in the syllabus. Questions should cover the entire syllabus.

QUESTION PAPER PATTERN

Time : 3 Hours Maximum Marks : 75

Section A (10 x 2 = 20 Marks)

Answer any TEN questions

15 questions to be asked on cultural / civilisational aspects found in the prescribed textbook

Section B (5 x 5 = 25 Marks)

Answer any FIVE questions

8 Grammar exercises to be given from the prescribed textbook

Section C (3 x 10 = 30 Marks)

Answer any THREE

3 must be answered out of 5 topics (1 dialogue writing, 1 letter /email writing, 1 composition, 1 comprehension, 1 translation)

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UNIVERSITY OF MADRAS

U.G. AND FIVE YEAR INTEGRATED PG DEGREE PROGRAMS

FOUNDATION COURSE: PART I – ARABIC

(EXISTING SYLLABUS (22-23) FOLLOWED FROM THE ACADEMIC YEAR 2023-2024)

Programme:	**U.G. AND FIVE YEAR INTEGRATED P.G. DEGREE PROGRAMS** **FOUNDATION COURSE: PART I – ARABIC**
Programme Code:	BFC-LA23
Duration:	**4 Semesters**
On successful completion of this program, the graduates are expected to achieve the following:	
Programme Outcomes:	1. Acquire the knowledge of the structure of Arabic words 2. Acquaint with the knowledge of basic Arabic grammar 3. Become familiar with the knowledge of phonetic system of Arabic language 4. Able to communicate in Arabic 5. Have the knowledge of moral values in the light of Quran and Hadith
Programme Specific Outcomes:	1. Understand the sounds and phrasing of Arabic language. 2. Learn the basic Arabic grammar 3. Develop communication skills in Arabic 4. Acquire new vocabulary in Arabic 5. Learn the moral values of the Holy Quran and Sunnah

List of Courses:

Semester	Course Code	Title of the Course	Foundation Course	Credits
I	100L1H	Paper I : Prose	FC	3
II	100L2H	Paper II : Grammar	FC	3
III	200L3H	Paper III : Communication Skill in Arabic	FC	3
IV	200L4H	Paper IV : Quran and Hadith	FC	3

Course I	Course Code	Title of the Course	Credits
FC	100L1H	Paper I : Prose	3

Course Outcomes	1. Understand the correct pronunciation of Arabic letters 2. Understand the structure-based composition. 3. Acquire new vocabulary in Arabic 4. Read the Arabic sentences without diacritical marks 5. Able to write the simple sentences in Arabic without errors.
Pre-requisites, if any:	Nil
Course Objectives	1. Understand basic Arabic grammar. 2. Understand the structure of Arabic language. 3. Employ sentence making. 4. Enhance vocabulary. 5. Improve reading and writing skills.

Units	
I	(دروس اللغة العربية لغير الناطقين بها، الجزء الأول، الدكتور ف. عبد الرحيم) من الدرس الأول إلى الدرس الرابع
II	من الدرس الخامس إلى الدرس الثامن
III	من الدرس التاسع إلى الدرس الثالث عشر
IV	من الدرس الرابع عشر إلى الدرس الثامن عشر
V	من الدرس التاسع عشر إلى الدرس الثالث والعشرين

Prescribed Text Book	دروس اللغة العربية لغير الناطقين بها، الجزء الأول، الدكتور ف. عبد الرحيم Duroos Al-Lugha Al-Arabiyya – Part I, By Dr. V. Abdur Rahim
Reading List (Print and online)	معجم الكلمات الواردة في دروس اللغة العربية لغير الناطقين بها مفتاح دروس اللغة العربية لغير الناطقين بها القراءة الراشدة – الشيخ أبو الحسن علي الحسني الندوي القراءة المفيدة – الدكتور محمد يوسف كوكن العمري منهاج العربية – السيد النبي حيدرآبادي www.alnahw.com

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO	3	3	3	2	1

3-Strong 2-Medium 1-Low

Course II	**Course Code**	**Title of the Course**	**Credits**
FC	100L2H	Paper II : Grammar	3

Course Outcomes	1. Able to use basic grammatical structure. 2. Develop reading skills and reading speed 3. Acquire new vocabulary in Arabic 4. Understand the different types of sentences. 5. Able to construct simple sentences in Arabic
Pre-requisites, if any:	Nil
Course Objectives	1. Understand basic Arabic grammar. 2. Understand the correct usage of Arabic grammar. 3. Employ sentence making. 4. Enhance vocabulary. 5. Improve reading and writing skills.
Units	
I	(قواعد اللغة العربية الأساسية، الدكتور سيد رحمة الله) من الدرس الأول إلى الدرس الرابع
II	من الدرس الخامس إلى الدرس الثامن
III	من الدرس التاسع إلى الدرس الثاني عشر

IV	من الدرس الثالث عشر إلى السادس عشر
V	من الدرس السابع عشر إلى الدرس العشرين
Prescribed Text Book	قواعد اللغة العربية الأساسية، الدكتور سيد رحمة الله Basic Arabic Grammar, By Dr. Syed Rahmathullah
Reading List (Print and online)	النحو الواضح – علي الجارم ومصطفى أمين دليل النحو الواضح – الدكتور بشير أحمد جمالي سهل العوامل _ الدكتور تاج الدين المناني النحو الميسر للكبار والصغار – علي محمود عقيلي القواعد التطبيقية في اللغة العربية – الدكتور نديم دعكور www.alnahw.com

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**
CO	3	3	3	3	1

3-Strong 2-Medium 1-Low

Course III	**Course Code**	**Title of the Course**	**Credits**
FC	200L3H	Paper III : Communication Skill in Arabic	3

Course Outcomes	1. Understand the basics of Arabic language. 2. Learn the structure of Arabic words. 3. Familiarize with the phonetic system of Arabic. 4. Able to communicate in Arabic 5. Able to translate from Arabic to English and vice versa
Pre-requisites, if any:	Nil
Course Objectives	1. Understand the sounds and phrasing of Arabic language. 2. Acquire new vocabulary and apply in context. 3. Develop communication skills in Arabic. 4. Understand the different aspects of communication. 5. Learn to communicate in everyday interactions.
Units	
I	(الكتاب الأساسي في تعليم اللغة العربية لغير الناطقين بها، الجزء الأول – السعيد محمد بدوي وفتحي علي يونس) التعارف – في المطار (١)
II	في الفندق – في المطعم
III	في البنك – عند الطبيب (١)

IV	في الطريق – في مكتب البريد
V	في السوق (١) – في السوق (٢)
Prescribed Text Book	الكتاب الأساسي في تعليم اللغة العربية لغير الناطقين بها، الجزء الأول – السعيد محمد بدوي وفتحي علي يونس Al Kitaab Al Asaasi Fi Taleem Al Lugha Al Arabiyya Li Ghair An Naatiqeena Biha - Part I, By Sayeed Muhaamad Badawi and Fathi Ali Yunus
Reading List (Print and online)	A Practice Book on Gulf Arabic, By Dr. Abdul Jaleel. T Arabic Conversation Book, By Mohd. Harun Rashid and Khalid Perwez A Hand book of Commercial Arabic by Dr. Aboobacker K.P العربية لغير العرب – د. مصطفى حسن الريس، الأزهر العربية للحياة – جامعة الملك سعود القراءة العربية لغير العرب – وزارة التربية بالكويت www.talkinarabic.com

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**
CO	3	3	3	2	1

3-Strong 2-Medium 1-Low

Course IV	**Course Code**	**Title of the Course**	**Credits**
FC	200L4H	Paper IV : Quran and Hadith	3

Course Outcome	1. Know the principal textual sources of the Islamic tradition: The Qur'an and the Hadith. 2. Know the role of Quran and Hadith in the synthesis of Islamic faith and practice. 3. Understand the structure of Arabic grammar through Quran and Hadith. 4. Understand the methodology of translation of Quran and Hadith. 5. Understand the moral values of Quran and Hadith
Pre-requisites, if any:	Nil
Course Objectives	1. Know the importance of Quran and Hadith. 2. Understand the style of Quran and Hadith. 3. Understand the role of Quran and Hadith in the Islamic faith and law.

	4. Know the structure of Arabic grammar through the examples from Quran and Hadith. 5. Learn the cultural and moral values.
Units	
I	(١. سورة لقمان من القرآن الكريم ٢. أحاديث سهلة للدكتور ف. عبد الرحيم) سورة لقمان من الآية ١ إلى الآية ١٠
II	من الآية ١١ إلى ٢٠
III	من الآية ٢١ إلى ٣٤
IV	أحاديث سهلة من الحديث ١ إلى الحديث ١٠
V	من الحديث ١١ إلى الحديث ٢٠
Prescribed Text Book	١. سورة لقمان من القرآن الكريم ٢. أحاديث سهلة للدكتور ف. عبد الرحيم 1) Sooratu Luqman 2) Ahadeeth Sahlah By Dr. V. Abdur Rahim
Reading List (Print and online)	Tafsir Al-Jalalain The Noble Quran, Dr. Muhammad Muhsin Khan and Muhammad Taqi-Ud-Dhin Al-Hilali الأربعون النووية نصوص من الحديث النبوي الشريف، الدكتور ف. عبد الرحيم

	شرح أحاديث سهلة، الدكتور ش. عبد المالك https://quran.com/ https://sunnah.com/nawawi40

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO	1	2	3	3	3

3-Strong 2-Medium 1-Low

UNIVERSITY OF MADRAS

FOUNDATION COURSE: ENGLISH

SYLLABUS WITH EFFECT FROM 2023-2024

FIRST YEAR - SEMESTER II

PAPER II –GENERAL ENGLISH

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
100L2ZU	Part II	Y	Y	-	-	3	6	25	75	100

Learning Objectives	
LO1	To make students realize the importance of resilience
LO2	To enable them to become good decision makers
LO3	To enable them to imbibe problem-solving skills
LO4	To enable them to use tenses appropriately
LO5	To help them use English effectively at the work place.

Unit No.	Unit Title & Text	No. of Periods for the Unit
I	**RESILIENCE** **Poem** 1.1 Don't Quit – Edgar A. Guest 1.2 Still Here – Langston Hughes **Short Story** 1.3 Engine Trouble – R.K. Narayan 1.4 Rip Van Winkle – Washington Irving	20
II	**DECISION MAKING** **Short Story** 2.1 The Scribe – Kristin Hunter 2.2 The Lady or the Tiger - Frank Stockton **Poem** 2.3 The Road not Taken – Robert Frost 2.4 Snake – D. H Lawrence	20
III	**PROBLEM SOLVING** **Prose life Story** 3.1 How I taught My Grandmother to Read – Sudha Murthy **Autobiography** 3.3 How frog Went to Heaven – A Tale of Angolo 3.4 Wings of Fire (Chapters 1,2,3) by A.P.J Abdul Kalam	20

IV	**Tenses** 4.1 Present 4.2 Past 4.3 Future 4.4 Concord	15
V	**English in the Workplace** 5.1 E-mail – Invitation, Enquiry, Seeking Clarification 5.2 Circular 5.3 Memo 5.4 Minutes of the Meeting	15

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Realize the importance of resilience	PO1,PO7
CO2	Become good decision-makers	PO1,PO2,PO10
CO3	Imbibe problem-solving skills	PO4,PO6,PO9
CO4	Use tenses appropriately	PO4, PO5,PO6
CO5	Use English effectively at the work place.	PO3,PO8

Text Books (Latest Editions)	
References Books	
1	Martin Hewings. Advanced English Grammar. Cambridge University Press, 2000
2	SP Bakshi, Richa Sharma. Descriptive English.Arihant Publications (India) Ltd., 2019.
3.	Sheena Cameron, Louise Dempsey. The Reading Book: A Complete Guide to Teaching Reading. S & L. Publishing, 2019.
4	Barbara Sherman. Skimming and Scanning Techniques, Liberty University Press, 2014.
5.	Phil Chambers. Brilliant Speed Reading: Whatever you need to read, however. Pearson, 2013.
6.	Communication Skills : Practical Approach Ed.ShaikhMoula
	Ramendra Kumar. Stories of Resilience, Blue Rose Publications, 2020.

Web Sources

1	Langston Hughes. Still Here https://poetryace.com/im-still-here
2	R. K. Narayan. Engine Trouble http://www.sbioaschooltrichy.org/work/Work/images/new/8e.pdf
3	Washington Irving. Rip Van Winkle https://www.gutenberg.org/files/60976/60976-h/60976-h.htm
4	Frank Stockton. The Lady or the Tigerhttps://www.gutenberg.org/ebooks/396

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weightage	15	15	15	15
Weighted percentage of Course Contribution toPos	3.0	3.0	3.0	3.0

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

FIRST YEAR: SEMESTER II

CELL BIOLOGY

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
122C2A	**Core Course: Cell Biology**	Core	3	2	-	-	5	5	25	75	100

Learning Objectives

The main objectives of this course are to

- Provide basic understanding of architecture of cells and its organelles.
- Understand the organization of prokaryotic and eukaryotic genome.
- Educate on the structural organization of bio membrane and transport mechanism
- Impart knowledge on cell cycle, cell division and basics of cells
- Familiarize the concept of mechanism of cell-cell interactions.

Module I: Architecture of cells- Structural organization of prokaryotic and eukaryotic cells microbial, plant and animal cells. The ultrastructure of nucleus, mitochondria, RER, SER, Golgi apparatus, lysosome, peroxisome and their functions 12 Hrs

Module II: Cytoskeleton- microfilament, microtubules and intermediary filament- structure, composition and functions. Organization of Genome -prokaryotic, and eukaryotic genome. Organization of chromatin – histones, nucleosome concept, formation of chromatin structure. Special types of chromosomes – lamp brush chromosomes, polytene chromosomes.12 Hrs

Module III: Biomembranes-Structuralorganizationofbilipidlayermodelandbasicfunctions-transport across cell membranes- uniport, symport and antiport. Passive and active transport.12Hrs

Module IV: Cellcycle-DefinitionandPhasesofCellcycle-Celldivision-MitosisandMeiosis and its significance, Cancer cells- definition, types and characteristics of cancer cells. 12 Hrs

Module V: Extracellular matrix – Collagen, laminin, fibronectin and proteoglycans- structure and biological role. Structure and role of cadherin, selectins, integrins, Cell -cell interactions-Types-gap junctions, tight junctions and Desmosomes. 12 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Explain the structure and functions of basic components of prokaryot and eukaryotic cells, especially the organelles.	PO1
CO2	Familiarize the cytoskeleton and chromatin	PO1, PO2
CO3	Illustrate the structure, composition and functions of cell membrane related to membrane transport	PO1, PO2
CO4	Elaborate the phases of cell cycle and cell division- mitosis and meiosis and characteristics of cancer cells.	PO1, PO2
CO5	Relate the structure and biological role of extracellular matrix in cellular interactions	PO1, PO2

Text books

1. Arumugam. N, Cell biology. Saras publication (10ed, paperback), 2019
2. Devasena. T, Cell Biology. Oxford University Press India-ISBN:9780198075516, 0198075510, 2012
3.Bruce Alberts and Dennis Bray. 2013, Essential Cell Biology. (4rd ed). Garland Science.

Reference books

1. S. C. R. Cell Biology. New age Publishers -ISBN-10: 8122416888/ISBN-13: 978-8122416886, 2008
2. Cooper, G.A. The Cell: A Molecular Approach. Sinauer Associates, Inc -ISBN10: 0878931066 / ISBN 13: 9780878931064, 2013
3. E.M.F., D. R, Cell and Molecular Biology. Lippincott Williams &Wilkins Philadelphia - ISBN: 0781734932 9780781734936, 2006
4. Lodish H. A, Berk C.A, Kaiser M, Krieger M.P, Scott A, Bretscher H, Ploegh and Matsudaira. 2007. Molecular Cell Biology, 6th Edition, WH. Freeman Publishers, New York, USA.

Web resources

https://nicholls.edu/biol-ds/bio1155/Lectures/Cell%20Biology.pdf
https://www.medicalnewstoday.com/article/320878.php
https://biologydictionary.net /cell

Mapping with Program Outcome

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3	3					3			3
CO 3	3	3					3			3
CO 4	3	3					3	3		3
CO5	3	3					3			3

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

FIRST YEAR: SEMESTER II

PRACTICAL II CELL BIOLOGY

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
122C21	**Core Course4 practical II: Cell Biology**	Core practical	-	-	5	-	5	5	40	60	100

Learning Objectives

The main objectives of this course are to

- Learn the parts of microscope
- Investigate the cells under microscope.
- Image the cells using different stains
- Identify the cells, organelles and stages of cell division
- Identify the spotters

I MICROSCOPYANDSTAININGTECHNIQUES

1. Study the parts of light and compound microscope
2. Preparation of Slides and Micrometry
3. Examination of prokaryotic and eukaryotic cell
4. Visualization of animal and plant cell by methylene blue
5. Visualization of nuclear fraction by acetocarmine stain
6. Staining and visualization of mitochondria by Janus green stain

II GROUP EXPERIMENT

7. Identification of different stages of mitosis in onion root tip

8. Identification of different stages of meiosis in onion bulb

III SPOTTERS

9. a) **Cells**: Nerve, plant and Animal cell

   b) **Organelles**: Mitochondria, Chloroplast, Endoplasmic reticulum,

   c) **Mitosis stages**–Prophase, Anaphase, Metaphase, Telophase

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Identify the parts of microscope.	PO1, PO2
CO2	Preparation of Slides	PO1, PO2
CO3	Identify the stages of mitosis & meiosis	PO1, PO2
CO4	Visualize nucleus and mitochondria by staining methods	PO1, PO2
CO5	Identify the spotters of cells, organelles and stages of cell division	PO1, PO2

Text books

1. Rickwood. D and J. R. Harris cell Biology: Essential Techniques, Johnwikey1996.
2. Davis, J.M. Basic Cell culture: A practical approach, IRL 1994.
3. Ganesh M. K. and Shivashankara A.R. 2012. Laboratory Manual for Practical Biochemistry Jaypee publications, 2ndEdn.

Reference books

1) Essential practical handbook of Cell biology, Genetics and Microbiology -A Practical manual-Debarati Das Academic publishers, ISBN, 9789383420599, 1st Edition 2017
2) Cell biology Practical, Dr. Venu Gupta ISBN 8193651219, Prestige publisher, 1st Jan 2018.
3) Cell and Molecular biology, DeRobertis, 8th edition, 1st June, 1987

Web resources

1.http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
2. https://www.microscopemaster.com/organelles.html
3. https://www.pdfdrive.com/biochemistry-books.htm
4.http://medcell.med.yale.edu/histology/cell_lab.php#:~:text=The%20electron%20microscope%20is%20necessary,and%20small%20granules%20and%20vesicles.
5. http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
6.https://www.khanacademy.org/science/ap-biology/heredity/meiosis-and-geneticdiversity/a/phases-of-meiosis
7. https://www.microscopemaster.com/organelles.html
8. https://www.pdfdrive.com/biochemistry-books.html

Mapping with Program Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3					3	3	3	3
CO 2	2	3					3	3	3	3
CO 3	2	3					3	3	3	3
CO 4	2	3					3	3	3	3

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

<table>
<tr><td>Title of the Course</td><td colspan="7">CHEMISTRY FOR BIOLOGICAL SCIENCES-II
(Other than Physics and Mathematics)</td></tr>
<tr><td>Paper No.</td><td colspan="7">Generic Elective</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Generic Elective</td><td>Year</td><td>I/II</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td rowspan="2">Course Code</td><td rowspan="2">122E2A</td></tr>
<tr><td>Semester</td><td>II/IV</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>2</td><td>-</td><td colspan="3">-</td><td colspan="2">2</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Chemistry for Biological Sciences I</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims to provide knowledge on
• nomenclature of coordination compounds and carbohydrates.
• Amino Acids and Essential elements of biosystem
• understand the concepts of kinetics and catalysis
• provide fundamentals of electrochemistry and photochemistry</td></tr>
<tr><td rowspan="4">Course Outline</td><td colspan="7">UNIT I - Co-ordination Chemistry and Water Technology
Co-ordination Chemistry: Definition of terms - IUPAC Nomenclature - Werner’stheory - EAN rule - Pauling’s theory – Postulates - Applications to $[Ni(CO)4]$, $[Ni(CN)4]^{2-}$,$[Co(CN)6]^{3-}$ Chelation - Biological role of Hemoglobin and Chlorophyll (elementary idea) - Applications in qualitative and quantitative analysis.
Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques –
BOD and COD.</td></tr>
<tr><td colspan="7">Unit II - Carbohydrates
Classification, preparation and properties of glucose and fructose. Discussion of open chain ring structures of glucose and fructose. Glucose-fructose inter conversion. Preparation and properties of sucrose, starch and cellulose.</td></tr>
<tr><td colspan="7">UNIT III - Amino Acids and Essential elements of biosystem
Classification - preparation and properties of alanine, preparation of dipeptides using Bergmann method - Proteins- classification – structure - Colour reactions – Biological functions – nucleosides -nucleotides – RNA and DNA – structure. Essentials of trace metals in biological system-Na, Cu, K, Zn, Fe,Mg.</td></tr>
<tr><td colspan="7">UNIT IV - Electrochemistry
Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials -electrochemical series. Strong and weak electrolytes - ionic product of water -pH, pKa, pKb. Conductometric titrations - pH determination by colorimetric method – buffer solutions and its biological applications - electroplating - Nickel and chrome plating – Types of cells - fuel cells-corrosion and its prevention.</td></tr>
</table>

Course Outline	**UNIT V - Photochemistry** Grothus - Drapper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield - Hydrogen -chloride reaction. Phosphorescence, fluorescence, chemiluminescence and photosensitization and photosynthesis (definition with examples).	
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)		Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.	
Recommended Text	1. A.Rajendran, Text book of Allied chemistry Vol-I & II, Dhanam publications, Chennai, First edition, 2018. 2. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009. 3. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006. 4. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition,2012. 5. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand &sons, New Delhi, twenty ninth edition,2007.	
Reference Books	1. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition,2012. 2. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; SultanChand&sons,NewDelhi,twentyninthedition,2007. 3. P.L.Soni, Mohan Katyal, Text book of Inorganicchemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007. 4. B.R.Puri, L.R.Sharma, M.S.Pathania, Text book Physical Chemistry; Vishal Publishing Co., New Delhi, forty seventh edition,2018. 5. B.K,Sharma, Industrial Chemistry; GOEL publishinghouse, Meerut, sixteenth edition, 2014.	

Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to

CO 1: write the IUPAC name for complex, different theories to explain the bonding in coordination compounds and water technology.

CO 2: explain the preparation and property of carbohydrate.

CO 3: enlighten the biological role of transition metals, amino acids and nucleic acids.

CO 4: apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuel cells.

CO 5: outline the various type of photochemical process.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

Level of Correlation between PO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

<table>
<tr><td>Title of the Course</td><td colspan="7">CHEMISTRY PRACTICAL
FOR PHYSICAL AND BIOLOGICAL SCIENCES-II</td></tr>
<tr><td>Paper No.</td><td colspan="7">Generic Elective</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Generic Elective</td><td>Year</td><td>I/ II</td><td rowspan="2">Credits</td><td rowspan="2">1</td><td rowspan="2">Course Code</td><td rowspan="2">122E21</td></tr>
<tr><td>Semester</td><td>II/IV</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>-</td><td>-</td><td colspan="3">2</td><td colspan="2">2</td></tr>
<tr><td>Prerequisites</td><td colspan="7"></td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims to provide knowledge on identification of organic functional groups different types of organic compounds with respect to their properties. determination of elements in organic compounds.</td></tr>
<tr><td></td><td colspan="7">SYSTEMATIC ANALYSIS OF ORGANIC COMPOUNDS
The analysis must be carried out as follows:
(a) Functional group tests [phenol, acids (mono & di) aromatic primary amine, amides (mono & di), aldehyde and glucose].
(b) Detection of elements (N, S, Halogens).
(c) To distinguish between aliphatic and aromatic compounds.
(d) To distinguish – Saturated and unsaturated compounds.</td></tr>
<tr><td>Reference Books</td><td colspan="7">V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic Principles of Practical Chemistry; Sultan Chand & sons, Second edition, 1997.</td></tr>
<tr><td colspan="8">Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to
CO 1: gain an understanding of the use of test tubes, boiling tubes, fusion tubes.
CO 2: design, carry out, record and interpret the results of organic analysis.
CO 3: apply their skill in the analysis of functional group present in organic compounds.
CO4: analyze the chemical constituents in allied chemical products</td></tr>
</table>

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M

Level of Correlation between PO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

MEDICAL LABORATORY TECHNOLOGY

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22SEC5	**Medical Laboratory Technology**	SEC (Discipline)	1	1	0	0	2	2	25	75	100

Learning Objectives

The main objectives of this course are to

- Impart knowledge on specimen collection and disposal of waste.
- Acquaint knowledge on collection, preservation and transfusion of blood.
- Quantify the biomolecules in biological sample
- Understand the significance of various tests and their interpretation in diseased conditions
- Acquaint knowledge on enzymes, hormones and Immunoglobulins as markers for diagnosis.

ModuleI: Collection, transport, analysis of specimen – blood, routine urine, faeces, sputum, semen, CSF Documentation of samples & results. Disposal of laboratory/ hospital waste-non-infectious waste, biomedical waste, infected sharp waste disposal, infected non sharp disposal – color coding as per guidelines. 6 Hrs

Module II: Determination of Blood group and Rh factor -Basic blood banking procedures- cross matching, screening test. Blood transfusion and hazards.6 Hrs

Module III: Estimation of blood sugar – Enzymatic method, HbA1C, Qualitative and quantitative analysis of urine sample- NPN-urea, uric acid, creatinine. Mineral, vitamin and CSF analysis.6 Hrs

Module IV: Immuno diagnostics -Widal test, VDRL test, ASO, RA, CRP and Complement fixation Test. RIA, ELISA, Skin test – Montaux and Lepramin test.6 Hrs

Module V: Assay of clinically important enzymes- Estimation of clinically important hormones – Insulin, Thyroid and Reproductive hormones and its clinical significance6 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Collect & preserve of biological samples.	PO1, PO2
CO2	Estimate the various constituents in biological sample	PO1, PO2, PO6
CO3	Perform the routine procedures adopted in blood bank	PO1, PO2, PO6
CO4	Analyse and interpret the values for both normal and disease conditions.	PO1, PO2, PO6
CO5	Assay the enzymes and hormones &interpret clinical implications	PO1, PO2, PO6

Text Books

1 Kanai L Mukherjee and Anuradha Chakravarthy Medical Laboratory Technology 4th edition, Vol I,2022

2. Ramnik Sood, Text Book of Medical Laboratory Technology, Jaypee Publishers, 2006

3. Tietz, N. (2018) Fundamentals of Clinical Chemistry and Molecular Diagnostics 8th edition, W.B. Saunders Company

Reference books

Web Resources

1 https://www.youtube.com/watch?v=QNYlX5Ne9lQ

2 https://www.slideshare.net/doctorrao/

agglutination-tests-and-immunoassays

3 https://microbenotes.com/introduction-to-precipitation-reaction/

Mapping with Program Outcome

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3					3	3	3	3
CO 2	2	3				2	3	3	3	3
CO 3	2	3				2	3	3	3	3
CO 4	2	3				2	3	3	3	3
CO5	2	3				2	3	3	3	3

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

SKILL ENHANCEMENT COURSE -SEC (NME)

Choose any of the skill enhancement course (NME) for Semester I & II

FIRST YEAR

SEMESTER I/II

MEDICINAL DIET

Course Code	Course Name	Category	Credits	Inst. Hours	Marks		
					CIA	External	Total
122S1C	**Medicinal Diet**	SEC	2	2	25	75	100

Learning Objectives

The main objectives of this course are to

- Provide basic knowledge about diet
- Understand of diet modification for GI diseases
- Plan a diet for liver diseases
- Prepare diet chart for Infectious diseases
- Plan a diet for Diabetes ,Renaland Cardio-vascular diseases

UNIT-I: Principles of Therapeutic Diet: Definitions of Normal diet, Therapeutic diet, soft Diet and Liquid diet. Objectives of Diet Therapy. Advantages of using normal diet as the basis for Therapeutic diet. Normal Diet-therapeutic modification of normal diet. 6 Hrs

UNIT II: Diet modification in Gastrointestinal diseases: Peptic ulcer, Diarrhea, Lactose intolerance, Constipation and Malabsorption syndrome. 6 Hrs

UNIT III: Diet Modification in liver and gall bladder in diseases: Etiology, symptoms and dietary treatment in jaundice, hepatitis, cirrhosis of liver and hepatic coma. 6 Hrs

UNIT IV: Diet Modification in Infectious Diseases: Fevers, Typhoid, Tuberculosis and Viral Hepatitis. Dietary modifications in Tuberculosis. 6 Hrs

UNIT V: Diet Modification in Diabetes , Renaland Cardio-vascular diseases-Diabetes, acute & chronic glomerulonephritis, nephrosis, renal failure, kidney stone and Hypertension. 6 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Possess basic knowledge about diet	PO1
CO2	Sketch diet plan for GI diseases	PO1,PO4,PO5,PO6
CO3	Sketch diet plan for liver diseases	PO1,PO4,PO5,PO6
CO4	Sketch a diet plan for Infectious diseases	PO1,PO4,PO5,PO6
CO5	Prepare diet chart for Diabetes Renaland Cardio-vascular diseases	PO1,PO4,PO5,PO6

Text Books

1. M.RaheenaBegum ,AText Book of Foods, Nutrition and Dietetics, Sterling Publishers Pvt.Ltd.
2. M.V.RajaGopal,Sumati.R.,Mudambi, Fundamentals of foods and Nutrition, Wiley Eastern Limited, Year-1990.
3. William S.R Nutrition and Diet Therapy, 1985, 5th edition, MoslyCo.St.Louis.

Reference books

1. Rodwell Williams Nutrition and Diet Therapy, 1985,the C.V MoslySt.Louis.
2. M.V.Krause&M.A.Mohan ,Food Nutrition and Diet Therapy, 1992 by W.B Saunders Company, Philadelphia, London.
3. Davidson and Passmore ,Human Methods and Diabetics, 1976 the English Language Book Society and Churchill.

Web sources

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2						3	3		3
CO 2	2			2	3	2	3	3		3
CO 3	2			2	3	2	3	3		3
CO 4	2			2	3	2	3	3		3
CO 5	2			2	3	2	3	3		3

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

சென்னைப் பல்கலைக்கழகம்
University of Madras

Part-IV

அடிப்படைத் தமிழ் - பாடத்திட்டம்

Basic Tamil - Syllabus

2 பருவங்கள் (இரண்டாம் பருவம்)

(B.A., B.Sc., B.Com., BCA., BBA)

2023-24

பருவம் - II (Semester - II)

அடிப்படைத் தமிழ் - II (Basic Tamil - II)

Course Code	Course Name	Category	L	T	P	S	Credit	Ins. Hours	Marks		
									CIA	External	Total
100S2A	அடிப்படைத் தமிழ் - II Basic Tamil - II	Supportive	2		-	-	2	2	25	75	100
Pre - requisite	தமிழ் எழுத்துகளை அறிந்திருத்தலோடு தொடக்க நிலையில் பேசவும் எழுதப் படிக்கவும் தெரிந்திருத்தல்.										SV 2023

Learning Objectives - கற்றல் நோக்கங்கள்

- தமிழ்மொழியைத் தொடக்க நிலையில் பேசவும் பிறர் பேசுவதைப் புரிந்துகொள்ளவும் திறன் பெறுதல். தமிழைப் படிக்கவும் எழுதவும் கற்றுக்கொள்ளுதல்.
- பிறமொழி மாணவர்களுக்குத் தமிழ்மொழி யின் சிறப்புகள் , கலை-பண்பாட்டை அறிமுகப்படுத்துதல்.
- தமிழ் இலக்கிய இலக்கண வளங்களின் சிறப்புக ளை அறிதல் . அவற்றுள் சிலவற்றைச் சுவைத்துப் பார்த்தல்.
- தமிழரின் தனித்தன்மைகளை உணரச் செய்தல்.

Expected Course Outcomes - எதிர்பார்க்கப்படும் கற்றல் அடைவுகள்

On the successful completion of the course, students will be able to
இப் பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்

CO 1	தமிழ்மொழியைப் பேசவும் பிறர் பேசுவதைப் புரிந்துகொள்ளவும் திறன் பெறுதல். தமிழைப் படிக்கவும் எழுதவும் கற்றுக்கொள்வர்.	K1,K2
CO 2	கடிதம், விண்ணப்பம், நிகழ்ச்சிக் குறிப்புகள் எழுதுதல், தகவல் தொடர்புச் சாதனங்களில் தகவல் எழுதுதல் என அன்றாட வாழ்வில் தமிழ்ப் பயன்பாட்டைக் கற்றுக்கொள்வர்.	K1,K3,K4
CO 3	தமிழின் இலக்கிய வளத்தோடு தமிழரின் அறக் கோட்பாடுகளை யும் தமிழரின் வரலாற்று-பண்பாட்டுச் செழுமையையும் புரிந்துகொள்வர்.	K1,K2,K4
CO 4	தமிழறிஞர்களையும் படைப்பாளிக ள், அரசியல் தலைவர்கள், சிறந்த ஆளுமைகளைப் பற்றி அறிந்துகொள்வர்.	K4,K5,K6
CO 5	தமிழர் கலை , பண்பாடு, பழக்கவழங்கங்கள், விளையாட்டுகள், விழாக்கள், தமிழரின் தனித்த அடையாளங்க ள், சிறப்புகள் ஆகியவற்றை அறிவதோடு, அவரவர் மண்ணுகுரிய கலைப் பண்பாட்டோடு ஒப்பிட்டுப் புரிந்துகொள்வர்.	K1,K4,K5, K6

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

Unit - I	**சொல்லும் பொருளும்**
	1. பெயர்-வேற்றுமை, வினை-காலம், பெயரடை-வினையடை, எதிர்ச்சொற்கள் போன்றவறைக் கொண்டு சிறுசிறு தொடர்கள் பேசவைத்தல், எழுதவைத்தல். 2. பெயர்ப் பலகை, செய்தித்தாள் போன்றவற்றை வாசிக்கவும் பொருள் கூறவும் பயிற்சியளித்தல். 3. உரையாடல் (படங்களைப் பார்த்து, சொற்களைச் சொல்லவைத்தல்/பேசவைத்தல், கேள்விகளுக்குப் பதில் அளித்தல், தலைப்புகள் கொடுத்துப் பேசச் செய்தல்.

Unit - II	**அன்றாட வாழ்வில் தமிழ்ப் பயன்பாடு**
	காலைக் கடமைகள், சமையல், உணவுகள், உடல்நலம், வீட்டுப் பொருள்கள், வணிகம், போக்குவரத்து, பயணம் தொடர்பான செயல்பாடுகள் போன்ற அன்றாட நடவடிக்கைகளில் தமிழ்மொழிப் பயன்பாடு.
Unit - III	**தமிழ் இலக்கியங்கள் அறிமுகம்**
	1. தமிழ் இலக்கியங்கள் அறிமுகம் - இலக்கிய இலக்கண வளங்களின் சிறப்புகள். 2. திருக்குறள், ஆத்திசூடி, சங்க இலக்கியம், திரைப் பாடல்கள், நாட்டுப்புறப் பாடல்கள் போன்றவற்றில் சுவைமிகுந்த பாடல்களை வாசிக்கவைத்தல் பொருளுணர்த்துதல், கற்றவற்றை எழுதச்செய்தல்.
Unit - IV	**தமிழ்ப் படைப்பாளர்கள், அறிஞர்கள், ஆளுமைகள், தலைவர்கள்**
	1. இலக்கிய-இலக்கணப் படைப்பாளர்கள் (தொல்காப்பியர், திருவள்ளுவர், ஔவையார், கம்பர், பாரதி, பாரதிதாசன், ஜெயகாந்தன், கண்ணதாசன், வைரமுத்து போன்றோர்). 2. அரசியல் தலைவர்கள் (காமராசர், பெரியார், அண்ணா, எம்.ஜி.ஆர். போன்றோர்). 3. திரைப் பிரபலங்கள் (சிவாஜி கணேசன், ரஜினிகாந்த், கமலஹாசன், பாலச்சந்தர், இளையராஜா, சி.பா. பாலசுப்பிரமணியம் போன்றோர்). 4. ஆளுமைகள் (வ.உ. சிதம்பரனார், பாவாணர், அப்துல் கலாம், போன்றோர்). மேற்குறித்தோரை அறிமுகப்படுத்துதல். மாணவர்களைப் பேசவைத்தல் /எழுதவைத்தல்.
Unit - V	**தமிழர் கலை, பண்பாடு, பழக்க வழங்கங்கள், விளையாட்டுகள், விழாக்கள்**
	1. தமிழரின் தனித்த அடையாளங்களும் சிறப்புகளும். 2. கலைகள் (கட்டடம், சிற்பம், ஓவியம், புழங்குபொருள்கள்). 3. நுண்கலைகள் (சிலம்பம், பட்டிமன்றம், வில்லுப்பாட்டு, ஆட்டம், கூத்து போன்றன). 4. விளையாட்டுகள் (குழந்தைகள், சிறுவர், இளைஞர், ஆண்கள், பெண்கள்). 5. விழாக்கள் (குடும்ப விழாக்கள், கோயில் சார்ந்த விழாக்கள், கிராமிய விழாக்கள்). 6. சுற்றுலாத் தலங்கள் / வரலாற்றுச் சிறப்புமிக்க இடங்கள். 7. உணவு, உடை, மருத்துவம் இன்னபிற. மேற்குறித்தவற்றை அறிமுகப்படுத்துதல். மாணவர்களைப் பேசவைத்தல் /எழுதவைத்தல்.
Text book (s)	
•	அடிப்படைத் தமிழ்-2 (Basic Tamil-II)
Reference Books / Websites	
•	தமிழில் நாமும் தவறில்லாமல் எழுதலாம் - பொற்கோ, பாரி நிலையம், சென்னை, 2003.
•	www.tamilvu.org/ta/content/சான்றிதழ்
•	www.thamizham.net/kal/ttenglish/cards32-u8.htm
•	www.thamizham.net/kal/ttenglish/index-u8.htm
•	www.ilearntamil.com
•	www.wikihow.com/Learn-Tamil
•	www.ilovelanguages.org/tamil.php
•	www.ling-app.com/learn-tamil
•	www.ilearntamilnow.com
•	www.17-minute-languages.com/en/learn-tamil
•	www.hindustanitongue.com/learn-tamil

•	www.duolingo.com/course/ta/en/Learn-Tamil
•	www.mylanguages.org/learn_tamil.php
•	www.learn101.org/tamil.php
•	www.goethe-verlag.com/book2/EN/ENTA/ENTA002.HTM
•	www.karky.in/payilcourses/index.html
•	www.tamilvu.org/ta/பயணியர்-தமிழ்
•	www.languagetrainers.com/blog/tamil-words/
•	www.thamizham.net/kal/tamil.htm
•	www.worldtamilacademy.com
•	www.outsourcingtranslation.com/resources/phrases/tamil-sentences.php
•	www.ling-app.com/ta/basic-words-in-tamil/
•	www.thirutamil.com/article/20-easy-thirukkural-in-tamil/
•	www.chennailibrary.com/avvai/kondraivendan.html
•	www.tamilvu.org/ta/content/புதிய-பாடத்திட்டம்-2022
•	www.tamilvu.org/ta/content/மின்-கற்றலுக்கான-இணையத்தளம்
•	www.ling-app.com/ta/tamil-culture
•	www.caleidoscope.in/art-culture/tamil-nadu-culture-3
Apps	
•	www.kaniyantamil.com/best-mobile-apps-tamil-learning/
•	Tamil 101 - Learn to Write
•	https://payil.app/tva/ta/
•	https://tamil-101.en.aptoide.com/app
•	Ling - Learn Tamil Language
•	Tamil by Nemo
•	Learn Tamil Quickly

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
CLO 1	3	2	3	2	2	3	2	2	2	2	3	3
CLO 2	2	2	2	3	3	2	2	3	3	2	2	2
CLO 3	3	3	3	2	2	3	3	2	3	3	3	3
CLO 4	3	2	3	3	3	3	2	2	2	2	3	2
CLO 5	2	2	3	3	2	2	3	3	2	3	3	2

Strong - 3, Medium - 2, Low - 1

சென்னைப் பல்கலைக்கழகம்
University of Madras

Part-IV

வளர்நிலைத் தமிழ் - பாடத்திட்டம்

Advanced Tamil - Syllabus

2 பருவங்கள் (இரண்டாம் பருவம்)

(B.A., B.Sc., B.Com., BCA., BBA)

2023-24

பருவம் - 2 (Semester - 2)
வளர்நிலைத் தமிழ் - II (Advanced Tamil - II)

Course Code	Course Name	Category	L	T	P	S	Credit	Ins. Hours	Marks		
									CIA	External	Total
100S2B	வளர்நிலைத் தமிழ் - II Advanced Tamil - II	Supportive	2	-	-	-	2	2	25	75	100
Pre - requisite	பத்தாம் வகுப்புவரை தமிழை மொழிப்பாடமாகப் படித்திருக்க வேண்டும்.										SV 2023

Learning Objectives - கற்றல் நோக்கங்கள்

- பண்டைத் தமிழ் இலக்கியங்கள் , அவற்றின் சிறப்புகள் மற்றும் பொருண்மைகள் ஆகியன குறித்து அறியச்செய்தல்.
- காப்பிய இலக்கியங்கள் , பக்தி இலக்கியங்கள் ஆகியவற்றில் காணலாகும் கருத்துக் கருவூலங்களை நுகரச் செய்தல்.
- உரைநடை இலக்கியத்துள் , கட்டுரை, இலக்கியம் குறித்த அறிமுகத்தை மாணவர்களுக்கு ஏற்படுத்துதல்.
- பாடத்தின்வழி, பல்வகை இலக்கியங்கள் தோன்றுவதற்கான காரணங்கள் மற்றும் மாற்றம் பெறுவதற்கான காரணங்களை அறியச் செய்தல்.
- இருவேறு மொழிகளின் இயல்புகளை உணர் த்தி, மொழிபெயர்க்கும் திறனையும் அலுவலகக் கடிதம் எழுதும் பயிற்சியையும் பெறச் செய்தல்.

Expected Course Outcomes - எதிர்பார்க்கப்படும் கற்றல் அடைவுகள்

On the successful completion of the course, students will be able to
இப் பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்.

CO 1	உரைநடை இலக்கியத்தின் பெருமைகளை உணர்ந்து , அதனை அன்றாட வாழ்வில் பயன்படுத்தும் திறன் பெறுவர்.	K2,K3
CO 2	பண்டைத் தமிழ் இலக்கியங்கள் காட்டும் சமூக , பண்பாட்டு, வாழ்வியல் முறைகளை அறிந்துகொள்வர்.	K1,K3,K4
CO 3	காப்பியக் கட்டமைப்புகளை இன்றைய புதினம் , திரைப்படங்கள் ஆகியவற்றுடன் ஒப்பிட்டுக் காணும் அறிவைப் பெறுவர்.	K1,K3,K4
CO 4	தமிழ் இலக்கிய மரபினையும் மாற்றங்களையும் ஆய்ந்து உணரும் ஆற்றல் பெறுவர்.	K1,K4,K5, K6
CO 5	மொழிபெயர்ப்புத் திறன் பெறுவதோடு, அன்றாட வாழ்வின் தேவைகளான பல்வகை அலுவலகக் கடிதங்கள் எழுதும் திறன் பெறுவர்.	K4,K5,K6

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

Unit - I	**பக்தி இலக்கியமும் சிற்றிலக்கியமும்**
	1. “மண்ணில் நல்லவண்ணம் வாழலாம்” - திருஞான சம்பந்தர் 2. திருவேங்கடமலையில் பிறத்தல் என்னும் தலைப்பில் குலசேகர ஆழ்வார் பாடியுள்ள பாடல்களில் ஏதேனும் ஒன்று. 3. முக்கூடற்பள்ளு இலக்கியத்தில் மூத்த பள்ளி தன் நாட்டுவளம் குறித்துப் பாடியுள்ள பாடல்களில் ஏதேனும் ஒன்று.
Unit - II	**சங்க இலக்கியம், அற இலக்கியம், காப்பியம்**
	1. “நாடா கொன்றோ காடா கொன்றோ” - ஔவையார். 2. “யாதும் ஊரே” - கணியன் பூங்குன்றனார் - புறநானூறு 3. “நிலத்தினும் பெரிதே”, “வேம்பின் பைங்காய்” - குறுந்தொகை. 4. திருக்குறள் – ’பொருள்செயல் வகை’ அதிகாரம்

	உ) சிலப்பதிகாரம் - வஞ்சிக் காண்டம் - காட்சிக் காதை. ஊ) குண்டலகேசி - "பாளையாம் தன்மை செத்தும்" எனத் தொடங்கும் பாடல்.
Unit - III	**தமிழ் உரைநடை**
	தமிழ் உரைநடைச் சிறப்பையும் தேவையையும் மாணவர்கள் உணரும் வகையில் ஒரு சிறுகதை, ஓர் ஓரங்க நாடகம், ஓர் எளிய கட்டுரைத் தொகுப்பு இவற்றை அறிமுகம் செய்க.
Unit - IV	**தமிழர் பண்பாட்டு வரலாறு**
	தமிழர் பண்பாடு, கலைகள் (நிகழ்த்து கலை, ஓவியம், கட்டடக் கலை போன்றவற்றை அறிமுகம் செய்க.
Unit - V	**மொழிப் பயிற்சி**
	1. மயங்கொலிப் பிழை, குறில்-நெடில், சொற்பிழை, சந்திப்பிழை, தொடர்ப் பிழைகளை நீக்கி எழுதப் பயிற்சியளித்தல். 2. கலைச்சொல்லாக்கம் 3. மொழிபெயர்ப்பு - தமிழ்-ஆங்கிலம், ஆங்கிலம்-தமிழ் பகுதிகளை மொழிபெயர்ப்பு செய்யப் பயிற்சியளித்தல். 4. வேலைவேண்டி விண்ணப்பம் எழுதுதல். 5. அலுவலகக் கடிதம். 6. போட்டித் தேர்வுகளுக்குரிய கண்ணோட்டத்தில் மொழி, இலக்கிய வரலாற்றினைக் கற்பித்தல்.
Text book (s)	
•	
Reference Books / Websites	
•	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
CLO 1	3	2	3	2	2	3	2	2	2	2	3	3
CLO 2	2	2	2	3	3	2	2	3	3	2	2	2
CLO 3	3	3	3	2	2	3	3	2	3	3	3	3
CLO 4	3	2	3	3	3	3	2	2	2	2	3	2
CLO 5	2	2	3	3	2	2	3	3	2	3	3	2

Strong - 3, Medium - 2, Low - 1

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

BASICS OF FORENSIC SCIENCE

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22SEC1	**Basics of Forensic Science**	SEC (Discipline)	1	1	-	-	2	2	25	75	100

Learning Objectives

The main objectives of this course are to

C1 Gain knowledge on the basic practices of forensic analysis.

C 2 Perform investigation using fresh blood.

C 3 Carry out the analysis using body fluids

C 4 Investigate the presence of forms of drugs and poisons in body fluids.

C5 Execute the identification test on multiple samples.

Module I: Forensic Science: Definition, History and Development. Crime scene management and investigation; collection, preservation, packing and forwarding of physical and trace evidences for analysis. 6Hrs

Module II: Blood – grouping and typing of fresh blood samples including enzyme. Cases of disputed paternity and maternity problems, DNA profiling.6Hrs

Module III: Analysis of body fluids- Analysis of illicit liquor including methyl and ethyl alcohol in body fluids and breathe. Chemical examination, physiology and pharmacology of Insecticides and pesticides. 6Hrs

Module IV: Psychotropic drugs -Sedatives, stimulants, opiates and drugs of abuse. Identification of poisons from viscera, tissues and body fluids. 6Hrs

Module V: Identification tests- Identification of hair, determination of species origin, sex, site and individual identification from hair. Classification and identification of fibres. Examination and identification of saliva, milk, urine and faecal matter 6Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Gain knowledge on basics of forensic science and method for collection and preservation of samples	PO1, PO2, PO6
6CO2	Assess the paternity, maternity problems and DNA profiling	PO1, PO2
CO3	Identify the presence of alcohol, insecticides and pesticides in body fluids	PO1, PO2
CO4	Detail on the test performed to identify the presence of drugs and poisons in body fluids	PO1, PO2
CO5	Identify species and sex from the available body fluids	PO1, PO2

Reference books

1. An Introduction to Forensic DNA Analysis by Norah Rudin & Keith Inman USA, Second edition.

2. Forensic Science Handbook, Volume 2 & 3 by Saferstein, Richard E.

4. Forensics by Embar-Seddon, Ayn and Pass. Allan D.

5. Forensic Medicine by Adelman, Howard C & Kobilinsky, Lawrence Page 24 of 63

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3					3		3	3
CO 2	2	3					3		3	3
CO 3	2	3					3		3	3
CO 4	2	3					3		3	3
CO5	2	3					3		3	3

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

சென்னைப் பல்கலைக்கழகம்
University of Madras

Part-I

பொதுத் தமிழ் - பாடத்திட்டம்

General Tamil - Syllabus

4 பருவங்கள் (மூன்றாம் பருவம்)

(B.A., B.Sc., B.Com., BCA., BBA)

2023-24

பருவம் - 3 (Semester - 3)

பொதுத் தமிழ் - III (General Tamil - III)

Course Code	Course Name	Category	L	T	P	S	Credit	Ins. Hours	Marks		
									CIA	External	Total
200L3A	பொதுத் தமிழ் - III General Tamil - III	Part - I Supportive	6	-	-	-	3	6	25	75	100
Pre - requisite	**பன்னிரண்டாம் வகுப்பில் தமிழை ஒரு பாடமாகப் பயின்றிருக்க வேண்டும்.**										SV 2023

Learning Objectives - **கற்றல் நோக்கங்கள்**

- இலக்கியங்களின் சிறப்பினை உணர்த்துதல்.
- காலந்தோறும் எழுந்த காப்பியங்களின் தோற்றம், வளர்ச்சி, வகைகளை அறியச் செய்தல்.
- காப்பியச் செய்யுள்களின்வழி, யாப்பு, அணி போன்ற இலக்கண வகைகளை அறியச் செய்தல்.
- திறனாய்தல், கடித வகைகள் எழுதும் திறனை மாணவர்கள் பெறுமாறு செய்தல்.
- போட்டித் தேர்வுகளுக்கு ஏற்பக் கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்.

Expected Course Outcomes - **எதிர்பார்க்கப்படும் கற்றல் அடைவுகள்**

On the successful completion of the course, students will be able to
இப் பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்.

CO 1	தமிழ்க் காப்பியங்களின்வழி வாழ்வியல் சிந்தனையைப் பெறுவர்.	K1,K2
CO 2	காப்பியக் கட்டமைப்பை அறிந்துகொள்வர்.	K2
CO 3	மொழிவளத்தைப் பெருக்கிக்கொண்டு சிறந்த கட்டுரைகள், இலக்கியப் படைப்புகளை உருவாக்கும் ஆற்றல் பெறுவதோடு, பணிவாய்ப்பும் பெறுவர்.	K3,K4,
CO 4	செய்யுள்களில் காணலாகும் யாப்பு, அணி இலக்கணங்களை நுகர்ந்து இலக்கிய அனுபவம் பெறுவர்.	K3,K4
CO 5	மொழிபெயர்ப்புத் திறன்களைக் கற்பதன் வாயிலாகப் போட்டித் தேர்வுகளை எதிர்கொள்வர்.	K4,K5

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

Unit - I	**காப்பியங்கள் - 1**
	1. சிலப்பதிகாரம் - மதுரைக் காண்டம் - அடைக்கலக் காதை 2. மணிமேகலை - பாத்திரம் பெற்ற காதை 3. சீவக சிந்தாமணி - விமலையார் இலம்பகம் - 1889, 1890, 1891, 1893, 1894, 1895
Unit - II	**காப்பியங்கள் - 2**
	1. பெரியபுராணம் - பூசலார் நாயனார் புராணம் 2. கம்பராமாயணம் - அயோத்தியா காண்டம் - மந்தரை சூழ்ச்சிப் படலம்
Unit - III	**காப்பியங்கள் - 3, கட்டுரை**
	1. சீறாப்புராணம் - மழை அழைப்பித்த படலம் 2. இரட்சணிய யாத்திரிகம் - சிலுவைப் பாடுகள் 3. நல்வாழ்வு - மு. வரதராசனார்
Unit - IV	**பாடம் சார்ந்த இலக்கிய வரலாறு**
	காப்பியங்கள், கட்டுரை இலக்கியம்: தோற்றம், வளர்ச்சி, வகைகள்
Unit - V	**மொழித்திறன்**

	1. நூல் மதிப்புரை 2. கலை-இலக்கியத் திறனாய்வு 3. நேர்காணல் 4. அலுவலகம் தொடர்பான கடிதம் வரைதல். 5. வேலைவேண்டியும் குறைகளைக் களையவேண்டியும் விண்ணப்பம் எழுதுதல். 6. பலவகைப்பட்ட விண்ணப்பங்களை நிரப்புதல். (**குறிப்பு**: அலகு 4, 5 ஆகியன போட்டித் தேர்வு நோக்கில் நடத்தப்பட வேண்டும்).
Reference Books	
•	தமிழ் இலக்கிய வரலாறு - மு. வரதராசனார், சாகித்திய அகாதமி, புதுதில்லி 2010.
•	தமிழ் இலக்கிய வரலாறு - மது.ச. விமலானந்தம், அபிராமி பதிப்பகம், சென்னை 2004.
•	புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு - தமிழண்ணல், மீனாட்சி புத்தக நிலையம், மதுரை, 2017.
•	தமிழ் இலக்கிய வரலாறு - சிற்பி பாலசுப்ரமணியம், சொ. சேதுபதி, கவிதா வெளியீடு சென்னை, 2015.
•	பன்முக நோக்கில் தமிழ் இலக்கிய வரலாறு - கா. வாசுதேவன், தேவன் பதிப்பகம், திருச்சி, 2022.
•	வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு - பாக்யமேரி, நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை, 2009.
•	தமிழில் நாமும் தவறில்லாமல் எழுதலாம் - பொற்கோ, பாரி நிலையம், சென்னை, 2003.
•	தவறின்றித் தமிழ் எழுதுவோம் - மா. நன்னன், ஏகம் பதிப்பகம், சென்னை, 2006.
•	நல்ல தமிழ் இலக்கணம் - செ. சீனி நைனா முகம்மது, அடையாளம் பதிப்பகம், திருச்சி, 2013.
•	தமிழ் இலக்கியத் தகவல் களஞ்சியம் - தேவிரா, ஸ்ரீநந்தினி பதிப்பகம், சென்னை, 2022.
Websites	
•	www.sirukathaigal.com
•	www.tamilvu.org
•	www.tamildigitallibrary.in
•	https://www.tamiluniversity.ac.in/english/library2 - /digital - library/
•	https://www.tamilelibrary.org/
•	www.projectmadurai.or
•	http://www.tamilvu.org/ta/library - libcontnt - 273141
•	https://www.tamildigitallibrary.in/
•	http://www.noolaham.org

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
CLO 1	3	2	3	2	2	3	2	2	2	2	3	3
CLO 2	2	2	2	3	3	2	2	3	3	2	2	2
CLO 3	3	3	3	2	2	3	3	2	3	3	3	3
CLO 4	3	2	3	3	3	3	2	2	2	2	3	2
CLO 5	2	2	3	3	2	2	3	3	2	3	3	2

Strong - 3, Medium - 2, Low - 1

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

SYLLABUS WITH EFFECT FROM 2022-2023

EXISTING SYLLABUS (22-23) FOLLOWED FROM THE ACADEMIC YEAR 2023-2024

200L3G

FOUNDATION COURSE: PART-I SANSKRIT PAPER-III

Inst.Hrs. : 6 **Year : II**
Credits : 3 **Semester : III**

Paper III – Drama, Grammar and History of Sanskrit Literature

Course Outcomes	1. Be familiar with the style of the great Sanskrit Dramatist Bhasa 2. Be able to appreciate the aesthetical, social, political, cultural, etc., values expressed in prescribed composition 3. Understand the structural patterns of Sanskrit dramatic composition 4. Develop the finer and minor nuances of Nataka form of drama 5. Analyze the literary texts
UNITS	
I	Introduction to Dramaturgy – Ten types of Drama - Characteristics and features (*Nāndī, Sūtradhāra, Sthāpanā* and *Bharatavākyam*) of Sanskrit Dramas. Prose Text: *Karṇabhāram* - Page. 01 - 10 (till 10 *Slokās*)
II	Characteristics and features (*Vastu, Netā* and *Rasas*) of Sanskrit Drama - Prose Text: *Karṇabhāram* - Page. 11 - 20 (till 17 *Slokās*)
III	Authorship of 13 Trivandrum play of *Bhāsa* - Introduction to the Dramas of *Kālidāsa, Bhavabhūti, Harṣavardhana* and *Rājaśekhara* Text: *Karṇabhāram* - Page. 21 - 32 (Upto the end)
IV	Introduction to the dramatic works of *Viśākhadatta, Śūdraka, Bhaṭṭanārāyaṇa* and *Murāri* - Introduction to Allegorical dramas 1. *Prabodhacandrodaya* and 2. *Saṅkalpasūryodaya*
V	Introduction to *Campū* literature 1. *Bhojacampū* 2. *Viśvaguṇādarśacampū* and 3. *Nalacampū* Grammar – *Lṛṭ lakārāḥ* (Future tense) (i) गमिष्यति (*Gamiṣyati*) (ii) स्थास्यति (*Sthāsyati*) (iii) पठिष्यति (*Paṭhiṣyati*) (iv) नर्तिष्यति (*Nartiṣyati*) (v) कोपिष्यति (*Kopiṣyati*) (vi) कथयिष्यति (*Kathayiṣyati*) (vii) गणयिष्यति (*Gaṇayiṣyati*) (viii) भविष्यति (*Bhaviṣyati*) (ix) करिष्यति (*Kariṣyati*) (x) श्रोष्यति (*Śroṣyati*) Declensions: (*Sarvanāmaśabdāḥ*) - 1. तद् शब्दः (*Tad śabdaḥ*) in all genders 2. अस्मद् शब्दः (*Asmad śabdaḥ*) 3. युष्मद् शब्दः (*Yuṣmad śabdaḥ*)

Course Objectives	Understand the structure and use of different phrases and Idioms in Sanskrit Drama and grammatical aspects of *Karṇabhāram*	K2
	Enhance one's ability to converse freely in the language, which is considered to be a specialized skill as far as the Sanskrit Language goes	K2
	Draft and summarize the literary texts	K3
	Identify and apply different grammatical peculiarities	K3
	Analyze and critically assess the literary texts	K4

Book recommended for Reference	*Kalāśālā-Saṁskṛta-Sukhabodhinī - III* **To be Published by: University of Madras, Chennai - 5**

Mapping with Programme Outcomes:

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	S	M	M	S	S
CO 2	S	S	S	S	S
CO 3	S	M	M	S	S
CO 4	S	S	M	S	S
CO 5	S	S	S	S	S

S-Strong M-Medium L-Low

UNIVERSITY OF MADRAS

FOUNDATION COURSE: FRENCH

SYLLABUS WITH EFFECT FROM 2023-2024

UG & 5 Year PG Integrated – SEMESTER – III

Foundation Course: Translation, Comprehension and Grammar - I

Course Outcomes	1. Identify and appreciate the construction and the structure of different tenses and sentences 2. Translate simple texts 3. Draft and summarize literary texts 4. Apply the grammatical rules to express one's ideas using different tenses 5. Analyze literary texts with respect to their structure and composition		
Course	Foundation Course in French	**Course Code**	**200L3K**
Title of the Course:	Translation, Comprehension and Grammar – I		
Credits:	3		
Pre-requisites, if any:	-		
Course Objectives	Understand the structure and use of the different grammatical tenses		K2
	Translate texts and examine them		K2 and K4
	Draft summaries of literary texts		K2 and K6
	Identify the requirement and employ the different grammatical tenses		K3
	Analyze and critically assess the literary texts		K4 and K5
UNITS			
I	*Nos études* *Les feuilles mortes* Le passé composé		
II	*Demain dès l'aube* *Une visite inattendue* L'imparfait		
III	*La tortue et le chien* Le subjonctif Le conditionnel		
IV	*Le vrai Père* Les pronoms relatifs La comparaison		
V	*L'hiver* *La danse* L'expression du temps		
Prescribed Text	K. Madanagobalane & N.C. Mirakamal, *Le français par les textes*, Chennai, Samhita Publications – Goyal Publisher & Distributors Pvt Ltd, 2017		

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	M	M	M	M	L	S	S	S	S	S	M
CO 2	M	M	S	S	S	S	M	S	M	M	S	M	S
CO 3	S	M	S	M	M	M	M	S	S	S	M	S	M
CO 4	S	S	M	M	S	M	L	S	S	S	S	S	M
CO 5	M	M	S	S	S	M	M	S	S	S	M	S	M

S-Strong M-Medium L-Low

SEMESTER III

Title of the Paper : Translation, Comprehension and Grammar-I

Prescribed textbook: K.Madanagobalane &N.C.Mirakamal, *Le français par les textes*, Chennai, Samhita Publications-Goyal Publisher & Distributors Pvt Ltd, 2017

The following texts from the prescribed textbook:

- *Nos études*
- *Les feuilles mortes*
- *Demain dès l'aube*
- *Une visite inattendue*
- *La tortue et le chien*
- *Le vrai Père*
- *L'hiver*
- *La danse*

The following grammar components are chosen from the prescribed textbook:

- Le passé composé
- L'imparfait
- Le subjonctif

- Le conditionnel
- Les pronoms relatifs
- La comparaison
- L'expression du temps

Paper setters to strictly adhere to the syllabus and ask questions only from the pages included in the syllabus. Questions should cover the entire syllabus.

QUESTION PAPER PATTERN

Time : 3 Hours Maximum Marks : 75

Section A (10 x 2 = 20 Marks)

Answer any TEN questions

15 short answer questions to be asked from the prescribed texts (name of the text might be included within brackets in the question)

Section B (5 x 5 = 25 Marks)

Answer any FIVE questions

8 Grammar exercises to be given from the prescribed textbook

Section C (3 x 10 = 30 Marks)

Answer any THREE

3 must be answered out of 5 topics (1 translation of a prescribed text, 1 translation of unknown text, 1 comprehension of unknown text, 2 summaries of the prescribed texts)

***

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**
CO	3	3	3	3	1

3-Strong 2-Medium 1-Low

Course III	**Course Code**	**Title of the Course**	**Credits**
FC	200L3H	Paper III : Communication Skill in Arabic	3

Course Outcomes	1. Understand the basics of Arabic language. 2. Learn the structure of Arabic words. 3. Familiarize with the phonetic system of Arabic. 4. Able to communicate in Arabic 5. Able to translate from Arabic to English and vice versa
Pre-requisites, if any:	Nil
Course Objectives	1. Understand the sounds and phrasing of Arabic language. 2. Acquire new vocabulary and apply in context. 3. Develop communication skills in Arabic. 4. Understand the different aspects of communication. 5. Learn to communicate in everyday interactions.
Units	
I	(الكتاب الأساسي في تعليم اللغة العربية لغير الناطقين بها، الجزء الأول – السعيد محمد بدوي وفتحي علي يونس) التعارف – في المطار (١)
II	في الفندق – في المطعم
III	في البنك – عند الطبيب (١)

IV	في الطريق – في مكتب البريد
V	في السوق (١) – في السوق (٢)
Prescribed Text Book	الكتاب الأساسي في تعليم اللغة العربية لغير الناطقين بها، الجزء الأول – السعيد محمد بدوي وفتحي علي يونس Al Kitaab Al Asaasi Fi Taleem Al Lugha Al Arabiyya Li Ghair An Naatiqeena Biha - Part I, By Sayeed Muhaamad Badawi and Fathi Ali Yunus
Reading List (Print and online)	A Practice Book on Gulf Arabic, By Dr. Abdul Jaleel. T Arabic Conversation Book, By Mohd. Harun Rashid and Khalid Perwez A Hand book of Commercial Arabic by Dr. Aboobacker K.P العربية لغير العرب – د. مصطفى حسن الريس، الأزهر العربية للحياة – جامعة الملك سعود القراءة العربية لغير العرب – وزارة التربية بالكويت www.talkinarabic.com

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

EXISTING SYLLABUS (22-23) FOLLOWED FOR THE ACADEMIC YEAR 2023-2024

200L3E

FOUNDATION COURSE: PART-I HINDI PAPER-III

Inst.Hrs. : 6 **Year : II**
Credits : 3 **Semester : III**

PAPER –III ANCIENT POETRY AND INTRODUCTION TO HINDI LITERATURE (UPTO REETI KAAL)	
Duration:	**1 Semester**
Programme Outcomes:	1. Identify the ancient poets and their works, contribution to society and Literature 2. Studies the contemporary conditions and its impact on Ancient poets 3. Understand the message of poets their expressional and artistic skills 4. Evaluation and critical study of Ancient Poetry and Trends of Ancient Literature 5. Obtain the skills of summerise, interpretation of contexts and literary attitude
Programme Specific Outcomes:	1. Basic knowledge of Ancient Poets and their works 2. Basic Knowledge of History of Hindi literature and its trends 3. Obtain skills of briefing, interpretation and evaluation 4. Basic idea of critical and analytical study of literature. 5. Obtain the application knowledge of relation between contemporary condition and literature and its impact on poets

Course Objectives	1. Identify the literary trends of ancient Hindi literature, and social conditions and its impact on Ancient poetry	K1
	2. Summarise the content of prescribed poems and understand the trends of Ancient Hindi Literature .	K2
	3. Critical study and analysis of artistic skills of poets and their expressional skills and literary trends	K4
	4. Employ the methods of interpreting contexts, ideas and identify the special features, poetic skills through practicing annotation writing	K3
	5. Differentiate the subject, ideology, contribution and poetic skills with each other and also know about contemporary poets , writers and the impact of contemporary situations	K5
	6. Conceive the aims of Literature and relations between Literature and contemporary society	K6

Pre-requisites, if any:	Basic Knowledge of Hindi Fiction and Translation
UNITS	
I	1. Kabirdas - Saakhi (Dohas from 1 to 10) 2. Literary Trends of Veeragatha Kaal (Aadikaal) 3. Chand Baradai and his Works 4. Vidhyapathi and his Works
II	1. Surdas - Bramargeet Saar 2. Literary Trends of Bhakthi Kaal 3. Gyan Margi Shakha 4. Important Poet : 1. Kabirdas
III	1. Tulasidas – Vinay ke Pad only 2. Literary Trends of Bhakthi Kaal – Prem Margi Shakha 3. Literary Trends of Bhakthi Kaal - Ram Bhakthi Shakha 4. Important Poets – 1. Joyasi and 2. Tulasidas
IV	1. Meera Bai – Pad only 2. Tiruvalluar (Dharmakaand only) 3. Literary Trends of Bhakthi Kaal – Krishna Bhakthi Shakha 4. Important Poet – Surdas
V	1. Biharilal (Dohas 1 to 5) 2. Literary Trends of Reethikaal 3. Important Poet : Bihari and his works 4. Bhushan and his works and Ghananand and his works

Course Outcomes	1. Identifies the Ancient Poets their works, and impact of contemporary conditions of society and ancient History of Hindi Literature 2. Understand the theme , message, expressional and artistic skills 3. Evaluate the thought, ideology, expressional and artistic skills of writers and contextual meanings and literary trends of Ancient History 4. Obtain skills of summarizing, evaluating and critical study and of poems 5. Employ the techniques of interpretation and contextual meaning of texts

Reading List (Print and Online)	1. Hindi Sahithya Ka Itihas, By: Ramchandra Shukla, Jaya Bharati Publications, 217, B, Maya Press Road, Allahabad – 211 003. 2. Hindi Sahithya Yug Aur Pravrithiya By: Dr. Sivakumar Varma, Asok Prakashan Nayi Sarak, New Delhi – 6. 3. Hindi Sahithya ka Itihas

	By : Gulabroy, Lakshmi Narayana Agarwal Book Publishers and seller, Anupama Plaza – 1, Block No. 50, Sanjay Palace, Agra – 282002.
Recommended Texts	**1. Poetry Selection** **Madras University Publications** **University of Madras**

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	M	M	M
CO 2	S	S	S	S	S
CO 3	S	S	S	S	S
CO 4	M	S	S	S	S
CO 5	M	S	S	S	S

UNIVERSITY OF MADRAS

FOUNDATION COURSE: TELUGU

SYLLABUS WITH EFFECT FROM 2023-2024

Course - 3	**Semester – III**	**Course Code:200L3B**
Title of the Course : Paper –III, PROSE		
Credits : 03		
Pre- requisites, if any: Knowledge in Modern Literature and Writing Style in Telugu		
Course Outcomes ● 1. To understand the significance of the modern literary works. ● 2. To Explain the nature of modern style of writings ● 3. To evaluate the culture through modern literary works. ● 4. To indentify the Influence between Traditional and Modern literary works. ● 5. To interpret the various styles of fictions in Telugu.		
Units		
I	**Telugu Bhasha – Avirbhava Vikasalu – Prof. G.V.S.R. Krishnamurty**	
II	**Andhra Vangmayam – Avirbhava Vikasalu – Prof. V. Ramachandra Chowdary**	
III	**Adhunika Telugu Sahitya Prakriyalu, Dhoranulu – Dr. M. Sampath Kumar**	
IV	**Telugu Janapada Vignanam – Prof. T.Subba Rao**	
V	**Prachina Telugu Sahityamlo manavataritulu – Prof. G. Appa Rao**	
Reading List (Print and Online)	1. Evolution of Telugu Short Story by P.Dakshinamurty - Vishalandhra Publications, Hyderabad 2. Telugu Sahitya Charitra – Vibbinna Dhoranalu – Kaluva Mallaiah 3. Telugu Basha Charitra – Badriraju Krishnamurthy - Vishalandhra Publications, Hyderabad	
Recommended Texts	1. Poetry Selections : Classical & Modern Poetry – University of Madras, Chennai. 2. Telugu Sahitya Samiksha - G.Nagayya - Navya Prachurana, Tirupati 3. Janapada vijnanam by R.V.S.Sundram, Andhra Sahitya Parishattu, Hyderabad 4. Andhrula charitra and Samskruti - K.Lakshmiranjanam, Andhra Pradesh Sahitya, Academi, Hyderabad 5. Telugu Basha Charitra – Badriraju Krishnamurthy - Vishalandhra Publications, Hyderabad	

UNIVERSITY OF MADRAS

FOUNDATION COURSE: ENGLISH

SYLLABUS WITH EFFECT FROM 2023-2024

SECOND YEAR - SEMESTER III

PAPER II –GENERAL ENGLISH

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
200L3ZU	**Part II**	Y	Y	-	-	3	6	25	75	100

Learning Objectives	
LO1	To make them active listeners
LO2	To enhance the interpersonal relationship skills
LO3	To embolden them to cope with stress
LO4	To master grammar skills
LO5	To help them to use English effectively in a business environment

Unit No.	Unit Title & Text	No. of Periods for the Unit
I	**ACTIVE LISTENING** **Short Story** 1.1 In a Grove – AkutagawaRyunosuke Translated from Japanese by Takashi Kojima 1.2 The Gift of the Magi – O' Henry **Prose** 1.3 Listening – Robin Sharma 1.4 Nobel Prize Acceptance Speech – WangariMaathai	20
II	**INTERPERSONAL RELATIONSHIPS** **Prose** 2.1 Telephone Conversation – Wole Soyinka 2.2 Of Friendship – Francis Bacon **Song on (Motivational/ Narrative)** 2.3 Ulysses – Alfred Lord Tennyson 2.4 And Still I Rise – Maya Angelou	20
III	**COPING WITH STRESS** **Poem** 3.1 Leisure – W.H. Davies 3.2 Anxiety Monster – RhonaMcFerran **Readers Theatre** 3.3 The Forty Fortunes: A Tale of Iran 3.4 Where there is a Will – Mahesh Dattani	20
IV	**Grammar** 4.1 Phrasal Verbs & Idioms 4.2 Modals and Auxiliaries 4.3 Verb Phrases – Gerund, Participle, Infinitive	15

V	**Composition/ Writing Skills** 5.1 Official Correspondence – Leave Letter , Letter of Application, Permission Letter 5.2 Drafting Invitations 5.3 Brochures for Programmes and Events	15

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Listen actively	PO1,PO7
CO2	Develop interpersonal relationship skills	PO1,PO2,PO10
CO3	Acquire self-confidence to cope with stress	PO4,PO6,PO9
CO4	Master grammar skills	PO4,PO5,PO6
CO5	Carry out business communication effectively	PO3,PO8

Text Books (Latest Editions)

1	WangariMaathai – Nobel Lecture. Nobel Prize Outreach AB 2023. Jul 2023.
2	Mahesh Dattani, Where there is a Will. Penguin, 2013.
3	Martin Hewings, Advanced English Grammar, Cambridge University Press, 2000
4	EssentialEnglish Grammar by Raymond Murphy

Web Resources

1	WangariMaathai – Nobel Lecture. Nobel Prize Outreach AB 2023. Mon. 17 Jul 2023. https://www.nobelprize.org/prizes/peace/2004/maathai/lecture/
2	Telephone Conversation - Wole Soyinka https://www.k-state.edu/english/westmank/spring_00/SOYINKA.html
3	Anxiety Monster- RhonaMcFerran- www.poetrysoup.com

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weightage	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

SECOND YEAR: SEMESTER III

BIOMOLECULES

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
222C3A	**Core Course5: Biomolecules**	Core	3	2	-	-	5	5	25	75	100

Learning objectives

The main objectives of this course are to:

- Introduce the structure, properties and biological significance of carbohydrates
- Comprehend the classification, functions and acid base properties of amino acids
- Elucidate the various levels of organization of Proteins.
- Impart knowledge on the classification, properties and characterization of lipids.
- Acquaint with the classification, structure, properties and functions of nucleic acids

Module I: Carbohydrates-Classification and biological significance, physical properties - stereo isomerism, optical isomerism, anomers, epimers and mutarotation. Monosaccharides: Occurrence, linear and cyclic structure, Reactions of monosaccharides due to the presence of hydroxyl, aldehyde and keto groups. Disaccharides: Structure and properties of reducing disaccharides (lactose and mannose), non-reducing disaccharide(sucrose). Polysaccharides: Homopolysaccharides - Occurrence, structure and biological significance of starch, glycogen and cellulose. Heteropolysaccharides - Structure and biological significance of mucopolysaccharides - hyaluronic acid, chondroitin sulphate and heparin. (Structural elucidation not needed).12 hrs

Module II: Amino acids -Classification based on composition of side chain and nutritional significance. General structure of amino acids. 3 - and 1- letter abbreviations. Modified amino acids in protein non - protein amino acids. Physical properties of amino acids, isoelectric point, titration curve (alanine, lysine, glutamic acid), optical activity. Chemical reactions due to carboxyl group, amino group and side chains. Colour reactions of amino acids. 12Hrs

Module III: Proteins-Classification based on shape, composition, solubility and functions.

Properties of proteins - Ampholytes, isoelectric point, salting in and salting out, denaturation and renaturation, UV absorption. Levels of Organization of protein structure- Primary structure, Formation and characteristics of peptide bond, phi and psi angle, Secondary structure-α helix (egg albumin), β- pleated sheath (keratin), triple helix (collagen). Tertiary structure – with reference to myoglobin. Quaternary structure with reference to haemoglobin. 12 Hrs

Module IV: Lipids- Lipids: Bloor's classification, chemical nature and biological functions. Fatty acids: classification, nomenclature, structure and properties of fatty acids. Simple and mixed triglycerides: structure and general properties, Characterization of fats- iodine value, saponification value, acid number, acetyl number, polensky number, Reichert –Meissl number along with their significance. Compound lipids-Structure and functions of phospholipids and glycolipids. Derived lipids-Structure and functions of cholesterol, bile acids and bile salts.12Hrs

Module V: Nucleic Acids-Structure of purine and pyrimidine bases, nucleosides and nucleotides and their biological importance. Types of DNA: A, B, C, Z DNA, structure and biological significance, super helicity. Types of RNA: mRNA, tRNA, rRNA, hnRNA, snRNA, Secondary and tertiary structure of tRNA. Properties of DNA-Hypochromic and hyperchromic effect, melting temperature, viscosity. Denaturation and annealing.12Hrs

Course Outcomes

CO	**On completion of this course, students will be able to**	**Program outcomes**
CO1	Classify, illustrate the structure and explain the physical and chemical properties of carbohydrates.	PO1
CO2	Indicate the classification, structure, properties and biological functions of amino acids.	PO1
CO3	Explain the classification and elucidate the different levels of structural organization of proteins.	PO1
CO4	Elaborate on classification, structure, properties, functions and characterization of lipids	PO1, PO4
CO5	Describe the structure, properties and functions of different types of nucleic acids	PO1

Textbooks

1. Biochemistry, U. Sathyanarayana & U. Chakrapani, 2013, 5th edition, Elsevier India Pvt. Ltd., Books & Elective Pvt. Ltd.

2. Fundamentals of Biochemistry, J. L. Jain, Sunjay Jain, Nitin Jain, 2013, 7th edition S. Chand & Company Ltd.

3.Text book of Medical Biochemistry, M N Chatterjee, Rana Shinde, 2002, 8th edition, Jaypee Brothers.

Reference books

1. David L. Nelson, Michael M. Cox, 2005, Principles of Biochemistry, 4th edition W. H. Freeman and Company.

2. Voet. D, Voet. J. G. and Pratt, C. W, 2004, Principles of Biochemistry, 4th edition John Wiley & Sons, Inc.

3. Zubay G. L, *et.al*., 1995, Principles of Biochemistry, 1st edition, Wm C. Brown Publishers.

Web resources

https://www.britannica.com/science/biomoleculehttps://en.wikipedia.org/wiki/Biomoleculehttps://www.khanacademy.org/science/biology/macromolecules

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3						3			3
CO 3	3						3			3
CO 4	3			2			3	2		3
CO5	3						3			3

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

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SECOND YEAR: SEMESTER III
PRACTICAL III BIOMOLECULES

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
222C31	**Core Paper-6 Practical III Biomolecules**	Core Practical	-	-	5	-	5	5	40	60	100

Learning Objectives

The main objectives of this course are to

- Identify the biomolecules carbohydrates and amino acids by qualitative test
- Determine the quality of Lipids by titrimetric methods
- Isolate nucleic acids from plant and animal source

I)Qualitative testfor 15 Hrs

1) Carbohydrates

a) Glucose b) Fructose c) Arabinose d) Maltose e) Sucrose f) Lactose g)Starch

2) Amino acids

a) Arginine b) Cysteine c) Histidine d) Proline e) Tryptophan f) Tyrosine g) Methionine

II Titrimetric methods15 Hrs

1) Determination of Saponification value of an edible oil

2) Determination of Iodine number of an edible oil

3) Determination of Acid number of an edible oil

III. Group Experiments 15 hrs

1) Isolation of DNA from plant/animal source.

2) Isolation of RNA from rich source.

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Qualitatively analyse the carbohydrates and report the type of carbohydrate based on specific tests	PO1, PO2, PO3
CO2	Qualitatively analyse amino acids and report the type of amino acids based on specific tests	PO1, PO2, PO3
CO3	Determine the Saponification, Iodine and acid number of edible oil	PO1, PO3, PO4
CO4	Isolate the nucleic acid from biological sources	PO1, PO3

Text books

1. David T Plummer, An Introduction to Practical Biochemistry, 3rd edition, Tata McGraw-Hill Edition
2. J. Jayaraman Laboratory Manual in Biochemistry New Age International (P) Limited Fifth edition 2015
3. S. Sadasivam A. Manickam Biochemical Methods New Age International Pvt Ltd publisher's third edition 2018

Reference books

1.Rageeb, Kiran Patil, M. Bakshi Rahman, Sufiyan Ahmad Raees A Practical book on Biochemistry Everest publishing house1st Edition, 2019
2.Introductory practical Biochemistry – S.K. Sawhney, Randhir Singh, 2nd ed, 2005.
3. Biochemical Tests – Principles and Protocols. Anil Kumar, Sarika Garg and Neha Garg. Vinod Vasishtha Viva Books Pvt Ltd, 2012.
4. Harold Varley, Practical Clinical Biochemistry, CBS. 6th edition, 2006.
5. Keith Wilson and John Walker. Principles and Techniques of Practical Biochemistry, 4thedition, Cambridge University press, Britain.1995.

Web resources

1.https://www.pdfdrive.com/instant-notes-analytical-chemistry-e912659.html 14
2.https://www.pdfdrive.com/analytical-biochemistry-e46164604.html
3. https://www.pdfdrive.com/biochemistry-books.html

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3	3				3	3	3	3
3CO 2	2	3	3				3	3	3	3
CO 3	2		3	2			3	3	3	3
CO 4	2		3				3	3	3	3

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

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MICROBIOLOGY - I (THEORY) – THIRD SEMESTER

ELECTIVE PAPER FOR OTHER LIFE SCIENCE DEPARTMENTS

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
222E3D	**Microbiology I**	Elective	2	1	-	-	3	3	25	75	100

Learning outcomes

1. Outline landmark events in the History of microbiology and to classify Microorganisms into taxonomic groups.
2. Describe the structural and functional make up of a Bacteria.
3. Compile various staining and cultivation techniques.
4. Expose to techniques for obtaining pure cultures of microorganisms with knowledge on methods of measuring microbial growth.
5. Get acquainted with sterilization and preservation techniques.

Course Content:

UNIT I:

Introduction to Microbiology - Theories of Biogenesis and Abiogenesis. Contributions of Anton Von Leeuwenhoek, Louis Pasteur, Robert Koch, Alexander Flemming, Joseph Lister. Classification of Microorganisms-Five Kingdom Concept. Principles and applications of simple, compound, bright field, dark field, and electron microscopy (SEM andTEM).

UNIT II:

Structural Characteristics of Bacteria - Morphology, Structure of Bacterial Cells - Capsule, Flagella, Fimbriae or Pili, Cell wall, Cell membrane, Mesosomes, Cytoplasm, Cytoplasmic Inclusions, Spores.

UNIT III:

Basic Microbiology Techniques - Staining techniques - Simple and Differential Staining. Cultivation of Bacteria - Types of Media.

UNIT IV:

Pure Culture Techniques - Serial Dilution, Spread Plate, Pour Plate Technique, Streak Plate.Measurement of Microbial Growth (Turbidity, Biomass and Cell Count).

UNIT V:

Sterilization-Physical Methods - Heat, Filtration, Chemical Methods - Alcohols, Phenols, Radiation - UV and Gamma Rays.Preservation Techniques -Mineral Oil Method, Lyophilisation.

References:

1. Stanier R.Y, Ingraham, Wheelis M.L. Painte. (1999). General Microbiology, 5th edn, Mac Millan PressLtd.
2. Tortora, G.J., Funke, B.R.,Case, C.L.(2004). Microbiology- An Introduction, 8th edn, Benjamin-Cummings PubCo.
3. Madigan M.T., Martinko J.M, Parker J. (2005). Brock - Biology of Microorganisms, 11th edn, Pearson Prentice HallInternational,Inc.
4. Alcamo's Jeffrey, C.Pommerville. (2004). Fundamentals of Microbiology,7th edn, Jones and BartlettPublishers.
5. Ronald.M.Atlas. (1996). Principles of Microbiology, 2nd edn, Wm.C. Brown Publishers.
6. Pelczar M.J., Chan E.C.S. and KreigN.R.(2010). Microbiology 5th edn, McGraw-Hill, New YorkPublications.
7. Prescott L.M, Harley J. P and Klein D.A. (2005). Microbiology 6th edn, McGraw-HillPublications.
8. R.C.Dubey ,D.K.Maheshwari,(2010) Microbiology 2nd edn , S.Chand and Company ltd. NewDelhi.
9. Talaro, K. P., & Chess, B. (2018). *Foundations inmicrobiology*.McGraw-Hill.
10. Salle AJ (1996) Fundamental Principle of Bacteriology [7th Edition] University of California, Los Angeles, Tata McGraw Hill Publishing CompanyLtd.,NewDelhi

Web Resources:

1. https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_(Boundless)/1%3A_Introduction_to_Microbiology/1.1%3A_Introduction_to_Microbiology/1.1B%3A_History_of_Microbiology_-_Hooke%2C_van_Leeuwenhoek%2C_and_Cohn
2. http://textbookofbacteriology.net/structure.html
3. https://milnepublishing.geneseo.edu/suny-microbiology- lab/chapter/differential-staining-techniques/
4. http://www.biologydiscussion.com/organism/culture-organism/obtaining-pure-culture-of-microorganisms-6-methods/55042
5. https://www.studyread.com/what-is-sterilization-methods/

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ELECTIVE-I: BOTANY-I

Title of the Course		**BOTANY-I**					
Paper Number		Elective-I					
Category	Elective	**Year**	II	**Credits**	**2**	**Course Code**	**222E3A**
		Semester	III				
Instructional Hours per week		**Lecture**	**Tutorial**		**Lab Practice**		**Total**
		1	**1**		**-**		**2**
Pre-requisite		To study the basics of botany.					

Learning Objectives	
C1	To study morphological and anatomical adaptations of plants of various habitats.
C2	To demonstrate techniques of plant tissue culture.
C3	To familiarize with the structure of DNA, RNA.
C4	To carryout experiments related with plant physiology.
C5	To perform biochemistry experiments.

Course outcomes: CO	**On completion of this course, the students will be able to:**	**Programme outcomes**
CO1	Increase the awareness and appreciation of human friendly algae and their economic importance.	K1
CO2	Develop an understanding of microbes and fungi and appreciate their adaptive strategies.	K2
CO3	Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms.	K3
CO4	Compare the structure and function of cells and explain the development of cells.	K4
CO5	Understand the core concepts and fundamentals of plant biotechnology and genetic engineering.	K5

UNIT	**CONTENTS**
I	**Algae:** General characters of algae - Structure, reproduction and life cycle of the following genera - *Anabaena* and *Sargassum* and economic importance of algae.
II	**Fungi, Bacteria and Virus:** General characters of fungi, structure, reproduction and life cycle of the following genera - *Penicillium* and *Agaricus* and economic importance of fungi. Bacteria - general characters, structure and reproduction of *Escherichia coli* and economic importance of bacteria. Virus - general characters, structure of TMV, structure of bacteriophage.

III	**Bryophytes, Pteridophytes and Gymnosperms:** General characters of Bryophytes, Structure and life cycle of *Funaria*. General characters of Pteridophytes, Structure and life cycle of *Lycopodium*. General characters of Gymnosperms, Structure and life cycle of *Cycas*.
IV	**Cell Biology:** Prokaryotic and Eukaryotic cell- structure /organization. Cell organelles - ultra structure and function of chloroplast, mitochondria and nucleus. Cell division - mitosis and meiosis.
V	**Genetics and Plant Biotechnology:** Mendelism - Law of dominance, Law of segregation, Incomplete dominance. Law of independent assortment. Monohybrid and dihybrid cross - Test cross - Back cross. Plant tissue culture - *In vitro* culture methods. Plant tissue culture and its application in biotechnology.
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	1. Singh, V., Pande, P.C and Jain, D.K. 2021. A Text Book of Botany. Rastogi Publications, Meerut. 2. Bhatnagar, S.P and Alok Moitra. 2020. Gymnosperms, New Age International (P) Ltd., Publishers, Bengaluru. 3. Sharma, O.P. 2017. Bryophyta, MacMillan India Ltd. Delhi. 4. Lee, R.E. 2008. Phycology, IV Edition, Cambridge University Press, New Delhi. 5. Rao, K., Krishnamurthy, K.V and Rao, G.S. 1979. Ancillary Botany, S. Viswanathan Pvt. Ltd., Madras.
Reference books:	1. Parihar, N.S. 2012. An introduction to Embryophyta –Pteridophytes - Surjeet Publications, Delhi. 2. Alexopoulos, C.J. 2013. Introduction to Mycology. Willey Eastern Pvt. Ltd. 3. Vashishta, P.C. 2014. Botany for Degree Students Gymnosperms. Chand & Company Ltd, Delhi. 4. Coulter, M. Jhon, 2014. Morphology of Gymnosperms. Surjeet Publications, Delhi. 5. Vashishta, P.C. 2014. Botany for Degree Students Algae. 2014. Chand & Company Ltd, Delhi. 6. Parihar, N.S. 2013. An introduction to Embryophyta –Bryophytes -, Surjeet Publications, Delhi. 7. Pandey B.P. 1986, Text Book of Botany (College Botany) Vol I &II, S.Chand and Co. New Delhi.

Web Resources	https://www.kobo.com/us/en/ebook/the-algae-world http://www.freebookcentre.net/biology-books-download/Fungi-(PDF-15P).html http://scitec.uwichill.edu.bb/bcs/bl14apl/bryo1.htm https://www.toppr.com/guides/biology/plant-kingdom/pteridophytes/ https://arboretum.harvard.edu/wp-content/uploads/2013-70-4-beyond-pine-cones-an-introduction-to-gymnosperms.pdf https://www.us.elsevierhealth.com/medicine/cell-biology https://www.us.elsevierhealth.com/medicine/genetics https://www.kobo.com/us/en/ebook/plant-biotechnology-1

Mapping with Programme Outcomes:

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

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

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SEMESTER - III

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
222E3B	**Zoology I**	Elective	1	1	-	-	2	2	25	75	100

Learning Objectives	
CO1	To acquire a basic knowledge of diversity and organization of Protozoa and Porifera
CO2	To acquire a basic knowledge of diversity and organization of Coelenterates, Helminthes and Annelida ,Arthropoda, Mollusca and Echinodermata
CO3	To comprehend the taxonomic position and diversity among Protochordata, Pisces and Amphibia
CO4	To comprehend the taxonomic position and diversity among Reptilia, Aves and Mammalia
CO5	To acquire detailed knowledge of certain invertebrate and chordate forms

UNIT	Details	No. of Hours	Course Objectives
I	Diversity of Invertebrates–I Principles of taxonomy. Criteria for classification–Symmetry and Coelom–Binomial nomenclature. Classification of Protozoa and Porifera up to classes with two examples. **Protozoa :**Type study: *Paramecium caudatum* **Porifera :**Type Study: Scypha (sycon)	12	CO1
II	Diversity of Invertebrates–II Classification of Coelenterata, Helminthes and Annelida upto classes with two examples. **Coelenterata :** Type study: *Obelia geniculata* **Platyhelminthes:** Type study*: Fasciola hepatica* **Annelida :** Type study: *Hirudinaria* (Leech)	12	CO2
III	Diversity of Invertebrates–III Classification of Arthropoda, Mollusca and Echinodermata upto classes with two examples. **Arthropoda :** Type study: *Penaeus* (Prawn) **Mollusca :** Type study: *Unio* **Echinodermata:** Type study: *Asterias* (Star fish)	12	CO3
IV	Diversity of Chordates–I	12	CO4

	Classification of Prochordata ,Pisces and Amphibia upto orders with two examples. **Prochordates:** Type study: *Amphioxus* – Structure and affinities **Vertebrates -**Pisces **:** Type study: Shark **Amphibians :** Type study: Frog		
V	Diversity of Chordates–II Classification of Reptilia, Aves and Mammalia upto orders giving two examples. **Reptiles :** Type study: *Calotes* **Aves :** Type study- Pigeon **Mammalia :** Type study- Rabbit	12	CO5
	Total	**60**	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Recall the characteristic features invertebrates and chordates.	PO1
CO2	Classify invertebrates up to class level and chordates up to order level	PO1
CO3	Explain and discuss the structural and functional organisation of some invertebrates and chordates	PO4, PO6
CO4	Relate the adaptations and habits of animals to their habitat	PO4, PO5, PO6
CO5	Analyse the taxonomic position of animals.	PO3, PO8

Text Books (Latest Editions)	
1.	EkambaranathaIyer,-OutlinesofZoologyViswanathanPublication

References Books **(Latest editions, and the style as given below must be strictly adhered to)**	
1.	Ekambaranatha Iyar and T.N.Ananthakrishnian - A Manual
2.	EkambaranathaIyarandT.N.Ananthakrishnan,-AManualofZoology-Invertebrata–VolII:ViswanathanPublishors.
3.	EkambaranathaIyarandT.N.Ananthakrishnan,-AManualofZoology:ChordataViswanathanPublishers.
4.	JordanE.L.andP.S. Verma-Invertebrate Zoology,S.Chand&Co.

Web Resources

1.	www.sanctuaryasia.com	
2.	www.iaszoology.com	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**
CO 1	S							
CO 2	M		S					
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

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

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Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
222E3C	**Biotechnology – I**	Elective	1	1	0	0	2	2	25	75	100

Learning objectives

The main objectives of this course are to -

- Acquire basic knowledge of biotechnology, history, various branches associated with biotechnology and its application in varied fields and research opportunities
- Understanding of biotechnology as a discipline and milestone discoveries in life sciences that led to establishment of Biotechnology as a separate discipline
- Learning about various branches of Biotechnology
- Learning the interdisciplinary nature of Biotechnology
- To create awareness on the scope and applications of Biotechnology
- To create awareness on the research opportunities and research sectors

Unit: I Scope and Introduction to Biotechnology	History & Introduction to Biotechnology What is Biotechnology? Definition of Biotechnology Traditional and Modern Biotechnology
Unit II Basics of Physiology	Physiology – Plant physiology: Fundamentals of Photosynthesis,IntracellularOrganizationofPhotosyntheticSystem,AnimalPhysiology:Basicsofrespiratory,digestive, excretory, CNS
Unit III Branches of Biotechnology	Brief introduction-Plant Biotechnology, Animal Biotechnology, Genetic engineering, Marine Biotechnology Environmental Biotechnology, Industrial biotechnology Pharmaceutical biotechnology

Unit IV Applications Biotechnology	Applications of Biotechnology in Agriculture, food industry, beverages industry, pharmaceutical industry, waste water treatments, Aquaculture and forensic sciences, IPR
Unit V Research in Biotechnology	Biotechnology Research in India, Biotechnology Institutions in India (Public and Private Sector) Biotechnology in context of Developing World Public Perception of Biotechnology

Course Outcomes

CO	**On completion of this course, students will be able to**	**Program Outcomes**
CO1	Establish a stronger foundation in historical background and basics of Biotechnology	PO1
CO2	Learn about various branches of Biotechnology	PO1,PO3
CO3	Gain awareness on the scope & interdisciplinary nature of Biotechnology	PO5,PO6
CO4	Know applications of Biotechnology	PO5,PO6
CO5	Gain awareness on Research and Research sectors	PO5,PO6

Reference Books

1. Satyanarayana U(2008),Biotechnology, Books & Elective(P) Ltd.

2. CassidaL(2007) Industrial Microbiology, New Age International

Reference books

1. JamesD.Watson,AmyA.Caudy,RichardM.Myers,JanWitkowski(2006)Recombinant DNA: Genes and Genomes - a Short Course (3rd ed), W.H. Freeman & Co

2. ReedG(2004)Prescott and Dunn's Industrial Microbiology, CBS Publishers & Distributors

3. Click B.R. and Pasternark J.J (2010). Molecular Biotechnology: Principles and Applications of Recombinant DNA. (4th ed) American Society for Microbiology

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO 1	3		3		3	3	3	3	3	3
CO 2	3		3		3	3	3	3	3	3
CO 3	3		3		3	3	3	3	3	3
CO 4	3		3		3	3	3	3	3	3
CO5	3		3		3	3	3	3	3	3

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

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<table>
<tr><td colspan="2">Title of the Course</td><td colspan="7">BIOSTATISTICS-1</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>II</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code</td><td rowspan="2">222E3E</td></tr>
<tr><td>Semester</td><td>III</td></tr>
<tr><td colspan="2">Instructional Hours Per week</td><td>Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2"></td><td>2</td><td colspan="2">1</td><td colspan="2">--</td><td>3</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="7">High School level Mathematics</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="7">1. The main objectives of this course are:
2. To provide in depth knowledge about types of data, organizing data, presentation of data.
3. Toexplainvariousdescriptivemeasuresforextractingmeaningfulinformationfromthedata and their interpretation.
4. To know sampling methods, knowledge about bivariatedata- its graphical representation, quantifying its relationship
5. To know about Probability and basic probability distributions
Carryout different test procedures.</td></tr>
<tr><td colspan="2" rowspan="4">Course Outline</td><td colspan="7">Unit I
Retrospective and Prospective studies, Definition of statistics, application of Statistics in various fields like clinical trials and epidemiology research, continuous and categorical data, Types of measurement Scales-Nominal, Ordinal, Interval &Ratio. Frequency table, diagrammaticrepresentationofstatisticaldata-barchartPiechart,frequency polygon, histogram</td></tr>
<tr><td colspan="7">Unit II
Measures of location-arithmetic mean, median and mode.
Simple numerical problems
Measuresofdispersion–Range,meandeviation,quartiledeviation,standard deviation. Simple numerical problems
Coefficient of variation, Coefficient of Dispersion. Skewness and kurtosis. Box plot, outliers</td></tr>
<tr><td colspan="7">Unit III
Simple random sampling, systematic sampling, stratified sampling.
Bivariate data-scatter diagram-Pearson Correlation –Rank correlation, simple regression lines. Simple numerical problems</td></tr>
<tr><td colspan="7">Unit-IV
Events, Independent events, Probability definition and properties, Binomial Distribution, Poisson Distribution, Normal Distribution and standard normal distribution. Simple numerical problems</td></tr>
</table>

	Unit-V Concepts of sampling distribution- standard error-type I and type IIerrors, errors- level of significance,criticalregion, Statistical tests for single mean and double means- based on standard normal distribution and Students-t distributions, proportion based tests, chi-square test for variance, one-way ANOVA test. Simple numerical problems.
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination Question paper)	
Skills acquired from this course	Basic Knowledge in Statistics,ProblemSolving,Analyticalability,ProfessionalCompetency
Recommended Text	1. WAYNE W. DANIEL (2018): Biostatistics: A Foundation for Analysis in the Health Sciences, Wiley. 2. MICHAEL R. CHERNICK and ROBERT H. FRIIS (2003): Introductory Biostatistics for Health Sciences, John Wiley and Sons
Reference Books	1. KenBlack-AppliedBusinessStatistics–Wiley2012. 2. Pillai,R.S.NandBagavathi,V.(2003):Statistics,S.ChandandCompanyLtd.NewDelhi 3. Sharma,J.K.(2009):BusinessStatiastics,2nd edition,PearsonEducation.
Website and e-Learning Source	e-books, tutorials on MOOC/SWAYAM courses on the subject 1. https://www.khanacademy.org/math/statistics-probability/random-variables-stats-libraryhttps://www.stat.pitt.edu/stoffer/tsa4/intro_prob.pdf 2. https://nptel.ac.in/content/syllabus_pdf/111102112.pdf 3. https://towardsdatascience.com/descriptive-statistics-f2beeaf7a8df

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SKILL ENHANCEMENT COURSE -SEC

BIOMEDICAL INSTRUMENTATION

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22SEC2	**Biomedical Instrumentation**	SEC(Discipline)	2	-	-	-	2	2	25	75	100

Learning Objectives

The objectives of this course are to

- Provide insights about the blood pressure and its measurement.
- Elaborate the mechanism of instruments related to respiration.
- Highlight the importance of imaging techniques.
- Acquaint students about the basics of medical assisting devices.
- Familiarize about the life saving therapeutic equipments.

Module I: Measurement of blood pressure – sphygmomanometer. Cardiac output – Cardiac rate – Heart sound – Stethoscope, ECG – EEG – EMG – ERG.6 Hrs

Module II: Monitoring of inspired/expired anaesthetic gases, capnograph, inhalators, nebulizers, aspirators, infant respirator, Plethysmography.6 Hrs

Module III: Medical imaging: X-ray machine - Radio graphic and fluoroscopic techniques – Computed tomography – MRI – PET, Ultrasonography – Endoscopy – Thermography.6 Hrs

Module IV: Assisting equipments: Pacemakers – Defibrillators – Ventilators6 Hrs

Module V: Therapeutic equipments: Nerve and muscle stimulators –Diathermy – Heart – Lung machine – Audio meters – Dialyzers. 6 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Programme outcome
CO1	Illustrate the functions of instruments used for measuring blood pressure.	PO1, PO2, PO5
CO2	Elaborate the devices required for monitoring of respiratory gases.	PO1, PO2, PO5
CO3	Understand the operation of the imaging and sonographic instruments.	PO1, PO2, PO5
CO4	Differentiate between the action of pacemakers, defibrillators and ventilators.	PO1, PO2, PO5
CO5	Demonstrate the function of therapeutic equipments	PO1, PO2, PO5

Text books

1. M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies.
2. L.A. Geddes and L. E. Baker, 'Principles of Applied Bio-Medical Instrumentation', John Wiley & Sons.
3. J. Webster, 'Medical Instrumentation', John Wiley & Sons.
4. C. Rajarao and S. K. Guha, 'Principles of Medical Electronics and Bio-medical Instrumentation', Universities (India) Ltd, Orient Longman Ltd.

Reference books

1. Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, 'Bio-Medical Instrumentation and Measurements', II Edition, Pearson Education, 2002.
2. R. S. Khandpur, 'Handbook of Bio-Medical instrumentation', Tata McGraw Hill Publishing Co Ltd.,

Web Resources

https://youtu.be/GkUCmb0cKwo?list=PLCZ9KmODEcu138IlVeHClJ4nskArYr1Dg

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3			3		3	3	3	3
CO 2	2	3			3		3	3	3	3
CO 3	2	3			3		3	3	3	3
CO 4	2	3			3		3	3	3	3
CO 5	2	3			3		3	3	3	3

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

FIRST AID

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22SEC3	**First Aid**	SEC (Discipline)	1	1	-	-	2	2	25	75	100

Learning Objectives

The main objectives of this course are to:

- Provide knowledge on the basics of first aid.
- Perform first aid during various respiratory issues.
- Demonstrate the first aid to treat injuries.
- Learn the first aid techniques to be given during emergency.
- Familiarize the first aid during poisoning.

Module I: Aims and important rules of first aid, dealing with emergency, types and content of a first aid kit. First aid technique – Dressing and Bandages, fast evacuation technique, transport techniques.6 Hrs

Module II: Basics of Respiration – CPR, first aid during difficult breathing, drowning, choking, strangulation and hanging, swelling within the throat, suffocation by smoke or gases and asthma. 6 Hrs

Module III: Common medical aid- first aid for wounds, cuts, head, chest, abdominal injuries, shocks, burns, amputations, fractures, dislocation of bones. 6Hrs

Module IV: First aid related to unconsciousness, stroke, fits, convulsions- seizures, epilepsy. 6Hrs

Module V: First aid in poisonous bites (Insects and snakes), honey bee stings, animal bites, disinfectant, acid and alkali poisoning .6Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Discuss on the rules of first aid, dealing during emergency and first aid techniques	PO1, PO4, PO5
CO2	Understand the first aid techniques to be given during different types of respiratory problems	PO1, PO4, PO5
CO3	Provide first aid for injuries, shocks and bone injury	PO1, PO4, PO5
CO4	Detail on the first aid to be given for unconsciousness, stroke, fits and convulsions	PO1, PO4, PO5
CO5	Gain expertise in giving first aid for insect bites and chemical poisoning	PO1, PO4, PO5

Text books

1) First aid and health Dr. Gauri Goel, Dr. Kumkum Rajput, Dr. Manjul Mungali 1SBN-978-93-92208-19-5

2) Indian First Aid Mannual-https://www.indianredcross.org/publications/FA-manual.pdf

3) Red Cross First Aid/CPR/AED Instructor Manual

Reference books

Web resources

1) https://www.redcross.org/take-a-class/first-aid/first-aid-training/first-aid-online

2) https://www.firstaidforfree.com/

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2						3	3	3	3
CO 2	2			3	3		3	3	3	3
CO 3	2			3	3		3	3	3	3
CO 4	2			3	3		3	3	3	3
CO5	2			3	3		3	3	3	3

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

MICROBIAL TECHNIQUES

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22SEC6	**Microbial Techniques**	SEC (Discipline)	1	1	-	-	2	2	25	75	100

Learning objectives

The objectives of this course are to

- Study the growth of bacteria
- Know the parts & uses of microscope
- Learn staining methods to identify microbes
- Learn different types of culture methods
- Study food preservation methods

Module – I: Growth of bacteria- Definition, growth phases, factors affecting growth (pH, temperature, and oxygen), cell count (haemocytometer, Bacterial cell- Bacillus subtilis), fungal cell (Saccharomyces) and human blood cell.6 Hrs

Module -II: Microscopy- Principle, types - Compound microscope, electron microscope- TEM, SEM, use of oil immersion objective.6 Hrs

Module III: Stains and staining- Principles of staining, simple staining, negative staining, Differential staining, Gram and acid-fast staining, flagella staining, capsule and endospore Staining. Staining of yeast (methylene blue), lactophenol cotton blue, staining of mold (Penicillium, Aspergillus), Agaricus. 6 Hrs

Module IV: Cultivation of bacteria– Types of growth media (natural, synthetic, complex, enriched, selective- definition with example), culture methods (streak plate, spread plate, pour plate, stab culture, slant culture, liquid shake culture, anaerobiosis) - aerobic and Anaerobic bacteria. 6 Hrs

Module V: Food microbiology- Microbiological examination of food: microscopic examination and culture, phosphatase test of Pasteurized milk. Preservation of food- High temperature (boiling, pasteurization, appreciation), low temperature (freezing), dehydration, osmotic pressure, chemical preservations, radiation. Microorganisms as food SCP. 6 Hrs

Course Outcome

CO	On completion of this course, students will be able to	Program Outcomes
CO1	Understand the growth of bacteria and to perform cell count	PO1, PO2
CO2	Acquire knowledge of microscope and its uses	PO1, PO2
CO3	Identify the microbes by staining methods	PO1, PO2, PO6
CO4	Culture microbes by various methods	PO1, PO2, PO6
CO5	Preserve foods at high and low temperature	PO, PO2, PO6

Text books

1. Sherris Medical Microbiology, 7th Edition by Authors: Kenneth Ryan, C. George Ray, Nafees Ahmad, W. Lawrence Drew, Michael Lagunoff, Paul Pottinger, L. Barth Reller and Charles R. Sterling
2. Food Microbiology: Fundamentals and Frontiers, 5th Edition by Editor(s): Michael P. Doyle, Francisco Diez-Gonzalez, Colin Hill
3.Text book of microbiology by Ananthanarayan and Panicker's
4. Textbook of microbiology by P.C. Trivedi Sonali Pandey Seema Bhadauria5. 5.Prescott's Microbiology, 10th Edition by Authors: Joanne Willey, Linda Sherwood and Christopher J. Woolverton

Reference books

1. Bailey& Scott's Diagnostic Microbiology, 14th Edition by Author: Patricia Title
2. Medical Microbiology, 7th Edition Authors: Patrick R. Murray, Ken S. Rosenthal and Michael A. Pfaller
3. Microbiology: Laboratory Theory and Application, 3rd Edition Authors: Michael J. Leboffe and Burton E. Pierce

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3					3	3	3	3
CO 2	2	3					3	3	3	3
CO 3	2	3				2	3	3	3	3
CO 4	2	3				2	3	3	3	3
CO5	2	3				2	3	3	3	3

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

UNIVERSITY OF MADRAS
U.G. DEGREE COURSE

ENVIRONMENTAL STUDIES PROGRAMME
ABILITY ENHANCEMENT COMPULSORYCOURSES
(AECC- Environmental Studies)
Syllabus with effect from the academic year 2018-2019
(i.e. for batch of candidates admitted to the course from the academic year 2017-18)

Credits: 2 II Year / III/IV Sem.

Unit 1: Introduction to Environmental Studies
- Multidisciplinary nature of environmental studies;
- Scope and importance; concept of sustainability and sustainable development.

Unit 2 : Ecosystem (2 lectures)
- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem:
  Food chains, food webs and ecological succession, Case studies of the following ecosystem:
  a) Forest ecosystem
  b) Grassland ecosystem
  c) Desert ecosystem
  d) Aquatic ecosystem (ponds, stream, lakes, rivers, ocean, estuaries)

Unit 3: Natural Resources : Renewable and Non – renewable Resources (6 lectures)
- Land resources and landuse change: Land degradation, soil erosion and desertification.
- Deforestation : Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water : Use and over –exploitation of surface and ground water, floods, droughts, conflicts over water (international and inter-state).
- Energy resources : Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit 4: Biodiversity and Conservation (8 lecturers)
- Levels of biological diversity: genetics, species and ecosystem diversity, Biogeographic zones of India: Biodiversity patterns and global biodiversity hot spots
- India as a mega- biodiversity nation, Endangered and endemic species of India.
- Threats to biodiversity: Habitat loss, poaching of wildlife, man- wildlife conflicts, biological invasions; Conservations of biodiversity: In-situ and Ex-situ Conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit 5: Environmental Pollution (8 lecturers)
- Environmental pollution: types, causes, effects and controls: Air, Water, soil and noise Pollution.
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste
- Pollution case studies.

Unit 6: Environmental Policies & Practices (8 lecturers)

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act, Air (Prevention & Control of Pollution) Act; Water (Prevention and Control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human Wildlife conflicts in Indian context.

Unit 7: Human Communities and the Environment (7 lectures)

- Human population growth, impacts on environment, human health and welfare.
- Resettlement and rehabilitation of projects affected persons; case studies.
- Disaster management: floods, earthquake, cyclone and landslides.
- Environmental movements : Chipko, Silent Valley, Bishnois of Rajasthan.
- Environmental ethics : Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies(e.g. CNG Vehicles in Delhi)

Unit 8 : Field Work (6 lectures)

- Visit to an area to document environmental assets: river / forest/ flora/ fauna etc.
- Visit to a local polluted site – Urban / Rural/ Industrial/ Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystem- pond, river, Delhi Ridge etc.

(Equal to 5 Lectures)

Suggested Readings:

1. Carson , R. 2002.Slient Spring, Houghton Mifflin Harcourt.
2. Gadgil , M.,& Guha, R. 1993.This Fissured Land: An Ecological History of India. Univ.of California Press.
3. Glesson, B. and Low, N.(eds.)1999. Global Ethics and Environment, London, Routledge.
4. Gleick,P.H.1993.Water Crisis. Pacific Institute for Studies in Dev.,Environment & Security. Stockholm Env.Institute, Oxford Univ.Press.
5. Groom, Martha J., Gary K.Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates,2006.
6. Grumbine,R.Edward, and Pandit,M.K2013.Threats from India's Himalayas dams .Science,339:36-37
7. McCully,P.1996.Rivers no more :the environmental effects of dams(pp.29-64).Zed books.
8. McNeill,John R.2000.Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum,E.P.,Odum, H.T.& Andrees,J.1971.Fundamental of Ecology. Philadelphia Saunders.
10. Pepper,I.L.,Gerba,C.P & Brusseau,M.L.2011.Environmental and Pollution Science. Academic Press.
11. Rao,M.N.& Datta,A.K1987.Waste Water Treatment. Oxford and IBH Publishing Co.Pvt.Ltd.
12. Raven,P.H.,Hassenzahl,D.M & Berg,L.R.2012 Environment.8th edition. John Willey & sons.

13. Rosencranz, A., Divan,S.,& Noble, M.L.2001.Environmental law and policy in India. Tirupathi 1992.
14. Sengupta,R.2003.Ecology and Economics: An approach to sustainable development.OUP
15. Singh,J.S.,Singh,S.P and Gupta,S.R.2014.Ecology,Environmental Science and Conservation. S.Chand Publishing, New Delhi.
16. Sodhi,N.S.,Gibson,L.&Raven ,P.H(eds).2013.Conservation Biology :Voices from the Tropics. John Willey & Sons.
17. Thapar,V.1998.Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Warren,C.E.1971.Biology and water Pollution Control. WB Saunders.
19. Willson,E.O.2006. The Creation: An appeal to save life on earth..New York: Norton.
20. World Commission on Environment and Development.1987.Our Common Future. Oxford University Press.

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சென்னைப் பல்கலைக்கழகம்
University of Madras

Part-I

பொதுத் தமிழ் - பாடத்திட்டம்

General Tamil - Syllabus

4 பருவங்கள் (நான்காம் பருவம்)

(B.A., B.Sc., B.Com., BCA., BBA)

2023-24

பொதுத்தமிழ் -4

தமிழும் அறிவியலும்

இரண்டாம் ஆண்டு – நான்காம் பருவம்

Course Code	Course Name	category	L	T	P	S	Credits	Ins.Hrs	CIA	External	Total
200L4AU	பொதுத்தமிழ் -4 தமிழும் அறிவியலும்	Supportive	Y	-	-	-	3	6	25	75	100

Learning Objectives

- தாய்மொழி வழியாக அறிவியல் பற்றிய சிந்தனைகளை வளர்த்தல்.
- அறிவியல் கலைச் சொல்லாக்கம் பற்றிப் பயிற்றுவித்தல்.
- மாணவர்களுக்கு அறிவியல் பார்வையை ஏற்படுத்துதல்.
- தமிழில் அறிவியல் படைப்பிலக்கியங்களை உருவாக்கத் தூண்டுதல்
- தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்

Expected Course Outcomes

On the Sucessful completion of the Course, Students will be able to

இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்

CO 1	தாய்மொழி வழியாக அறிவியல் பற்றிச் சிந்திக்கும் திறன் பெற்றிருப்பர்.	K4
CO 2	அறிவியல் கலைச் சொல்லாக்கம் பற்றிய விதிகள், நுணுக்கங்களைத் தெரிந்திருப்பர்.	K5, K6
CO 3	அறிவியல் தமிழ் வளர்ச்சியில் மொழிபெயர்ப்பின் பங்கு குறித்து அறிந்திருப்பர்.	K3
CO 4	மொழியறிவோடு சிந்தனைத்திறனைப் பெறுவர்	K3
CO 5	மொழிப்பயிற்சிக்குத் தேவையான இலக்கணங்களைக் கற்பர்.	K2

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

அலகு-1 தமிழரின் அறிவியல் சிந்தனைகள்

- அறிவியலும் மனித வாழ்வும்
- ஐந்திணைப் பகுப்பும் சூழலியலும்
- தொழில்நுட்ப மேலாண்மை
- நீர் நில மேலாண்மை

அலகு-2 பழந்தமிழ் இலக்கியங்களில் அறிவியல் சிந்தனைகள்

1. நிலவியல்
2. உலோகவியல்
3. வானவியல்
4. உயிரியல்
5. உளவியல்

அலகு-3	இடைக்கால இலக்கியங்களில் அறிவியல் சிந்தனைகள்

1. காப்பியங்களில் அறிவியல்
2. சிற்றிலக்கியங்களில் அறிவியல்
3. உரைநூல்களில் அறிவியல்

அலகு-4	இணையத் தமிழ்

1. இணையத் தமிழ் பயன்பாடு - அறிமுகம்
2. இணையத்தமிழ்க் கல்விக்கழகம்
3. இணைய நூலகம்
4. செயற்கை நுண்ணறிவியல்
5. தமிழ்நாட்டு அறிவியல் ஆளுமைகள்

அலகு-5	கடிதம் எழுதுதலும் கட்டுரை எழுதுதலும்

- உறவு முறைக் கடிதப் பயிற்சி
- அலுவலகக் கடிதப் பயிற்சி
- விண்ணப்பப் படிவம் எழுதும் பயிற்சி
- தன் விவரப் படிவம் எழுதும் பயிற்சி
- கருத்து விளக்கக் கட்டுரைகள் எழுதும் பயிற்சி
- பத்திரிகைகளுக்குக் கட்டுரை எழுதும் பயிற்சி

Text books

- அறிவியல் தமிழ் இன்றைய நிலை - இராதா செல்லப்பன், உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை.
- மணவை முஸ்தபா, தமிழில் அறிவியல் படைப்பிலக்கியம், மணவை பப்ளிகேஷன், சென்னை.
- கலைச்சொல்லாக்கம் - மங்கை, ரங்கராசபுரம், சென்னை .

Reference Books

1.தமிழர் வேளாண்மை மரபுகள் - இல).செ.கந்தசாமி

- 2. சங்க இலக்கியத்தில் வேளாண் சமுதாயம், பெ.மாதையன், நியூ செஞ்சுரி புக் ஹவுஸ்

3. தமிழில் அறிவியல் இதழ்கள்சாமுவேல்- ரா.பார்வேந்தன் ஃபிஷ்கிரீன் பதிப்பகம், கோவை

4. அறிவியல் தமிழ் - பதிப்பாசிரியர் இராதா செல்லப்பன்,பாரதிதாசன் பல்கலைக்கழகம், திருச்சிராப்பள்ளி.

5. இணையத் தமிழ் வரலாறு, மு.பொன்னவைக்கோ, பாரதிதாசன் பல்கலைக்கழகம்

6. இணையத் தமிழ், சந்திரிகா சுப்பிரமணியம் - சந்திரோதயம் பதிப்பகம்

7. இணையமும் இனிய தமிழும் - துரை. மணியரசன், இசை பதிப்பகம்

8. கணினித் தமிழ், இல. சுந்தரம் - விகடன் பிரசுரம்

9. மாண்புமிகு மண், பாமயன், வம்சி புக்ஸ்

10. தமிழ் இலக்கியத்தில் அறிவியல் சிந்தனைகள் வானதி பதிப்பகம், சென்னை
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
Web Sources

- https://www.chennailibrary.com/
- https://www.sirukathaigal.com
- https://www.tamilvirtualuniversity.org
- https://www.noolulagam.com
- https://www.katuraitamilblogspot.com

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4		3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	3	3	2	2	2	3	3

1.

Strong -3,Medium-2,Low-

UNIVERSITY OF MADRAS

FOUNDATION COURSE: TELUGU

SYLLABUS WITH EFFECT FROM 2023-2024

Course - 4	**Semester – IV**	**Course Code:200L4B**
Title of the Course : DRAMA, COMPOSITION & TRANSLATION		
Credits : 03		
Pre- requisites, if any: **Knowledge in Drama also Techniques in Translation and Writing Style in Telugu**		

Course Outcomes

- 1. To understand the rich trading of Telugu Drama
- 2. To Explain nature of Drama of Telugu
- 3. To describe the nature of understandings in Drama
- 4. To evaluate the culture of the society through Drama.
- 5. To brief the content of the techniques of translation composition

Units

I	**Introduction of Fiction Writing**
II	**Introduction of Boyi Bheemanna**
III	**Paleru**
IV	**Introduction of General Essay writing methods**
V	**Introduction about Translation**
Reading List (Print and Online)	1. Paleru – Boyi Bhemanna
Recommended Texts	1. Paleru – Boyi Bhemanna, Vishalandra Publications, Hyderabad 2. Anuvada siddhantalu S.Akki Reddy Samatha Publications, Madras

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

EXISTING SYLLABUS (22-23) FOLLOWED FOR THE ACADEMIC YEAR 2023-2024

200L4E

FOUNDATION COURSE: PART-I HINDI PAPER-IV

Inst.Hrs. : 6 **Year : II**
Credits : 3 **Semester : IV**

PAPER –IV MODERN POETRY AND INTRODUCTION TO HINDI LITERATURE (AADHUNIK KAAL)	
Duration:	**1 Semester**
Programme Outcomes:	1. Identify the Modern poets and their works, contribution to society and Literature 2. Studies the contemporary conditions and its impact on Modern poets 3. Understand and differentiate the message of poets their expressional and artistic skills and 4. Evaluation and critical study of Modern Poetry and Trends of Ancient Literature 5. Obtain the skills of summerise, interpretation of contexts and literary attitude
Programme Specific Outcomes:	1. Basic knowledge of modern Poets and their works 2. Basic Knowledge of History of Hindi literature and its trends 3. Obtain skills of briefing, interpretation and evaluation 4. Basic idea of critical and analytical study of literature. 5. Obtain the application knowledge of relation between contemporary condition and literature and its impact on poets

Course Objectives		
	1. Identify the modern trends of Modern Hindi literature, different forms of modern literature i.e. poetry, fiction etc.	K1
	2. Summarise the content of prescribed poems and understand the trends of modern Hindi Literature .	K2
	3. Critical study and analysis of artistic skills of poets and their expression skills	K4
	4. Employ the methods of interpreting contexts, ideas and identify the poetic skills through practicing annotation writing	K3 K5
	5. Differentiate the subject and poetic skills of prescribe poems with each other and also know about contemporary poets , writers and the impact of contemporary situations	K6
	6. Conceive the aims of Literature and relations between	

	Literature and contemporary society	

Pre-requisites, if any:	Basic knowledge of Modern Hindi poets and their poetry
UNITS	
I	1. Asha – (Jayashankar Prasad) 2. Tum Logon se Door (Nagarjun) 3. Literary Trends of Chayavaad
II	1. Kavi Aur Kalpana – (Dhramaveer Bhaarathi) 2. Bharat Ki Aarthi - (Shamsher Bahadhur Singh) 3. Literary Trends of Pragathivaad
III	1. Varadan Mangoonga Nahi (Siva Mangal Singh Suman) 2. Anevalon Se Ek Savaal (Bharat Bhooshan Agarwal) 3. Literary Trends of Nayee Kavita
IV	1. Literary Trends of Hindi Short Stories 2. Literary Trends of Hindi One Act Plays 3. Maithili Saran Gupta, Mahadevi Varma,
V	1. Jayashankar Prasad, Nirala, 2. Panth, Dinakar, Premchand, 3. Yashpaal, Jainendra Kumar, Mohan Rakesh,

Course Outcomes	1. Evaluate the poetic skills of poets and their poems 2. Identify the conditions inspire the poets and writers 3. Enumerate the literary trends and different literary forms 4. Understand the human, social, ethical and literary values 5. Obtain the knowledge to evaluate and critical analysis of literary works

Reading List (Print and Online)	1. Hindi Sahithya Ka Itihas, By: Ramchandra Shukla, Jaya Bharati Publications, 217, B, Maya Press Road, Allahabad – 211 003. 2. Hindi Sahithya Yug Aur Pravrithiya By: Dr. Sivakumar Varma, Asok Prakashan Nayi Sarak, New Delhi – 6. 3. Hindi Sahithya ka Itihas By : Gulabroy, Lakshmi Narayana Agarwal Book Publishers and seller, Anupama Plaza – 1, Block No. 50, Sanjay Palace, Agra – 282002

Recommended Texts	**6. Poetry Selection** **Madras University Publications** **University of Madras**

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	S	S	S
CO 2	S	S	M	S	M
CO 3	S	S	M	S	S
CO 4	M	M	S	S	S
CO 5	S	S	S	S	S

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

SYLLABUS WITH EFFECT FROM 2022-2023

EXISTING SYLLABUS (22-23) FOLLOWED FROM THE ACADEMIC YEAR 2023-2024

200L4G

FOUNDATION COURSE: PART-I SANSKRIT PAPER-IV

Inst.Hrs. : 6 **Year : II**
Credits : 3 **Semester : IV**

Paper IV – Alankara, Didactic & Modern literatures and Translation

Course Outcome	1. Apply the usage of compound words 2. Differentiate the alankaras 3. Translate the prose passages prescribed 4. Identify and apply different grammatical tenses of "Mahabharata" related translation 5. Analyze and critically assess the literary texts
	UNITS
I	Introduction to Didactic literature (*Pañcatantram* and *Hitopadeśaḥ*) Text: The lion and the hare शशकसिंहकथा (*Śaśakasiṃhakathā*) from Pañcatantram and The jackal and the elephant शृगालहस्तिकथा (*Śṛgālahastikathā*) a story from *Mitralābhaḥ* of *Hitopadeśaḥ*
II	*Alaṅkārāḥ - i. Upamā, ii. Rūpakam, iii. Ullekhaḥ, iv. Utprekṣā and v. Vyatirekaḥ*
III	Introduction to Modern literature - Introduction to अर्थशास्त्रम् (*Artha śāstram*) of चाणक्यः (*Cāṇakyaḥ*) - Introduction to मयमतम् (*Mayamatam*) - Introduction to नीतिद्विषष्ठिका (*Nīti dvi ṣaṣṭ hi kā*) - *Slokās* - 1 to 10 - Introduction to the life history of श्रीआदिशङ्कराचार्यः (*Śrī -Ādi śaṅkar ācār yaḥ*), श्रीरामाजानुचार्यः (*Śrī Rāmānuj ācār yaḥ*) and श्रीमध्वाचार्यः (*Śrī Madhvācār yaḥ*)
IV	Introduction to Modern literature in Sanskrit - Text: तिरुक्कुरळ् संस्कृतानुवादः(Sanskrit translation of Tirukkural) *Slokās* 1 to 10 ईश्वरवन्दनम् (*Kaḍavuḻ Vāzhththu*) by कलियन् रामानुजजीयर् (*Kaliyan Rāmānujajīyar*) नालडियार् (*Nāladiyār*) translated by श्री एस्. एन्. रामदेशिकः (*Śrī S. N Rāmadeśi ka*) - *Slokās*: 1 to 5
V	Translation from prose section Unit - I stories Grammar: Conjugation - *Loṭ lakārāḥ* (Imperative mood) (i) गच्छतु (*Gacchat u*) (i i) तिष्ठतु (*Ti ṣṭ hat u*) (i i i) पठतु (*Paṭ hat u*) (i v) शृणोतु (*Śṛ ṇot u*) (v) करोतु (*Kar ot u*)

Course Objectives	Demonstrate the usage of connecting words	K2
	Understand the alankaras which are used in devotional lyrics	K2
	Draft and summarize the literary texts	K3
	Identify the meaning, types of figure of speech of the prescribed text	K3
	Analyze and critically assess the literary texts	K4

Book recommended for Reference	*Kalāśālā-Saṁskṛta-Sukhabodhinī - IV* **To be Published by: University of Madras, Chennai - 5**

Mapping with Programme Outcomes:

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	M	S	S
CO2	S	S	M	S	S
CO3	S	S	M	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	M

S-Strong M-Medium L-Low

UNIVERSITY OF MADRAS

FOUNDATION COURSE: FRENCH

SYLLABUS WITH EFFECT FROM 2023-2024

UG & 5 Year PG Integrated – SEMESTER – IV

Foundation Course: Translation, Comprehension and Grammar - II

Course Outcomes	1. Apply connecting words (*cause, but, concession, condition, hypothèse, conséquence*) to improve the spoken as well as written communication skills 2. Differentiate the various past tenses in "*Les Temps du Passé*" and their unique usage 3. Summarize the literary texts 4. Identify and apply the different grammatical tenses of "*les temps du passé*" in sample exercises to practice 5. Critically assess the literary texts through an analysis of its themes, narrative techniques, characters and its cultural significance		
Course	Foundation Course in French	**Course Code**	**200L4K**
Title of the Course:	Translation, Comprehension and Grammar – II		
Credits:	3		
Pre-requisites, if any:	**----**		
Course Objectives	Demonstrate the usage of connecting words in a given text		K2
	Understand and differentiate the various types of past tenses in "*Les Temps du Passé*"		K2 and K4
	Summarize the literary texts after a thorough analysis		K2 and K4
	Identify and apply the different grammatical tenses of "*les temps du passé*"		K3
	Analyze and critically assess the literary texts with regard to the themes and literary techniques		K4 and K5
UNITS			
I	*Estula* *Décadi et son grand-père* Le plus-que-parfait		
II	*Une mauvaise nouvelle* *L'égoïste puni* Le passé simple		
III	*La visite de la grand-mère* L'expression de la cause L'expression de la conséquence		
IV	*Le Horla* L'expression du but L'expression de la concession		
V	*Monsieur Friquet* *Le lévrier et le serpent* L'expression de la condition et de l'hypothèse		
Prescribed Text	K. Madanagobalane & N.C. Mirakamal, *Le français par les textes*, Chennai, Samhita Publications – Goyal Publisher & Distributors Pvt Ltd, 2017		

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	S	M	L	S	M	L	S	S	S	M	S	M
CO2	S	M	M	L	M	M	L	S	S	S	S	M	M
CO3	M	S	S	M	M	M	M	S	S	M	M	S	M
CO4	S	M	M	L	M	M	L	S	S	S	S	M	M
CO5	M	S	S	M	M	M	M	S	S	M	M	S	M

S-Strong M-Medium L-Low

SEMESTER IV

Title of the Paper : Translation, Comprehension and Grammar-II

Prescribed textbook: K.Madanagobalane & N.C.Mirakamal, *Le français par les textes*, Chennai, Samhita Publications-Goyal Publisher & Distributors Pvt Ltd, 2017

The following texts from the prescribed textbook:

- *Estula*
- *Décadi et son grand-père*
- *Une mauvaise nouvelle*
- *L'égoïste puni*
- *La visite de la grand-mère*
- *Le Horla*
- *Monsieur Friquet*
- *Le lévrier et le serpent*

The following grammar components are chosen from the prescribed textbook:

- Le plus-que-parfait

- Le passé simple
- L'expression de la cause
- L'expression de la conséquence
- L'expression du but
- L'expression de la concession
- L'expression de la condition et de l'hypothèse

Paper setters to strictly adhere to the syllabus and ask questions only from the pages included in the syllabus. Questions should cover the entire syllabus.

QUESTION PAPER PATTERN

Time : 3 Hours Maximum Marks : 75

Section A (10 x 2 = 20 Marks)

Answer any TEN questions

15 questions to be asked from the prescribed texts (name of the text might be included within brackets in the question)

Section B (5 x 5 = 25 Marks)

Answer any FIVE questions

8 Grammar exercises to be given from the prescribed textbook

Section C (3 x 10 = 30 Marks)

Answer any THREE

3 must be answered out of 5 topics (1 translation of a prescribed text, 1 translation of unknown text, 1 comprehension of unknown text, 2 summaries of the prescribed texts)

-***-

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**
CO	3	3	3	2	1

3-Strong 2-Medium 1-Low

Course IV	**Course Code**	**Title of the Course**	**Credits**
FC	200L4H	Paper IV : Quran and Hadith	3

Course Outcome	1. Know the principal textual sources of the Islamic tradition: The Qur'an and the Hadith. 2. Know the role of Quran and Hadith in the synthesis of Islamic faith and practice. 3. Understand the structure of Arabic grammar through Quran and Hadith. 4. Understand the methodology of translation of Quran and Hadith. 5. Understand the moral values of Quran and Hadith
Pre-requisites, if any:	Nil
Course Objectives	1. Know the importance of Quran and Hadith. 2. Understand the style of Quran and Hadith. 3. Understand the role of Quran and Hadith in the Islamic faith and law.

	4. Know the structure of Arabic grammar through the examples from Quran and Hadith. 5. Learn the cultural and moral values.
Units	
I	(١. سورة لقمان من القرآن الكريم ٢. أحاديث سهلة للدكتور ف. عبد الرحيم) سورة لقمان من الآية ١ إلى الآية ١٠
II	من الآية ١١ إلى ٢٠
III	من الآية ٢١ إلى ٣٤
IV	أحاديث سهلة من الحديث ١ إلى الحديث ١٠
V	من الحديث ١١ إلى الحديث ٢٠
Prescribed Text Book	١. سورة لقمان من القرآن الكريم ٢. أحاديث سهلة للدكتور ف. عبد الرحيم 1) Sooratu Luqman 2) Ahadeeth Sahlah By Dr. V. Abdur Rahim
Reading List (Print and online)	Tafsir Al-Jalalain The Noble Quran, Dr. Muhammad Muhsin Khan and Muhammad Taqi-Ud-Dhin Al-Hilali الأربعون النووية نصوص من الحديث النبوي الشريف، الدكتور ف. عبد الرحيم

	شرح أحاديث سهلة، الدكتور ش. عبد المالك https://quran.com/ https://sunnah.com/nawawi40

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

Methods of assessment:

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and cons

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO	1	2	3	3	3

3-Strong 2-Medium 1-Low

UNIVERSITY OF MADRAS

UG & 5 YR INTEGRATED DEGREE – FOUNDATION COURSE

EXISTING SYLLABUS (22-23) FOLLOWED FOR THE ACADEMIC YEAR 2023-2024

200L4E

FOUNDATION COURSE: PART-I HINDI PAPER-IV

Inst.Hrs. : 6 **Year : II**
Credits : 3 **Semester : IV**

PAPER –IV MODERN POETRY AND INTRODUCTION TO HINDI LITERATURE (AADHUNIK KAAL)	
Duration:	**1 Semester**
Programme Outcomes:	1. Identify the Modern poets and their works, contribution to society and Literature 2. Studies the contemporary conditions and its impact on Modern poets 3. Understand and differentiate the message of poets their expressional and artistic skills and 4. Evaluation and critical study of Modern Poetry and Trends of Ancient Literature 5. Obtain the skills of summerise, interpretation of contexts and literary attitude
Programme Specific Outcomes:	1. Basic knowledge of modern Poets and their works 2. Basic Knowledge of History of Hindi literature and its trends 3. Obtain skills of briefing, interpretation and evaluation 4. Basic idea of critical and analytical study of literature. 5. Obtain the application knowledge of relation between contemporary condition and literature and its impact on poets

Course Objectives		
	1. Identify the modern trends of Modern Hindi literature, different forms of modern literature i.e. poetry, fiction etc.	K1
	2. Summarise the content of prescribed poems and understand the trends of modern Hindi Literature .	K2
	3. Critical study and analysis of artistic skills of poets and their expression skills	K4
	4. Employ the methods of interpreting contexts, ideas and identify the poetic skills through practicing annotation writing	K3 K5
	5. Differentiate the subject and poetic skills of prescribe poems with each other and also know about contemporary poets , writers and the impact of contemporary situations	K6
	6. Conceive the aims of Literature and relations between	

	Literature and contemporary society	

Pre-requisites, if any:	Basic knowledge of Modern Hindi poets and their poetry
UNITS	
I	1. Asha – (Jayashankar Prasad) 2. Tum Logon se Door (Nagarjun) 3. Literary Trends of Chayavaad
II	1. Kavi Aur Kalpana – (Dhramaveer Bhaarathi) 2. Bharat Ki Aarthi - (Shamsher Bahadhur Singh) 3. Literary Trends of Pragathivaad
III	1. Varadan Mangoonga Nahi (Siva Mangal Singh Suman) 2. Anevalon Se Ek Savaal (Bharat Bhooshan Agarwal) 3. Literary Trends of Nayee Kavita
IV	1. Literary Trends of Hindi Short Stories 2. Literary Trends of Hindi One Act Plays 3. Maithili Saran Gupta, Mahadevi Varma,
V	1. Jayashankar Prasad, Nirala, 2. Panth, Dinakar, Premchand, 3. Yashpaal, Jainendra Kumar, Mohan Rakesh,

Course Outcomes	1. Evaluate the poetic skills of poets and their poems 2. Identify the conditions inspire the poets and writers 3. Enumerate the literary trends and different literary forms 4. Understand the human, social, ethical and literary values 5. Obtain the knowledge to evaluate and critical analysis of literary works

Reading List (Print and Online)	1. Hindi Sahithya Ka Itihas, By: Ramchandra Shukla, Jaya Bharati Publications, 217, B, Maya Press Road, Allahabad – 211 003. 2. Hindi Sahithya Yug Aur Pravrithiya By: Dr. Sivakumar Varma, Asok Prakashan Nayi Sarak, New Delhi – 6. 3. Hindi Sahithya ka Itihas By : Gulabroy, Lakshmi Narayana Agarwal Book Publishers and seller, Anupama Plaza – 1, Block No. 50, Sanjay Palace, Agra – 282002

Recommended Texts	**6. Poetry Selection** **Madras University Publications** **University of Madras**

Method of Evaluation:

Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	S	S	S
CO 2	S	S	M	S	M
CO 3	S	S	M	S	S
CO 4	M	M	S	S	S
CO 5	S	S	S	S	S

UNIVERSITY OF MADRAS

FOUNDATION COURSE: ENGLISH

SYLLABUS WITH EFFECT FROM 2023-2024

SECOND YEAR - SEMESTER IV

PAPER II –GENERAL ENGLISH

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
200L4ZU	Part II	Y	Y	-	-	3	6	25	75	100

Learning Objectives	
LO1	To help learners imbibe goal-setting attitude.
LO2	To enable them to understand the value of integrity.
LO3	To help them deal with emotions.
LO4	To teach the learners to frame sentences using tenses.
LO5	To enhance reporting skills.

Unit No.	Unit Title & Text	No. of Periods for the Unit
I	**GOAL SETTING (UNICEF)** **Life Story** 1.1 From Chinese Cinderella – Adeline Yen Mah 1.2 Why I Write - George Orwell **Short Essay** 1.3 On Personal Mastery – Robin Sharma 1.4 On the Love of Life – William Hazlitt	20
II	**INTEGRITY** **Short Story** 2.1The Taxi Driver – K.S. Duggal 2.2 Kabuliwala - Rabindranath Tagore 2.3 A Retrieved Reformation – O Henry **Extract from a play** 2.4 The Quality of Mercy (Trial Scene from the Merchant of Venice - Shakespeare)	20
III	**COPING WITH EMOTIONS** **Poem** 3.1 Pride – Dahlia Ravikovitch 3.2 Phenomenal Woman – Maya Angelou **Reader's Theatre** 3.3 The Giant's Wife A Tall Tale of Ireland – William Carleton 3.4 The Princess and the God : A Tale of Ancient India	20

IV	**Language Competency Sentences** 4.1 Simple Sentences 4.2 Compound Sentences 4.3 Complex Sentences **Direct and Indirect Speech**	15
V	**Report Writing** 5.1 Narrative Report 5.2 Newspaper Report **Drafting Speeches** 5.3 Welcome Address 5.4 Vote of Thanks	15

Course Outcomes

Course Outcomes	On completion of this course, students will	
CO1	Determine their goals	PO1,PO7
CO2	Identify the value of integrity.	PO1,PO2,PO10
CO3	Deal with emotions.	PO4,PO6,PO9
CO4	Frame grammatically correct sentences	PO4,PO5,PO6
CO5	Write cohesive reports.	PO3,PO8

Text Books (Latest Editions)

1	Oxford Practice Grammar , John Eastwood, Oxford University Press
2	Cambridge Grammar of English , Ronald Carter and Michael McCarthy
3.	George Orwell Essays, Penguin Classics

Web Resources	
1	http:/www.gradesaver.com/George-orwell-essays/study/summary
2	O' Henry. A Retrieved Reformation. https://americanenglish.state.gov/files/ae/resource_files/a-retrieved-reformation.pdf
3	Maya Angelou. Phenomenal Woman. https://www.poetryfoundation.org/poems/48985/phenomenal-woman
4	The Quality of Mercy, https://poemana1ysis.com
5	https://www'.oxfordscho1ar1yeditions.coin/disp1ay/10.1093/actrade/9780199235742.book.1/actrade-9780199235742-div1-106- William Hazilitt

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 – Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weightage	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

SECOND YEAR: SEMESTER IV

BIOCHEMICAL TECHNIQUES

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
222C4A	**Core Course7 Biochemical techniques**	Core	3	2	-	-	5	5	25	75	100

Learning objectives

The objectives of this course are to

- Introduce the basic principles, types and applications of various sedimentation technique.
- Provide an understanding of the underlying principles of chromatographic techniques
- Demonstrate experimental skills in various electrophoretic techniques.
- Appraise the use of colorimetric and spectroscopic techniques in biology
- Impart knowledge about the measurement of radioactivity and safety aspects of radioactive isotopes.

Module I: Centrifugation - Basic principles, RCF**,** Sedimentation coefficient, Svedberg constant. Types of rotors. Preparative centrifugation- differential and density gradient centrifugation, Rate zonal and Iso-pycnic techniques, construction, working and applications of analytical ultracentrifuge-Determination of molecular weight (Derivation excluded) 9 Hrs

Module II: Chromatography - adsorption, partition. Principle, instrumentation and applications of paper chromatography, thin layer chromatography, ion-exchange chromatography, gel permeation chromatography and affinity chromatography. 9 Hrs

Module III: Electrophoresis – General principles, factors affecting electrophoretic mobility. Tiselius moving boundary electrophoresis. Electrophoresis with paper and starch. Principle, instrumentation and applications of agarose gel electrophoresis and SDS-PAGE. 9Hrs

Module IV: Basics of Electromagnetic radiations- Energy, wavelength, wavenumber and frequency. Absorption and emission spectra, Lambert – Beer Law, Light absorption and transmittance. Colorimetry-Principle, instrumentation and applications. Visible and UV

spectrophotometry – Principle, instrumentation and applications -enzyme assay, structural studies of proteins and nucleic acids. 9 hrs.

Module V: Radioactivity **-** Types of Radioactive decay, half-life, units of radioactivity, Detection and measurement of radioactivity - Methods based upon ionization - Geiger Muller Counter. Methods based upon excitation - Solid & Liquids scintillation counters. Autoradiography. Biological applications and safety aspects of radioisotopes. 9 Hrs

Course Outcomes

CO	**On completion of this course, students will be able to**	**Program outcomes**
CO1	Describe types of rotors and identify the centrifugation technique for the separation of biomolecules.	PO1, PO2, PO6
CO2	Demonstrate the principles, operational procedure and applications of planar and column chromatography.	PO1, PO2, PO6
CO3	Specify the factors and explain the separation of DNA and protein using electrophoretic technique.	PO1, PO2, PO6
CO4	State Beer's Law and illustrate the instrumentation and uses of colorimeter and spectrophotometer.	PO1, PO2, PO6
CO5	Enumerate various methods of measurement of radioactivity and safety aspects of radioactive isotopes.	PO1, PO2, PO6

Textbooks

1. Avinash Upadhyay, Kakoli Upadhyay & NirmalenduNath, 2002, Biophysical Chemistry, Principles and Techniques, 3rd edition, Himalaya Publishing House.

2. L. Veerakumari, 2009, Bio-instrumentation, 1stedition, MJP Publishers.

3. Keith Wilson & John Walker, 2000, Practical Biochemistry- Principles and techniques, Cambridge University Press, 4thedition.

Reference books

1. Terrance G. Cooper The tools of Biochemistry, 1977, John Wiley & Sons, Singapore.

2. Gurumani, Research Methodology for Biological Sciences, 2011, 1st edition, MJP Publishers.

3. Saroj Dua, Neera Garg, Biochemical Methods of Analysis, 2010, 1st edition, Narosa Publishing house.

Web Resources

1.https://www.britannica.com/science/chromatography

2.https://www.youtube.com/watch?v=xgxFBQZYXlE

3.https://www.youtube.com/watch?v=7onjVBsQwQ8

Mapping with Program Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3				2	3	3	3	3
CO 2	2	3				2	3	3	3	3
CO 3	2	3				2	3	3	3	3
CO 4	2	3				2	3	3	3	3
CO 5	2	3				2	3	3	3	3

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

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SYLLABUS WITH EFFECT FROM 2023-2024

SECOND YEAR: SEMESTER IV

PRACTICAL IV BIOCHEMICAL TECHNIQUES

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
222C41	**Core Course 8-Practical IV- Biochemical techniques**	Core Practical	-	-	5	-	5	5	40	60	100

Learning objectives

The objectives of this course are to:

- Acquaint the students with colorimetric estimations of biomolecules.
- Equip skills on various separation techniques.
- Impart knowledge about the estimation of minerals and vitamins.

I Colorimetry

1. Estimation of amino acid by Ninhydrin method.

2. Estimation of protein by Biuret method.

3. Estimation of DNA by Diphenylamine method.

4. Estimation of RNA by Orcinol method.

5. Estimation of Phosphorus by Fiske and Subbarow method.

II Chromatography

1. Separation and identification of sugars and amino acids by paper chromatography.

2. Separation and identification of amino acids and lipids by thin layer chromatography.

III Demonstration

1. Separation of serum and plasma from blood by centrifugation.
2. Separation of serum proteins by SDS-PAGE.

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Estimate the number of biomolecules by Colorimetric method.	PO1, PO3, PO6
CO2	Quantify the amount of minerals by Colorimetric method	PO1, PO3, PO6
CO3	Separate and identify sugars, lipids and amino acids by chromatography	PO1, PO3
CO4	Operate centrifuge for the separation of serum and plasma	PO1, PO3, PO6
CO5	Demonstrate the separation of proteins electrophoretically	PO1, PO3, PO6

Text books

1. J. Jayaraman, Laboratory Manual in Biochemistry New Age International (P) Limited Fifth edition 2015.
2. S. Sadasivam A. Manickam Biochemical Methods New Age International Pvt Ltd publishers third edition 2018.
3. Keith Wilson and John Walker Principles and techniques of Practical Biochemistry Cambridge University Press 2010, Seventh edition.

Reference books

1. S. K. Sawhney and Randhir Singh, Introductory Practical Biochemistry. Alpha Science International, Ltd 2nd edition, 2005.
2. David T. Plummer, 2001, An Introduction to Practical Biochemistry, 3rd edition, Tata McGraw- Hill publishing company limited.
3. Varley's Practical Clinical Biochemistry by Alan H Gowen lock, published by CBS Publishers and distributors, India Sixth Edition,1988.

Web resources

https://www.pdfdrive.com/biochemistry-books.html

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2		3			2	3	3	3	3
CO 2	2		3			2	3	3	3	3
CO 3	2		3				3	3	3	3
CO 4	2		3			2	3	3	3	3
CO 5	2		3			2	3	3	3	3

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

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MICROBIOLOGY - II (THEORY) – FOURTH SEMESTER

ELECTIVE PAPER FOR OTHER LIFE SCIENCE DEPARTMENTS

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
222E4D	**Microbiology II**	Elective	2	1	-	-	3	3	25	75	100

Learning Outcomes:

1. Focus on Microbial spoilage, preservation, testing and production of food products.
2. Explain types of soil microbes with their role in the various Bio Geo cycles and their applications.
3. Discuss the different sources of water, their purification methods and threats of water borne diseases.
4. Explain the composition of air, its quality with remedial sanitary measures to combat air borne diseases.
5. Get insights on industrial production of human utility products and regulatory bodies of Environmental pollution.

Course Content:

UNIT I:

Food Microbiology-Microbial Spoilage of Food - Fruits, Vegetables, Cereals. GeneralPreservation Techniques - High Temperature, Low Temperature. Microbiology of Milk - Microbes in Milk and their Sources.Pasteurization, Phosphatase test. Fermented milk products – Curd, Butter Milk, Cheese.

UNIT II:

Soil Microbiology - Microbes in Soil - Bacteria, Fungi, Actinomycetes, Algae and Viruses, Rhizosphere. Nitrogen Cycle, Carbon Cycle. Biofertilizers – Rhizobium

UNIT III:

Water Microbiology - Sources of Water, Potable Water, Municipal Purification of Water, Water Borne Diseases.

UNIT IV:

Air Microbiology - Composition of Air, Microbes in Air, Enumeration of Microorganisms in Air, Air Sanitation, Air Borne Diseases.

UNIT V:

Industrial Microbiology Microbes in the production of Organic acids – Citric acid, Antibiotics – Penicillin, Alcoholic Beverages - Wine and Beer. Regulatory bodies for Environment Pollution.

References:

1. Stanier R.Y, Ingraham, Wheelis M.L. Painter. (1999). General Microbiology, 5th edn, Mac MillanPressLtd.
2. Tortora, G.J., Funke, B.R.,Case, C.L.(2004). Microbiology-An Introduction, 8th edn, Benjamin-Cummings PubCo.
3. Madigan M.T., Martinko J.M, Parker J. (2005). Brock - Biology of Microorganisms, 11th edn,Pearson, Prentice Hall International,Inc.
4. Alcamo's Jeffrey, C.Pommerville. (2004). Fundamentals of Microbiology, 7th edn, Jones and BartlettPublishers.
5. Ronald.M.Atlas. (1996). Principles of Microbiology, 2nd edn, Wm.C.Brown Publishers.
6. Pelczar M.J., Chan E.C.S. and KreigN.R. (2010). Microbiology, 5th edn,McGraw-Hill New York Publications.
7. Prescott L.M, Harley J. P and Klein D.A. (2005). Microbiology 6th edn, McGraw-HillPublications.
8. R.C.Dubey ,D.K.Maheshwari.(2010). Microbiology 2nd edn, S.Chand and Company ltd.
9. Talaro, K. P., & Chess, B. (2018). *Foundations inmicrobiology*.McGraw-Hill.
10. Salle AJ (1996) Fundamental Principle of Bacteriology [7th Edition] University of California, Los Angeles, Tata McGraw Hill Publishing CompanyLtd.,NewDelhi

Web Resources:

1. https://aggie-horticulture.tamu.edu/food-technology/food-processing-entrepreneurs/microbiology-of-food/
2. https://www.britannica.com/science/biogeochemical-cycle
3. https://www.disabled-world.com/health/water-diseases.php
4. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=5229
5. https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_(Boundless)/17%3A_Industrial_Microbiology

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B.Sc. DEGREE PROGRAMME IN ZOOLOGY

SYLLABUS WITH EFFECT FROM 2023-2024

Title of the Course		**ELECTIVE BOTANY-II**					
Category	Elective	**Year**	II	**Credits**	2	**CourseCode**	222E4A
		Semester	IV				
Instructional Hours per week		**Lecture**		**Tutorial**	**Lab Practice**		**Total**
		1		**1**	-		**2**
Pre-requisite		To study basics of botany.					

Learning Objectives	
C1	To be familiar with the basic concepts and principles of plant systematics.
C2	Learn the importance of plant anatomy in plant production systems.
C3	Understand the mechanism underling the shift from vegetative to reproductive phase.
C4	To learn about the physiological processes that underlie plant metabolism.
C5	To know the energy production and its utilization in plants.

Course outcomes	**On completion of this course, the students will be able to**	**Programme Outcomes**
CO1	Understand the fundamental concepts of plant anatomy and embryology.	K1
CO2	Analyze and recognize the different organs of plants and secondary growth.	K2
CO3	Understand water relation of plants with respect to various physiological processes	K3
CO4	Classify aerobic and anaerobic respiration.	K4
CO5	Classify plant systematics and recognize the importance of herbarium and virtual herbarium.	K5

UNIT	**CONTENTS**
I	**Morphology of Flowering Plants:** Plant and its parts- Structure and function of root and stem. Leaf and its parts. Leaf types- simple and compound. Phyllotaxy and types. Inflorescence - Racemose, Cymose and Special types.
II	**Taxonomy:** Study of the range of characters and plants of economic importance in the following families: Rutaceae, Caesalpiniaceae, Asclepiadaceae, Euphorbiaceae and Cannaceae
III	**Anatomy** Tissue and tissue systems: Simple and complex tissues. Anatomy of monocot and dicot roots - anatomy of monocot and dicot stems - anatomy of dicot and monocot leaves.
IV	**Embryology** Structure of mature anther and ovule - Types of ovules, structure of embryo sac, pollination - double fertilization, structure of dicotyledonous and monocotyledonous seeds.
V	**Plant Physiology** Absorption of water, photosynthesis - light reaction - Calvin cycle; respiration - Glycolysis - Krebs cycle - electron transport system. Growth hormones - auxins and cytokinins and their applications.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Texts	1. Sharma, O.P. 2017. Plant Taxonomy. (II Edition).The McGraw Hill Companies. 2. Bhojwani, S.S. Bhatnagar, S.P and Dantu, P.K. 2015. The Embryology of Angiosperms (6th revised and enlarged edition). Vikas Publishing House, New Delhi. 3. Maheshwari, P. 1963. Recent Advances in Embryology of Angiosperms. Intl. Soc. Plant Morphologists, New Delhi. 4. Salisbury, F. B.C.W. Ross.1991. Plant Physiology. Wassworth Pub. Co. Belmont. 5. Ting, I.P. 1982. Plant Physiology. Addison Wesley Pb. Philippines.
Reference books	1. Lawrence.G.H.M. 1985. An Introduction to Plant Taxonomy, Central Book Depot, Allahabad. 2. Bhojwani, S.S and Bhatnagar, S.P. 2000. The Embryology of Angiosperms (4th revised and enlarged edition). Vikas Publishing House, New Delhi. 3. Pandey, B.P. 2012. Plant Anatomy. S Chand Publishing. 4. Jain, VK. 2006. Fundamentals of Plant Physiology, S. Chand and Company Ltd. 5. Rajni Gupta. 2012. Plant Taxonomy: Past, Present and Future. Vedams (P) Ltd. New Delhi. 6. Jain, V.K. 2006. Fundamentals of Plant Physiology, S.Chand and Company Ltd., New Delhi. 7. Verma, S.K. 2006. A Textbook of Plant Physiology, S.K.Chand & Co., New Delhi.
Web Resources	1. https://books.google.co.in/books/about/Plant_Taxonomy.html?id=0bYs8F0Mb9gC&redir_esc=y 2. https://books.google.co.in/books/about/PLANT_TAXONOMY_2E.html?id=Roi0lwSXFnUC&redir_esc=y 3. https://archive.org/EXPERIMENTS/plantanatomy031773mbp 4. https://www.amazon.in/Embryology-Angiosperms-6th-S-P-Bhatnagar-ebook/dp/B00UN5KPQG 5. https://www.crcpress.com/Plant-Physiology/Stewart-Globig/p/book/9781926692692

Mapping with Programme Outcomes:

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

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

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ELECTIVE-I: BOTANY PRACTICALS
SEMESTERS – I & II

Title of the Course		**ELECTIVE BOTANY I & II PRACTICALS**					
Paper Number		**Elective Practicals-I**					
Category	Elective	**Year**	II	**Credits**	**2**	**Course Code**	**222E41**
		Semester	III & IV				
Instructional Hours per week		**Lecture**	**Tutorial**		**Lab Practice**	**Total**	
		-	**--**		**1**	**1**	
Pre-requisite		Practicals pertaining to above subjects is important to get knowledge on various aspects of plants.					

Learning Objectives		
C1	To enhance information on the identification of each taxonomical group by developing the skill-based detection of the morphology and microstructure of microorganisms, algae, and fungi.	
C2	To comprehend the fundamental concepts and methods used to identify Bryophytes, Pteridophytes and Gymnosperms through morphological changes and evolution, anatomy and reproduction.	
C3	To be familiar with the basic concepts and principles of plant systematics.	
C4	Understanding of laws of inheritance, genetic basis of loci and alleles.	
C5	To learn about the physiological processes that underlie plant metabolism.	
Course outcomes: CO	**On completion of this course, the students will be able to**	**Programme Outcomes**
CO1	To study the internal organization of algae and fungi.	K1
CO2	Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms.	K2
CO3	To study the classical taxonomy with reference to different parameters.	K3
CO4	Understand the fundamental concepts of plant anatomy and embryology.	K4
CO5	To study the effect of various physical factors on photosynthesis.	K5

EXPERIMENTS

1. Make suitable micro preparation of the types prescribed in Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.
2. Micro photographs of the cell organelles ultra structure.
3. Simple genetic problems.
4. To describe in technical terms, plants belonging to any of the family prescribes and to identify the family.
5. To dissect a flower, construct floral diagram and write floral formula.
6. Demonstration experiments
   1. Ganong's Light screen
   2. Test tube Funnel experiment for photosynthesis
7. To make suitable micro preparations of anatomy materials prescribed in the syllabus.
8. Spotters - Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperm anatomy, Embryology, Cell biology and Biotechnology.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	1. Sharma, O.P. 2017. Bryophyta, MacMillan India Ltd, New Delhi. 2. Sharma, O.P. 2012. Pteridophyta, Tata McGraw-Hills Ltd, New Delhi. 3. Subramaniam, N.S. 1996. Laboratory Manual of Plant Taxonomy. Vikas Publishing House Pvt. Ltd., New Delhi. 4. Benjamin, A. Pierce. 2012. Genetics- A conceptual Approach. W.H. Freeman and Company, New York, England. 5. Noggle G.R and G.J. Fritz. 2002. Introductory Plant Physiology. Prentice Hall of India, New Delhi.
Reference Books	1. Strickberger, M.W. 2005. Genetics (III Ed). Prentice Hall, New Delhi, India. 2. Nancy Serediak and M. Huynh. 2011. Algae identification lab Guide. Accompanying manual to algae identification field guide, Ottawa Agriculture and Agri food Canada publisher. 3. Mohammed Gufran Khan, Shite Gatew and Bedilu Bekele. 2012. Practical manual for Bryophytes and Pteridophytes. Lambert Academic Publishing. 4. Aler Gingauz. 2001. Medicinal Chemistry. Oxford University Press & WileyPublications. 5. Steward, F.C. 2012. Plant Physiology Academic Press, US

Web sources	1. https://www.amazon.in/Practical-Manual-Pteridophyta-Rajan-Sundara/dp/8126106883 2. https://www.google.co.in/books/edition/Gymnosperms/3YrT5E3Erm8C?hl=en&gbpv=1&dq=gy mnosperms&printsec=frontcover 3. https://www.amazon.in/Computational-Phytochemistry-Satyajit-Dey-Sarker-ebook/dp/B07CV96NZJ 4. https://medlineplus.gov/genetocs/understanding/basics/cell/ 5. https://apan.net/meetings/apan45/files/17/17-01-01-01.pdf 6. http://www.cuteri.eu/microbiologia/manuale_microbiologia_pratica.pdf 7. https://www.amazon.in/Manual-Practical-Bryophyta-Suresh-Kumar/dp/B0072GNFX4

Mapping with Programme Outcomes:

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

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

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SEMESTER – IV

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
222E4B	**Zoology II**	Elective	1	1	-	-	2	2	25	75	100

Learning Objectives	
CO1	To enable students to learn basic concepts relating to aspects of respiratory, circulatory, excretory nervous and sensory physiology.
CO2	To enable students to comprehend the processes involved during development
CO3	To enable students to learn basic concepts of immunity and the working of immune organs and familiarize them with the recommended vaccination schedule
CO4	To enable students to comprehend the basic concepts of human genetics and patterns of inheritance
CO5	To enable students to learn about ecosystem, cycling of minerals and water conservation

UNIT	Details	No. of Hours	Course Objectives
.I	Human Physiology: Respiration- Respiratory pigments and transport of gases. Mechanism of blood clotting., Structure of Heart, BP, Types of excretory products– Structure of Kidney, Ornithine cycle. Structure of neuron–Conduction of nerve impulse, Mechanism of vision, Endocrine glands- Hormones and feedback mechanism- Pituitary, Thyroid, Pancreas .	12	CO1
II	Developmental Biology: Gametogenesis, Fertilization, Cleavage, Gastrulation in chick	12	CO2
III	Immunology : Innate and Acquired - Active and Passive immunity; Antigens and Antibodies; Immunological organs–responses in humans; Vaccination schedule	12	CO3
IV	Human Genetics: Human Chromosomes – Sex Determination in Humans; Syndromes Patterns of Inheritance: Autosomal Dominant, Autosomal Recessive, X-linked, Y-linked, Mitochondrial, Multiple Allelic and Polygenic; Genetic Counselling.	12	CO4
V	Hydrosphere and Lithosphere- Physico-chemical factors,	12	CO5

	Bio-geo chemical cycles-Carbon, Oxygen , Nitrogen and Phosphorus Cycle, Sewage water treatment		
	Total	**60**	
Course Outcomes			
Course Outcomes	On completion of this course, students will;		
CO1	Recall the parts and working of body organs and developmental stages, name the patterns of inheritance and list different types of animal behaviour	PO1	
CO2	Analyse the different developmental stages	PO1,PO3	
CO3	Analyse the working of body and immune systems	PO4, PO6	
CO4	Analyse the different patterns of inheritance	PO4, PO5, PO6	
CO5	Relate the behaviour of animals to physiology. Analyse the different types of behaviour	PO3, PO8	
Text Books (Latest Editions)			
1.	Verma P.S. & Agarwal - Developmental Biology, Chordata embryology S. Chand & Co.		
References Books (Latest editions, and the style as given below must be strictly adhered to)			
1.	Owen, J. A., Punt, J. &Stranford, S. A. - Kuby Immunology. New York: W.H. Freeman & Company		
2.	Klug, W. S., Cummings, M. R. & Spencer, C - Concepts of Genetics. (12th ed.). New Jersey: Pearson Education		
3.	Mathur, R.- Animal Behaviour. Meerut: Rastogi.		
4.	VermaP.S.&Agarwal-DevelopmentalBiology,ChordataembryologyS.Chand&Co.		
Web Resources			
1.	Continuous Internal Assessment Test		
2.	Assignments		
3.	Seminars		
4.	Attendance and Class Participation		
5.	End Semester Examination		

Methods of Evaluation		Total
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Simple definitions, MCQ, Recall steps, Concept definitions	
	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
External Evaluation	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	75 Marks
	Longer essay/ Evaluation essay, Critique or justify with pros and cons	100 Marks
Methods of Assessment	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**
CO 1	S							
CO 2	M		S					
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

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

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Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
222E42	**ELECTIVE ZOOLOGY I & II PRACTICAL**	Elective	-	-	1	-	2	1	40	60	100

Learning Objectives	
CO1	**To understand** the structure and label the various parts of the dissected organisms and **to sketch** the required system using virtual dissections, charts and web resources.
CO2	To **compare** and **discuss** the difference in the mouth parts of cockroach and mosquitos by mounting and drawing
CO3	**To identify and understand the** different invertebrate and chordate forms and **classify** them using lab manuals
CO4	To **identify and discuss** the significance of pigeon feather and placenta. To **compare and criticise** various types of syndromes.
CO5	Field trip helps students to **understand** and **apply** the theoretical knowledge. To **plan** the area of research. Campus fauna enables them to **understand, identify** and **classify** the various fauna surrounding them. It also enables them to **compil**e all the data and to **discuss** the **importance** of conservation of fauna

UNIT	Details	No. of Hours	Course Objectives
I	**DISSECTION:** **1.** Cockroach - digestive system 2. Cockroach - nervous system 3. Prawn - nervous system 4. Fish -digestive system	12	CO1
II	**MOUNTING:** **1.** Mouth parts- Cockroach 2.Mouth parts - Mosquito 3.Scales-Placoid, Cycloid and Ctenoid 4.Prawn appendages	12	CO2
III	**SPOTTERS-** *Paramecium* ,*Plasmodium*, Scypha, *Leucosolenia*, Corals. *Taenia solium* –entire, *Ascaris* male and female. Earthworm, Prawn ,Scorpion, Pila, Starfish,	12	CO3
IV	Amphioxus, Shark,, Frog, Calotes, Pigeon feather, Rabbit, sheep placenta, Genetic disorder plates **(**Down's, Turner and Klinefelter). Human sperm, T.S. of	12	CO4

	ovary, Kidney structure, sphygmomanometer.		
V	**Field visit** – Study of fauna in the campus	12	CO5
	Total	**60**	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Compare and distinguish the dissected internal organs of lower and higher animals.	PO1,PO3,PO5
CO2	Prepare and develop the mounting procedure of important invertebrate and chordate anatomical parts and to appreciate the structure, function and mode of life.	PO1, PO3,PO5
CO3	Identify and label the external features of different groups of invertebrate animals	PO6, PO8
CO4	Identify and label the external features of different groups of chordate animals	PO6, PO8
CO5	Understand and apply the theoretical knowledge. To plan the area of research and to identify different groups of invertebrate and chordate animals.	PO1,PO3, PO8

Text Books (Latest Editions)

1.	EkambaranathaIyyar and T. N. Ananthakrishnan, 1995 A manual of Zoology Vol.I (Part 1, 2) S. Viswanathan, Chennai
2.	Ganguly, Sinha an d A dhikari , 2 0 11 . Biology of Animals: Volume I, New Central Book Agency; 3rd revised edition. 1008 pp.
3.	Sinha, Chatterjee and Chattopadhyay, 2 0 1 4. Advanced Practical Zoology, Books & Allied Ltd; 3rd Revised edition, 1 07 0 pp.
4.	Lal ,S. S, 2016 . Practical Zoology Invertebrate, Rastogi Publications.
5.	Verma, P. S. 2010. A Manual of Practical Zoology: Invertebates, S Chand, 4 97pp.
6.	Lal S S, 2009. Practical Zoology Vertebrate, Rajpal and Sons Publishing, 484pp.

References Books

(Latest editions, and the style as given below must be strictly adhered to)

1.	Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science.
2.	Barnes, R.D. (1982). *Invertebrate Zoology*, V Edition. Holt Saunders International Edition.
3.	Barrington, E.J.W. (1979). *Invertebrate Structure and Functions*. II Edition, E.L.B.S. and Nelson
4.	Boradale, L.A. and Potts, E.A. (1961). *Invertebrates: A Manual for the use of Students*. Asia Publishing Home.
5.	Lal, S.S. 2005. A text Book of Practical Zoology: Invertebrate, Rastogi, Meerut

Web Resources		
1.	https://nbb.gov.in/	
2.	http://www.agshoney.com/training.htm	
3.	https://icar.org.in/	
4.	http://www.csrtimys.res.in/	
5.	http://csb.gov.in/	
	https://iinrg.icar.gov.in/	
	https://www.nationalgeographic.com/animals/invertebrates/	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	40 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	60 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**
CO 1	S							
CO 2	M		M					
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
222E4C	**Biotechnology – II**	Elective	1	1	0	0	2	2	25	75	100

Course level learning outcomes:

- Understanding the scope and importance of Biotechnology in the context of Recombinant DNA technology
- Learning about the applications of recombinant DNA technology
- Learning about Plant genetic engineering and its applications
- To create awareness on the scope and importance of Animal Biotechnology
- To understand the Fermentation process and its applications in Environmental Biotechnology

UNIT-I

Scope and importance of biotechnology. Recombinant DNA technology - Principles of gene cloning: Plasmids and bacteriophages as vectors for gene cloning- Cloning vectors based on E. coli plasmids, pBR322, pUC8. Selection and identification for transformed cells – colony hybridization, screening with antibodies.

UNIT-II

Production of recombinantpharmaceuticals such as insulin,human growth hormone,factor VIII and Recombinantvaccines. PCR–Principle, Steps, Types and its application inclinical diagnosis and forensic science. Southern blotting, Northern blotting and DNA fingerprintingTechnique and their applications

UNIT-III

Plant genetic engineering: Plant tissue culture, Gene transfer systems, Ti plasmid, plantvirus vectors, electroporation, microinjection, microprojectile technology and gene expression.Applications - Resistance to biotic stress - insect resistance and virus resistance plants. Resistancetoabiotic stress-Herbicide resistance plant.Productionofedible vaccines.

UNIT-IV

Animalcellculture:Animalcelllinesandorganculture-culturemethodsandapplications. Transgenic animals: transgenic mice Production and its applications. Stem celltechnology:definition,types,culture andapplications.

UNIT-V

Fermentationtechnology–Fermentationanditstypes,Upstreamanddownstreamprocessing. Fermentor design. Production and applications of ethanol, streptomycin, and amylase.Environmental biotechnology – Basics of Biodegradation andbioremediation,Waste watertreatmentandDrinking-watertreatment

Course Outcomes

CO	**On completion of this course, students will be able to**	**Program Outcomes**
CO1	Establish a stronger foundation in GeneticEngineering	PO1
CO2	Learn about Plant Biotechnology and its applications.	PO1,PO3
CO3	Gain awareness on the scope & applications in Animal Biotechnology	PO5,PO6
CO4	Know applications of Biotechnology in Fermentation Technology	PO5,PO6
CO5	Know the application in Environmental Biotechnology	PO5,PO6

Text Books:

- ATextbookofBiotechnology-R.C.Dubey,S.Chand&companyPvt.Ltd5th edition(2014).
- Biotechnology- SatyanarayanaU, Books &Allied(P)Ltd.(2008)
- Industrial Microbiology-CasidaL, New Age International(2007)
- Prescott and Dunn's Industrial Microbiology- ReedG, CBS Publishers & Distributors(2004)
- Advances in animal Biotechnology-Singh.B,Mal.M,GautamS.K,Mukesh.M, Springer(2019)

Reference books:

Biotechnology:Applyingthegeneticrevolution-DavidP.clark,PazdernikN.J,Elsevier(2009)
MolecularBiotechnology:Principlesand ApplicationsofRecombinantDNA-ClickB.R.andPasternarkJ.J.AmericanSocietyforMicrobiology,4th edition.(2010) (2006), RecombinantDNA:GenesandGenomes- aShortCourse-JamesD.Watson, AmyA.Caudy,RichardM.Myers ,JanWitkowski,W.H.Freeman&Co,3rdedition(2006)

Web Resources:

https://futureoflife.org/background/benefits-risks-biotechnology/

https://www.sciencedirect.com/topics/neuroscience/genetic-engineering

http://www.biologydiscussion.com/biotechnology/techniques-biotechnology/important-techniques-of-biotechnology-3-techniques/15683

https://iopscience.iop.org/book/978-0-7503-1347-6/chapter/bk978-0-7503-1347-6ch1

https://www.slideshare.net/zeal_eagle/fermentation-technology

https://www.slideshare.net/zeal_eagle/fermentation-technology

https://www.slideshare.net/Chepkitwai/blotting-techniques-6129300

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO 1	3		3		3	3	3	3	3	3
CO 2	3		3		3	3	3	3	3	3
CO 3	3		3		3	3	3	3	3	3
CO 4	3		3		3	3	3	3	3	3
CO5	3		3		3	3	3	3	3	3

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

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B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="6">BIOSTATISTICS- II</td></tr>
<tr><td>Category</td><td>Elective</td><td>Year</td><td>II</td><td>Credits</td><td>3</td><td>Course Code</td><td>222E4E</td></tr>
<tr><td colspan="2"></td><td>Semester</td><td>IV</td><td colspan="4"></td></tr>
<tr><td colspan="2">Instructional Hours Per week</td><td colspan="2">Lecture
2</td><td colspan="2">Tutorial
1</td><td>Lab Practice
--</td><td>Total
3</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="6">High School level Mathematics</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="6">The main objectives of this course are:
1. To understand nonparametric tests and its applications
2. To develop student’s abilities in understanding the concepts of categorical data
3. Understand basic techniques for the analysis of categorical data.
4. provide a comprehensive method for analyzing the survival data.
5. Understand the basic epidemiological concepts and the factors determine the occurrences of the disease.</td></tr>
<tr><td colspan="2" rowspan="4">Course Outline</td><td colspan="6">Unit I
Nonparametric tests-merits and demerits, median based tests, one sample and paired sample test, Sign test, Wilcoxon test, Mann Whitney U test,chi-square test for goodness of fil, Empirical distribution, K-S test</td></tr>
<tr><td colspan="6">Unit II
Nature of Categorical data - Contingency tables and their distribution: Binomial and Multinomial sampling. chi-square test for independence of attributes Comparing proportions in two-by-two tables: Difference of proportions - Relative risk</td></tr>
<tr><td colspan="6">Unit III
Odds Ratio – Properties of Odds Ratio - relationship between Odds Ratio and Relative Risk - Odds ratio in I x J tables -Nominal and Ordinal Measures of Association.</td></tr>
<tr><td colspan="6">Unit IV
Life distributions-Exponential Weibull, types I and Type II censoring, survival probability, hazard function, Estimation of survival functions, Product–limit, Kaplan-Meier estimator</td></tr>
</table>

	Unit V Observational studies in Epidemiology: Retrospective (case control) & prospective (cohort orlongitudinal) studies. Organization and Planning: Main features of the study protocol - Selection of patients - Treatment schedule - Evaluation of patient response, Phases of clinical trials, Basic study designs: Randomized control study, Nonrandomized concurrent control study**,**Cornfield and Garts method, Mantel – Haenszel method, Clinical and community trials Statistical techniques: Methods for comparison oftwo treatments. Crossover design with Garts and McNemars test
Extended Professional Component (is a part of internal component only Not to be included in the External Examination Question paper)	
Skills acquired from this course	Basic Knowledge in Statistics,ProblemSolving,Analyticalability,ProfessionalCompetency
Recommended Text	1. Agresti, A. (1991): An Introduction to Categorical data analysis, John Wiley & Sons, 2nd edition. 2. Miller,R.G.(1981) : Survival analysis, John Wiley. 3. Kahn, H.A., Sempose, C.T. (1989): Statistical methods in Epidemiology, Oxford University press. 4. Pocock, S.J. (2009): Clinical Trials – A Practical Approach, John Wiley andSons. 5. Piantadosi, S. (2005): Clinical Trials - A Methodological Perspective, Second Edition, Wiley series in probability and Statistics. 6. Lawrence M.Friedman.CurtD.Furberg David L.DeMets.David M. ReboussinChristopher B. Granger (2015): Fundamentals of Clinical trials (Fifth Edition)
Reference Books	1. Daley, D.J., Gani, J. (1999): Epidemic modeling an introduction, Cambridge. 2. Collet, D.(1984) : Statistical analysis of life time data. 3. Zar,J.H(1999) Biostatistical Analysis, Fpurth Edition, Pearson Education

	4. Jekel, J.F., Katz, D.L. and Elmore, J.G. (2001):Epidemiology, Biostatistics and preventive Medicine, second edition, Saunders 5. Gerstman, B.B.(2003) : Epidemiology Kept Simple: An Introduction to traditional and Modern Epidemiology ,Second Edition, John Wiley and Sons.
Website and e-Learning Source	e-books, tutorials on MOOC/SWAYAM courses on the subject http://apps.who.int/iris/bitstream/10665/43541/1/9241547073_eng.pdf • http://samples.sainsburysebooks.co.uk/9781118031179_sample_388791.pdf

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

MEDICAL CODING

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22SEC4	**Medical Coding**	SEC(Discipline)	1	1	-	-	2	2	25	75	100

Course objectives

The objectives of this course are to

- Understand the basic concept of Medical coding
- Familiarize the student about medical terminology
- Understand about the classification of diseases based on WHO/AHA
- Understand about the CPT code used for diseases as per American Medical Association (AMA)

Module- I: Introduction to Medical coding, coding theory, Healthcare Common Procedure Coding, First Aid and CPR 6Hrs

Module- II: Introduction to Medical Terminology, specialization I & II, Diagnostic coding, factors affecting diagnostic coding 6Hrs

Module III: Documenting medical records- Importance of Documentation, Types of dictation formats 6Hrs

Module- IV: Introduction to Human Anatomy and Coding, ICD-10- CM classification system

6Hrs**Module- V:** Introduction to CPT coding, types of CPT coding Medical Law and Ethics6hrs

Course Outcome

CO	On completion of this course, students will be able to	Program Outcomes
CO1	Explaining the basic concept of coding and its application. Possess the knowledge about the First aid and CPR	PO1, PO2, PO6
CO2	Possess the knowledge about medical terminology used in Medical coding industry	PO1, PO2, PO6
CO3	Possess the knowledge about the ICD-10 CM international classification of diseases based on WHO	PO1, PO2, PO6
CO4	Possess the knowledge about the CPT codes used for diseases as per American Medical Association (AMA)	PO1, PO2, PO6
CO5	Understand CPT coding and its types	PO1, PO2, PO6

Text books

1.Understanding Medical Coding, A comprehensive guide Sandra L Johnson Robin Linker

2.Buck's Step – by – step Medical Coding Elsevier reference

Reference books

1.Terry Tropin M Shai, RHIA, CCS-P, AHIMAICD-10-CMcoding guidelines made easy2017.

4.Besty J Shiland- Medical terminology and anatomy for ICD-10.

Mapping with Program Outcomes

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO 1	2	3				3	3		2	3
CO 2	2	3				3	3		2	3
CO 3	2	3				3	3		2	3
CO 4	2	3				3	3		2	3
CO5	2	2				2	3		2	3

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

TISSUE CULTURE

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
22SEC7	**Tissue Culture**	SEC (Discipline)	1	1	0	0	2	2	25	75	100

Learning objectives

The objectives of this course are to

- Introduce the tools and techniques used in tissue culture technique.
- Acquire knowledge on preparation of growth medium for culture techniques.
- Impart knowledge on procedures involved gene transfer.
- Acquaint with the process of tissue culture technique.
- Understand the importance of plant and animal tissue culture for the production and evaluation of bioactive compounds

Module l: Introduction to Tissue culture, Types- seed, embryo, Callus, Organ, Protoplast culture, Advantages and importance of tissue culture, Tools and techniques. 6 Hrs

Module II: Media and Culture Preparation - pH, temperature, solidifying agents. Role of Micro and macro nutrients. Maintenance of cultures.6 Hrs

Module III: Methods of gene transfer in plants and animals - direct and indirect gene transfer methods.6 Hrs

Module IV: Cell culture technique - Explants selection, sterilization and inoculation. 6 Hrs

Module V: Transgenic plants for crop improvement. Transgenic plants for molecular farming. Animal Cloning - an overview-Applications of animal cell culture 6 Hrs

Course outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Introduction to plant tissue culture	PO1, PO2, PO3
CO2	Brief knowledge on preparation of tissue culture media	PO1, PO2
CO3	Understanding on different methods of gene transfer	PO1, PO2, PO3
CO4	Gain knowledge on plant and animal cell culture techniques	PO1, PO2, PO3
CO5	Study of applications of genetically modified plants and animals.	PO1, PO2, PO3

Text books

1. Trivedi, P.C.2000. Applied Biotechnology: Recent Advances. PANIMA Publishing corporation.
2. Ignacimuthu. 1996. Applied Plant Biotechnology. Tata McGraw – Hill.
3.Lycett, G.W. and Grierson, D. (ed). 1990. Genetic Engineering of crop plants.
4.Grierson and Covey, S.N.1988. Plant Molecular biology. Blackie.
5.Chawla, H.S., "Introduction to Plant Biotechnology", 3rd Edition, Science Publishers, 2009.

Reference books

1.Gamburg OL, Philips GC, Plant Tissue & Organ Culture fundamental Methods, arias Publications. 1995.
2.Stewart Jr., C.N., "Plant Biotechnology and Genetics: Principles, Techniques and Applications" Wiley- Interscience, 2008.
3.Freshney, R. I. (2010). Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications. Wiley-Blackwell, 2010.6th Edition.
4.Davis, J. M. (2008). Basic Cell Culture. Oxford University Press. New Delhi.
5.Davis, J. M. (2011). Animal Cell Culture. John Willy and Sons Ltd. USA.6Freshmen R. I. (2005). Culture of Animal Cells. John Willy and Sons Ltd. USA.
6.Butler, M. (2004). Animal Cell Culture and Technology. Taylor and Francis. Keywork USA.
7.Verma, A. S. and Singh, A. (2014). Animal Biotechnology. Academic Press, ELSEVIER, USA

Web Resources

https://www.britannica.com/science/tissue-culture
https://en.wikipedia.org/wiki/Plant_tissue_culture
https://microbeonline.com/animal-cell-culture-introduction-types-methods-applications/

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3	3				3	3	3	3
CO 2	2	3					3	3	3	3
CO 3	2	3	3				3	3	3	3

CO 4	2	3	3				3	3	3	3
CO5	2	3	3				3	3	3	3

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

UNIVERSITY OF MADRAS
U.G. DEGREE COURSE

PART – IV - VALUE EDUCATION

Common for all U.G. & Five Year Integrated Courses
(Effective from the Academic Year 2012 – 2013)

SYLLABUS

CREDITS: 2 **III YEAR / V SEM**

Objective: Value are socially accepted norms to e valuate objects, persons and situations that form part and parcel of sociality. A value system is a set of consistent values and measures. Knowledge of the values are inculcated through education. It contributes in forming true human being, who are able to face life and make it meaningful. There are different kinds of values like, ethical or moral values, doctrinal or ideological values, social values and aesthetic values. Values can be defined as broad preferences concerning appropriate courses of action or outcomes. As such, values reflect a person's sense of right and wrong or what "ought" to be. There are representative values like, "Equal rights for all", "Excellence deserves admiration". "People should be treated with respect and dignity". Values tend to influence attitudes and behavior and help to solve common human problems. Values are related to the norms of a culture.

UNIT I: Value education-its purpose and significance in the present world – Value system – The role of culture and civilization – Holistic living – balancing the outer and inner – Body, Mind and Intellectual level – Duties and responsibilities.

UNIT II: Salient values for life – Truth, commitment, honesty and integrity, forgiveness and love, empathy and ability to sacrifice, care, unity, and inclusiveness, Self esteem and self confidence, punctuality – Time, task and resource management – Problem solving and decision making skills – Interpersonal and Intra personal relationship – Team work – Positive and creative thinking.

UNIT III: Human Rights – Universal Declaration of Human Rights – Human Rights violations – National Integration – Peace and non-violence – Dr.A P J Kalam's ten points for enlightened citizenship – Social Values and Welfare of the citizen – The role of media in value building.

UNIT IV: Environment and Ecological balance – interdependence of all beings – living and non-living. The binding of man and nature – Environment conservation and enrichment.

UNIT V: Social Evils – Corruption, Cyber crime, Terrorism – Alcoholism, Drug addiction – Dowry – Domestic violence – untouchability – female infanticide – atrocities against women – How to tackle them.

Books for Reference :

1. M.G. Chitakra: Education and Human Values, A.P.H. Publishing Corporation, New Delhi, 2003.
2. Chakravarthy, S.K: Values and ethics for Organizations: Theory and Practice, Oxford University Press, New Delhi, 1999.
3. Satchidananda, M.K: Ethics, Education, Indian Unity and Culture, Ajantha Publications, Delhi, 1991.
4. Das, M.S. & Gupta, V.K.: Social Values among Young adults: A changing Scenario, M.D. Publications, New Delhi, 1995.
5. Bandiste, D.D.: Humanist Values: A Source Book, B.R. Publishing Corporation, Delhi, 1999.
6. Ruhela, S.P.: Human Values and education, Sterling Publications, New Delhi, 1986.
7. Kaul, G.N.: Values and Education in Independent Indian, Associated Publishers, Mumbai, 1975.
8. NCERT, Education in Values, New Delhi, 1992.
9. Swami Budhananda (1983) How to Build Character A Primer : Rmakrishna Mission, New Delhi.
10. A Culture Heritage of India (4 Vols.), Bharatiya Vidya Bhuvan, Bombay, (Selected Chapters only)
11. For Life, For the future : Reserves and Remains – UNESCO Publication.
12. Values, A Vedanta Kesari Presentation, Sri Ramakrishna Math, Chennai, 1996.
13. Swami Vivekananda, Youth and Modern India, Ramakrishna Mission, Chennai.
14. Swami Vivekananda, Call to the Youth for Nation Building, Advaita Ashrama, Calcutta.
15. Awakening Indians to India, Chinmayananda Mission, 2003.

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UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

THIRD YEAR: SEMESTER V

ENZYMES

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322C5A	**Enzymes**	Core	3	1	-	-	4	5	25	75	100

Learning objectives

The main objectives of this course are to

- Provide fundamental knowledge on enzymes and their properties.
- Understand the mechanism of action of enzymes and the role of coenzymes in catalysis.
- Introduce the kinetics of enzymes and determine the Km and Vmax.
- Explain the effect of inhibitors on enzyme activity
- Understand the role of enzymes in clinical diagnosis and industries.

Module I: Introduction to enzymes: Nomenclature and Classification based on IUB with examples, enzyme as catalyst-Activation energy, Enzyme specificity-absolute, Group, linkage and stereo specificities. Concept of Active site, Lock and key hypothesis and induced fit theory, Enzyme expression Units-IU, turnover number, katal and specific activity.12 Hrs.

Module II: Mechanism of enzyme catalysis – Acid Base catalysis, covalent catalysis, electrostatic catalysis, metal ion catalysis, proximity and orientation effect. Coenzymes -Definition, types, co-enzymatic forms of vitamins- NAD/NADP, FAD, FMN, Coenzyme A TPP, PLP, lipoic acid and biotin. Multienzyme complexes - Pyruvate dehydrogenase complex. Isoenzyme with reference to LDH and CK. 12 hrs.

Module III: Enzyme kinetics - Definition of kinetics, Factors affecting enzyme activity - temperature, pH, substrate and enzyme concentration, activators-cofactors, Derivation of Michaelis-Menton equation for unisubstrate reactions, Lineweaver -

Burk plot, Eadie -Hofstee plot Significance of Km and V max and their determination using the plots. 12 hrs.

Module IV: Enzyme inhibition - Reversible and irreversible inhibition - types of reversible inhibitors, competitive, non-competitive, un-competitive inhibitors. Graphical representation by L-B plot, (Kinetic derivations not required), Determination of Km and Vmax in the presence and absence of inhibitors. Allosteric enzymes - Sigmoidal curve, positive and negative modulator. 12 hrs.

Module V: Applications of enzymes -Immobilized enzymes - methods of immobilization-adsorption, covalent bonding, cross linking, encapsulation, entrapment and applications of immobilized enzymes. Biosensors – e.g., Glucose sensors. Industrial applications of enzymes –Food, textile and pharmaceutical industries. 12Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Programme outcome
CO1	Identify the major classes of enzymes, differentiate between a chemical catalyst and a biocatalyst and define the units of enzymes.	PO1
CO2	Explain the mechanism of enzyme catalysis and the role of coenzymes in enzyme action.	PO1, PO2
CO3	Illustrate the steady state kinetics, interpret M M plot and L B plot based on kinetics data, and determine Km and Vmax.	PO1, PO3
CO4	Distinguish the types of inhibition along with its importance in biochemical reactions.	PO1, PO3
CO5	Comprehend the various methods for production of immobilized enzymes and discuss the application of enzymes in clinical diagnosis and various industries.	PO1, PO2, PO6

Textbooks

1. U. Sathyanarayana & U. Chakrapani, 2013, Biochemistry, 4th edition, Elsevier India Pvt. Ltd., Books & Elective Pvt. Ltd.
2. Dr. G.R Agarwal, Dr. Kiran Agarwal & O.P. Agarwal, 2015, Textbook of Biochemistry (Physiological chemistry),18th edition, Goel Publishing House,
3. T. Devasena, 2010, Enzymology, 1stedition, Oxford university Press.

Reference books

1. Trevor Palmer, 2008, Enzymes: Biochemistry, Biotechnology, Clinical Chemistry, 2nd edition, East West Press Pvt. Ltd.
2. David L. Nelson, Michael M. Cox, 2005, Principles of Biochemistry, 4th edition W.H. Freeman and Company,
3. Voet. D, Voet. J. G. and Pratt, C.W, 2004, Principles of Biochemistry, 4th edition John Wiley & Sons, Inc.
4. Zubay G. L, *et.al*., 1995, Principles of Biochemistry,1st edition, Wm C. Brown Publishers.

Web resources

www.biologydiscussion.com/notes/enzymes-

noteshttps://www.britannica.com/science/protein/The-mechanism-of-enzymatic-

actionhttps://www.youtube.com/watch?v=oVJ2LJxO6tU

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3	2					3			3
CO 3	3		2				3			3
CO 4	3		2				3			3
CO 5	3	2				2	3	3	3	3

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

UNIVERSITY OF MADRAS

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SYLLABUS WITH EFFECT FROM 2023-2024

THIRD YEAR: SEMESTER V

INTERMEDIARY METABOLISM

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322C5B	Core paper:10 Intermediary metabolism	Core	3	1	-	-	4	5	25	75	100

Learning Objectives

The main objectives of this course are to

- Review the basic concepts of free energy transformation and describe biological oxidation.
- Illustrate the pathways of carbohydrate metabolism.
- Explain the pathways of oxidation and biosynthesis of lipids.
- Detail the catabolism of amino acids and synthesis of specialized products from amino acids.
- Acquaint the metabolism of nucleic acids and its regulation

Module I: Bioenergetics-High energy compounds**:** Role of high energy compounds, free energy hydrolysis of ATP and other organophosphates, ATP-ADP cycle.

Biological Oxidation: Electron transport chain - its organization and function. Inhibitors of ETC. Oxidative phosphorylation, P/O ratio, Peter Mitchell's chemiosmotic hypothesis. Mechanism of ATP synthesis, uncouplers of oxidative phosphorylation, substrate level phosphorylation with examples.15 hrs.

Module II: Metabolism of carbohydrates - Glycolysis, TCA Cycle, Amphibolic nature and integrating role of TCA cycle. Anaplerosis, Pentose Phosphate Pathway (HMP shunt), Gluconeogenesis, Glycogenesis, Glycogenolysis and its regulation, glyoxylate cycle, Entner- Duodoroff pathway and Coricycle.15 hrs.

Module III: Metabolism of lipids -Oxidation of fatty acids - α, β and ω -oxidation of saturated fatty acids, Oxidation of fatty acids with odd number of carbon atoms and unsaturated fatty acids, Ketogenesis, Biosynthesis of saturated fatty acids and unsaturated

fatty acids, Biosynthesis and degradation of triglycerides, phospholipids and cholesterol. 15 hrs.

Module IV: Metabolism of amino acid- Metabolic nitrogen pool, Catabolism of amino acid: Oxidative deamination, non – oxidative deamination, transamination and decarboxylation, Biogenic amines, Urea cycle and its regulation.15 hrs.

Module V: Metabolism of nucleotides-Biosynthesis of purines and pyrimidines, - de-novo synthesis and salvage pathways, Degradation of purines and pyrimidines, Conversion of ribonucleotide to deoxyribonucleotide15 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	State the concepts of bioenergetics and illustrate the mechanism of flow of electrons and the production of ATP.	PO1, PO2
CO2	Elaborate the biochemical reactions and integration of pathways of carbohydrate metabolism.	PO1,
CO3	Sketch the oxidation and biosynthesis of fatty acids, phospholipids, triglycerides and cholesterol with suitable examples	PO1
CO4	Explain catabolism of amino acids, synthesis of nonessential amino acids and specialized products from amino acids.	PO1
CO5	Describe the metabolism of nucleic acids with necessary illustrations and its regulation.	PO1

Textbooks

1. U. Sathyanarayana & U. Chakrapani, 2015, Biochemistry, 4th Elsevier India Pvt.Ltd.,

2. M. N. Chatterjea and Rana Shinde, 2002, Textbook of Medical Biochemistry, 5th edition Jaypee Brothers Medical Publishers Pvt.Ltd.,

Reference books

1. Lehninger Principles of Biochemistry, David L. Nelson, Michael M. Cox, 2008, 5th edition, W.H. Freeman and Company.

2. Robert K. Murray, Daryl K. Granner, Victor W. Rodwell, 2006, Harper's Illustrated Biochemistry, 27th edition, McGraw Hill Publishers.

3. Principles of Biochemistry Voet. D, Voet. J.G, and Pratt C.W., 2010, Fourth edition, John

Wiley & Sons, Inc,

4. Principles of Biochemistry, Geoffrey L. Zubay, William W. Parson, Dennis E. Vance, 1995, 2nd Edition, Wm. C. Brown Publishers.

5. Biochemistry, Garret, R. H and Grisham. C. M. 2005, 3rd Edition. Thomson Learning INC.

Web resources

1.https://nptel.ac.in/courses/104/105/104105102/

2.http://www.nptelvideos.in/2012/11/biochemistry-i.html

3.https://www.saddleback.edu/faculty/jzoval/mypptlectures/ch15_metabolism/lecture_notes_ ch15_metabolism_current-v2.0.pdf

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3	2					3			3
CO 2	3						3			3
CO 3	3						3			3
CO 4	3						3			3
CO 5	3						3			3

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

UNIVERSITY OF MADRAS

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SYLLABUS WITH EFFECT FROM 2023-2024

THIRD YEAR: SEMESTER V
CLINICAL BIOCHEMISTRY

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322C5C	**Clinical Biochemistry**	Core	3	1	-	-	4	5	25	75	100

Learning objectives

The main objectives of this course are to

- Comprehend the basic concepts and disorders of carbohydrate metabolism
- Explain the disorders of lipid metabolism.
- Elucidate the liver function test and kidney function test.
- Designate the gastric function test.
- Familiarize the clinical enzymology.

Module I: Disorders of carbohydrate metabolism: Maintenance of blood glucose by hormone with special reference to insulin and glucagon. Abnormalities in glucose metabolism: Diabetes mellitus; types, causes, biochemical manifestations, diagnosis and treatment, glycated haemoglobin. Inborn errors of carbohydrate metabolism, glycosuria, Fructosuria, Pentosuria, Galactosemia andGlycogenstoragediseases.15 hrs

Module II: Disorders of Lipid Metabolism**:** Lipid Profile, Atherosclerosis, Fatty liver and hyperlipidemia. Hyper-cholesterolemia, Lipidosis and Xanthomatotic, Tay-Sach`s disease, Niemann-Pick disease, lipotropic agents 15 hrs.

Module III: Liver Function Tests**:** Bilirubin metabolism and jaundice, Estimation of conjugated and total bilirubin in serum (Diazo method). Detection of bilirubin and bile salts in urine (Fouchet's test and Hay's Sulphur test). Thymol turbidity test, prothrombin time, serum enzymes in liver disease serum transaminases (SGPT & SGOT) and lactate dehydrogenase (LDH). 15 hrs.

Kidney Function Tests**:** Measurement of urine pH, volume, specific gravity, osmolality, sediments in urine, inulin, urea and creatinine clearance tests. Concentration and dilution tests. Phenol red test. Levels of plasma protein and its significance related to kidney

function. Proteinuria. 15Hrs

Module IV: Gastric Function test: Composition of gastric juice, collection of gastric contents, examination of gastric residuum, fractional test meal (FTM), stimulation test-alcohol and histamine stimulation, Tubeless gastric analysis1.5 Hrs

Module V: Clinical enzymology**:** Enzymes of diagnostic importance- LDH, creatine kinase, transaminases, phosphatases, Isoenzymes of lactate dehydrogenase.15 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Explain the concepts of hormones and their importance to maintain glucose and types of Diabetes, diagnosis and treatment.	PO1, PO3, PO6
CO2	Analyze the lipid profile and different deficiency state.	PO1, PO3, PO6
CO3	Describe the liver and kidney functions and specific diagnostic methods used for biological sample.	PO1, PO3, PO6
CO4	Detail about the composition of gastric juice and special test for diagnosis.	PO1, PO3, PO6
CO5	Elaborate the enzyme markers used for diagnostic studies.	PO1, PO3, PO6

Text books

1. MN Chatterjee and Rana Shinde, Text Book of Medical Biochemistry, Jaypee Brothers Medical Publishers (P) LTD, New Delhi, 8th Edition, 2012.

2. Ambika Shanmugam's Biochemistry for medical students, 8th edition, Published by Wolters Kluwer India Pvt. Ltd.

Reference books

1. Philip. D. Mayne, Clinical Chemistry in diagnosis and treatment. ELBS Publication, 6th edition, 1994.

2. Thomas M. Devlin (2014) Text book of Biochemistry with clinical correlations (7thed). John Wiley and sons.

3. Tietz Fundamentals of clinical chemistry and molecular Diagnostics (2014) (7thed) Saunders.

Web Resources

1. https://www.britannica.com/science/metabolic-disease/Disorders-of-carbohydrate-metabolism

2. https://www.slideshare.net/MohitAdhikary/gastric-and-pancreatic-function-tests

3.https://onlinecourses.nptel.ac.in/noc20_ge13/preview

Mapping with Program Outcomes

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO 1	3		3			2	3	2	2	3
CO 2	3		3			2	3	2		3
CO 3	3		3			2	3	3	2	3
O 4	3		3			2	3	3	2	3
CO 5	3		3			2	3	3	2	3

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

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SYLLABUS WITH EFFECT FROM 2023-2024

THIRD YEAR: SEMESTER V

PRACTICAL V CLINICAL BIOCHEMISTRY

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322C51	**Practical V- Clinical Biochemistry**	Core Practical V	0	0	4	0	4	5	40	60	100

Learning objectives

The objectives of this course are to

- Introduce the methods of sample collection (blood & urine) for analytical purpose.
- Impart practical knowledge on the assay of activity of various diagnostically important enzymes
- Understand the estimation procedure for various important biomolecules.
- Help students learn the routine qualitative analysis of urine sample for diagnostic purpose.
- Train students on various hematological tests and its significance.

1. Collection and preservation of blood and urine samples.
2. Estimation of creatinine by Jaffe's method (serum &urine)
3. Estimation of urea by diacetyl monoxime method (serum & urine)
4. Estimation of uric acid (serum & urine)
5. Estimation of cholesterol by Zak's method
6. Estimation of Glucose by Ortho Toluidine method
7. Estimation of Protein by Lowry's method
8. Estimation of Hemoglobin by Shali's/ Drabkins method
9. Assay of SGPT and SGOT
10. Qualitative analysis of normal constituents of urine Urea, Creatinine, Phosphorus, Calcium

Abnormal constituents

a) Calcium

b) Sugar (Glucose, fructose, pentose)

c) Protein

d) Amino acids (Tyrosine, Histidine, Tryptophan)

e) Ketone bodies

f) Bile pigments with clinical significance. 80 hrs.

DEMONSTRATION EXPERIMENTS (10 hrs.)

HEMATOLOGY

a. RBC Counting
b. Total and differential count of white blood cells
c. Packed cell volume
d. Erythrocyte sedimentation rate
e. Blood clotting time
f. Blood grouping

Course Outcomes

CO	On completion of this course, students will be able to	Programme outcome
CO1	Acquaint knowledge on collection of biological samples (urine, blood) and their preparation for diagnostic purpose.	PO1, PO2
CO2	Assay the activity of various clinically important enzymes and relate their clinical importance.	PO1, PO2
CO3	Estimate the important biomolecules in biological samples and relate their clinical significance	PO1, PO2, PO3, PO6
CO4	Qualitatively analyze urine sample for normal and abnormal constituents in urine and interpret the results	PO1, PO2, PO3
CO5	Perform the routine haematological tests.	PO1, PO2, PO3, PO6

Text Books

1. Manickam. S. S. (2018). Biochemical Methods (3rd ed.). New age International Pvt Ltd publishers - ISBN 10: 8122421407 / ISBN 13: 9788122421408.

2. Plummer. D. T. (n.d.). An Introduction to Practical Biochemistry. Tata McGraw Hill- ISBN: 97800708416

3.Alan H Gowenlock. 1998. Varley's Practical Clinical Biochemistry, 6th edition, CBS

Publishers, India.

4. B. Godkar. 2020. Textbook of Medical Laboratory Technology Vol 1 & 2 Paperback, 3rd edition, Bhalani Publishers.

5. Kanai L Mukerjee. 1996. Medical Lab Technology, Vol I& II, 1st edition, Tata Mcgraw Hill, Pennsylvania.

6. Ranjna Chawla. 2014. Practical Clinical Biochemistry Methods and interpretations 58 (Paperback). 4th edition, Jaypee Brothers Medical Publishers, New York.

Reference books

1. Singh. S. K. (2005). Introductory Practical Biochemistry (2nd ed.). Alpha Science International, Ltd- ISBN 10: 8173193029 / ISBN 13: 9788173193026

2. Ashwood, B. A. (2001). Tietz Fundamentals of Clinical chemistry. WB Saunders Company, Oxford Science Publications USA - ISBN 10: 0721686346 / ISBN 13: 978072168634

Web resources

1. https://www.elsevier.com/journals/clinical-biochemistry/0009-9120/guide-for-authors

2. http://rajswasthya.nic.in/RHSDP%20Training%20Modules/Lab.%20Tech/Biochemistry/Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf

3.https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y

4.https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y *

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3	3					3	3	3	3
CO 2	3	3					3	3	3	3
CO 3	3	3	3			3	3	3	3	3
CO 4	3	3	2				3	3	3	3
CO 5	3	3	3			3	3	3	3	3

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

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THIRD YEAR: SEMESTER V

IMMUNOLOGY

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322E5A	**Immunology**	Elective	2	1	-	-	3	4	25	75	100

Learning Objectives

The objective of this course is to

- Introduce the structure and functions of lymphoid organs and cells of the immune system
- Illustrate the structure and classification of antibodies and adaptive immune response
- Impart knowledge on the types of immunity and uses of vaccines
- Provide an understanding of immune related diseases and transplantation
- Study the Ag-Ab interaction and immunological techniques to identify antigens and antibodies

Module I: Structure and function of primary lymphoid organs (thymus, bone marrow), secondary lymphoid organs (spleen, lymph node), Cells involved in immune system- Functions- Phagocytosis -Inflammation. 15 Hrs.

Module II: Antigens - Nature, Immunogens, haptens, cross reactions - Immunoglobulin- types- structure and function. Cells involved in antibody formation, Clonal selection theory, Co-operation of T-cell with B-cell. Differentiation of T and B lymphocyte -Humoral and cell mediated immunity. Monoclonal antibody – Production and application in biology. 15Hrs

Module III: Immunity and its types-Innate, Acquired, active and passive- Natural and Artificial - Commonly used toxoid vaccines, killed vaccines, live attenuated vaccines, rDNA Vaccines, DNA and subunit vaccines. 15Hrs

Module IV: Hypersensitivity – Immediate (Type 1) and Delayed (Type IV), Auto- immune diseases with examples. Organ specific and systemic autoimmunity. SLE, RA. Transplantation – Types of Grafts, structure& functions of MHC, graft Vs host reaction, immunosuppressive Agents.15Hrs

Module V: Antigen-antibody reactions, General features of Antigen Antibody reactions. Precipitation, Immuno diffusion, SID and DID -Oudin Procedure, Oakley Fulthrope Procedure, Radio immunodiffusion, Ouchterlony double diffusion, CIE, Rocket electrophoresis, Agglutination- Coomb's test Complement Fixation test-Wasserman's reaction, RIA, ELISA. 15Hr

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Associate structure and function of the organs involved in our body's natural Defence	PO1
CO2	Classify antigens and antibodies and the role of lymphocytes in defending the host	PO1, PO2
CO3	Describe the types of immunity and the uses of vaccines	PO1, PO4
CO4	Understand the immune related diseases and mechanism of transplantation	PO1, PO2
CO5	Examine the immunological tests and relate it to the immune status of an Individual	PO1, PO3

Text Books

1.Kuby, J. (2018). Immunology (5th ed). W.H. Freeman - ISBN-10: 1319114709 / ISBN-13: 978-1319114701

2. Rao, C. V. (2017). Immunology (3rd ed.). Chennai: Alpha Science Int. Ltd - ISBN-10: 1842652559/ ISBN 13:978-1842652558

3.Tizard (1995). An Introduction to Immunology. Harcourt Brace College Publications

References Books

1.Kenneth M. Murphy, Paul Travers, Mark Walport - (2007), Janeway's Immunobiology, 7thedition, Garland Science.

2. Abul K. Abbas, Andrew H. Lichtman, Jordan S. Pober - (1994), Cellular and molecular immunology, 2ndedition, B. Saunders Company.

3. Basic Immunology Functions and Disorders of the Immune System, 6th Edition - January 25, 2019 Authors: Abul Abbas, Andrew Lichtman, Shiv Pillai, ISBN: 9780323549431eBook ISBN: 9780323639095

4. Peter Delves, Seamus Martin, Dennis Burton, Ivan Roitt - (2006), Roitt's Essential Immunology, 11th edition, Wiley-Blackwell

Web resources

1.https://onlinecourses.nptel.ac.in/noc22_bt40/preview

2.https://onlinecourses.swayam2.ac.in/cec20_bt05/preview

3.https://youtu.be/8uahFPl6ny8

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3		2				3			3
CO 3	3			2			3	3		3
CO 4	3	2					3	1		3
CO 5	3		3				3	3	3	3

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

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THIRD YEAR: SEMESTER V

RESEARCH METHODOLOGY

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322E5C	**Research Methodology**	Elective	2	1	-	-	3	4	25	75	100

Learning objectives

The objectives of the course are to:

- Introduce the components of research.
- Acquaint on the experimental design and literature survey
- Analyse the data and find out the significance statistically
- Highlight the importance of computation in research.
- Provide mechanics of writing a research report hands-on experience in designing and working on small projects.

Module I: Characteristics and types of Research, Research Methods versus Methodology, Research designs in Biochemistry: experimental, *in vitro, in vivo, in situ*, clinical trials. Identification and criteria of selecting a research problem (Hypothesis); Formulation of objectives; Research plan and its components.15 Hrs

Module II: Experimental design- Objective, Design of work, Guidelines for design of experiments, Literature Search - Databases for literature search, Material and methods, Designing biological experiments, Compilation and documentation of data15 Hrs

Module III: Statistical Analysis: Measures of variation - standard deviation, Non-linear regression, Standard error. Analysis of variance for one-way and two-way classified data and multiple comparison procedures. Significance - students “t” test, chi-square test. Dunnet’s test 15Hrs

Module IV: Computer and its role in research: Basics of MS word, MS Excel: tabulation, calculation and data analysis, preparation of graphs, histograms and charts. Use of statistical software SPSS. Power Point: preparation of presentations and scientific poster designing
15 hrs.

Module V: Scientific writing for journals - Preparation of Abstract, Impact factor, h-index, i-10 index, citation index, Dissertation/Thesis writing: format, content and chapterization, writing style, drafting titles & sub-titles, captions and legends. Writing results, discussion and conclusions. Bibliography and references, referencing style - Harvard and Vancouver systems, Appendices and acknowledgement; Ethical issues in research; Intellectual property right and plagiarism. 15 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Programme outcome
CO1	Explain the types of research and formulate and plan the research.	PO1, PO3
CO2	Design experimental setup, review the literature, compile and document the data.	PO1, PO3
CO3	Analyse and validate the experimental data using statistical tools	PO1, PO2, PO3
CO4	Interpret the data using computational tools.	PO1, PO2, PO3
CO5	Compile and draft a research report, present results findings and publish ethically.	PO1, PO3, PO4

Text Books

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.

2. Kothari, C.R., Research Methodology: Methods and Techniques. 2004, New Age International.

3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications.2 volumes.

4. Gurumani. N, Research Methodology for biological Sciences, 2014, MJP Publishers.

Reference Books

1. Dr. Prabhat Pandey, Dr. Meenu Mishra Pandey, Research Methodology: Tools and Techniques 2015

2.Coley, S.M. and Scheinberg, C. A., 1990, "Proposal Writing", Sage Publications.

4. Day, R.A., 1992.How to Write and Publish a Scientific Paper, Cambridge University Press.

5. Fink, A., 2009. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications

6. Scientific Thesis Writing and Paper Presentation. MJP Publishers.2010

7. Research Methodology (2 Vols-Set), Suresh C. Sinha and Anil K. Dhiman, Vedams Books (P) Ltd.2002.

Web Resources

1. https://explorable.com/research-methodology
2. http://www.scribbr.com
3. http://www.open.edu
4. http://www.macmillan .ihe.com.

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3		3				3			3
CO 2	3		3				3	3	3	3
CO 3	3	2	3				3	3	3	3
CO 4	3	2	3				3	3	3	3
CO 5	3		3	2			3	3	33	3

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

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THIRD YEAR: SEMESTER V

BIOCHEMICAL PHARMACOLOGY

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322E5B	**Biochemical Pharmacology**	Elective	2	1	-	-	3	4	25	75	100

Learning Objectives

The objectives of this course are to

- Introduce the basic concepts of pharmacology.
- Explain the metabolism of drugs and factors responsible for metabolism.
- Acquaint the adverse response and side effects of drugs.
- Familiarize important drugs used for common metabolic disorders.
- Provide an understanding about the action of antibiotics.

Module I: Drugs – classification based on sources, routes of drug administration - Oral/Enteral, Parenteral and Local application. Absorption of drugs, factors influencing drug absorption, distribution and excretion of drugs. 15 Hrs

Module II: Drug metabolism **-** Phase I and Phase II reactions, role of cytochrome P_{450}, non-microsomal reactions of drug metabolism. Factors influencing drug metabolism. Therapeutic index. 15 Hrs

Module III: Drug allergy, Drug tolerance - IC 50, LD50 of a drug, Drug intolerance, Drug addiction, Drug abuses and their biological effects. Drug resistance - biochemical mechanism. 15 Hrs

Module IV: Therapeutic Drugs - Analgesics and Non-steroidal anti-inflammatory drugs (NSAIDs) – Aspirin and Acetaminophen. Insulin, Oral antidiabetic drugs - Sulfonylureas, Biguanides. Antihypertensive drugs - ACE inhibitors, Calcium channel blockers. Anti-cancer agents – Antimetabolites. 15 Hrs

Module V: Antibiotics - Definition, Examples and Biochemical mode of action of penicillin, streptomycin, tetracyclines and chloramphenicol. 15 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Classify the different routes of drug administration, describe the absorption, distribution, metabolism and excretion of drugs.	PO1
CO2	Illustrate the metabolism of drugs, classify the microsomal and non-microsomal reactions and explain the role of cytochromes.	PO1
CO3	List out the various adverse response and side effects of drugs.	PO1, PO2, PO4
CO4	Justify the use of synthetic drugs and elucidate its pharmacological actions and its adverse effects for different disease.	PO1, PO4
CO5	Highlight the importance and explain the mode of action of important antibiotics.	PO1, PO4

Text Books

1. N. Murugesh, A concise text book of Pharmacology –Sathya Publishers.
2. Jayashree Ghosh, A Textbook of Pharmaceutical chemistry –S. Chand & Company Ltd.
3. S C Metha, Ashutosh Kar, Pharmaceutical Pharmacology –New Age International (P) Limited, Publishers.

References Books

1. Lippincott's illustrated Reviews- Pharmacology by Mary J. Mycek, Richard A. Harvey, Pamela C. Champe, Lippincott – Raven publishers, New Delhi.
2. David. E. Golan, Principles of Pharmacology, Wolters Kluwer (India) Pvt.Ltd.
3. R.S. Satoskar, S. B. Elsevier Pharmacology and pharmacotherapy. - ISBN-10: 9788131248867 / ISBN-13: 978-8131248867 ,2017.
4. Tripathi, K. Essentials of Medical Pharmacology. Jaypee Publishers- ISBN-10: 9350259370 / ISBN-13: 978-9350259375.2018.

Web Resources

https://slideplayer.com/slide/3728296/64/video/What+is+bioremediation%3F.mp4

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3						3			3
CO 3	3	2		2			3	2		3
CO 4	3			2			3	2		3
CO 5	3			2			3	2		3

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

UNIVERSITY OF MADRAS

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THIRD YEAR: SEMESTER VI

MOLECULAR BIOLOGY

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322C6A	**Molecular Biology**	Core	3	1	-	-	4	6	25	75	100

Learning Objectives

The objectives of this course are to

- Provide insights into the central dogma of molecular biology and explain the mechanism of DNA replication.
- Elaborate the mechanism of transcription and Reverse transcription.
- Highlight the characteristics of genetic code and describe the Process of protein synthesis.
- Introduce the concept of regulation of gene expression in Prokaryotes
- Familiarize the different types of mutations and explain the Mechanism of DNA repair.

Module I: Central Dogma of molecular Biology, DNA as the unit of inheritance. Experimental evidences by Griffith's transforming principle, Avery, McLeod and Mc Carthy's experiment, and Hershey and Chase Experiment. Replication in prokaryotes: Modes of replication, Meselson and Stahl's experimental proof for semiconservative replication. Mechanism of Replication – Initiation, events at Ori C, Elongation – replication fork, semi discontinuous replication, Okazaki fragments, and termination. Bidirectional replication, Inhibitors of replication. Models of replication-theta, rolling circle and D loop model.15 hrs.

Module II: Transcription - Mechanism of transcription: DNA dependent RNA polymerase(s), recognition, binding and initiation sites, TATA/ Pribnow box, elongation and termination. Post-transcriptional modifications; inhibitors of transcription. RNA splicing and processing of mRNA, tRNA and rRNA. Reverse transcription. 15 hrs.

Module III: Genetic Code and its characteristics, Wobble hypothesis. Translation: Adaptor role of tRNA, Activation of amino acids, Initiation, elongation and termination of protein synthesis, post-translational modifications and inhibitors of protein synthesis.15 Hrs.

Module IV: Regulation of Gene Expression in Prokaryotes – Principles of gene regulation, negative and positive regulation, concept of operons, regulatory proteins, activators, repressors, regulation of lac operon and trp operon.15 hrs.

Module V: Mutation: Types-Nutritional, Lethal, Conditional mutants. Missense mutation and other point mutations. Spontaneous mutations; chemical and radiation – induced mutations. DNA repair: Direct repair, Photoreactivation, Excision repair, Mismatch repair, Recombination repair and SOS repair. 15 hrs.

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Illustrate the Central Dogma of molecular biology, explain the multiplication of DNA in the cell and describe the types and modes of replication.	PO1
CO2	Elaborate the mechanism of transcribing DNA into RNA, discuss the formation of different types of RNA.	PO1
CO3	Decipher the genetic code and summarize the process of translation.	PO1
CO4	Comprehend the principles of gene expression and explain the concept of operon in prokaryotes.	PO1, PO2
CO5	Distinguish the types of mutations and explain the various mechanisms of DNA repair.	PO1, PO2

Textbooks

1.Veer Bala Rastogi, 2008, Fundamentals of Molecular Biology, 1st edition, Ane books India.
2.David Friefelder,1987, Molecular Biology, 2nd edition, Narosa Publishing House.
3.Dr. P. S. Verma and Dr. V. K. Agarwal, 2013, Cell biology, Genetics, Molecular Biology, Evolution and Ecology,1st edition, S. Chand & Company Pvt. Ltd.

Reference books

1. Karp. G., 2010, Cell and Molecular Biology: Concepts and Experiments, 6th edition, John Wiley & Sons. Inc.
2. De Robertis, E. D. P and De Robertis, E. M. F., 2010, Cell and Molecular Biology, 8thedition, Lippincott Williams and Wilkins, Philadelphia.
3. James. D. Watson, 2013, Molecular Biology of the Gene 7th edition, Benjamin Cummings.
4. George M. Malacinski, 1992, Freifelder's Essentials of Molecular Biology, 4thedition, Narosa publishing House.

Web resources

1. www.mednotes.net/notes/biology
2. https://www.onlinebiologynotes.com/repair-mechanism-of mutation/
3. https://teachmephysiology.com/biochemistry/protein-synthesis/dna-translation/

Mapping with Program Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3						3			3
CO 3	3						3			3
CO 4	3	2					3			3
CO 5	3	2					3	1		3

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

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THIRD YEAR: SEMESTER VI

HUMAN PHYSIOLOGY

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322C6B	**Human Physiology**	Core	3	1	-	-	4	6	25	75	100

Learning Objectives

The main objectives of this course are to

- Aid in understanding the physiology of respiratory and circulatory systems
- Explain the structure and physiology of the nervous and muscular system
- Explicate the functions of digestive and excretory system of the body.
- Impart knowledge about the process of reproduction.
- Emphasize the importance of various endocrine factors that regulate metabolism, growth, homeostasis and reproduction.

Module I: Respiratory System-Over view of respiratory system, Types of respiration, Transport of respiratory gases, Exchange of respiratory gases in lungs and tissues -Chloride Shift & Bohr's effect, Lung surfactant. Circulatory System-Structure and functions of the Heart. Arterial and venous system, Cardiac cycle, Pace maker, Blood pressure and Factors affecting blood pressure. 15Hrs

Module II: Nervous system- Structure of neuron, synaptic transmission, reflex action, neurotransmission- Resting membrane and Action potential. neuro transmitters- acetyl choline, Noradrenaline, Dopamine, Serotonin, Histamine, GABA, Substance P. Muscular system-structure and types of muscles - skeletal, smooth and cardiac muscles, muscle proteins- types and functions, mechanism of muscle contraction. 15Hrs

Module III: Digestive system- composition, functions of saliva, gastric pancreatic intestine and bile secretions, structure of digestive system, Digestion, absorption of carbohydrates, lipids, proteins. Excretory system-Structure of nephron, mechanism of urine formation, Concentration and acidificationofUrine.Roleofkidneysinthemaintenanceofacidbasebalance. 15Hrs

Module IV: Reproductive system: Oogenesis, spermatogenesis, capacitation and transport of sperm- blood testes barrier. Fertilization, early development, Implantation, Placentation and

Parturition. 15Hrs

Module V: Endocrinology- Classification of hormones, endocrine glands and their secretions, structure and functions of Insulin, thyroxine. Steroid hormones- Corticosteroids, Sex hormones – testosterone and estrogen, menstrual cycle. 15Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Explain the exchange of gases, design of blood vessels and cardiac cycle.	PO1
CO2	Summarize the events in transmission of nerve impulses and mechan of muscle contraction.	PO1
CO3	Elaborate the structure and functions of digestive system, structure of nephron and mechanism of urine formation and role of kidney in maintenance of pH.	PO1
CO4	Describe the process of Oogenesis, Spermatogenesis, Fertilization, and Parturition.	PO1, PO2
CO5	Understand the role of different hormones that regulate metabolism, growth, glucose homeostasis and reproductive function.	PO1, PO2

Textbooks

1. K. Sembulingam & Prema Sembulingam, 2016, Essentials of Medical Physiology, 7th edition, Jaypee Brothers Medical Publishers(P)Ltd.
2. Chatterjee. C. C., 1988, Human Physiology-VolI & II,1st edition, Medical Elective Agency.
3. Animal Physiology- Mariakuttikanand Arumugam, Saras publication, 2017.

Reference books

1. Text book of medical biochemistry physiology- MN. Chatterjee and Rana shinde, 7th edition, Jaypee brothers- medical publishers, 2007.
2. Meyer, Meyer & Meij, 2002, HumanPhysiology,3rd edition, A.I.T.B.S Publishers.
3.GuytonandHall, 2011, Textbook of Medical Physiology, 12th edition, W.B. Saunders Company.
4.Testbook of Medical Physiology – Guyton & Hall,12th edition, Saunders Publishers, 2010

5. Human anatomy and physiology – Elaine N. Marieb, 3rd edition, Benjamin/ Cummings (a Pearson education company), 1995.

Web resources

https://www.youtube.com/watch?v=6qnSsV2syUE
https://www.youtube.com/watch?v=9_h0ZXx1lFw
https://slideplayer.com/slide/9431799/

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3	2		3
CO 2	3						3	2		3
CO 3	3						3	2		3
CO 4	3	3					3	2		3
CO5	3	3					3	2		3

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

THIRD YEAR - SEMESTER VI
BIOTECHNOLOGY

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322E6A	**Biotechnology**	Elective	2	1	0	0	3	5	25	75	100

Learningobjectives

The main objectives of this course are to

- Impart knowledge on gene manipulation and gene transfer technologies
- Make the students understand the procedures involved in plant tissue culture.
- Acquire knowledge on animal cell culture and stem cell technology.
- Improve the employability skills of students by providing knowledge in recent techniques such as PCR, blotting, ELISA etc.
- Understand the application of fermentation technology.

Module I: Recombinant DNA technology

Recombinant DNA technology - Principles of gene cloning: restriction endonucleases and other enzymes used in manipulating DNA molecules. Ligation of DNA molecules, DNA ligase, linkers and adapters, homopolymer tailing. end labelling and construction maps of PBR322, λ bacteriophage.15 Hrs

Module II: Plant Tissue culture

Plant tissue culture- basic requirements for culture, M S medium, callus culture, protoplast culture. Vectors – Ti plasmid (cointegration vector and binary vector), Viral vectors- TMV, CaMV and their applications. Transgenic plants – pest resistant, herbicide resistant and stress tolerant plants**.**15 Hrs

Module III: Animal Tissue culture

Animal cell lines and organ culture - culture methods and applications. Transgenic animals: transgenic mice- Production and its applications. Stem cell technology: definition, types, and applications. 15 Hrs

Module IV: Molecular Techniques

PCR –Principle, types and its application in clinical diagnosis and forensic science. Southern blotting, Northern blotting and DNA finger printing Technique-principle and their applications. 15 Hrs

Module V: Fermentation technology

Fermentation technology – Fermentors - general design, fermentation processes - Media used, downstream processing. Production and applications of ethanol, Streptomycin and Proteases. Production of edible vaccines.15 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Acquire knowledge on rDNA technology, DNA manipulation, and use of restriction endonuclease	PO1, PO3
CO2	Get acquainted with the use of cloning and vectors in plant tissue culture.	PO1, PO2, PO3
CO3	Understand the methods for production of proteins using recombinant DNA technology and their applications, basics of tissue culture, transgenesis, stem cell technology, risks, and safety aspects and patenting in biotechnology	PO1, PO3
CO4	Gain knowledge about the importance of gene and gene manipulation technologies	PO1, PO3
CO5	Know the concept fermentation technology and its applications.	PO1, PO3

Text Books

1.James D. Watson, Amy A. Caudy, Richard M. Myers, Jan Witkowski (2006) Recombinant DNA: Genes and Genomes - a Short Course (3rd ed), W.H. Freeman & Co

2. Satyanarayana U (2008), Biotechnology, Books & Elective (P) Ltd.

3. Cassida L (2007) Industrial Microbiology, New Age International

Reference books

1. Reed G (2004) Prescott and Dunn's Industrial Microbiology, CBS Publishers & Distributors

2.Biotechnology: applying the genetic revolution- David P. clark, Pazdernik N. J, Elsevier (2009).

3.Click B.R. and Pasternark J.J (2010). Molecular Biotechnology: Principles and Applications of Recombinant DNA. (4th ed) American Society for Microbiology

Web Sources

NPTEL Certification course - Gene Therapy by Sachin Kumar https://nptel.ac.in/courses/102/103/102103041/

Coursera Certification course –Vaccines

https://futureoflife.org/background/benefits-risks-biotechnology/

https://www.sciencedirect.com/topics/neuroscience/genetic-engineering

http://www.biologydiscussion.cm/biotechnology/techniques-biotechnology/important-techniques-of-biotechnology-3-techniques/15683

https://iopscience.iop.org/book/978-0-7503-1347-6/chapter/bk978-0-7503-1347-6ch1

https://www.slideshare.net/zeal_eagle/fermentation-technology

https://www.slideshare.net/zeal_eagle/fermentation-technology

https://www.slideshare.net/Chepkitwai/blotting-techniques-6129300

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3		3		3	3	3	3	3	3
CO 2	3		3		3	3	3	3	3	3
CO 3	3		3		3	3	3	3	3	3
CO 4	3		3		3	3	3	3	3	3
CO5	3		3		3	3	3	3	3	3

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

THIRD YEAR: SEMESTER VI

BIOINFORMATICS

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322E6B	**Bioinformatics -**	EP2	2	1	0	0	3	5	25	75	100

Learning Objectives

The objective of this course is to

- Impart knowledge on bioinformatics and applications
- Learn about biological databases
- Understand the local and global sequence alignment
- Provide insights on BLAST and Microarray
- Familiarize about structural genomics and visualization tools

Module I: Introduction to Bioinformatics – Bioinformatics and its applications. –Genome, Metabolome-Definition and its applications. Metabolome-Metabolome database- E.coli metabolome database, Human Metabolome database. Transcriptome-Definition and applications.15 Hrs

Module II: Biological Databases - definition, types and examples –, Nucleotide sequence database (NCBI, EMBL, Gene bank, DDBJ) Protein sequence database- SwissProt, TrEMBL, Structural Database-PDB, Metabolic database-KEGG15 Hrs

Module III: Sequence Alignment-Local and Global alignment-Dot matrix analysis, PAM, BLOSUM. Dynamic Programming, Needleman- Wunch algorithm, Smith waterman algorithm. Heuristic methods of sequence alignment 15 Hrs

Module IV: BLAST-features, types (BLASTP, BLASTN, BLASTX), PSI BLAST, result format. DNA Microarray-Procedure and applications.15 Hrs

Module V: Structural Genomics-Whole genome sequencing (Shotgun approach), Comparative genomics-tools for genome comparison, VISTA servers and precomputed tools. Molecular visualization tools. RASMOL, Swiss PDB viewer. Nutrigenomics-Definition and applications. 15 Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Introduce the fundamentals of Bioinformatics and its applications Genome, metabalome & Transcriptome.	PO1
CO2	Classify biological database and to correlate the different file formats used by nucleic acid, protein database, structural and metabolic databas	PO1, PO2, PO3
CO3	Develop algorithms for interpreting biological data.	PO1, PO2
CO4	Discuss the concepts of sequence alignment and its types. Understand the tool used to detect the expression of genes	PO1, PO2, PO3
CO5	Apply the various tools employed in genomic study and protein visualization. Analyse the entire genome by shot gun method.	PO1, PO2

Text books

1.Basic of Bioinformatics by Rui Jiang Xuegong Zhang and Michael Q. Zhang Editors

2.Bioinformatics for Beginners Genes, Genomes, Molecular Evolution, Databases and Analytical Tools By: Supratim Choudhuri (Author)

3.Bioinformatics by Saras publication

4.Introduction to Bioinformatics by Arthur Lesk

Reference books

1.Computation in Bioinformatics Multidisciplinary Applications S Balamurugan, Anand T. Krishnan, Dinesh Goyal, Balakumar Chandrasekaran

2.Chemoinformatics and Bioinformatics in the Pharmaceutical Sciences

Navneet Sharma PhD Pharmaceutics, Himanshu Ojha, Pawan Raghav, Ramesh K. Goyal

Web resources

1.https://nptel.ac.in/courses/102/106/102106065/

2 http://www.digimat.in/nptel/courses/video/102106065/L65.html

3 https://www.slideshare.net/sardar1109/bioinformatics-lecture-notes

Mapping with Program Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3		2	3
CO 2	3	3	3				3		3	
CO 3	3	3					3		3	
CO 4	3	3	3				3		3	
CO5	3	3					3		3	

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

THIRD YEAR - SEMESTER VI

BIO-ENTREPRENEURSHIP

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322E6C	**Bio-entrepreneurs**	Elective	2	1	-	-	3	5	25	75	100

Learning Objectives

The objective of this course is to

- Impart knowledge on bio entrepreneurship and the types of industries
- Learn about business plan, proposal and funding agencies
- Understand the market strategy and the role of information technology in expansion of business
- Provide insights on legal requirement and accounting to establish as Bio-entrepreneurship
- Familiarize about business bio incubators centres

Module I: Introduction to Bio entrepreneurship; Types of industries – Biopharma, Bio agriculture and CRO; Introduction to Trademarks, Copyrights and patents. 15 Hrs

Module II: Business Plan, Budgeting and Funding Idea or opportunity; Business proposal preparation; funds/support from Government agencies like MSME/banks, DBT, BIRAC, Start-up and make in India Initiative; dispute resolution skills; external environment changes; avoiding/managing crisis; Decision making ability. 15 Hrs

Module III: Market Strategy- Basics of market forecast for the industry; distribution channels – franchising, policies, promotion, advertising, branding and market; Introduction to information technology for business administration and Expansion15 Hrs

Module IV: Legal Requirements, Finance and Accounting; Registration of company in India; Ministry of Corporate Affairs (MCA); basics in accounting: introduction to concepts of balance sheet, profit and loss statement, double entry, bookkeeping; finance and break-even analysis; difficulties of entrepreneurship in India.15 Hrs

Module V: Role of knowledge centres such as universities, innovation centres, research institutions (public & private) and business incubators in Entrepreneurship development; quality

control and quality assurance; Definition, role and importance of CDSCO, NBA, GLP, GCP, GMP.15 Hrs

Course Outcomes

After completion of the course the students will be able to

CO	On completion of this course, students will be able to	Program outcomes
CO1	Understand the concept and scope for entrepreneurship	PO1
CO2	Identify various operations involved in a venture creation	PO1, PO5, PO6
CO3	Gather funding and launching a winning business	PO1, PO5, PO6
CO4	Nurture the organization and harvest the rewards	PO1, PO5, PO6
CO5	Illustrate about the Business incubator centres and Bio entrepreneurship	PO1, PO5, PO6

Text books

1.Adams, D. J. (2008). Enterprise for life scientists: Developing innovation and entrepreneurship in the biosciences. Bloxham: Scion - ISBN 10: 1904842364 / ISBN 13: 9781904842361

2.Shimasaki, C. (2014). Biotechnology Entrepreneurship: Starting, managing, and Leading Biotech Companies. Academic London Press - ISBN 10: 0124047300 / ISBN 13: 9780124047303

3.Onetti, A. &. (2015). Business modelling for life science and biotech companies: Creating value and competitive advantage with the milestone bridge. Routledge - ISBN 10: 1138616907 / ISBN 13: 9781138616905

4. Kapeleris, D. H. (2006). Innovation and entrepreneurship in biotechnology: Concepts, theories & cases - ISBN-13: 978-1482210125, ISBN-10: 1482210126

Reference books

1.Desai, V. (2009). The Dynamics of Entrepreneurial Development and Management New Himalaya. New Himalaya House Delhi: pub - ISBN: 9789350440810 9350440814

2.Ono, R. D. (1991). The Business of Biotechnology, From the Bench of the Street. Butterworth-Heinemann - ISBN 10: 1138616907 / ISBN 13: 9781138616905

3. Jordan, J. F. (2014). Innovation, Commercialization, and Start-Ups in Life Sciences. London: CRC Press - ISBN-10: 812243049X, ISBN-13: 978-8122430493

Web sources

1. http://www.simplynotes.in/e-notes/mbabba/entrepreneurship-development/

2.https://openpress.usask.ca/entrepreneurshipandinnovationtoolkit/chapter/chapter-1-introductionto-entrepreneurship/

Mapping with Program Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2						3			3
CO 2	2				2	3	3			3
CO 3	2				2	3	3			3
CO 4	2				2	3	3		3	3
CO 5	2				2	3	3			3

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

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN BIOCHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

THIRD YEAR - SEMESTER VI

PLANT BIOCHEMISTRY AND PLANT THERAPEUTICS

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
322E6D	**Plant Biochemistry and Plant Therapeutics**	Core	1	2	-	-	3	5	25	75	100

Learning Objectives

The main objectives of this course are to

- Convey the knowledge of photosynthesis.
- Detail the structure and types of secondary metabolites.
- Impart the idea on various plant hormones.
- Emphasize the effects of free radicals and the importance of antioxidants
- Understand the role of medicinal plants in treating diseases.

Module I: Photosynthesis- Photosynthesis apparatus, pigments of photosynthesis, photo chemical reaction, photosynthetic electron transport chain, path of carbon in photosynthesis- Calvin cycle, Hatch – lack pathway (4 ways) CAM path way, significance of photosynthesis. 15Hrs

Module II: Secondary metabolites: Structure, Types, Sources, Biosynthesis and function of phenolics, tannins, lignins, terpenes and alkaloids. Medicinal properties of secondary metabolite15Hrs

Module III: Plant hormones Structure and function of plant hormones such as ethylene, cytokine Ins, auxins, Absicic acid, Florigin and Gibberlins. 15Hrs

Module IV: Free radicals, types, production, free radical induced damages, lipid peroxidation, reactive oxygen species, antioxidant defense system, enzymatic and non-enzymatic antioxidants, role of antioxidants in prevention of disease, phytochemicals as antioxidants. 15Hrs

Module V: Plant therapeutics: Bioactive principles in herbs, plants with antidiabetic, anticancer, antibacterial, antiviral, anti-malaria and anti-inflammatory properties.15Hrs

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Gain knowledge on photosynthetic apparatus, pigments present, pathways, and significance of photosynthesis	PO1
CO2	Learn in detail about the structure, types, sources, biosynthesis and functions of secondary metabolites.	PO1, PO3
CO3	Understand the structure and functions of plant hormones.	PO1
CO4	Discuss about free radicals, types and its harmful effects. Role of enzymatic and non-enzymatic antioxidant in defence mechanism, prevention in disease.	PO1, PO2, PO3
CO5	Identify the plants with antidiabetic, anticancer, antibacterial, antiviral, anti-malaria and anti-inflammatory properties.	PO1, PO2, PO3

Text books

1. Singh M. P and Panda. H 2005. Medicinal Herbs with their formulations, Daya publishing house, Delhi

2. Plant Physiology- Devlin N. Robert and Francis H. Witham, CBS Publications

3. Molecular activities of plant cell – An Introduction to Plant Biochemistry. John. W.

4. Anderson and John Brardall, Black well Scientific Publications, 1994.

Reference books

1. Khan, I. A and Khanum. A 2004. Role of biotechnology in medicinal and aromatic plants, Vol.1andVol.10, Ukka 2 publications, Hyderabad.

2. Plant Biochemistry and Molecular Biology – Hans Walter Heldt, Oxford University, 4th Edition, 2010

3. Plant biochemistry (2008), Caroline bowsher, Martin steer, Alyson Tobin, garland science.

4. Plant physiology and development (sixth edition) by Lincoln Taiz, Eduardo Zeiger, Ian Max Moller and Angus Murphy publisher; Oxford university press

Web resources

1 https://www.intechopen.com/books/secondary-metabolites-sources-and-applications/anintroductory- chapter-secondary-metabolites

2 https://www.toppr.com/guides/biology/plant-growth-and_development/plantgrowth

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3		2				3	3		3
CO 3	3						3			3
CO 4	3	3	3				3	3		3
CO5	3	3	3				3	3		3

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

UNIVERSITY OF MADRAS

சென்னைப் பல்கலைக்கழகம்

[Established under the Act of Incorporation XXVII of 1857 – Madras University Act 1923] [State University]
Centenary Building, Chepauk, Chennai – 600 005

No.V.3/S.1 /Common template for UG/2024/ 292 Date: - 8 OCT 2024

From
The Registrar,
University of Madras.

To
The Principals of all affiliated Arts and Science College (Autonomous/Non-Autonomous)

Sir/Madam,

Sub: Academic- Implementation of common Template for all UG Degree Programme from the academic year 2023-2024 - Reg

*****

I am by direction to inform you that the common Template for all UG Degree Programme inclusion of Naan Mudhalvan course from 2nd semester to 6th semester from the academic year 2023-2024 offered in the affiliated Arts and Science Colleges is adopted based on the letter received from TANSCHE.

I am forwarding herewith the common Template for all UG Degree Programmes.

This may kindly be brought to the notice of the concerned Department/ Staff/Students in your colleges without fail.

The receipt of this communication may kindly be acknowledged.

Thanking you,

Yours faithfully,

S. Kanthasamy
for REGISTRAR

Encl: as above

UNIVERSITY OF MADRAS

Revised Template for the Scheme of Examination and Credit Distribution for UG Degree Programmes which Includes Naan Mudhalvan Courses with effect from the academic year 2023-2024 onwards

Component	Semester I	Credits	Hours
Part I	Languages – Tamil/Other Languages - 1	3	6
Part II	English 1	3	6
Part III	Core Course - CC 1	5	5
	Core Course - CC 2	5	5
	Elective 1 Generic/Discipline Specific	3	4
Part IV	Skill Enhancement Course (SEC) - 1	2	2
	Skill Enhancement(Foundation Course)	2	2
		23	**30**

Component	Semester II	Credits	Hours
Part I	Languages – Tamil /Other Languages - 2	3	6
Part II	English - 2	3	4 + 2*
Part III	Core Course - CC 3	5	5
	Core Course - CC 4	5	5
	Elective 2 Generic/Discipline Specific	3	4
Part IV	Skill Enhancement Course (SEC) - 2	2	2
	NMC- 1 * (Naan Mudhalvan Course) - Language Proficiency for Employability	2	2*
	Skill Enhancement Course – (SEC) -3	2	2
		25	**30**

- The Instructional hours distributed for Part-II English is 4 hours instead of 6 hours and the 2 hours provided for Language Proficiency for Employability (Naan Mudhalvan Course (NMC-I)) which shall be handled by the faculty of English Department only .

Component	Semester III	Credits	Hours
Part I	Languages – Tamil /Other Languages - 3	3	6
Part II	English - 3	3	6
Part III	Core Course - CC 5	5	5
	Core Course - CC 6	5	5
	Elective 3 Generic/Discipline Specific	3	4
Part IV	Skill Enhancement Course (SEC) - 4 (Entrepreneurial Skill)	1	1
	NMC-2 (Naan Mudhalvan Course/Skill Enhancement Course (SEC) - 5	2	2
	E.V.S.	-	1
		22	**30**

Contd..2..

Component	Semester IV	Credit	Hours
Part I	Languages – Tamil /Other Languages - 4	3	6
Part II	English - 4	3	6
Part III	Core Course - CC 7 Core Industry Module	5	5
	Core Course 8	5	5
	Elective 4 Generic/Discipline Specific	3	3
Part IV	NMC-3 (Naan Mudhalvan Course)/Skill Enhancement Course (SEC) - 6	2	2
	E.V.S	2	1
	Value Education	2	2
		25	**30**

Component	Semester V	Credits	Hours
Part I	Core Course - CC 9	4	5
Part II	Core Course - CC 10	4	5
Part III	Core Course - CC 11	4	5
	Core Course/ Project with viva-voce - CC 12	4	5
	Elective - 5 Generic/Discipline Specific	3	4
	Elective - 6 Generic/Discipline Specific	3	4
Part IV	NMC-4 (Naan Mudhalvan Course)/Skill Enhancement Course (SEC) - 7	2	2
	Summer Internship/Industrial Training	2	-
		26	30

Component	Semester VI	Credit	Hours
Part I	Core Course 13	4	6
Part II	Core Course 14	4	6
Part III	Core Course 15	4	6
	Elective - 7 Generic/Discipline Specific	3	5
	Elective - 8 Generic/Discipline Specific	3	5
Part IV	NMC- 5 (Naan Mudhalvan Course)/ Professional Competency Skill	2	2
Part V	Extension Activity	1	-
		21	30

- Total – 142 Credits (Minimum Credits required for the award of Degree 142)
- Originally Value Education subjects in the V Semester, now it is shifted to IV Semester in view of accommodating Naan Mudhalvan Course in the V Semester.
- Naan Mudhalvan Courses are mandatory for award of Degree for all UG Programmes, If a student is long absentee/lack of attendance for exceptional cases, he/she shall not be mapped for NM courses, instead the existing Skill Enhancement Course (SEC) shall be offered to the said students for award of Degree.

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