Dr. N.G.P.ARTS AND SCIENCE COLLEGE

REGULATIONS 2023-24 for Under Graduate Programme

(Outcome Based Education model with Choice Based Credit System)

B.Sc. Biochemistry Degree

(For the students admitted during the academic year 2023-24 and onwards)

Eligibility

A pass in Higher Secondary Examination conducted by the Government of Tamil Nadu with Physics/ Biology/ Chemistry /Biochemistry/ Microbiology/Home science as one of the paper are only eligible for Examinations accepted as equivalent there by Academic Council, subject to such conditions as may be prescribed there to are permitted to appear and qualify for the **Bachelor of Science in Biochemistry Degree Examination** of this College after the programme of study of three academic years.

Programme Educational Objectives

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. Offer students a thorough understanding on basic principles of biochemistry at the molecular and cellular levels.
2. Empower students to comprehend the occurrence of varied bio- molecular types with unique chemical characteristics that make them indispensible for life.

3. Provide students a detailed understanding on basic energy requirement of living cells, and how cells meet this prerequisite adequately through varied metabolic processes.
4. Capacitate students to grasp intricate influence of DNA and RNA structures in preserving and transferring information of cell function for generations.
5. Enable students to understand how multiple biological reactions with differing kinetics are performed in a small cell volume at a given time.
6. Entitle students to appreciate the prominence of Biochemistry in basic and applied research in varied branches of industry, medicine, agriculture, pharmacy, food technology, biotechnology, etc.

PROGRAMME OUTCOMES:

On the successful completion of the program, the following are the expected outcomes.

PO Number	PO Statement
PO1	Graduates are cognizant of basic principles and concepts in diverse branches of biological and allied sciences that govern mechanisms of bio-molecular unity in varied life existences. Alumni are expressive of assimilated wisdom to peers and public at ease with language of their choice through discussion and debate.
PO2	Graduates are comprehensive of intricacies in biological organization, and they have acquired and developed primary and secondary experimental competencies and technical skills to address, investigate, design, develop and demonstrate solutions to life's important issues.
PO3	Graduates are advantaged to the pivotal and functional importance of major and allied subjects, and combine it with modern tools to investigate both basic and applied research questions in areas of industry, medicine, agriculture, pharmacy, food technology, biotechnology, etc. Alumni are valuable performers as an individual or in a team.
PO4	Graduates are competent to enroll in higher education programs, and successful in placements of vast career options in core and allied areas of the study (scholars, managers, counselors, writers, technical experts, field experts, teachers, entrepreneur and a responsible citizen). Alumni have acquired and developed skills to manage projects and finances. While discharging duties at varied capacities, graduates are inculcated to keep sustainable environment as a goal, and follow ethics of professional stature.
PO5	Graduates are infused with metamorphic qualities of education, and inspired to develop scientific temperament and lead a scientific way of life in facing socio-economical challenges that will benefit the society. Alumni are adept at connecting their learning's to worldwide events. Thereby, they continue the learning's lifelong.

TOTAL CREDIT DISTRIBUTION

Part	Subjects	No.of Papers	Credit	SemesterNo.
I	Tamil/Hindi/French/Malayalam	4	4x3=12	I,II,III&IV
II	English	4	4x3=12	I,II,III&IV
III	Core Credits (5)	3	5X 3=15	I-VI
	Core Credits (4)	9	4X 9=36	I-VI
	Core Credits (3)	1	3X1=03	I-VI
	Core Practical (2)	7	2X7=14	I-VI
	Core Project (2)	1	2X1=2	VI
	Inter Departmental Course(IDC)	2	3X2=6	I-II
	Inter Departmental Course(IDC)	2	4X2=8	III & IV
	Inter Departmental Course Practical (IDC)	1	2X1=2	I
	Discipline Specific Elective(DSE)	3	4X3=12	V & VI
	Skill Enhancement Course(SEC)	4	2X4=8	III -VI
	Industrial Training	1	2X1=2	V
IV	Environmental Studies(AECC)	1	2X1=2	I
	Basic Tamil/ Advanced Tamil/ Human Rights and Womens rights	1	2X1=2	II
	Generic Elective (GE)	1	2X1=2	V
	Innovation, IPR and Entrepreneurship	1	2X1=2	VI
V	NSS/NCC/YRC/RRC/Yoga/ Sports/Clubs	1	2X1=2	II
Total credits			142	

CURRICULUM

B.Sc BIOCHEMISTRY PROGRAMME

Course Code	Course Category	Course Name	L	T	P	Exam(h)	MaxMarks			Credits
							CIA	ESE	Total	
First Semester										
Part-I										
231TL1A1TA	Language-I	Tamil-I	4	1	-	3	25	75	100	3
231TL1A1HA		Hindi-I								
231TL1A1MA		Malayalam-I								
231TL1A1FA		French–I								
Part-II										
231EL1A1EA	Language-II	English I	4	-	1	3	25	75	100	3
Part-III										
233BC1A1CA	Core-I	Biomolecules	4	-	-	3	25	75	100	4
233BC1A1CB	Core-II	Cell biology	3			3	25	75	100	3
233BC1A1CP	Core Practical-I	Biomolecules and Cell Biology	-	-	4	6	40	60	100	2
232CE1A1IA	IDC-I	Chemistry	3	-	-	3	25	75	100	3
232CE1A1IP	IDC Practical-I	Chemistry	-	-	4	3	40	60	100	2
Part-IV										
233MB1A1AA	AECC-I	Environmental studies	2	-	-	-	50	-	50	2
Part-V										
233BC1A1XA	Extension Activity	NSS/NCC/YRC/ RRC/Yoga/Sports	-	-	-	-	50	-	50	1
Total			20	1	9				800	23

BoS Chairman/HoD
Department of Biochemistry
Dr. N. G. P. Arts and Science College
Coimbatore – 641 048

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Course Code	Course Category	Course Name	L	T	P	Exam(h)	MaxMarks			Credits
							CIA	ESE	Total	
Second Semester										
Part-I										
231TL1A2TA 231TL1A2HA 231TL1A2MA 231TL1A2FA	Language-I	Tamil - II Hindi-II Malayalam-II French–II	4	1	-	3	25	75	100	3
Part-II										
231EL1A2EA	Language-II	English - II	4	-	1	3	25	75	100	3
Part-III										
233BC1A2CA	Core-III	Enzymes	5	-	-	3	25	75	100	4
233BC1A2CB	Core-IV	Microbiology	4	-	-	3	25	75	100	4
233BC1A2CP	Core Practical-II	Enzymes and Microbiology	-	-	4	6	40	60	100	2
232PY1A2IB	IDC-II	Physics	3	-	2	3	25	75	100	3
Part-IV										
231TL1A2AA/ 231TL1A2AB/ 235CR1A2AA	AECC-II	Basic Tamil/ Advanced Tamil /Human Rights and Women's Rights	2	-	-	-	50	-	50	2
Part V										
233BC1A2XA	Extension Activity	NSS/NCC/ YRC/RRC/ Yoga/Sports/ Clubs	-	-	-		50	-	50	1
		Total	**22**	**1**	**7**				**700**	**22**

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Course Code	Course Category	Course Name	L	T	P	Exam(h)	MaxMarks			Credits
							CIA	ESE	Total	
Third Semester										
Part-I										
231TL1A3TA	Language-I	Tamil-III	3	1	-	3	25	75	100	3
231TL1A3HA		Hindi-III								
231TL1A3MA		Malayalam-III								
231TL1A3FA		French–III								
Part–II										
231EL1A3EA	Language-II	English-III	3	1	-	3	25	75	100	3
Part–III										
233BC1A3CA	Core-V	Human Physiology	5	-	-	3	25	75	100	5
233BC1A3CB	Core-VI	Developmental Biology	5	-	-	3	25	75	100	4
233BC1A3CP	Core Practical-III	Human Physiology and Developmental Biology	-	-	4	6	40	60	100	2
232MT1A3IF	IDC-III	Principles of Biostatistics	4	-	-	3	25	75	100	4
233BC1A3SA	SEC-I	Analytical Biochemistry	2	-	2	3	25	75	100	2
Total			**22**	**2**	**6**				**700**	**23**

4/4/24
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Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fourth Semester										
Part-I										
231TL1A4TA	Language - I	Tamil-IV	3	1	-	3	25	75	100	3
231TL1A4HA		Hindi-IV								
231TL1A4MA		Malayalam-IV								
231TL1A4FA		French-IV								
Part-II										
231EL1A4EA	Language - II	English-IV	3	1	-	3	25	75	100	3
Part-III										
233BC1A4CA	Core- VII	Intermediary Metabolism	5	-	-	3	25	75	100	5
233BC1A4CB	Core- VIII	Nutritional Biochemistry	4	-	-	3	25	75	100	4
233BC1A4CP	Core Practical-IV	Metabolism and Nutritional Biochemistry	-	-	4	6	40	60	100	2
234CS1A4EP	IDC-IV	Python for Biologists	3	-	2	3	40	60	100	4
233BC1A4EP	SEC-II	Bioinformatics	2	-	2	6	40	60	100	2
Total			**20**	**2**	**8**				**700**	**23**

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Course Code	Course Category	Course Name	L	T	P	Exam(h)	MaxMarks			Credits
							CIA	ESE	Total	
Fifth Semester										
Part-III										
233BC1A5CA	Core- IX	Genetics and Molecular Biology	5	-	-	3	25	75	100	5
233BC1A5CB	Core- X	Plant Biochemistry and Biotechnology	4	-	-	3	25	75	100	4
233BC1A5CC	Core- XI	Immunology	4	-	-	3	25	75	100	4
233BC1A5CP	Core Practical-V	Molecular Biology and Plant Biochemistry	-	-	4	6	40	60	100	2
233BC1A5CQ	Core Practical - VI	Immunology and Nutritional Biochemistry	-	-	4	6	40	60	100	2
233BC1A5SA	SEC-III	rDNA Technology	3	-	-	3	25	75	100	2
233BC1A5DA	DSE-I	Blood Biochemistry and Hematology	4	-	-	3	25	75	100	4
233BC1A5DB		Environmental Biochemistry								
233BC1A5DC		Dairy Biochemistry								
233BC1A5TA	IT	Industrial Training	-	-	-	-	40	60	100	2
Part IV										
	GE-I		2	-	-	-	50	-	50	2
Total			**22**	**-**	**8**				**850**	**27**

Course Code	Course Category	Course Name	L	T	P	Exam(h)	Max Marks			Credits
							CIA	ESE	Total	
Sixth Semester										
Part-III										
233BC1A6CA	Core-XII	Clinical Biochemistry	4	-	-	3	25	75	100	4
233BC1A6CB	Core-XIII	Hormonal Biochemistry	4	-	-	3	25	75	100	4
233BC1A6CV	Core	Project and Viva Voce	-	-	4	3	40	60	100	2
233BC1A6CP	Core Practical-VII	Clinical and Hormonal Biochemistry	-	-	4	6	40	60	100	2
233BC1A6SA	SEC-IV	Molecular Diagnostics	4	-	-	3	40	60	100	2
233BC1A6DA	DSE-II	Neurobiochemistry	4	-	-	3	25	75	100	4
233BC1A6DB		Marine Biochemistry								
233BC1A6DC		Sports Biochemistry								
233BC1A6DD	DSE-III	Pharmaceutical Biochemistry	4	-	-	3	25	75	100	4
233BC1A6DE		Bioprocess Technology								
233BC1A6DF		Bioresources and Bioprospecting								
Part-IV										
233BC1A6AA	AECC-III	Innovation,IPR & Entrepreneurship	2	-	-	-	50	-	50	2
Total			22	-	08	-	-	-	750	24
Grand Total									4500	142

DISCIPLINE SPECIFIC ELECTIVE

Students shall select the desired course of their choice in the list of elective courses during Semesters V&VI

Semester V (Elective I) List of Elective Courses

S.No.	Course Code	Name of the Course
1.	233BC1A5DA	Blood Biochemistry and Hematology
2.	233BC1A5DB	Environmental Biochemistry
3.	233BC1A5DC	Dairy Biochemistry

Semester VI (Elective II) List of Elective Courses

S.No.	Course Code	Name of the Course
1.	233BC1A6DA	Neurobiochemistry
2.	233BC1A6DB	Marine Biochemistry
3.	233BC1A6DC	Sports Biochemistry

Semester VI (Elective III) List of Elective Courses

S.No.	Course Code	Name of the Course
1.	233BC1A6DD	Pharmaceutical Biochemistry
2.	233BC1A6DE	Bioprocess Technology
3.	233BC1A6DF	Bioresources and Bioprospecting

GENERIC ELECTIVE COURSES (GE)

The following are the courses offered under Generic Elective Course Semester III (GE-I)

S.No.	Course Code	Course Name
1	233BC1A3GA	Organic farming: principles and practices

EXTRACREDIT COURSES

The following are the courses offered under self study to earn extra credits:

S.No.	CourseCode	Course Name
1	233BC1ASSA	Herbal technology
2	233BC1ASSB	Bioentrepreneurship

CERTIFICATE PROGRAMMES

The following are the programme offered to earn extra credits:

S.No.	Programme Code and Name	Course Code	Course Name
1	3BC5AA Certificate course on Cheminformatics	233BC5A1CA	Cheminformatics
2	3BC5AB Certificate course on Molecular Diagnostics	233BC5B1CA	Molecular Diagnostics

UG - REGULATION (R5)

(2023-24 and onwards)

(OUTCOME BASED EDUCATION WITH CBCS)

1.NOMENCLATURE

1.1 Faculty: Refers to a group of programmes concerned with a major division of knowledge Eg. Faculty of Computer Science consists of disciplines like Departments of Computer Science, Information Technology, Computer Technology, Computer Applications, Data Analytics, Cognitive Systems, Artificial Intelligence and Machine Learning and Cyber Security

1.2 Programme: Refers to the Bachelor of Science / Commerce /Arts stream that a student has chosen for study.

1.3 Batch: Refers to the starting and completion year of a programme of study. Eg. Batch of 2023-26 refers to students belonging to a 3 year Degree programme admitted in 2023 and completing in 2026.

1.4 Course: Refers to component of a programme. A course may be designed to involve lectures / tutorials / laboratory work / seminar / project work/ practical training / report writing / Viva- voce, etc., or a combination of these, to meet effectively the teaching learning needs.

a) **Core Course:**A course, which should compulsorily be studied by a candidate as a core requirement

b) **Inter Disciplinary Course (IDC):** A course chosen generally from a related discipline/subject with an intention to seek exposure in the discipline relating to the core domain of the student

c) **Discipline Specific Elective (DSE) Course**: Elective courses offered under main discipline/ subject of study.

d) **Skill Enhancement Courses (SEC):** Value-based and/or skill-based courses which are aimed at providing hands-on-training, competencies, skills, etc.

e) **Ability Enhancement Compulsory Courses (AECC):**Mandatory courses that lead to Knowledge enhancement. Environmental Science, Human Rights and Women's Rights, Basic Tamil/ Advanced Tamil, Innovation and IPR, Innovation, IPR and Entrepreneurship.

f) **Ability Enhancement Elective Course (AEEC)/Generic Elective (GE)** An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is Generic Elective.

1.5 Project Work:

Course involving application of knowledge in problem solving / analyzing /exploring a real life situation / difficult problem. The Project work will be given in lieu of a Core paper.

Internship/Industrial Training

Students must undertake industrial / institutional training for a minimum of 15 days during the IV semester summer vacation. The students will submit the report for evaluation during V semester.

1.6 Extra Credits:

Extra credits shall be awarded for achievements in identified curricular/co-curricular/Extracurricular activities executed outside the regular class hours. Extra credits are not mandatory for completing the programme.

2. STRUCTURE OF PROGRAMME

2.1 PART- I: LANGUAGE- I

Tamil or any one of the languages namely Malayalam, Hindi and French will be offered under Part – I in the first four semesters.

2.2 PART- II: LANGUAGE- II

English will be offered during the first four semesters.

2.3 PART- III:

- Core Course
- Inter Departmental Course (IDC)
- Discipline Specific Elective (DSE)
- Skill Enhancement Course (SEC)
- Industrial Training (IT)

2.4 PART- IV:

2.4.1 Ability Enhancement Compulsory Course (AECC):

The Ability Enhancement Compulsory Courses such as i)Environmental Studies, ii) Human Rights and Womens' Rights, iii) Innovation and IPR/ Innovation, IPR and Entrepreneurship are offered during I,II and VI Semester.

Basic Tamil

a) Those who have not studied Tamil up to XII Std and taken a non-Tamil language under Part-I shall take oneBasic Tamil coursein the second semester.

(OR)

Advanced Tamil

b) Those who have studied Tamil up to XII Std and taken a non-Tamil language under Part-I shall take one Advanced Tamil course in the second semester.

Note: Students who come under the above a+b categories are exempted from Human Rights and Women's Rights in the second semester.

Ability Enhancement Elective Course (AEEC)/Generic Elective (GE) An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is Generic Elective offered in V semester. (Theory/Practical/Non-Lab Practical)

2.5 PART- V: EXTENSION ACTIVITIES

The following extracurricular activities like NSS/YRC/NCC/RRC/Yoga/Sports/Clubs are offered under extension activities during semester I & II. Students will be evaluated based on their active participation in any one of the above activities. 75% Attendance is compulsory for extension activity.

3. CREDIT ALLOTTMENT

The following is the credit allotment:

- Lecture Hours (Theory) : 1 credit per lecture hour per week
- Laboratory Hours : 1 credit for 2 Practical hours per week
- Project Work : 1 credit for 2 hours of project work per week

4. DURATION OF THE PROGRAMME

The B.A. /B.Com./B. Sc. Programme must be completed within 3 years (6 semesters) and a maximum of 6 years (12 semesters) from the date of acceptance to the programme. If not, the candidate must enroll in the course determined to be an equivalent by BoS in the most recent curriculum recommended for the Programme.

5.REQUIREMENTS FOR COMPLETION OF A SEMESTER

Every student shall ordinarily be allowed to keep terms for the given semester in a program of his/ her enrolment, only if he/ she fulfills at least seventy five percent (75%) of the attendance taken as an average of the total number of lectures, practicals, tutorials, etc. wherein short and/or long excursions/field visits/study tours organised by the college and supervised by the faculty as envisaged in the syllabus shall be credited to his/her attendance. Every student shall have a minimum of 75% as an overall attendance.

6. EXAMINATIONS

The end semester examinations shall normally be conducted after completing 90 working days for each semester. The maximum marks for each theory and practical course shall be 100 with the following breakup:

a) Mark distribution for Theory Courses

Continuous Internal Assessment (CIA)	: 25 Marks
End Semester Exams (ESE)	: 75 Marks
Total	: 100 Marks

i) Distribution of Internal Marks

S.No.	Particulars	Distribution of Marks
1	CIA I (2.5 Units) (On completion of 45th working day)	5
2	Model (All 5 Units) (On completion of 85th working day)	5
3	Attendance	5
4	Library Usage	5
5	Skill Enhancement *	5
	Total	**25**

Breakup for Attendance Marks:

S.No	Attendance Range	Marks Awarded
1	95% and Above	5
2	90% - 94%	4
3	85% - 89%	3
4	80% - 84%	2
5	75% - 79%	1

Note:

Special Cases such as NCC, NSS, Sports, Advanced Learner Course, Summer Fellowship and Medical Conditions etc. the attendance exemption may be given by principal and Mark may be awarded.

Break up for Library Marks:

S.No	Attendance Range	Marks Awarded
1	10h and above	5
2	9h- less than 10h	4
3	8h – less than 9h	3
4	7h - less than 8h	2
5	6h – less than 7h	1

Note:
In exception, the utilization of e-resources of library will be considered.

***Components for "Skill Enhancement" may include the following:**

Class Participation, Case Studies Presentation/term paper, Field Study, Field Survey, Group Discussion, Term Paper, Presentation of Papers in Conferences, Industry Visit, Book Review, Journal Review, e-content Creation, Model Preparation, Seminar and assignment.

Components for Skill Enhancement

Any one of the following should be selected by the course coordinator

S.No.	Skill Enhancement	Description
1	Class Participation	• Engagement in class • Listening Skills • Behaviour
2	Case Study Presentation/ Term Paper	• Identification of the problem • Case Analysis • Effective Solution using creativity/imagination
3	Field Study	• Selection of Topic • Demonstration of Topic • Analysis & Conclusion
4	Field Survey	• Chosen Problem • Design and quality of survey • Analysis of survey
5	Group Discussion	• Communication skills • Subject knowledge • Attitude and way of presentation • Confidence • Listening Skill
6	Presentation of Papers in Conferences	• Sponsored • International/National • Presentation • Report Submission
7	Industry Visit	• Chosen Domain • Quality of the work

		• Analysis of the Report • Presentation
8	Book Review	• Content • Interpretation and Inferences of the text • Supporting Details • Presentation
9	Journal Review	• Analytical Thinking • Interpretation and Inferences • Exploring the perception if chosen genre • Presentation
10	e-content Creation	• Logo/ Tagline • Purpose • Content (Writing, designing and posting in Social Media) • Presentation
11	Model Preparation	• Theme/ Topic • Depth of background Knowledge • Creativity • Presentation
12	Seminar	• Knowledge and Content • Organization • Understanding • Presentation
13	Assignment	• Content and Style • Spelling and Grammar • References

ii) Distribution of External Marks (ESE)

Total : 75
Written Exam : 75

Marks Distribution for Practical course

Total : 100
Internal : 40
External : 60

i) Distribution of Internals Marks

S.No.	Particulars	Distribution of Marks
1	Experiments/Exercises	15
2	Test 1	10
3	Test 2	10
4	Observation Notebook	05
	Total	**40**

ii) Distribution of Externals Marks

S.No.	Particulars	External Marks
1	Practical	40
2	Record	10
3	Viva- voce	10
	Total	60

Practical examination shall be evaluated jointly by Internal and External Examiners

Mark Distribution for Project/ Internship/ Industrial Training

Total : 100
Internal : 40
External : 60

i) Distribution of Internal Marks

S.No.	Particulars	Internal Marks
1	Review I	15
2	Review II	20
3	Attendance	5
	Total	**40**

ii) Distribution of External Marks

S.No	Particulars	External Marks
1	Project Work /Internship /Industrial training Presentation	40
2	Viva –voce	20
	Total	**60**

Evaluation of Project Work/Internship/ Industrial training shall be shall be done jointly by Internal and External Examiners.

7. Credit Transfer

a. Upon successful completion of **1 NPTEL** Course **(4 Credit Course)** recommended by the department, during Semester I to IV, a student shall be eligible to get exemption of one **4 credit course** during the V or VI semester. The proposed NPTEL course should cover content/syllabus of exempted core paper in V orVI semester.

S. No.	Course Code	Course Name	Proposed NPTEL Course	Credit
1			Option – 1 Paper title	4
			Option – 2 Paper title	
			Option – 3 Paper title	

b. Upon successful completion of **2 NPTEL Courses** (2 Credit each) recommended by the department, during Semester I to IV, a student shall be eligible to get exemption of **one 4 credit course** during the V or VI semester. Out of 2 NPTEL proposed courses, **atleast 1 course** should cover content/syllabus of exempted core paper in V orVI semester.

Mandatory

The exempted core paper in the V or VI semester should be submitted by the students for approval before the end of 4th semester

Credit transfer will be decided by equivalence committee

S. No.	Course Code	Course Name	Proposed NPTEL Course	Credit
1			Option – 1 Paper title	2
			Option – 2 Paper title	
			Option – 3 Paper title	
2			Option – 1 Paper title	2
			Option – 2 Paper title	
			Option – 3 Paper title	

NPTEL Courses to be carried out during semester I – IV.

S.No.	Student Name	Class	Proposed NPTEL Course		Proposed Course for Exemption
			Course I	Option 1- Paper Title Option 2- Paper Title Option 3- Paper Title	Any one Core Paper in **V or VI semester**
			Course II	Option 1- Paper Title Option 2- Paper Title Option 3- Paper Title	

Class Advisor **HoD** **Dean**

8. Innovations

Upon Successful outcome of Design Thinking / Copy right/Product/ Patent by the end of the V Semester, student shall be eligible to get exemption in AECC: Innovation, IPR & Entrepreneurship / Innovation & IPR offered during VI Semester.

9.Internship/Industrial Training

Students must undertake industrial / institutional training for a minimum of 15 days during the IV semester summer vacation. The students shall submit the report for evaluation during V semester.

10. Extra Credits: 10

Earning extra credit is not essential for programme completion. Student is entitled to earn extra credit for achievement in Curricular /Co-Curricular/ Extracurricular activities carried out other than the regular class hours.

A student is permitted to earn a maximum of Ten extra Credits during the programme period.

A maximum of 1 credit under each category is permissible.

Category	Credit
Proficiency in foreign language	1
Proficiency in Hindi	1
Self study Course	1
Typewriting/Short hand	1
CA/ICSI/CMA (Foundations)	1
CA/ICSI/CMA(Inter)	1
Sports and Games	1
Publications / Conference Presentations (Oral/Poster)	1
Lab on Project	1
Innovation / Incubation / Patent / Sponsored Projects / Consultancy	1
Representation in State / National level celebrations	1
Awards/Recognitions/Fellowships	1

Credit shall be awarded for achievements of the student during **the period of study only.**

GUIDELINES

Proficiency in foreign language

A pass in any foreign language in the examination conducted by an authorized agency.

Proficiency in Hindi

A pass in the Hindi examination conducted by Dakshin Bharat Hindi Prachar Sabha.

Examination passed during the programme period only will be considered for extra credit.

Self study Course

A pass in the self study courses offered by the department.

The candidate should register the self study course offered by the department only in the III semester.

Typewriting/Short hand

A Pass in short hand /typewriting examination conducted by Tamil Nadu Department of Technical Education (TNDTE) and the credit will be awarded.

CA/ICSI/CMA(Foundations)

Qualifying foundation in CA/ICSI/CMA / etc.

CA/ICSI/CMA(Inter)

Qualifying Inter in CA/ICSI/CMA / etc.

Sports and Games

Students can earn extra credit based on their achievements in sports in University/ State / National/ International levels.

Publications / Conference Presentations (Oral/Poster)

Research Publications in Journals
oral/poster presentation in Conference

Lab on Project (LoP)

To promote the undergraduate research among all the students, the LoP is introduced beyond their regular class hours. LoP is introduced as group project consisting of not more than five members. It consist of four stages namely Literature collection, Identification of Research area, Execution of research and Reporting / Publication of research reports/ product developments. These four stages spread over from III to IV semester.

(Evaluation will be done internally)

Innovation / Incubation / Patent / Sponsored Projects / Consultancy

Development of model/ Products /Prototype /Process/App/Registration of Patents/ Copyrights/Trademarks/Sponsored Projects /Consultancy

Representation in State/ National level celebrations

State / National level celebrations such as Independence day, Republic day Parade, National Integration camp.

Awards/Recognitions/Fellowships

Regional/ State / National level awards/ Recognitions/Fellowships

GUIDELINES

100 % CIA Courses:

- **AECC**
- **AEEC**

S.No	Type of Course
1	Environmental Studies (AECC)
2	Human Rights and Women's Rights, Basic Tamil / Advanced Tamil (AECC)
3	Innovation &IPR/ Innovation, IPR and Entrepreneurship(AECC)
4	Generic Elective (AEEC)

Modalities for Implementing Internal Assessment Marks:

- Student pertaining to 2023 Batch (2023-26) UG programme for the above mentioned courses shall secure a minimum of 40% out of the maximum marks in the continuous internal assessment (CIA) i.e., 20 marks out of 50 marks.
- Students who have not acquired the minimum marks shall be allowed to reappear to improve their marks in the exam components only within the time duration of the programme, in the forthcoming semesters.

Distribution of Internal Marks for AECC & AEEC

Theory			**Practical**	
S. No.	**Particulars**	**Distributionof Marks**	**Particulars**	**Distributionof Marks**
1	CIAI(2.5Units) (On completionof45thworkingday)	15	CIA I (Exercise 1-5)	5
2	Model(5Units)(On completionof85thworkingday)	15	CIA II (Exercise 6 - 10)	5
3	Assignment	05	Class Participation	10
4	Attendance	05	Practical Record	10
5	LibraryUsage	05	Test -III & Viva-Voce (10+10)	20
6	SkillEnhancement*	05	---	---
	Total	**50**		50

Question paper pattern AECC & AEEC

Test	MARKS	DESCRIPTION	TOTAL	Remarks
CIA Test I **1 Hour** **First 2.5 Units**	50 x 1 = 50 Marks	MCQ	50 Marks	Marks secured will be Converted to 15 marks
CIA test II/ Model test **1 Hour** **All five Units**	50 x 1 = 50 Marks	MCQ	50 Marks	Marks secured will be Converted to 15 marks

Question paper pattern	Total Marks -50
Basic Tamil	**Advanced Tamil**
Section -A	**Section -A**
Choose the correct answer 10x2=20	**Choose the correct answer 10** x1=10
Section -B	**Section -B**
True or false 10x2=20	**Fill in the blanks** 10x2=20
Section -C	**Section -C**
Answer in one page 1x10=10	**Write an essay in two pages** 2x10=20

Question paper pattern for all other courses falling under Part I to Part III

CIA I : [1 ½ Hours-2.5 Units] - 25 Marks

SECTION	MARKS	DESCRIPTION	TOTAL	Remarks
Section – A	8 x 0.5 = 04 Mark	MCQ	25 Mark	Marks secured will be converted To 5 mark
Section - B	3 x 3 = 09 Mark	Answer ALL Questions Either or Type ALL Questions Carry Equal Marks		
Section - C	2 x 6 = 12 Mark			

CIA II /Model: [3 Hours-5 Units] - 75 Mark

SECTION	MARKS	DESCRIPTION	TOTAL	Remarks
Section – A	10 x 1 = 10 Mark	MCQ	75 Mark	Marks secured will be converted To 5 mark
Section - B	5 x 5 = 25 Mark	Answer ALL Questions (Either or Type Questions) Each Questions Carry Equal Mark		
Section - C	5 x 8 = 40 Mark			

End Semester Examination: [3 Hours-5 Units] - 75 Mark

SECTION	MARKS	DESCRIPTION	TOTAL
Section – A	10 x 1 = 10 Mark	MCQ	75 Mark
Section - B	5 x 5 = 25 Mark	Answer ALL Questions (Either or Type Questions) Each Questions Carry Equal Mark	
Section - C	5 x 8 = 40 Mark		

Course Code	Course Name	Category	L	T	P	Credit
231TL1A1TA	TAMIL - I	LANGUAGE- I	4	1	-	03

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடு நாகரீகம், பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல்
- கலை மற்றும் மரபுகளை அறியச் செய்தல்
- மாணவர்களின் படைப்பாக்கத்திறன்களை ஊக்குவித்தல்

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	வாழ்க்கைத் திறன்கள் (Life Skills)- மாணவர்களின் செயலாக்கத் திறனை ஊக்குவித்தல்	K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K4
CO3	பாட இணைச்செயல்பாடுகள் (Co-curricular activities)	K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு (Tamil knowledge)	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1		✓	✓		✓
CO2	✓			✓	
CO3		✓			✓
CO4			✓		
CO5	✓			✓	✓

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231TL1A1TA	TAMIL - I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I மறுமலர்ச்சிக் கவிதைகள் 13 h

1. இலக்கிய வரலாறு - மறுமலர்ச்சிக் கவிஞர்களின் தமிழ்ப்பணிகள்
2. பாரததேசம் - பாரதியார்
3. படி - பாரதிதாசன்
4. தமிழரின் பெருமை - நாமக்கல் கவிஞர்
5. தமிழ்க் கொலை புரியாதீர் - புலவர் குழந்தை
6. திரைத்தமிழ்

அ) 'விஞ்ஞானத்த வளர்க்கப் போறண்டி' எனத் தொடங்கும் பாடல் - உடுமலை நாராயண கவி

ஆ) 'சும்மா கிடந்த நிலத்தை' எனத் தொடங்கும் பாடல் - பட்டுக்கோட்டை கல்யாண சுந்தரனார்

இ) 'சமரசம் உலாவும் இடமே' எனத் தொடங்கும் பாடல் - மருதகாசி

ஈ) 'உன்னை அறிந்தால்' எனத் தொடங்கும் பாடல் - கண்ணதாசன்

Unit II புதுக்கவிதைகள் 13 h

1. இலக்கிய வரலாறு - புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்
2. கடமையைச் செய் - மீரா
3. மலையாளக் காற்று - சிற்பி
4. ஒப்பிலாத சமுதாயம் - அப்துல் ரகுமான்
5. கன்னிமாடம் - மு.மேத்தா
6. கரிக்கிறது தாய்ப்பால் - ஆரூர் தமிழ்நாடன்
7. ஐந்தாம் வகுப்பு 'அ' பிரிவு - நா. முத்துக்குமார்
8. ஹைகூ கவிதைகள் - 10 கவிதைகள்

Unit III பெண்ணியம் 09 h

1. தொலைந்து போனேன் - தாமரை
2. நீரில் அலையும் முகம் - அ. வெண்ணிலா
3. தற்காத்தல் - பொன்மணி வைரமுத்து
4. ஏனிந்த வித்தியாசங்கள் ? - மல்லிகா
5. புதையுண்ட வாழ்க்கை - சுகந்தி சுப்ரமணியன்

Unit IV **சிறுகதைகள்** 15 h

1. இலக்கிய வரலாறு - சிறுகதையின் தோற்றமும் வளர்ச்சியும்
2. கனகாம்பரம் - கு.ப.ராஜகோபாலன்
3. ஆற்றங்கரைப் பிள்ளையார் - புதுமைப்பித்தன்
4. பொம்மை - ஜெயகாந்தன்
5. காய்ச்சமரம் - கி. ராஜநாராயணன்
6. காட்டில் ஒருமான் - அம்பை
7. வேட்கை - சூர்யகாந்தன்

Unit V **பயிற்சிப் பகுதி** 10 h

அ. இலக்கணம்

1. வல்லின ஒற்று மிகும், மிகா இடங்கள் - ஒற்றுப்பிழை நீக்கி எழுதுதல்
2. ர,ற-ல,ழ,ள - ண,ந,ன வேறுபாடு - ஒலிப்பு நெறி, சொற்பொருள் வேறுபாடு அறிதல்)

ஆ. படைப்பாக்கம்

1. கவிதை - எழுதுதல் (15 வரிகள் முதல் 30 வரிகள் வரை)
2. சிறுகதை - எழுதுதல் (குறைந்தது 3 பக்கங்கள்)

Text Book

1 தமிழ் மொழிப்பாடம் - 2022-2023, தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, கோயம்புத்தூர் – 641048, வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை – 600 098.

References

1 பேராசிரியர் புலவர் சோம. இளவரசு , எட்டாம் பதிப்பு - 2014, தமிழ் இலக்கிய வரலாறு – மணிவாசகர் பதிப்பகம், சென்னை – 600 108.

2 பேராசிரியர் முனைவர் பாக்கியமேரி , முதற் பதிப்பு - 2013 , இலக்கணம் - இலக்கிய வரலாறு - மொழித்திறன் - பூவேந்தன் பதிப்பகம், சென்னை-600 004.

3 இணையதள முகவரி: https://www.tamilvu.org

Course Code	Course Name	Category	L	T	P	Credit
231TL1A1HA	HINDI–I	LANGUAGE-1	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The writing ability and develop reading skill
- The various concepts and techniques for criticizing literature
- The techniques for expansion of ideas and translation process

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓			✓	✓
CO2		✓			✓
CO3				✓	
CO4	✓		✓		
CO5		✓	✓		✓

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231TL1A1HA	HINDI-I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I 13 h

गद्य - नूतनगद्यसंग्रह(जयप्रकाश)पाठ 1- रजियापाठ 2- मक्रीलपाठ 3- बहतापानीनिर्मला
पाठ 4- राष्ट्रपितामहात्मागाँधी

Unit II 13 h

कहानीकुंज- डॉवी.पी. 'अमिताभ'(पाठ 1-4)

Unit III 12 h

व्याकरण : शब्दविचार (संज्ञा, सर्वनाम,विशेषण)

Unit IV 12 h

अनुच्छेद लेखन

Unit V 10 h

अनुवाद अभ्यास-III (केवल अंग्रेजी से हिन्दी में) (पाठ 1 to 10)

Text Books

1 प्रकाशक: सुमित्रप्रकाशन 204 लीलाअपार्ट्मेंट्स, 15 हेस्टिंग्सरोड'अशोकनगरइलाहाबाद-211001

2 प्रकाशक: गोविन्दप्रकाशनसदरबाजार, मथुराउत्तरप्रदेश-281001

3 पुस्तक: व्याकरण प्रदिप – रामदेवप्रकाशक: हिन्दी भवन 36 टेगोर नगर इलाहाबाद-211024

4 पुस्तक: व्याकरण प्रदिप – रामदेवप्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024

5 प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17

Course Code	Course Name	Category	L	T	P	Credit
231TL1A1MA	MALAYALAM- I	LANGUAGE - I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The writing ability and develop reading skill
- The various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- The competency in translating simple Malayalam sentences into English and vice versa

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Apply creative ability	K3
CO5	Build the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓			✓	✓
CO2					✓
CO3		✓	✓		
CO4	✓			✓	
CO5		✓			✓

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231TL1A1MA	MALAYALAM - I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I **Novel** 14 h

Pathummayude Adu

Unit II **Novel** 10 h

Pathummayude Adu

Unit III **Short Story** 14 h

Nalinakanthi

Unit IV **Short Story** 10 h

Nalinakanthi

Unit V **Practical Application** 12 h

Expansion of ideas, General Essay and Translation

Text Books

1 Vaikkam Muhammed Basheer, "Pathummayude Adu" (NOVEL), DC Books & Kottayam

2 T.Padmanabhan, "Nalinakanthi" (Short Story), DC Books & Kottayam.

References

1 Malayala Novel Sahithyam.

2 Malayala Cherukatha Innale Innu.

Course Code	Course Name	Category	L	T	P	Credit
231TL1A1FA	FRENCH - I	LANGUAGE - I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The competence in general communication skills with oral, written and comprehension & expression
- The culture, life style and the civilization aspects of the French people as well as of France
- The students to acquire competency in translating simple French sentences into English and vice versa

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents	K1
CO2	Apply the adjectives and the classroom environment in France	K2
CO3	Select the Plural, Articles and the Hobbies	K2
CO4	Measure the Cultural Activity in France	K3
CO5	Evaluate the sentiments, life style of the French people and the usage of the conditional tense	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓				✓
CO2					✓
CO3					
CO4	✓		✓		✓
CO5	✓		✓		

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/Human Values/ Ethics

231TL1A1FA	FRENCH - I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I **Salut I Page 10** 12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
• Saluer • Enter en contact • avec quelqu'un. • Se presenter. • S'excuser	En cours de cuisine, premiers contacts avec les members d'un groupe	• Comprendre des personnes qui se saluent. • Ēchanger pour entrer en contact, se présenter, saluer, s'excuser. • Communiquer avec *tu* ou *vous*. • Comprendre les consignes de classe • Ēpeler son nom et son prénom. Computer jusqu'à 10.

Unit II **Enchanté I Page 20** 12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
• Demander de se presenter. • Présenter quelqu'un.	Dans la classe de français, se presenter et remplir une fiche pour le professeur.	• Comprendre les informations essentielles dans un échange en milieu professionnel. • Ēchanger pour se presenter et présenter quelqu'un.

Unit III **J'adore I Page 30** 12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
• Exprimer ses gouts.	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation	• Dans une soirée de recontres rapid comprendre des personnes qui échangent sur elles et sur leurs goût • Comprendre une personne qui parler des goûts de quelqu'un d'autre

Unit IV J'adore I Page 30 14 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
• Présenter quelqu'un	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation	• Exprimer ses goûts • Comprendre une demande laissée sur un répondeur téléphonique. • Parler de ses projets de week-end
Autoévaluation du module I Page 40 – Préparation au DELF A1 page 42		
Demander à quelqu'un de faire quelque chose. Demander poliment. Parler d'actions passes. Tu veux bien?	Organiser un programme d'activités pour accueillir une personne importante	Comprendre une personne demande un service à quelqu'un. Demander à quelqu'un de faire quelque chose. Imaginer et raconter au passé à partir de situations dessinées.

Unit V Practical Application 10 h

Make in Own Sentences

Text Book

1 Regine Merieux, Yves Loiseau. 2012. LATITUDES – 1: Méthode de français (Page No: 9-55) Les Editions Dider, Paris, Imprime en Roumanie par Canale en Janvier

Course Code	Course Name	Category	L	T	P	Credit
231EL1A1EA	ENGLISH - I	LANGUAGE- II	4	-	1	3

PREAMBLE

This course has been designed for students to learn and understand

- the effect of dialogue, imagery and varied genres
- any spontaneous spoken discourse and respond to them with proper sentence structure
- the transactional concept of English language

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify the various aspects in poetry	K2
CO2	Infer linguistic and non-linguistic features of the context for understanding and interpreting	K3
CO3	Construct sentences and convey messages effectively in real life situations	K3
CO4	Apply different reading strategies with varying speed	K3
CO5	Prepare modules with their own ideas and present them coherently in a grammatically correct form	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓		✓	✓	✓
CO2		✓			✓
CO3	✓	✓		✓	
CO4			✓		
CO5	✓	✓			✓

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231EL1A1EA	ENGLISH- I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Genre Studies 12 h

Nissim Ezekiel: The Worm- Author's Biography- title indications- outline- paraphrasing the poem- context of poem- form- poetic devices- enjambment- techniques– Annotations

Niyi Osundare: Our Earth Will Not Die- Author's Biography- title indications- outline- paraphrasing the poem- context of poem- form- poetic devices- enjambment- techniques– Annotations

A. G. Gardiner: On Superstitions- Author's biography- Narrative structure- Exploration of the text- passage analysis- insight of ideas- cohesion and context- style- language techniques- Annotation

Nancy Bella: Clever Thief- Author's Biography- Plot Summary- Detailed summary and Analysis- Themes- Important Quotations- Characters- Description - analysis- Terms- Symbols- Critical analysis

H. G. Wells: The Truth about Pyecraft- Author's Biography-narrative structure- passage analysis- insight of ideas- cohesion and context- style- language techniques

Unit II Listening Skills 12 h

Listening vs. hearing- Types of listening, Tips to enhance Listening Skills, Non-verbal and Verbal signs of active listening - Comprehensive Listening - Listening to pre-recorded audios on speeches, interviews and conversations - Listening Activities- Listening and responding to complaints (formal situation), Listening to problems and offering solutions (informal)

Unit III Speaking Skills 14 h

Formal occasions- Introducing oneself, Introducing others, Enquiries and Seeking permission, Making short presentations- Informal occasions- Requests, Offering help, Congratulating, Farewell party, graduation speech- Giving instructions to do a task and to use a device, Giving and asking directions

Unit IV Reading Skills 10 h

Study Skills: Skimming and Scanning- Reading different kinds of texts- Types of reading-Developing a good reading speed, reading aloud, Referencing skill - Word

Power (Denotation and Connotation) - Reading comprehension, Data interpretation –Charts, Graphs, Advertisements

Unit V Writing Skills 12 h

Sentence patterns, Note- making and note taking-Strategies - Paragraph writing: Structure and Principles - Academic Writing - Formal and Informal Letters, Report, Book /Movie Review

Text Books

1 Gardiner, A. G. 1926. Alpha of the Plough: Second series, J.M. Dent & Sons Ltd., London, United Kingdom. pg.no-151-156. (Unit I)

2 Ezekiel, Nissim. "The Worm," Crazy Romantic Love, www. mianmawaisarain.live/2020/05/poem-worm-nissim-ezekiel.html. Accessed 3 Aug. 2022. (Unit I)

3 < http://livros01.livrosgratis.com.br/ln000835.pdf /> (Unit I)

4 Mithra, S. M. 1919. Hindu Tales from the Sanskrit, Macmillan & Co Ltd., London, United Kingdom. pg.no-127-142. (Unit I)

5 Nation, I. S. P and Jonathan Newton. 2009. Teaching ESL/EFL Listening and Speaking. Routledge, New York, United States. (Unit II)

6 Prabha, Dr. R. Vithya & S. Nithya Devi. 2019. Sparkle. (1st Edn.) McGraw - Hill Education, Chennai, India. (Unit III– V)

References

1 Our Earth Will Not Die By Niyi Osundare." Studocu.Com, studocu.com /in/document/bangalore-university/bachelor-of-computer-applications /1586771577-our-earth-will-not-die/27675462. Accessed 3 Aug. 2022.

2 OnSuperstitions."THEHISTORIAN,thehistorian1947.wordpress.com/2019/0 3/08/on-superstitions-by-a-g-gardiner. Accessed 3 Aug. 2022.

3 Swales, John M. & Feak, Christine B. 2012. Academic Writing for Graduate Students: Essential Tasks and Skills, University of Michigan Press, Michigan, United States.

4 Rudzka, Brygida -Ostyn, 2003. Word Power: Phrasal Verbs and Compounds: A Cognitive Approach, Mouton de Gruyter, New York, United States.

Course Code	Course Name	Category	L	T	P	Credit
233BC1A1CA	BIOMOLECULES	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The importance of biological macromolecules.
- The influence and role of structure in reactivity of biomolecules.
- Their role with regard to maintenance and perpetuation of the living systems.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the classification of biomolecules such as Carbohydrates, Lipids, Amino acids, Proteins and Nucleic acids.	K1
CO2	Describe the structure, conformational freedom and functions of biomolecules.	K2
CO3	Present the structural principles that govern reactivity/physical properties of biomolecules.	K3
CO4	Analyze the chemical and biochemical properties of biomolecules that help to sustain life.	K4
CO5	Develop knowledge on clinical consequences of Mineral and Vitamin deficiency. Experiment with pH and Buffer.	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

233BC1A1CA	BIOMOLECULES	SEMESTER I

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Carbohydrates 10 h

Introduction to biological macromolecules. Carbohydrate - Definition, classification. Structure, properties & chemical reactions of monosaccharide. Structure and Properties of disaccharides – Maltose, Lactose and Sucrose. Polysaccharides – structure & biological functions of Homo & Hetero polysaccharides. Occurrence, importance and the structure of sugar derivatives - amino sugars, bacterial cell wall polysaccharides - peptidoglycan.

Unit II Lipids 8 h

Definition, classification and physico-chemical properties of lipids. Storage lipids: Fatty acids - types, nomenclature & properties. Structural lipids - phospholipids, glycolipids & sphingolipids. Structure and functions of steroids - cholesterol. Eicosanoids - an overview.

Unit III Amino acids and Proteins 10 h

Classification and general properties of amino acids. Chemical reactions of amino acids due to carboxyl groups and amino groups. Peptide bond - structure and properties. Structure and biological importance of glutathione, synthetic peptides - polyglutamic acid. Protein - classification and Physico-chemical properties. Organization of protein Structure – Primary (Insulin), Secondary (Keratin, Collagen), Tertiary (Myoglobin) & Quaternary structure (Hemoglobin). Denaturation of proteins.

Unit IV Nucleic acids 8 h

Structures of Purines, Pyrimidines, Nucleosides and Nucleotides. Properties of nucleic acids. DNA double helical structure, A, B & Z forms. Denaturation & renaturation of DNA. Structure and functions of mRNA, tRNA, rRNA, snRNA, snoRNA, miRNA, siRNA. Chemical reactions of RNA and DNA with acid and alkali, colour reactions of DNA and RNA.

Unit V Minerals, Vitamins, Water, pH & Buffers 12 h

Micro and Macro Minerals - Clinical Significance. Vitamins – Definition,

classification. Fat soluble (Vitamin A, D, E, K) and Water soluble vitamins (Vitamin B Complex & Vitamin C) - sources, functions and deficiencies, hypervitaminosis. Water: Structure, Physical properties of water, weak interaction in aqueous solutions. pH – Introduction, buffers, Henderson-Hasselbalch equation, biological buffer system.

Text Books

1 Jain, J.L., Jain, N. and Jain, S., 2016, "Fundamentals of Biochemistry", 7th Edition, S. Chand and Company Publication, Chennai.

2 Deb A.C., 2011, "Fundamentals of Biochemistry", 10th edition, New Central Book Agency, Kolkatta.

References

1 Nelson, D.L. and Cox, M.M., 2017, "Lehninger's Principles of Biochemistry", 7th edition, W.H. Freeman and Company, New York.

2 Berg, J.M., Tymoczko, J.L., Gatto Jr, G.J. and Stryer, L., 2015, "Biochemistry", 8th edition, W.H. Freeman and Company, New York.

3 Voet, D. and Voet, J.G., 2018, "Biochemistry", 5th edition, John Wiley and Sons Pvt. Ltd., New York.

4 Rodwell, V.W., Bender, D.A., Botham, K.M., Kennelly, P. and Weil, P.A., 2018, "Harper's Illustrated Biochemistry", 31st edition, The McGraw-Hill Inc., New York.

Course Code	Course Name	Category	L	T	P	Credit
233BC1A1CB	CELL BIOLOGY	CORE	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- biology of cells, cellular organelles, cell division and renewal
- ultrastructural organization of cellular components
- importance of cellular function

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Differentiate cellular types based on origin and evolution.	K1
CO2	Explain the structure and functions of various cellular organelles.	K2
CO3	Demonstrate microfilament polymerization, assembly and intracellular organization	K3
CO4	Explain the importance and functions cell-matrix and cell-cell interactions.	K4
CO5	Explicate structure and functions of nucleus and chromosomes and cell division	K1

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

233BC1A1CB	CELL BIOLOGY	SEMESTER I

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Introduction to cell biology 7 h

An overview of cells: origin and evolution of cells and cell theory. Classification of cells: prokaryotic (Archaea and Eubacteria) and eukaryotic cells (animal and plant cells). Comparison of cells: microbial, plant, and animal cells. Cells as experimental models: prokaryotic and eukaryotic cells. Exceptions to cell theory: Mycoplasma, Viruses, Virioids, prions.

Unit II Structure and Functions of different cell organelles 8 h

Endoplasmic reticulum: RER- Brief overview of translational and posttranslational transport of proteins, SER: Lipid Synthesis, Brief overview of export of proteins from ER.

Structure and functions: Golgi apparatus, Ribosomes, Nuclear envelope, Nuclear-pore complex, Lysosomes - Lysosomal storage diseases, Glyoxysomes, Mitochondria, Chloroplast and Peroxisomes.

Unit III Cytoskeleton proteins 7 h

Structure and organization: Actin filaments. Microfilament polymerization: tread milling and role of ATP. Non-muscle myosin. Intermediate filament proteins: assembly and intracellular organization. Assembly, organization and movement: cilia and flagella.

Unit IV Cell wall, extracellular matrix, cell membrane and transport 7 h

Cell wall and cell matrix proteins: prokaryotic and eukaryotic cells. Structure and function: capsule. Interactions: Cell-matrix and cell-cell. Junctions: adherence, tight and gap, desmosomes, hemi-desmosomes, focal adhesions and plasmodesmata. Cell signaling and receptors (overview).Cell membrane: fluid mosaic model. Transport across membrane: Osmosis, diffusion, active and passive transport, and ion channels

Unit V Nucleus, chromosome, cell cycle 7 h

Structure and function: Nucleus and Chromosomes. Cell division: Mitosis and Meiosis (prokaryotes and eukaryotes). Cell cycle: phases of cell cycle (eukaryotic cell cycle, restriction point and checkpoints- overview). Cell death: apoptosis and

necrosis (overview). Transformed cells: salient features.

Stem cells and maintenance of adult Tissues, Embryonic Stem cells and Therapeutic cloning.

Text Books

1 Verma, P S and Agarwal, V K, 2004, "Cell Biology, Genetics, Molecular Biology, Evolution and Ecology", 1st edition, S. Chand Publications, New Delhi.

2 Rodwell, V.W., Bender, D.A., Botham, K.M., Kennelly, P. and Weil, P.A., 2018, "Harper's Illustrated Biochemistry", 31st edition, The McGraw-Hill Inc, New York.

References

1 Cooper G M. and Hausman R E, 2015, "The cell: A Molecular approach", 6th edition, ASM Press, Washington D.C, USA.

2 Alberts B, Johnson A, Lewis J, Raff M, Roberts K and Walter P, 2015, "Molecular Biology of the cell" 6th edition, Taylor and Francis Company, United Kingdom.

3 Harvey Lodish, Arnold Berk, Paul Matsudaira, Chris A. Kaiser, Monty Krieger, Matthew P. Scott, Lawrence Zipursky and James Darnell, 2016. "Molecular Cell Biology", 8th edition, WH Freeman and Company, New York.

4 Kar G, Iwasa J and Marshall M, 2016. "Karp's Cell and Molecular Biology: Concepts and Experiments", 8th edition, John Wiley and Sons, USA.

233BC1A1CP	CORE PRACTICAL - I: BIOMOLECULES AND CELL BIOLOGY	SEMESTER I

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Experiments
	BIOMOLECULES
1	Preparation of Normal and Molar solutions, Preparation of Buffer Solutions- Phosphate, Citrate, Tris, Acetate
2	Determination and adjustment of pH using pH paper and pH meter
3	Qualitative Analysis of carbohydrates: Monosaccharides: Glucose, Fructose, Galactose. Disaccharides: Sucrose, Lactose, Maltose Polysaccharides: Starch
4	Qualitative analysis of amino acids: Histidine, Tyrosine, Tryptophan, Cysteine and Arginine
5	Determination of Saponification number, acid number and Iodine number of edible oil
6	Qualitative test for nucleic acids
	CELL BIOLOGY (DBT Star Scheme Practicals)
7	Mitosis in Onion root tip squash
8	Meiosis in grasshopper testis squash
9	Fractionation of cellular components
10	Staining and visualization of mitochondria by Janus green stain
11	Cell Types - Microbial, Animal and Plant Morphometric measurements
12	Identification and study of cancerous cells using permanent slides and photomicrographs

References

1 Kleinsmith, L J, Hardin, J and Bertoni, G P, 2011, "Becker's The World of the Cell", 8th Edition, Pearson/Benjamin-Cummings, Boston, USA.

2 Jayaraman, J, 2011, "Laboratory Manual in Biochemistry", 2nd Edition, New Age International Pvt. Ltd., India.

Course Code	Course Name	Category	L	T	P	Credit
232CE1A1IA	CHEMISTRY	IDC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The concept of expressing concentration of solutions.
- The concepts of Chemical kinetics and catalysis.
- About the bonding and basic organic chemistry.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of concentration of the solutions	K2
CO2	Infer the acid and basic properties of solutions	K2
CO3	Interpret the concept of the bonding in molecules	K2
CO4	Summarize the basic concepts of the stereo chemistry	K2
CO5	Explain the Chemical kinetics and catalysis	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓		✓
CO2	✓		✓	✓	
CO3		✓		✓	✓
CO4			✓		
CO5	✓	✓		✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

232CE1A1IA	CHEMISTRY	SEMESTER I

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Solutions 8 h

Normality, molarity, molality, mole fraction, mole concept. Primary and secondary standards – preparation of standard solutions. Principle of Volumetric analysis (with simple problems). Indicators – Theory of indicators- Oswald and quinonoid theory.

Unit II Acids and Bases 7 h

Acid base theories – Strength of acids and bases – Equilibrium constant and Ionic constant of water- pH, pKa, pKb, Buffer solution, pH and pOH simple calculations.

Unit III Chemical bonding 7 h

Types of bonding - Ionic Bond: Nature of ionic bond, factors influencing the formation of ionic bond, Covalent and coordinate bond- Molecular Orbital Theory- MO- configuration of H2, N2, O2 - bond order– diamagnetism and paramagnetism.

Unit IV Stereo Chemistry 7 h

Isomerism, Structural isomerism- Symmetry of elements (Plane, Centre and Axis of symmetry), Optical isomerism of lactic acid and tartaric acid, Enantiomers, Diastereomers – Separation of racemic mixture, Geometrical isomerism (maleic and fumaric acid). R/S and E/Z configuration assignments for simple molecules.

Unit V Chemical kinetics and catalysis 7 h

Rate of reaction, rate law, order, molecularity, first order rate law, half life period of first order equation, pseudo first order reaction, zero and second order reactions. Catalysis – homogenous, heterogeneous and enzyme catalysis, Industrial applications of enzyme catalysis.

Text Books

1 Puri. B.R, Sharma. L.R and Pathania. M.S, 2017, "Principles of Physical Chemistry", 47th Edition, John Wiley and Sons & USA

2 Madhan. R.D, 2016, "Modern Inorganic Chemistry", 10th Edition, Mc Graw Hill Company & USA.

References

1 Lee. J.D, 2002, "A New Concise Inorganic Chemistry", 5th Edition, ELBS & UK.

2 Jain. M.K and Sharma. S.C, 2012, "Modern Organic Chemistry", Vishal publishing Co & New Delhi

3 Puri. B.R, Sharma. L.R and Kalia. K.C, 2016, "Principles of Inorganic Chemistry", Vishal Publishing & Co & New Delhi.

4 Glasstone. S and Lewis. D, 2014, "Elements of Physical Chemistry", 2nd Edition, Macmillan Ltd, London

232CE1A1IP	CHEMISTRY PRACTICAL	SEMESTER I

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Experiments
	Volumetric analysis
1	Estimation of Sodium Hydroxide using standard Sodium Carbonate.
2	Estimation of Hydrochloric acid using standard Oxalic acid.
3	Estimation of Oxalic acid using standard Sulphuric acid.
4	Estimation of Ferrous sulphate using standard Mohr salt solution.
5	Estimation of Oxalic acid using standard Ferrous sulphate solution.
6	Estimation of Ferrous ions using Mohr salt solution.
	Systematic analysis of organic compounds.
7	Systematic analysis of organic compounds containing diamides.
8	Systematic analysis of organic compounds containing carbohydrates.
9	Systematic analysis of organic compounds containing monocarboxylic acids.
10	Systematic analysis of organic compounds containing Dicarboxylic acids.
11	Systematic analysis of organic compounds containing amines.
12	Systematic analysis of organic compounds containing amides

References

1. V. Venkateswaran, R. Veeraswmay and A.R. Kulandaivelu, 1997, "Basic Principles of Practical Chemistry" 2nd Edition. Sultan Chand and Sons, New Delhi.
2. J. Mendham, R.C. Denney, J.D. Bames and M. Thomas, 1989, "Vogel's Text book of Quantitative Analysis" 6th Edition, Pearson Education.
3. R. Gopalan, P.S. Subramanian and K. Rengarajan, 2004, "Elements of Analytical Chemistry", 1st Edition, S. Chand and Sons, New Delhi.
4. S. Giri, D.N. Bajpai and O.P. Panday, 2013, "Practical Chemistry Vol. I & II", 30th Edition, S. Chand & Company, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
233MB1A1AA	ENVIRONMENTAL STUDIES	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- Multi disciplinary aspects of Environmental studies
- Importance to conserve the Biodiversity
- Causes of Pollution and its control

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	To understand the importance of natural resources in order to conserve for the future	K1
CO2	To impart knowledge on Natural resources and its conservation	K2
CO3	To impart knowledge on Biodiversity and its conservation	K3
CO4	To create awareness on effects, causes and control of air, water, soil and noise pollution etc.,	K4
CO5	To build awareness about sustainable development and Environmental protection	K1

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓		✓	✓	✓
CO2	✓		✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
✓	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

223MB1A1AA	ENVIRONMENTAL STUDIES	SEMESTER I

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Environmental studies & Ecosystems 5 h

Introduction to Environmental studies& Ecosystems: Multidisciplinary nature of environmental studies; components of environment – atmosphere, hydrosphere, lithosphere and biosphere. Scope and importance; Concept of sustainability and sustainable development. Ecosystem- Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession.

Unit II Natural Resources: Renewable and Non-renewable Resources 5 h

Natural Resources: Renewable and Non-renewable Resources: Land Resources and land use 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 overexploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs.

Unit III Biodiversity and Conservation 5 h

Biodiversity and Conservation: Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography 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; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit IV Environmental Pollution, Environmental Policies & Practices 5 h

Environmental Pollution, Environmental Policies & Practices: Environmental pollution: types, causes, effects and controls; Air, water, soil, chemical and noise pollution. Nuclear hazards and human health risks. Solid waste management: Control measures of urban and industrial waste. Pollution case studies. Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture. Environment Laws: Environment Protection Act; Prevention & Control of Pollution Act – Air & Water. Wildlife Protection Act; Forest Conservation Act;

Unit V Human Communities and the Environment& Field Work 4 h

Human Communities and the Environment & Field Work: Human population and growth: Impacts on environment, human health and welfares. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness. Visit to an area to document environmental assets; river/forest/flora/fauna, etc. Population explosion – Family Welfare Programmes. Role of Information Technology in Environment and human health. Role of the Colleges, Teachers and Students in village adoption towards clean, green and make in villages in various aspects.

Text Books

1 *Carson, R.* 2002," **Silent Spring",** *Houghton Mifflin Harcourt*

2 *Gadgil, M., & Guha, R.*1993," **This Fissured Land: An Ecological History of India",** *Univ. of California Press.*

References

1 *Gleeson, B. and Low, N. (eds.)* 1999," **Global Ethics and Environment",** London, Routledge.

2 *Gleick, P.H.* 1993," **Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security",***Stockholm Env. Institute, Oxford Univ. Press.*

3 *Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll.* 2006, "**Principles of Conservation Biology**". *Sunderland: Sinauer Associates.*

4 *Grumbine, R. Edward, and Pandit, M.K.* 2013," **Threats from India's Himalaya dams", Science,** *339: 36-37.*

5 *McCully, P.*1996," **Rivers no more: the environmental effects of dams** "*(pp. 29-64). Zed Books.*

6 *McNeil, John R.* 2000," **Something New Under the Sun: An Environmental History of the Twentieth Century".**

7 *Odum, E.P., Odum, h.T. & Andrews, J.*1971," **Fundamentals of Ecology",** *Philadelphia: Saunders.*

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CourseCode	Course Name	Category	L	T	P	Credit
231TL1A2TA	TAMIL- II	LANGUAGE- I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடுநாகரீகம்,பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல்
- கலை மற்றும் மரபுகளை அறியச் செய்தல்
- மாணவர்களின் படைப்பாக்கத்திறன்களை ஊக்குவித்தல்

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	வாழ்க்கைத்திறன்கள்(Life Skills)மாணவர்களின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2
CO3	பாடஇணைச்செயல்பாடுகள் (Co-curricular activities)	K2
CO4	சூழலியல் ஆக்கம் (Ecology)	K3
CO5	மொழி அறிவு(Tamil knowledge)	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓		✓	✓	
CO3	✓	✓		✓	✓
CO4	✓		✓	✓	
CO5	✓		✓	✓	

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231TL1A2TA	TAMIL- II	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I அற இலக்கியம் 13 h

1. இலக்கிய வரலாறு- பதினெண்கீழ்க்கணக்குநூல்கள்

2.திருக்குறள்

அ. அறன்வலியுறுத்தல்- அ. எண் 04

ஆ. நட்பாராய்தல் - அ. எண் 80

இ. நாடு- அ. எண் 74

ஈ. குறிப்பறிதல்- அ. எண் 110

Unit II அற இலக்கியம் 13 h

1. நாலடியார் - அறிவுடைமை
2. மூதுரை - ஔவையார் - 10 பாடல்கள்6,7,9,10,14,16,17,23,26,30
3. இனியவைநாற்பது- பூதஞ்சேந்தனார் - முதல் 10 பாடல்கள்

Unit III அறநெறிக் கட்டுரைகள் 09 h

1. இலக்கியவரலாறு - தமிழ் உரைநடையின் தோற்றமும் வளர்ச்சியும்

2. கலைகள்-உ.வே.சா

3. சங்க நெறிகள்- வ.சுப.மாணிக்கம்

Unit IV அறநெறிக் கட்டுரைகள் 15 h

1. வீர வணக்கம் - க.கைலாசபதி
2. தமிழர் பண்பாடு - டாக்டர் சோ.நா.கந்தசாமி
3. இணையத் தமிழ் வளர்ச்சி - முனைவர் ப.அர.நக்கீரன்

Unit V பயிற்சிப் பகுதி 10 h

1.இலக்கணம்-வழு,வழுவமைதி,வழாநிலை

2.அலுவலகம் சார்ந்த கடிதம் -விண்ணப்பங்கள்,வேண்டுகோள்,முறையீடு

3.படைப்பாக்கம்-பொதுத்தலைப்பில் கட்டுரைகள் எழுதுதல்

Text Book

1 தமிழ் மொழிப்பாடம்-2023-2024,தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி,கோயம்புத்தூர். வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ்,சென்னை. (Unit I to V)

References

1 பேராசிரியர் புலவர் சோம. இளவரசு,எட்டாம் பதிப்பு. 2014. தமிழ் இலக்கிய வரலாறு- மணிவாசகர் பதிப்பகம்,சென்னை.

2 பேராசிரியர் முனைவர் பாக்கியமேரி,முதற் பதிப்பு. 2013. இலக்கணம்-இலக்கிய வரலாறு- மொழித்திறன்- பூவேந்தன் பதிப்பகம்,சென்னை. .

3 தமிழ் இணையக் கல்விக்கழகம் - TAMIL VIRTUAL ACADEMY. வலைதள முகவரி: https://www.tamilvu.org

Course Code	Course Name	Category	L	T	P	Credit
231TL1A2HA	HINDI- II	LANGUAGE- I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature
- the techniques for expansion of ideas and translation process

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓		✓	✓
CO3	✓		✓	✓	
CO4	✓		✓	✓	✓
CO5	✓	✓	✓	✓	

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231TL1A2HA	HINDI- II	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I 13 h

आधुनिकपद्य – शबरी(श्रीनरेशमेहता)

Unit II 13 h

उपन्यास: सेवासदन-प्रेमचन्द

Unit III 12 h

कहानी-किरीट- डा उषा पाठक / डा अचला पाण्डेय

पाठ 1.कफ़न, 3. चीफ़ की दावत

Unit IV 12 h

पत्र लेखन: (औपचारिक या अनौपचारिक)

Unit V 10 h

अनुवाद अभ्यास-III (केवल हिन्दी से अंग्रेजी में) (पाठ 1 to 10)

Text Books

1. प्रकाशक: लोकभारती प्रकाशन पहली मंजिल, दरबारी बिल्डिंग,महात्मा गाँधी मार्ग, इलाहाबाद. (Unit I)
2. प्रकाशक: सुमित्र प्रकाशन 204 लीला अपाट्मेंट्स, 15 हेस्टिंग्स रोड'अशोक नगर इलाहाबाद. (Unit II)
3. प्रकाशक: राधाकृष्ण प्रकाशन दिल्ली. (Unit III)
4. पुस्तक: व्याकरण प्रदिप – रामदेवप्रकाशक: हिन्दी भवन 36 इलाहाबाद. (Unit IV)
5. प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई. (Unit V)

Course Code	Course Name	Category	L	T	P	Credit
231TL1A2MA	MALAYALAM- II	LANGUAGE-I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- the competency in translating simple Malayalam sentences into English and vice versa

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓			✓	✓
CO3	✓	✓	✓	✓	
CO4	✓		✓	✓	✓
CO5	✓	✓	✓	✓	

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231TL1A2MA	MALAYALAM- II	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I **Novel** 12 h

Enmakaje: Chapter1- Chapter5

Unit II **Novel** 10 h

Enmakaje: Chapter 6- Chapter 10

Unit III **Novel** 12 h

Enmakaje: Chapter 11- Chapter 15

Unit IV **Autobiography** 14 h

NeermathalamPoothaKalam: Chapter 1- Chapter 10

Unit V **Autobiography** 12 h

NeermathalamPootha Kalam: Chapter 11- Chapter 20

Text Books

1. Ambika SuthanMangad, Enmakaje (Novel), DC Books Kottayam, Kerala, India. (Unit I to III)
2. Madhavikkutty, NeermathalamPootha Kalam (Autobiography), DC Books Kottayam, Kerala, India. (Unit IV & V)

References

1. MalayalaNovelSahithyam, DC Books Kottayam, Kerala, India.
2. MalayalaSahithyaCharithram, National Books Kottayam, Kerala, India.

Course Code	Course Name	Category	L	T	P	Credit
231TL1A2FA	FRENCH- II	LANGUAGE - I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the Competence in General Communication Skills – Oral + Written- Comprehension & Expression
- the Culture, life style and the civilization aspects of the French people as well as of France
- the students to acquire Competency in translating simple French sentences into English and vice versa

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents	K1
CO2	Apply the adjectives and the classroom environment in France	K2
CO3	Select the Plural, Articles and the Hobbies	K2
CO4	Measure the Cultural Activity in France	K3
CO5	Evaluate the sentiments, life style of the French people and the usage of the conditional tense	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	
CO3	✓		✓	✓	✓
CO4	✓		✓		✓
CO5	✓	✓	✓	✓	

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231TL1A2FA	FRENCH- II	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I

12 h

Proposer, accepter, refuserune invitation. Indiquer la date.	Organiserune soirée au cinéma avec des amis, par téléphone et par courriel.	Comprendreunemessage d'invitationsurunréponde urtéléphonique. Inviter quelqu'un accepter ourefuserl'invitation.

Unit II

12 h

Prendreet fixer un rendez-vous. Demander etindiquerl'heure.	Organiserune soirée au cinéma avec des amis, par téléphone et par courriel.	Comprendre des personnes qui fixentunrendez-vous par téléphonique. Prendreunrendez-vous par telephone

Unit III

12 h

Exprimer son point de vuepositif et négatif. S'informersur le prix. S'informersur la quantitité. Exprimer la quantitité.	En groupes, choisir un cadeau pour un ami.	Exprimer son point de vuesur des idées de cadeau. Faire des achatsdans un magasin

Unit IV

14 h

Demander etindiquerune direction. Localiser (près de, en face de ….). Exprimerl'obligationl'Interdit.Conseiller.	Suivre un itinéraire à l'aided'indications par telephone et d'un plan. Par courrierélectronique, donner des informations et des conseils à un ami qui veut voyager.	Comprendre des indications de direction. Comprendre des indications de lieu. Comprendreune chanson. Comprendre de courts messages qui experiment l'obligationoul'interdictio n.

		Donner des conseils à des personnesdans des situations données.

Unit V 10 h

Make in Own Sentences

Text Book

1 Regine Merieux, Yves Loiseau, "LATITUDES - 1" (Page No: 56-101) (Methode de Français), Goyal Publisher & Distributors Pvt.Ltd., 86 UB Jawahar Nagar (Kamala Nagar), New Delhi-7 Les Editions Dider, Paris, 2008-ImprimeenRoumanie par Canale en Janvier 2012.(UnitI toIV)

CourseCode	Course Name	Category	L	T	P	Credit
231EL1A2EA	ENGLISH- II	LANGUAGE- II	4	-	1	3

PREAMBLE

This course has been designed for students to learn and understand

- the language for specific purposes through various literary manuscripts
- the process of communicative competencies in academics through authentic contexts
- the different formats of business correspondence with lucidity and accuracy via various media

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify and appreciate the eminent writers' works of various genres	K1
CO2	Infer and comprehend complex situational talks	K2
CO3	Relate formal and informal communicative contexts to speak fluently	K2
CO4	Construct the denotative and connotativemeanings while reading specialized texts	K3
CO5	Develop the skill of writing through descriptions, narrations and essays	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓		✓	✓	✓
CO2	✓	✓	✓	✓	
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231EL1A2EA	ENGLISH-II	**SEMESTER** II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Genre Studies 15 h

John Keats: To a Friend Who Sent Me Some Roses - Author's Note - title indications- outline-paraphrasing the poem- context of poem- form- poetic devices- techniques- Style

A.G. Gardiner: On Habits - Author's Note- Title indications- Outline -Passage Analysis - context of the Prose - Narrative techniques- Style

SudhaMurthy: The Enchanted Scorpions-Author's Note - title indications-Plot summary- Outline of the story -devices- Narrative techniques- Style

David Pinski: A Dollar-Author's Note- Title indications -Plot Summary- Critical Analysis-Themes- Characteranalysis - Terms- Symbols

Unit II Listening Skills 10 h

Listening to Talks/Lectures by Specialists on selected subject-specific topics-Listening to Public Announcements- Listening to Instructions and Directions-Listening to Speeches- Listening to process/event descriptions to identify causes& effects

Unit III Speaking Skills 11 h

Small Talk- Mini Presentations and Making Recommendations- Group Discussions, Debates, and Expressing opinions through Role play- Picture Description-Giving Instruction to Use a Product- Presenting a Product- Summarizing a Lecture-Narrating Personal Experiences/ Events- Interviewing a Celebrity- Scientific Lectures- Educational Videos- Debates- Different Viewpoints on an Issue

Unit IV Reading Skills 12 h

Reading Biographies, Newspaper Reports, Technical Blogs-ReadingAdvertisements- Gadget Reviews- Newspaper Articles- Journal Reports – Reading Editorials & Blogs- Case Studies- Excerpts from Literary Texts

Unit V Writing Skills 12 h

Inferring & Interpreting- Predicting Reorganizing Material- Summary Writing Based on the Reading Passages- Writing - Emails & Essay Writing (Descriptive or Narrative)- Grammar - Tenses- Question Types: Wh/ Yes or No/ and Tags

Text Books

1. Keats, John. To a Friend Who Sent Me Some Roses. <https://www.Poets.org, 1820, poets.org/poem/ friend-who-sent-me-some-roses.html/>(UnitI)
2. Gardiner, Alfred George. On Habits (n.d.). <Https://Www. Gutenberg. Org/ Files/47429/47429-H/47429-H.Html/> (UnitI)
3. Murthy, Sudha. The Enchanted Scorpions. (n.d.). <https://www. ssgopalganj.in/online/EBooks/CLASS%20VI/Grandma's%20Bag%20of%20 Stories%20by%20Sudha%20Murthy.pdf/>pp-34-39.(UnitI)
4. Pinski, David.A Dollar-a One-act Play.<www.one-act-plays.com/ comedies/dollar.html/>(UnitI)
5. Hart, Steve,AravindR.Nair, VeenaBhambhani. 2016. Embark: English for Undergraduates. Cambridge University Press, New Delhi, India. (Unit II)
6. Lakshminarayan.2012. A Course Book On Technical English. Scitech Publications Pvt. Ltd., New Delhi, India. (Unit III)
7. Raman, Meenakshi&Sangeeta Sharma. 2016. Technical Communication-Principles And Practice, Oxford University Press, New Delhi, India. (Unit IV)
8. Viswamohan, Aysha. 2017. English For Technical Communication (With CD), McGraw Hill (India) Private Limited, New Delhi, India. (UnitV)

References

1. Bajwa and Kaushik. 2010. Springboard to Success- Workbook for Developing English and Employability Skills. Orient Black Swan, Chennai, India.
2. Chellammal, V. 2003. Learning to Communicate. Allied Publishing House, New Delhi, India
3. Krishnaswamy. N, LalithaKrishnaswamy& B.S. Valke. 2015. Eco English, Learning English through Environment Issues. An Integrated, Interactive Anthology. Bloomsbury Publications, New Delhi, India.
4. Syamala. V. 2002. Effective English Communication for You. Emerald Publishers, Chennai, Tamil Nadu, India.

Course Code	Course Name	Category	L	T	P	Credit
233BC1A2CA	ENZYMES	CORE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the classification, functions and reactions mediated by enzymes in a cell
- Features of enzyme catalysis and kinetics, mechanism of action of selected enzymes and coenzymes
- he isolation of enzymes, inhibitors and applications of enzymes

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Classify enzymes, explain active site and specificity of enzymes and enzymes as protein structure	K2
CO2	Describe coenzymes with examples, regulatory enzymes, ribozymes and abzymes	K2
CO3	Illustrate factors that affect enzyme activity and construct MM plot, LB plot, Eadie-Hofstee and Hanes plot	K3
CO4	Compare different types of enzyme inhibition, build models of bisubstrate reactions and illustrate theories of enzyme catalysis	K3
CO5	Explain industrial and diagnostic applications of enzymes	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

233BC1A2CA	ENZYMES	SEMESTER II

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Enzymes 12 h

Introduction -Definition, IUB Classification of enzymes, numbering and nomenclature (Class and subclass with one example). Units of enzyme activity – katal, International Unit (IU). Concept of active sites, enzyme specificity- Group specificity, optical specificity. Theories of enzyme catalysisLock and Key model and Induced fit model. Enzyme as proteins Structure: Primary, Secondary, Tertiary and Quaternary structure with reference to examples.

Unit II Coenzymes and Regulatory enzymes 12 h

Coenzymes, Cofactors: Definition, Structure and functions of TPP, NAD, NADP, FAD, FMN and Coenzyme A, metal cofactor. Regulatory enzymes: Isoenzymes - Lactate dehydrogenase and creatine phosphokinase. Allosteric enzymes - properties, types, models, Aspartate transcarbamoylase. Ribozymes, Abzymes. Multienzyme Complex: Pyruvate dehydrogenase.

Unit III Enzyme Kinetics 12 h

Enzyme Kinetics: Effect of pH, temperature, substrate concentration, product concentration and enzyme concentration on enzyme activity, Turn over number of enzymes. Michaelis-Menten equation. Lineweaver-Burk plot (only for single substrate catalyzed reaction), Eadie-Hofstee and Hanes plot. Determination of Km and Vmax.

Unit IV Enzyme Inhibition, Bi-substrate reactions and enzymatic catalysis 12 h

Enzyme Inhibition: Reversible-competitive, non-competitive and un-competitive inhibition. Irreversible inhibition and feedback inhibition. Bisubstrate reactions: sequential- ordered and random, ping-pong reactions. Enzymatic catalysis: Significance of activation energy, General acid base catalysis, covalent catalysis (chymotrypsin and lysozyme).

Unit V Enzyme Applications 12 h

Isolation of enzymes, criteria of purity. Immobilized Enzymes- methods & applications. Industrial uses of enzymes: production of glucose from starch,

cellulose and dextrans, use of lactase in dairy industry. Diagnostic (AST, ALT, creatine kinase, alkaline and acid phosphatases) applications of enzymes. Enzymes as Biosensors - Calorimetric biosensors, Potentiometeric biosensors. Enzyme Engineering: Artificial Enzymes.

Text Books

1 Palmer, T, 2004, "Understanding enzymes", 1st edition, East West Press Pvt. Ltd., New Delhi.

2 Bhatt S.M, 2014, "Enzymology and Enzyme technology", 15th edition, S. Chand publishing Ltd, New Delhi.

References

1 Palmer, T and Bonner, P L, 2004, "Enzymes: Biochemistry, Biotechnology, Clinical chemistry", 1st edition, East West Press Pvt. Ltd., New Delhi.

2 Wolfgang Aehle, P, 2006, "Enzymes in Industry" 3rd Edition, Wiley-VCH, German.

3 Choudhary N.L and Singh, A, 2012, "Fundamentals of Enzymology", 1st Edition, Oxford Book Company,UK.

4 Nelson D L and Cox M M, 2017, "Lehninger's Principles of Biochemistry", 7th Edition, Macmillan Learning, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
233BC1A2CB	MICROBIOLOGY	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The key Microbiological techniques.
- The principles and methods of sterilization and disinfection
- The pathogenic microbial diseases and the mode of action of antibiotics.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify and Illustrate different types of microscopes and staining Techniques	K3
CO2	Plan and choose a suitable nutritional medium required for microbial growth.	K3
CO3	Outline and apply the physical and chemical sterilization Methods.	K4
CO4	Identify the mode of action of antibiotics.	K3
CO5	Compare and contrast the various pathogenic microbial diseases.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

233BC1A2CB	MICROBIOLOGY	SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction 10 h

Definition, History and scope of Microbiology, Classification of microorganisms. Microscopy: Principles, types and applications of Microscopy - Simple and compound microscope - Dark field, Phase contrast, Fluorescence and Electron r croscopy, Confocal Microscope. Microbiological staining techniques: Simple s ining, Negative staining, Gram staining, Acid fast staining, capsule staining, fl gella staining, endospore staining.

U nit II Microbial nutrition and growth 10 h

Role of Carbon, nitrogen, hydrogen, oxygen, sulfur and phosphorous, nutritional classification of microorganisms. Nutritional uptake by cell - facilitated diffusion, a tive transport, group translocation, Media Preparation, types of media, Physical c nditions required for microorganisms – temperature, atmosphere, pH, pressure. Microbial growth and measurement. Pure culture techniques – tube dilution, pour plate, spread and streak plate methods. Anaerobic culture methods – Wright's tube, Roll tube, McIntosh - Fildes anaerobic jar, Gaspak, Anaerobic chamber (glove box), incubator. Principle, classes, and applications of Biosafety cabinets.

Unit III Sterilization and disinfection 8 h

Principles and methods of sterilization: dry heat, moist heat, filtration, radiation, tyndallization, Pasteurization, ultrasonication, Physical and Chemical methods of sterilization: disinfection sanitization, antisepsis sterilant and fumigation, Phenol coefficient test – Sterility testing.

Unit IV Antibiotics and mode of action 10 h

Antimicrobial spectrum of antibiotics and mode of action of the following antibiotics: a) Antibacterial - Penicillin, streptomycin and tetracyclines b) Antifungal – Nystatin, griseofulvin and cycloheximide c) Antiviral - Acycloguanosine (acyclic nucleoside) and remdesivir. Drug resistance – chromosomal mutation and plasmid-borne multiple drug resistance.

Unit V Microbes & Pathogenic diseases 10 h

Normal human micro flora, host - parasitic interaction, epidemics, exo and endotoxins. Air borne diseases: Aetiology, symptoms and prevention of

Tuberculosis, Diphtheria, Poliomyelitis, Influenza, SARS, and Covid-19. Food and Waterborne diseases: Aetiology, symptoms and pathogenesis of Typhoid, Cholera, Bacillary dysentery and Hepatitis. Direct contact disease: Aetiology and symptoms of Rabies. Fungal disease: Aetiology, symptoms and prevention of mucormycosis. Molecular methods to study complex microbial communities, Functional Metagenomics.

Text Books

1. Pelczer, Chan and Krieg, 2014,"Microbiology" 5th Edition, McGraw Hill, Education (India) Pvt Ltd, New Delhi, India
2. Anantha Narayanan and Panicker, 2020, "Text Book of Microbiology" , 11th Edition, Universities Press, Hyderabad, India

References

1. Willey, Sandman and Wood, 2020, "Prescott's Microbiology", 11th Edition, McGraw-Hill, New York, USA
2. Tortora, Funke, Case, Weber and Bair, 2021, "Microbiology - An Introduction", 13th Global Edition, Pearson Education Inc, London, UK
3. Arora and Arora, 2020, "Textbook of Microbiology", 6th Edition, CBS Publishers, New Delhi, India
4. Pommerville CJ, 2021, "Fundamentals of Microbiology", 12th Edition, Jones and Bartlett Publishers Inc, Massachusetts, USA

233BC1A2CP	CORE PRACTICAL II : ENZYMES AND MICROBIOLOGY	SEMESTER II

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Experiments
1	Isolation and Partial purification of the following enzymes from plant/Microbial sources a). Acid phosphatase b). Amylase c). Urease
2	Effect of pH on the activity of any one of the following enzymes: a). Acid phosphatase b). Amylase c). Urease
3	Effect of temperature on the activity of any one of the following enzymes: a). Acid phosphatase b). Amylase c). Urease
4	Effect of substrate concentration on the activity of any one of the following enzymes: a). Acid phosphatase b). Amylase c). Urease
5	Separation of isoenzymes by Native PAGE and SDS PAGE (Demonstration)
6	Enzyme immobilization by sodium alginate method (DBT Star Practical)
7	Determination of Molecular weight of enzymes using gel filtration (DBT Star Practical)
8	Preparation and Inoculation of Culture Media-Solid and Liquid
9	Culture transfer techniques: Slid to solid (Streaking), Liquid to solid (spreading), Liquid to liquid, solid to liquid and determination of CFU/ml. (DBT Star Practical)
10	Staining techniques- Simple staining, Gram Staining, Negative, spore and Acid-Fast Staining
11	Antibiotic sensitivity of bacterial pure culture
12	Tests for identification of Bacteria- IMViC, Bacterial Sugar Fermentation, Oxidase, catalase, urease and H2S Production
13	Study and plot the growth curve of E. coli by turbidimetric and standard plate count methods (DBT Star Practical)

Note:

References

1 Abhilasha Singh, 2007, "Enzyme Assays", 1st Edition, Regency Publications, New Delhi.

2 Sadasivam S and Manickam A, 2008, "Biochemical Methods", 3rd Edition, New Age International Publishers, New Delhi.

3 James C Cappuccino, 2017, "Microbiology A laboratory manual", 11th edition, Pearson education publishing house, New Delhi

4 Rajan S and Selvi Christy, 2018, "Experimental Procedures in Life Sciences", CBS Publishers & Distributors Pvt Ltd, India.

Course Code	Course Name	Category	L	T	P	Credit
232PY1A2IB	PHYSICS	IDC	3	-	2	3

PREAMBLE

This course has been designed for students to learn and understand

- The properties of materials and its determination
- The number systems and truth tables
- The concepts of smart materials and its applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain concepts of elasticity, and their applications in real time examples	K2
CO2	Demonstrate the Newton's law of Gravitation and applications of acoustics.	K3
CO3	Identify different number system and verification of logic gates with truth tables.	K2
CO4	Examine the coefficient of viscosity of the liquids	K4
CO5	Value the concept of diffraction and interference and application of various smart materials	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability	✓	Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

232PY1A2IB	PHYSICS	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Properties of Matter 12 h

Elastic Modulus – Poisson's ratio (definition)– Bending of beams – Expression for bending moment -Depression of Cantilever-Experimental determination of Young's modulus by cantilever depression - Determination of Y by uniform and non-uniform bending methods - Determination of rigidity modulus and moment of inertia of a disc by torsional pendulum.

Unit II Gravitation and Acoustics 12 h

Newton's law of Gravitation - Kepler's laws of planetary motion - Deduction of Newton's law of gravitation from Kepler's laws- Determination of 'G' by Boy's method- Variation of 'g' with altitude and depth - Acceleration due to gravity- Determination of 'g' by compound pendulum - Doppler effect– Applications of Doppler effect – Determination of frequency of alternating current by Sonometer.

Unit III Digital Electronics 12 h

Number system: Decimal – Binary –Conversion of binary to decimal number - Conversion of decimal to binary- Binary addition, subtraction – Logic gates – OR, AND, NOT, XOR, NAND and NOR gates –Verification of truth tables – Laws and theorems of Boolean's algebra – De Morgan's theorems.

Unit IV Viscosity 12 h

Viscosity – Viscous force – Co-efficient of viscosity –Poiseuille's formula for coefficient of viscosity of a liquid – Stoke's method for coefficient of viscosity of a viscous liquid - Determination of coefficient of viscosity using burette - Comparison of viscosities

Unit V Optics and Smart materials 12 h

Interference – Conditions for interference maxima and minima – Air wedge – Determination of thickness of a thin wire by Air wedge method – Newtons rings - Determination of wavelength using newton's ring - Diffraction – Difference between diffraction and interference - Theory of transmission grating - Metallic glasses – Shape memory alloys – Biomaterials - Applications

Text Books

1 Murugeshan R and Kiruthiga Sivaprasath ER, 2014, "Modern Physics", 17th Edition, S. Chand and Co, New Delhi.

2 Murugeshan R and Kiruthiga Sivaprasath, ER, 2008, "Properties of Matter", 10th Edition, S Chand and Co, New Delhi.

References

1 Millman J, Halkias C and Chetan Parikh, 2009, "Integrated Electronics", 10th Edition, Tata McGraw Hill Publishing Company Ltd, New York

2 Robert Resnick, David Halliday, and Kenneth S Krane, I.N., 2001, "Physics", 10th Edition, Wiley India, New Delhi.

3 Mehta R, 2010, "Principles of Electronics", 11th Edition, S. Chand and Co., New Delhi.

4 Brij Lal and Subrahmanyam N, 2006, "A Textbook of Optics", 10th Edition, S. Chand and Co., New Delhi.

231TL1A2AA	PART- IV: BASIC TAMIL	SEMESTER II

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2023–24ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது

(10 மற்றும் 12– ஆம் வகுப்பு வரை தமிழ் மொழிப்பாடம் பயிலாதவர்களுக்கு)

(பருவத் தேர்வு இல்லை)

Syllabus

Unit I தமிழ் மொழியின் அடிப்படைக் கூறுகள் 05 h

எழுத்துகள் அறிமுகம்

1. உயிர் எழுத்துக்கள் - குறில் , நெடில் எழுத்துகள்

2. மெய் எழுத்துக்கள் - வல்லினம், மெல்லினம், இடையினம்

3. உயிர்மெய் எழுத்துக்கள்

4. பயிற்சி

Unit II சொற்களின் அறிமுகம் 05 h

1.பெயர்ச்சொல்

2.வினைச்சொல் – விளக்கம் (எ.கா.)

3.பயிற்சி

Unit III குறிப்பு எழுதுதல் 05 h

1. பெயர், முகவரி, பாடப்பிரிவு , கல்லூரியின் முகவரி

2. தமிழ் மாதங்கள்(12), வாரநாட்கள்(7)

3. எண்கள் (ஒன்று முதல் பத்து வரை), வடிவங்கள், வண்ணங்கள்

Unit IV குறிப்பு எழுதுதல் 05 h

1. ஊர்வன, பறப்பன, விலங்குகள்

2.மனிதர்களின் உறவுப்பெயர்கள்

3. ஊர்களின்பெயர்கள் (எண்ணிக்கை 10)

Unit V பயிற்சிப் பகுதி 04 h

பயிற்சிப் பகுதி (உரையாடும் இடங்கள்)

வகுப்பறை, பேருந்து நிலையம், சந்தை– பேசுதல்,எழுதுதல்.

Notes:

அகமதிப்பீட்டுத்தேர்வு– வினாத்தாள் அமைப்புமுறை- மொத்த மதிப்பெண்கள் - 50

		பகுதி –அ
சரியான விடையைத் தேர்வு செய்தல்	10	x2=20
		பகுதி –ஆ
சரியா? தவறா?		10x2=20
		பகுதி – இ
ஒரு பக்க அளவில் விடையளிக்க		1x10=10

குறிப்பு:

- அனைத்து அலகுகளில் இருந்தும் வினாக்கள் அமைதல் வேண்டும்
- பகுதி இ–க்கான வினாக்கள் இது அல்லது அது என்ற அடிப்படையில் அமைதல் வேண்டும்

Text Book

1 அடிப்படைத் தமிழ் - 2023-2024,தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி,கோயம்புத்தூர்.வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ்,சென்னை. (Unit I to IV)

References

1 ஒன்றாம் வகுப்பு பாடநூல் - தமிழ்நாடு அரசு பாடநூல் கழகம், சென்னை.

2 தமிழ் இணையக் கல்விக்கழகம் - TAMIL VIRTUAL ACADEMY வலைதள முகவரி: <https://www.tamilvu.org/>

231TL1A2AB	PART- IV: ADVANCED TAMIL	SEMESTER II

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2023– 2024 ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது

(10 மற்றும் 12– ஆம் வகுப்புகளில் தமிழ் மொழிப்பாடம் பயின்றவர்களுக்கு உரியது)

(பருவத் தேர்வு இல்லை)

Syllabus

Unit I கவிதைகள் 06 h

1. தமிழ்நாடு - பாரதியார்
2.மனதில் உறுதி வேண்டும் - பாரதியார்
3. இன்பத்தமிழ் - பாரதிதாசன்
4.வேலைகளல்லவேள்விகள் - தாராபாரதி
5.தமிழா! நீ பேசுவது தமிழா! - காசியானந்தன்
6. நட்புக் காலம்(10 கவிதைகள்)- அறிவுமதி கவிதைகள்

Unit II கட்டுரை 05 h

கட்டுரைத் தொகுப்பு -நல்வாழ்வு - டாக்டர் மு.வரதராசன்

1. நம்பிக்கை
2. புலனடக்கம்
3. பண்பாடு

Unit III இலக்கணம் 04 h

1.வல்லினம் மிகும் மற்றும் மிகா இடங்கள்

2. ர,ற,ல,ழ,ள,ந,ண,ன – வேறுபாடு அறிதல்

Unit IV கடிதங்கள் 05 h

1. பாராட்டுக் கடிதம்
2. நன்றிக் கடிதம்
3. அழைப்புக் கடிதம்
4. அலுவலக விண்ணப்பங்கள்

Unit V பயிற்சிப் பகுதி 04 h

படைப்பாக்கப் பகுதி

பொதுத் தலைப்புகளில் கவிதை,கட்டுரை எழுதச்செய்தல்

Notes

அக மதிப்பீட்டுத் தேர்வு - வினாத்தாள் அமைப்பு முறை- மொத்த மதிப்பெண்கள் 50

		பகுதி –அ
சரியான விடையைத் தேர்வு செய்தல்	10	x1=10
		பகுதி –ஆ
கோடிட்ட இடங்களை நிரப்புக.		10x2=20
		பகுதி –இ
இரண்டு பக்க அளவில் விடையளிக்க		2x10=20

குறிப்பு:

- அனைத்து அலகுகளில் இருந்தும் வினாக்கள் அமைதல் வேண்டும்
- பகுதி இ–க்கான வினாக்கள் இதுஅல்லது அதுஎன்ற அடிப்படையில் அமைதல் வேண்டும்

Text Book

1 சிறப்புத் தமிழ் - 2023-2024, தொகுப்பு: தமிழ்த்துறை , டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, கோயம்புத்தூர். வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை. (Unit- I to IV)

References

1 பேராசிரியர் புலவர் சோம. இளவரசு ,எட்டாம் பதிப்பு. 2014 . தமிழ் இலக்கிய வரலாறு – மணிவாசகர் பதிப்பகம்,சென்னை.

2 டாக்டர் மு.வரதராசன். 2010. நல்வாழ்வு, பாரி நிலையம், சென்னை.

3 பேராசிரியர் முனைவர் பாக்கியமேரி ,முதற் பதிப்பு.2013. இலக்கணம் - இலக்கிய வரலாறு - மொழித்திறன்- பூவேந்தன் பதிப்பகம், சென்னை..

4 தமிழ் இணையக் கல்விக்கழகம் - TAMIL VIRTUAL ACADEMY. வலைதள முகவரி : <https://www.tamilvu.org/>

Course Code	Course Name	Category	L	T	P	Credit
235CR1A2AA	HUMAN RIGHTS AND WOMEN'S RIGHTS	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- Concepts of Human Rights.
- Human Right Violations and Redressal Mechanism.
- Rights to Women and Child.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of Human Rights.	K1
CO2	Describe the Fundamental Rights.	K2
CO3	Relate Human Right Violations and Redressal Mechanism.	K3
CO4	State the Rights to Women and Child.	K2
CO5	Apply Civil and Political Rights of Women.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1		✓		✓	✓
CO2		✓	✓	✓	✓
CO3				✓	✓
CO4		✓		✓	✓
CO5	✓	✓	✓	✓	✓

COURSE FOCUS ON

	Skill Development		Entrepreneurial Development
	Employability		Innovations
	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

235CR1A2AA	HUMAN RIGHTS AND WOMEN'S RIGHTS	SEMESTER II

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Human Rights 04 h

Meaning - Definition - Nature - Content - Legitimacy of Human Rights - Origin and Development of Human Rights - Theories - Principles of Magna Carta - Modern Movements of Human Rights - The Future of Human Rights. Case studies related to human rights.

Unit II Human Rights in India 05 h

The Constitution of India: Fundamental Rights - Right to Life and Liberty - Directive Principles of State Policy - Fundamental Duties - Individual and Group Rights - Other facets of Human Rights - Measures for Protection of Human Rights in India.

Unit III Human Right Violations and Redressal Mechanism 05 h

Human Rights: Infringement of Human Right by State Machinery and by Individual - Remedies for State action and inaction - Constitutional Remedies - Public Interest Litigation (PIL) - Protection of Human Rights Act, 1993 - National Human Rights Commission - State Human Rights Commissions - Constitution of Human Right Courts.

Unit IV Rights to Women and Child 05 h

Matrimonial protection - Protection against dowry - Protection to pregnancy - Sexual offences - Law relating to work Place - Directive principles of Constitution (Article 39 a, d, e & Article 42, 43 & 46) - Trafficking of women - Constitutional Rights - Personal Laws - Protection of children against Sexual Offences Act, 2012 (POCSO).Case studies related toSexual offences.

Unit V Civil and Political Rights of Women 05 h

Right of Inheritance - Right to live with decency and dignity - The Married women's Property Act, 1874 - Women's right to property - Women Reservation Bill - National Commission for Women - Political participation -Pre-independent political participation of women - Participation of Women in post independent period. Kavalan App.Case studies related to women rights.

Text Books

1. Lalit Parmar, 1998, "Human Rights", Anmol Publications Pvt. Limited, New Delhi.
2. Krishna Pal Malik, 2009, "Women & Law ", Allahabad Law University, New Delhi.

References

1. Mandagadde Rama Jois, 2015, "Human Rights", Bharatiya Values, Bharatiya Vidya Bhavan Publications, Mumbai.
2. Paras Diwan and Piyush Diwan, 1994, "Women and Legal Protection", South Asia Books, Andhra Pradesh.
3. Venkataram and Sandhiya. N, 2001, "Research in Value Education", APH Publishing Corporation, New Delhi.
4. Anand A S, 2008, "Justice for Women: Concerns and Expressions", Universal Law Publishing Co., New Delhi.

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Course Code	Course Name	Category	L	T	P	Credit
231TL1A3TA	TAMIL- III	LANGUAGE- I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடுநாகரீகம்,பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல்
- கலை மற்றும் மரபுகளை அறியச் செய்தல்
- மாணவர்களின் படைப்பாக்கத்திறன்களை ஊக்குவித்தல்

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	வாழ்க்கைத்திறன்கள் (Life Skills)- மாணவர்களின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2
CO3	பாடஇணைச்செயல்பாடுகள் (Co-curricular activities)	K2
CO4	சூழலியல் ஆக்கம் (Ecology)	K3
CO5	மொழி அறிவு(Tamil knowledge)	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓		
CO2				✓	
CO3		✓			
CO4	✓		✓		
CO5	✓			✓	

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231TL1A3TA	TAMIL- III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **காப்பியங்கள்** 10 h

1.சிலப்பதிகாரம் –வழக்குரை காதை

2. மணிமேகலை–ஆதிரை பிச்சையிட்ட காதை

Unit II **காப்பியங்கள்** 10 h

1. கம்பராமாயணம் -கும்பகர்ணன் வதைப்படலம்: பா. எண் : 60 முதல் – 100 வரை

2. பெரிய புராணம் - அதிபத்த நாயனார்புராணம்

Unit III **சிற்றிலக்கியங்கள்** 10 h

1.திருக்குற்றாலக்குறவஞ்சி - வசந்தவல்லி பந்தாடிய சிறப்பு (6: 4கண்ணிகள்)

2.கலிங்கத்துப்பரணி-களம்பாடியது: போர்க்களக் காட்சி- பா.எண்: 472 முதல்- 502 வரை

Unit IV **இலக்கிய வரலாறு** 10 h

1.காப்பியம் – வரையறை,ஐம்பெருங் காப்பியங்கள்,ஐஞ்சிறு காப்பியங்கள்

2.கம்பராமாயணம், பெரிய புராணம் – குறிப்பு

3. சிற்றிலக்கியங்களின் தோற்றமும் வளர்ச்சியும்

Unit V **இலக்கணம் &பயிற்சிப் பகுதி** 08 h

அ. இலக்கணம்

1.'பா' வகைகள் : வெண்பா, ஆசிரியப்பா, கலிப்பா, வஞ்சிப்பா - பொது இலக்கணம் மட்டும்.

2. அணி: உவமையணி, உருவக அணி, இல்பொருள் உவமையணி விளக்கம், உதாரணம்.

ஆ. பயிற்சிப் பகுதி

1.வாசகர் கடிதம்: நாளிதழ், வானொலி, செய்தி ஊடகங்களுக்கு விமர்சனம் எழுதுதல்

2.திரைக்கதை விமர்சனம்: மத்திய மற்றும் மாநில அரசு விருது பெற்ற தமிழ்த் திரைப்படங்கள் மட்டும்

Text Book

1 தமிழ் மொழிப்பாடம்-2023 -2024 ,தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி,கோயம்புத்தூர். வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ்,சென்னை. (Unit I to V)

References

1 பேராசிரியர் புலவர் சோம. இளவரசு,எட்டாம் பதிப்பு-2014,தமிழ் இலக்கிய வரலாறு-மணிவாசகர் பதிப்பகம்,சென்னை.

2 பேராசிரியர் முனைவர் பாக்கியமேரி,முதற் பதிப்பு- 2013,இலக்கணம்-இலக்கிய வரலாறு- மொழித்திறன்- பூவேந்தன் பதிப்பகம்,சென்னை. .

3 தமிழ் இணையக் கல்விக்கழகம் - TAMIL VIRTUAL ACADEMY. வலைதள முகவரி: https://www.tamilvu.org

Course Code	Course Name	Category	L	T	P	Credit
231TL1A3HA	HINDI- III	LANGUAGE- I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature
- the techniques for expansion of ideas and translation process

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓			✓	✓
CO2		✓			✓
CO3	✓		✓	✓	
CO4					✓
CO5	✓	✓	✓		✓

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231TL1A3HA	HINDI- III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

पद्य – काव्य पराशर (भोलानाथ)

(प्राचीन- कबीर, तुलसी, सुर, मीरा, आधुनिक- मैथिलीशरण गुप्त, अरूण कमल)

Unit II 10 h

हिन्दी साहित्य का इतिहास: (साधारण ज्ञान)

Unit III 10 h

अलंकार:अनुप्रास,यमक, श्लेष, वक्रोक्ति, उपमा,रूपक

Unit IV 10 h

संवादलेखन

Unit V 08 h

अनुवादअभ्यास-III (केवलहिन्दीसेअंग्रेजीमें)

(पाठ10 to 20)

Text Books

1. प्रकाशक: जवाहर पुस्तकालय सदर बाजार, मथुराउत्तर प्रदेश-281001(Unit I)
2. आचार्य रामचन्द्र शुक्ललोकभारती प्रकाशन इलाहाबाद. (Unit II)
3. प्रकाशक: विनोद पुस्तक मंदिरआगरा-282002 (Unit III)
4. पुस्तक: व्याकरणप्रदिप–रामदेवप्रकाशक: हिन्दीभवन36 इलाहाबाद-211024(Unit IV)
5. प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17(Unit V)

Course Code	Course Name	Category	L	T	P	Credit
231TL1A3MA	MALAYALAM- III	LANGUAGE-I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- the competency in translating simple Malayalam sentences into English and vice versa

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓			✓	
CO2	✓				✓
CO3		✓	✓		
CO4	✓			✓	✓
CO5	✓	✓	✓		✓

COURSE FOCUS ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231TL1A3MA	MALAYALAM- III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **Poetry** 10 h

Kumaranasan

Unit II **Poetry** 10 h

Kumaranasan

Unit III **Poetry** 10 h

Kumaranasan

Unit IV **Poetry** 10 h

VayalarRamavarma

Unit V **Poetry** 08 h

VayalarRamavarma

Text Books

1 Kumaranasan. 1998. Chinthavishtayaya Sitha. DC Books Kottayam, Kerala, India.(Unit I to III)

2 Ayisha (Poem), National Book Stall Kottayam, Kerala, India. (Unit IV & V)

Reference

1 Dr.M.Leelavathy.Kavitha Sahithya Charithram. Sahithya Academy Thrissur, Kerala, India.

Course Code	Course Name	Category	L	T	P	Credit
231TL1A3FA	FRENCH- III	LANGUAGE- I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the Competence in General Communication Skills – Oral + Written- Comprehension & Expression
- the Culture, life style and the civilization aspects of the French people as well as of France
- the students to acquire Competency in translating simple French sentences into English and vice versa

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents	K1
CO2	Apply the adjectives and the classroom environment in France	K2
CO3	Select the Plural, Articles and the Hobbies	K2
CO4	Measure the Cultural Activity in France	K3
CO5	Evaluate the sentiments, life style of the French people and the usage of the conditional tense	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓				✓
CO2	✓	✓			
CO3			✓	✓	
CO4	✓	✓			✓
CO5	✓		✓	✓	✓

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231TL1A3FA	FRENCH- III	SEMESTER III

Total Credits: 3
Total Instruction Hours: 48 h

Syllabus

Unit I

10 h

° Décrireun lieu. ° Situer	A partird'unerecherche de documents, composer une presentation touristique pour un magazine ou un site internet.	Comprehendre la description d'un lieu. Décrireunevilleouunerégionq u'onaime. Interrogersur la situation of d'un lieu. Comprendre des indications sur la fréquenced'actions.	Comprendreune presentation de catalogue touristique. Comprendre des pictogrammes. Comprendre la description d'un lieu et d'une situation precise dans un message électronique.

Unit II

10 h

Se situerdans le temps.	A partird'unerecherc he de documents, composer une presentation touristique pour un magazine ou un site internet.	Comprehendre la description d'un lieu. Décrireunevilleouunerégio nqu'onaime. Interrogersur la situation of d'un lieu. Comprendre des indications sur la fréquenced'actions.	Comprendreune presentation de catalogue touristique. Comprendre des pictogrammes. Comprendre la description d'un lieu et d'une situation precise dans un message électronique.

Unit III

10 h

Raconter. ° Décrire les étapesd'une action.	Raconterune scene insolite à l'oreal et à l'écrit.	Comprehendre le récit d ún voyage. Raconterses actions quotidiennes.	Ecrire une biographie a partir d'eléments écrits.

Unit IV

10 h

Exprimer l'intensité et la quantité. ° Interroger.	Raconterune scene insoliteà l'oreal et à l'écrit.	Comprehendre le récit d ún voyage. Raconterses actions quotidiennes.	Ecrire une biographie a partir d'eléments écrits.

Unit V

08 h

Make in Own Sentences based on the above Lessons

Text Book

1 LATITUDES 1 (Méthode de français) Pages from 102-127, Author : RegineMérieux, Yves Loiseau(Unit I to IV)

Course Code	Course Name	Category	L	T	P	Credit
231EL1A3EA	ENGLISH - III	LANGUAGE- II	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the basics of English grammar and specific usage
- the importance of the vocabulary and its use in different contexts
- the necessity of communication and composition writing skills

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Infer the specific usage of while-listening process	K2
CO2	Organize the various abilities and sub-skills involved in reading	K3
CO3	Utilize the importance of speaking skills and developing it through various practices	K3
CO4	Master diverse business communication formats and skills	K4
CO5	Acquire all-round mature outlook to function effectively in different context	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1			✓		✓
CO2	✓	✓		✓	
CO3	✓		✓		✓
CO4	✓		✓		]
CO5	[]	[✓]	[]	[✓]	[]

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231EL1A3EA	ENGLISH - III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Listening and Reading 09 h

Listening in casual conversation, Small group and Conference setting - Listening for Factual Information- Barriers of Listening- Developing Listening skills- Poor listening vs Effective Listening - Basics of Reading- Efficient and Inefficient Readers- Advantages of Reading- Four Basic steps of Effective Reading- Stumbling blocks in becoming an effective Reader- Strategies for Comprehending and Retaining content- Effective Note Taking while Reading

Unit II Speaking 09 h

Purpose of General Conversations- Advantages, Features of a good conversation- Tips for improving Conversation- Public Speaking- Importance of Public Speaking- Benefits, Tips, Overcoming fear of Public Speaking- Preparatory steps - Structuring the contents- Audience Awareness- Mode of Delivery

Unit III Writing Skills 10 h

Preparing an Effective CV or a Resume with Job Applications- Employers expectation - Organize the material– Useful suggestions- Cover Letter- Content to be included– Tone of the letter- Report Writing- importance– features- Types – main parts– Feasibility report– Accident report- Scientific report- Memos – Introduction– Structure- Proposal Writing

Unit IV English for Communication & Skill for Employment 12 h

Notices, Agendas and Minutes- Business correspondence- Speeches- Meetings, Vocabulary Development- Editing Skills, and Reference Skills- Reading and Replying to E-Mails- Making Presentations- Interview Techniques- Group Discussion, and Oral Presentation Skills- Interacting with Superiors, and Listening to Reports and Customer Complaints- Preparing the minutes of a meeting- Presenting Data in Verbal and Non-verbal modes- The Correct Attitude of Employment

Unit V Soft Skills 08 h

Importance of soft skills- Attributes- Social Skills- Thinking- Negotiating- Exhibiting- Identifying - Soft Skills training -Train Yourself- Practicing soft skills- Measuring attitude – Self-Discovery: Importance of knowing yourself- Process - SWOT analysis – Benefits – Usage – SWOT Analysis grid- Art of Negotiation

Text Books

1. Camp and Satterwhite. 1998. College English and Communication. 7th Edition Glencoe Mchrawttill Publishers, New York, Unites States of America. (Unit I, II, III)
2. Kumar, Sanjay and Lata Pushp. 2018. Language and Communication Skills for Engineers. First Edition, Oxford University Press, India. (Unit I, II, III)
3. Mohan, Krishna and Banerji, Meera. 2009. Developing Communication skills. 2nd Edition, Macmillcan, India. (Unit I, II, III, IV)
4. Alex. Soft Skills. 2009. S. Chand Publishing, New Delhi, India. (Unit V)

References

1. Ghosh, B.N. Editor. 2017. Managing Soft Skills for Personality Development. McGraw- Hill Education, Chennai, India.
2. Miles Craven. 2008. Cambridge English Skills Real Listening and Speaking. First Edition, Cambridge University Press, United Kingdom.
3. Mishra, Gauri and Ranjana Kaul.2016. Language Through Literature. Primus Books, India.
4. Pillai G, Radhakrishna. 2000. English for Success. Emerald Publishers, Chennai, India.

Course Code	Course Name	Category	L	T	P	Credit
233BC1A3CA	HUMAN PHYSIOLOGY	CORE	5	-	-	5

PREAMBLE

This course has been designed for students to learn and understand

- The functions of important physiological systems including the cardio- respiratory, Gastrointestinal and Renal.
- Integration and interrelationships of the organ systems of the human body
- The pathologic conditions altering normal physiology

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the significance of body fluids and gas exchanges in lungs	K2
CO2	Explain the physiological aspects of muscular and nervous system	K2
CO3	Summarize the physiological processes of the cardiovascular system	K2
CO4	Illustrate the physiological aspects of digestive system	K3
CO5	Demonstrate the importance of excretory, endocrine and reproductive systems	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

233BC1A3CA	HUMAN PHYSIOLOGY	SEMESTER III

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I Body fluids and Respiratory system 12 h

Blood and Body fluids: Intracellular, extracellular and interstitial fluid. Plasma as an extracellular fluid. Structure and functions of RBCs, WBCs and Platelets. Hemoglobin- Structure and function. Mechanism of blood coagulation, Anticoagulants, Blood types and blood transfusion. Formation and functions of lymph, CSF.

Respiratory system: Diffusion of gases in lungs, transport of oxygen from lungs to tissues through blood, factors influencing the transport of oxygen. Lung volumes, Transport of CO2 from tissues to lungs through blood, factors influencing the transport of CO2, Chloride shift.

Unit II Muscle and Nervous system 12 h

Muscle system: Skeletal muscles - Properties of skeletal muscles, Muscular contraction and relaxation, Smooth muscle - mechanism of contraction

Nervous system: Central Nervous system. Peripheral Nervous system. Blood brain barrier and CSF, Structure of neuron, Membrane potentials. Synaptic transmission, Structure of Neuromuscular junction and mechanism of neuromuscular transmission, neurotransmitters, Sensory receptors and neural pathways. Somatic sensation, EEG, sleep, coma, learning and memory

Unit III Cardiovascular system 12 h

Anatomy of heart, Properties of cardiac muscles, Conducting system of the heart, Cardiac cycle – Diastole and Systole, ECG. Chemical energy required for cardiac contraction, Pressure changes during cardiac cycles, Regulation of heart pumping- Effect of temperature, potassium and calcium ions on heart function. Overview of circulation- Capillary circulation, Blood volume, Blood flow, Arterial and venous blood pressure

Unit IV Gastrointestinal physiology 12 h

Anatomy and histology of alimentary canal. Digestive glands – histological structures of salivary glands, pancreas, liver. Movements of alimentary canal.

Composition and functions of saliva, gastric, pancreatic, intestinal juices and bile.

Synthesis of Bile acids. Digestion and absorption of carbohydrates, proteins and fats

Unit V Excretory, Endocrine and Reproductive system 12 h

Excretory System: Mechanism of urine formation, Composition of urine, Micturition, Renal regulation of acid balance.

Endocrine system: Definition and role of hormones, mechanism of action of hormones – intracellular receptor mechanism and second messenger mechanism (cAMP, cGMP, Ca2+). Structure, function and manifestations of deficiency and excess of hormones of pituitary, thyroid, parathyroid, pancreatic and adrenal glands.

Male and Female reproduction system- an overview, Assisted reproductive technology- Basics of ART

Text Books

1 Hall J.E, 2015, "Guyton and Hall Textbook of medical physiology", 13th edition , W.B. Saunders company publisher, USA

2 Pal G. K, 2022, "Textbook of Medical Physiology",4rd Edition, Elsevier/Ahuja, India

References

1 Chatterjee C. C, 2017, "Human Physiology - Vol I and II", 11th Edition, CBS Publishers, India

2 Barret K E., Barman S.M, Boitano S and Brooks H L, 2016, "Ganong's Review of Medical Physiology",25th Edition, McGraw Hill, USA

3 Widmaier E P, Raff H and Strang K, 2016, "Vander's Human Physiology: The Mechanisms of Body Function", 14th Edition, McGraw Hill USA.

4 Sembulingam K & Sembulingam P, 2013, "Essentials of Medical Physiology", 6thEdition, Jaypee Brothers Medical Publishers, New Delhi

Course Code	Course Name	Category	L	T	P	Credit
233BC1A3CB	DEVELOPMENTAL BIOLOGY	CORE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Conceptual overview of developmental patterns in different species
- Methods used to study the process of embryonic development in animals
- concept of aging , apoptosis and its relevance several medical applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the basic concepts and principles of development	K2
CO2	Describe early embryonic development process among model organisms	K2
CO3	Describe late embryonic developmental processes in model organisms	K2
CO4	Illustrate the plant developmental processes	K3
CO5	Demonstrate mechanism of apoptosis and aging process	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

233BC1A3CB	DEVELOPMENTAL BIOLOGY	SEMESTER III

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Basic concepts of development 12 h

Potency- Totipotent pluripotent, multipotent, unipotent cells. Commitment: Autonomous specification, conditional specification, Syncytial specification, morphogenetic gradients, cell specification.

Primary germ layers: Ectoderm, Mesoderm, Endoderm, triploblastic and diploblastic animals. Fate maps and cell lineages, Genomic equivalence: Creation of sheep dolly as evidence for genomic equivalence. Imprinting: DNA methylation

Mutants, chimeras and transgenes for analysis of development (Fate mapping studies) Chick- quail experiment -GFP

Unit II Early Embryonic Development 12 h

The Stages of Animal Development, Developmental Patterns in Unicellular Protists and Metazoa, The Developmental Mechanics of Cell Specification, Determining the Function of Genes during Development.

Structure of Gametes, Recognition of Egg and Sperm, Acrosomal Reaction.

The Early Development of Snails. The genetics of axis specification in Drosophila.

Early Mammalian Development: Mammalian Anterior-Posterior Axis Formation, Dorsal- Ventral and left-Right Axes in Mammals.

Unit III Later Embryonic Development 12 h

Cell aggregation and differentiation in Dictyosteliu discoideum; axes and pattern formation in Drosophila, amphibia and chick; organogenesis – vulva formation in Caenorhabditis elegans; eye lens induction, limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development-larval formation, metamorphosis; environmental regulation of normal development;

Sex determination - environment dependance in reptiles, location dependent

Unit IV An overview of plant development 12 h

Plant Life Cycles , Gamete Production in Angiosperms , Pollination ,Fertilization , Embryonic Development, Dormancy, Germination, Vegetative Growth, The Vegetative-to-Reproductive Transition ,Senescence.

Unit V Apoptosis and Aging 12 h

Apoptosis: mechanism and significance, Genes and aging, Antagonistic pleiotropy, Insulin/IGF-1 signaling in aging , Environmental and epigenetic causes of aging, Teratogenesis: Introduction, Principles and Teratogenic agents.

Text Books

1 Gilbert S F 2013, "Developmental Biology", 10th edition, Sinauer Associates, In, United States

2 Slack J M W 2012,"Essential Developmental Biology", 3rd edition, Wiley-Blackwell Publishers, United States

References

1 Balinsky B.I., 2012, "An Introduction to Embryology ", 5th edition, Cengage Learning, India

2 Wolpert L., Tickle C., Arias A.M., 2015, "Principles of Development", 5th edition, Oxford University Press Oxford, United Kingdom

3 Rajni A., Anita G., 2019, " Developmental Biology ", 1st edition, R Chand & Co , India

4 Taiz L., Zeiger E, Møller I M., Murphy A., 2018, "Plant Physiology and Development ", 6th edition, Oxford University Press Oxford, United Kingdom.

233BC1A3CP	CORE PRACTICAL : HUMAN PHYSIOLOGY AND DEVELOPMENTAL BIOLOGY	SEMESTER III

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Experiments
1	Estimation of Hemoglobin by Sahli's Method and Cyanmethemoglobin method (DBT Star Status Practical)
2	Determination of Hematocrit
3	Determination of Total RBC and WBC Count
4	Staining of Peripheral Blood Smear & Differential Leukocyte Count (DLC)
5	Determination of bleeding time (Duke's method) and clotting time (Capillary Tube Method)
6	Determination of blood grouping (ABO , Rh typing)
7	Pulmonary function tests and spirometry (Demonstration)
8	Histology of connective tissue, liver, brain permanent slides (Demonstration)
9	Measurement of pulse rate, heart rate and blood pressure
10	Case studies - Renal (clearance,GFR, eGFR) Respiratory & cardiac systems
11	Study of whole mounts and sections of developmental stages of frog : Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages)
12	Study of whole mounts of developmental stages of chick through: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages).
13	Study of the developmental stages and life cycle of Drosophila and Zebra Fish from stock culture.
14	Study of different sections of placenta (photomicropgraph/ slides).

References

1. VarshneyV P, BediM, 2018, "Ghai's Text book of practical physiology", 9th edition, Jaypee Brothers Medical Publishers, New Delhi.
2. Amrit Kaur, 2019,"Laboratory Manual of Physiology and Biochemistry", 1st edition, CBS publishers, India.
3. Trigunayat M.M, & Trigunayat K, 2019, A Manual of practical Zoology: Biodiversity, Cell Biology, Genetics and Developmental Biology, 1st Edition, Scientific Publishers, India.
4. Jangir O P, 2002, Developmental Biology A manual, 1st Edition,Agrobio India.

Course Code	Course Name	Category	L	T	P	Credit
232MT1A31F	PRINCIPLES OF BIOSTATISTICS	IDC	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- concepts of estimation
- various concepts of Probability distribution
- basic concept of Chi square distribution

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	explain the concept of probability distribution	K1
CO2	discuss the basics of sampling distribution	K2
CO3	explain the concept of estimation	K1
CO4	apply the concept of hypothesis testing	K3
CO5	analyze the effect of Chi-square test	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓		✓	✓	✓
CO2	✓	✓		✓	
CO3	✓		✓		✓
CO4	✓	✓	✓	✓	
CO5		✓			✓

COURSE FOCUSES ON

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

232MT1A3IF	PRINCIPLES OF BIOSTATISTICS	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Probability Distributions 10 h

Probability distributions of discrete variables - Binomial distribution - Poisson distribution - continuous probability distributions - Normal distribution - applications.

Unit II Sampling distributions 9 h

Sampling distributions - distribution of the sample mean and the difference between two sample means - distribution of the sample proportion and the difference between two sample proportions.

Unit III Estimation 9 h

Confidence interval for a population mean and difference between two population means - t distribution - confidence interval for a population proportion and the difference between two population proportions - determination of sample size for estimating means and proportions.

Unit IV Hypothesis testing 10 h

Hypothesis testing: A single population mean and the difference between two population means - paired comparisons - single population proportion and the difference between two population proportions.

Unit V The Chi- square distribution and the analysis of frequencies 10 h

Mathematical properties - tests of goodness-of-fit - tests of independence - tests of homogeneity - Fisher exact test - relative risk - odds ratio and the Mantel -Haenszel statistic - survival analysis.

Note: Theory 20% and problem 80%

Text Books

1 Wayne W. Daniel, 2006, "Biostatistics - A Foundation for Analysis in the Health Sciences", Seventh edition, Wiley India Pvt. Ltd, New Delhi

References

1 Bernard Rosner, 2015, " Fundamentals of Biostatistics", United States of America Print, Harvard University, New York

2 Parabhakara G.N., 2006, "Bio Statistics", First Edition, Medical Publishers Pvt Ltd, New Delhi.

3 Annadurai B., 2015, "A Text Book of Bio Statistics", First Edition, New Age International Pvt. Ltd, New Delhi

4 Veer Bala Rastogi, 2011, "Fundamentals of Bio-Statistics", 2nd Edition, Ane Books Pvt. Ltd, New Delhi

Course Code	Course Name	Category	L	T	P	Credit
233BC1A3SA	ANALYTICAL BIOCHEMISTRY	SEC	2	-	2	2

PREAMBLE

This course has been designed for students to learn and understand

- the analysis of various biochemical constituents through various techniques
- about various techniques and its application in the field of research
- The basic laboratory skills in the conduct of any laboratory experiment

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the principles, techniques and applications of the chromatography.	K2
CO2	Compare and contrast the various centrifugation techniques for analysis of different biological sample types	K2
CO3	Apply the various electrophoretic techniques in biological research applications	K3
CO4	Analyze the basics spectroscopic techniques	K4
CO5	Examine the biological samples by using of radio isotopic techniques	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

233BC1A3SA	ANALYTICAL BIOCHEMISTRY	SEMESTER III

Total Credits: 2

Total Instruction Hours: 48 h

Syllabus

Unit I Chromatography techniques 10 h

Basic principles, types, techniques and applications of various chromatography methods - Paper and Column chromatography, Thin layer chromatography, HPTLC, Ion-exchange chromatography, Affinity chromatography, Molecular sieve chromatography, Gas liquid chromatography, High Performance Liquid Chromatography, Fast Protein Liquid Chromatography.

Demonstration – on Paper chromatography and Packing of column using burette, cotton, sand and silica gel

Unit II Electrophoresis techniques 10 h

Basic principles, techniques, applications and various types of electrophoresis, Paper electrophoresis, gel electrophoresis – capillary electrophoresis, PAGE, Agarose gel electrophoresis ,Immunoelectrophoresis, Isoelectric focusing of proteins, 2D Electrophoresis.

Demonstration on electrophoresis

Unit III Centrifugation techniques 8 h

Basic Principles of centrifugation and sedimentation, sedimentation coefficient, different types of rotors, differential centrifugation, density gradient centrifugation, Ultracentrifugation.

Demonstration on centrifugation

Unit IV Spectroscopic techniques 10 h

Concept of electromagnetic spectrum. Basic principles and applications of UV Visible spectrometry and Colorimetry, Fluorimetry, Flame photometry, Atomic absorption spectroscopy, Nephelometry and turbidimetry.

Demonstration on UV Visible spectrometry and Fluorimetry

Unit V Radio isotopic techniques 10 h

Introduction to radioisotopes. Radioactive decay, Units of Radioactivity, Detection and measurement of Radioactivity – Geiger-Muller counter, Scintillation counter, Auto-radiography. Applications of Radio-isotopes in biological and medical

sciences.Imaging Techniques, Safety and disposal of radioisotopes

Note:

Make a visit to Nuclear medicine department.

Text Books

1 Sawhney and Singh, 2015, "Introductory Practical Biochemistry", 11th edition, Narosa Publishing house, New Delhi.

2 Dr. (Mrs.) Sonali M, Dr. Jaiprakash S, Dr. Paresh M, Dr. Santosh C, 2022, " A Textbook of Advanced Instrumentation Techniques ", 1st edition, Everest Publishing house, Shaniwar Peth Pune

References

1 Wilson and Walker, 2018, "Principles and techniques of Biochemistry and Molecular Biology", 8th edition, Cambridge University Press, UK.

2 Avinash upadhyay, Kakoli upadhyay, Nirmalendunath, 2014, " Biophysical Chemistry Principles & Techniques. ", Himalaya Publishing House

3 Sadasivam S and Manickam A, 2018, "Biochemical methods", 3rd edition, New Age International Publishers, New Delhi

4 Dr.Sameer Rastogi, 2021, "Textbook of Advanced Instrumentation techniques", 1st edition, Narain Publishers & Distributors, India.

233BC1ASSA	SELF STUDY : HERBAL TECHNOLOGY	SEMESTER III

Total Credits: 1

Syllabus

Unit I Pharmacognosy

Pharmacognosy - Definition and history, Indian systems of medicine - Siddha, ayurvedha, and Unani systems. Taxonomy of locally available medicinal plants, their chemical constituents and medicinal uses - Classification of Crude drugs - Chemistry of Drugs - Future of pharmacognosy.

Unit II Medicinal plants

Classification of medicinal plants - Vernacular name and family - Geographical source, cultivation, collection, and processing for market and commerce in crude drugs. Morphological and histological studies,chemical constituents - Therapeutic and other pharmaceutical uses.Underground stem - ginger, Alpinia - Roots - Rauolfia - Belladona -Aerial parts - Bark - Cinchona.

Unit III Medicinal Properties

Leaves - Adathoda, Eucalyptus - Flower - Clove fruits seeds – Nux vomica Nutmegs, Gooseberry - unorganized drugs - Gum - Acacia – Resin - Turpentine, fixed oil - castor oil.

Unit IV Herbal medicines for Human ailments

Herbal medicines for Human ailments - Drugs Acting On Cardiac Diseases, Cerebral Diseases, Nasal, diseases - Blood pressure Drugs acting on Nervous system - Depressants. - Stimulants - Respiration and Drugs - Urogenital system and drugs - Psychoactive plants.

Unit V Herbal Biotechnology

Propagation of medicinal plants - Micro and macro propagation conservation of rare medicinal plants. Role of biotechnology in medicinal plants banks - cultivation of medicinal and aromatic plants – Drug adulteration - methods of Drug evaluation, Herbal food - Food processing - packaging - Herbal sale and Export of medicinal plants - marketing - Intellectual property rights - Export laws.

Text Books

1 Trease, George Edward, and William Charles Evans. 1972, "Pharmacognosy" 10th Edition, Bailliere Tindall, London.

2 Handa, S S and Kapoor, V K. "Pharamcognosy" by 2nd Edition, Vallabh Prakashan Publishers, New Delhi.

References

1 Jain S K.2012, "Medicinal Plants" . 12th Edition, New Delhi: National Book Trust, India.

2 Neelesh Malvia and SapnaMalviya, 2019, "Herbal drug Technology", CBS Publishers, NewDelhi.

3 Joshi SG, 2018, "Medicinal Plants", Oxford & Ibh Publisher, India.

233BC1ASSB	SELF STUDY : BIOENTREPRENEURSHIP	SEMESTER III

Total Credits: 1

Syllabus

Unit I Innovation

Introduction, concept of innovation. Innovation Posture, Propensity and Performance. Innovation Measurement. Competitiveness. Innovation process. Innovation Management Through Management of Knowledge and Education. Types and characteristics of innovation. Concept of Innovation Systems. Basic principles and types of innovation systems.

Unit II Entrepreneur

Concept of an entrepreneur. Characteristics of successful entrepreneur. Entrepreneurial decision process. Functions (managerial, promotional and commercial) and need of entrepreneur. Types of entrepreneurs. Distinction between an entrepreneur and a manager. Case study: N.R.Narayana Murthy: An exemplary Risk Taker and Dr.VergheseKurien- Indian Social Entrepreneur

Unit III Entrepreneurship and Agri-preneurship

Concept and growth of entrepreneurship in India (Pre-Independence and Post-Independence era). Role of entrepreneurship in economic development. Types of entrepreneurship.

Agri-preneurship: Introduction and need for Agri-preneurship. Opportunities and challenges in agri-preneurship. Suggestions for development. Case study: e-choupal of Indian Tobacco Company.

Unit IV Bioentrepreneurship

Basics of Bioentrepreneurship Introduction to bioentrepreneurship – Biotechnology in a global scale, Scope in Bioentrepreneurship. Opportunities for Bioentrepreneurship. Entrepreneurship development programs of public and private agencies (MSME, DBT, BIRAC, Startup and Make in India). Incubators for entrepreneurship with example.

Unit V Bioentrepreneurship Process

Initiation of biotech ventures, concept of venture capital, history of establishment of pioneer biotechnology companies. Product selection. Concept and types of business models. Licensing of biotechnological invention, valuation, NDA, technology transfer. Patent landscape, IP protection and commercialization strategies. Case study: Successful Bio-entrepreneurs in India.

Text Books

1 Dr.Khanka.S.S, 2012,"Entreprenerial Development", fourth edition, S Chand and Company Limited, New Delhi

2 Dr.Gupta.O.P,2015, "Fundamentals of Entrepreneurship", SBPD Publishing House, Agra

References

1 Jayshree Suresh, 2011, "Entrepreneurial Development", Fifth Edition, Margham Publications, Chennai.

2 Holger Patzelt, Thomas Brenner, 2008,"Handbook of Bioentrepreneurship", Springer Science and Business Media LLC, New York.

3 Howard Frederick, Allan O Connor, Donald F. Kuratko, 2016, "Entrepreneurship: Theory, Process, Practice", Fourth Edition, Cengage Learning Australia Pty Limited, South Melbourne.

4 Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, 2017, "Entrepreneurship", Tenth Edition, McGraw-Hill Education, New York

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Academic Council CHAIRMAN Dr.N.G.P. Arts and Science College

Course Code	Course Name	Category	L	T	P	Credit
231TL1A4TA	TAMIL - IV	LANGUAGE- I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடு நாகரீகம், பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல்
- கலை மற்றும் மரபுகளை அறியச் செய்தல்
- மாணவர்களின் படைப்பாக்கத்திறன்களை ஊக்குவித்தல்

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	வாழ்க்கைத் திறன்கள் (Life Skills)- மாணவர்களின் செயலாக்கத் திறனை ஊக்குவித்தல்	K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K4
CO3	பாட இணைச்செயல்பாடுகள் (Co-curricular activities)	K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு (Tamil knowledge)	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1		✓	✓		✓
CO2	✓			✓	
CO3		✓			✓
CO4			✓		
CO5	✓			✓	✓

COURSE FOCUSES ON

✓	Skill Development	_	Entrepreneurial Development
✓	Employability	_	Innovations
_	Intellectual Property Rights	_	Gender Sensitization
_	Social Awareness/ Environment	_	Constitutional Rights/ Human Values/ Ethics

231TL1A4TA	TAMIL - IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **எட்டுத்தொகை** 10 h

1. நற்றிணை – குறிஞ்சித் திணை

I.பா.எண் : 01 – கபிலர்

II.பா.எண் : 88 – நல்லந்துவனார்

III.பா.எண் : 102 – செம்பியனார்

2. குறுந்தொகை – முல்லைத்திணை

I.பா.எண் : 65 – கோவூர்கிழார்

II. பா.எண் : 167 – கூடலூர்கிழார்

மருதத்திணை

I.பா.எண் : 08 – ஆலங்குடி வங்கனார்

II.பா.எண் : 61 – தும்பிசேர்கீரனார்

III.பா.எண் :196 – மிளைக் கந்தன்

நெய்தல் திணை

I.பா.எண் : 57 – சிறைக்குடி ஆந்தையார்

Unit II **எட்டுத்தொகை** 08 h

1. கலித்தொகை – பாலைக்கலி

I.பா.எண் : 09 – பெருங்கடுங்கோ

2. அகநானூறு - மருதத்திணை

I.பா.எண் : 86 – நல்லாவூர்கிழார்

3. புறநானூறு - I.பா.எண் : 188 – பாண்டியன் அறிவுடை நம்பி

II.பா.எண் : 192 – கணியன் பூங்குன்றனார்

III.பா.எண் : 279 – ஒக்கூர் மாசாத்தியார்

IV.பா.எண் : 312 – பொன்முடியார்

Unit III **பத்துப்பாட்டு** 10 h

1. பட்டினப் பாலை – கடியலூர் உருத்திரங் கண்ணனார் -1முதல் 218 வரிகள் வரை மட்டும்.

Unit IV **இலக்கிய வரலாறு** 10 h

1. எட்டுத் தொகை நூல்கள்
2. பத்துப்பாட்டு நூல்கள்

Unit V **இலக்கணம் மற்றும் திறனாய்வுப் பகுதி** 10 h

I. இலக்கணம்

1. அகத்திணை – அன்பின் ஐந்திணை - விளக்கம்
2. புறத்திணை – 12 திணைகள் - விளக்கம்

II. பயிற்சிப் பகுதி

சங்கப் பாடல்கள் குறித்து திறனாய்வு செய்தல்.

Note: பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது.

Text Book

செய்யுள் திரட்டு - மொழிப் பாடம் - 2023- 24

1 தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி,(Unit I - V)

References

1 பேராசிரியர் புலவர் சோம. இளவரசு, எட்டாம் பதிப்பு -2014, தமிழ் இலக்கிய வரலாறு - மணிவாசகர் பதிப்பகம், சென்னை.

2 பேராசிரியர் முனைவர் பாக்கியமேரி, முதற் பதிப்பு- 2013, இலக்கணம் -இலக்கிய வரலாறு - மொழித்திறன் -பூவேந்தன் பதிப்பகம், சென்னை.

3 தமிழ் இணையக் கல்விக்கழகம்.<http://www.tamilvu.org/>

Course Code	Course Name	Category	L	T	P	Credit
231TL1A4HA	HINDI - IV	LANGUAGE- I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature
- the techniques for expansion of ideas and translation process

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓			✓	✓
CO2		✓			✓
CO3	✓		✓	✓	
CO4					✓
CO5	✓	✓	✓		✓

COURSE FOCUSES ON

✓	Skill Development	-	Entrepreneurial Development
✓	Employability	-	Innovations
-	Intellectual Property Rights	-	Gender Sensitization
-	Social Awareness/ Environment	-	Constitutional Rights/ Human Values/ Ethics

231TL1A4HA	HINDI- IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

नाटक

Unit II 10 h

एकांकी

Unit III 10 h

काव्य मंजरी

Unit IV 10 h

सूचना लेखन

Unit V 08 h

अनुवाद अभ्यास- III

Text Books

1. लडाई – सर्वेश्वरदयाल सक्सेना प्रकाशक: वाणी प्रकाशन 21-A, दरियागंज नई दिल्ली-110002. (Unit I)
2. एकांकी पंचामृत – डाँ राम कुमार (भोर और तारा छोड्कर) प्रकाशक: जवाहर पुस्तकालय सदर बाजार, मथुरा उत्तर प्रदेश-281001. (Unit II)
3. काव्य मंजरी- (डा मुन्ना तिवारी) मैथिलीशरण गुप्त- मनुष्यता, जयशंकर प्रसाद- बीती विभावरी जागरी सूर्यकान्त त्रिपाठी निराला- तोडती पत्थर और भिक्षुक. (Unit III)
4. सूचना लेखन पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 इलाहाबाद -211024. (Unit IV)
5. अनुवाद अभ्यास (केवल अंग्रेजी से हिन्दी में) (पाठ 10 to 20) प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17 (पाठ10 to 20). (Unit V)

Course Code	Course Name	Category	L	T	P	Credit
231TL1A4MA	MALAYALAM- IV	LANGUAGE - I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- the competency in translating simple Malayalam sentences into English and vice versa

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓			✓	
CO2	✓				✓
CO3		✓	✓		
CO4	✓			✓	✓
CO5	✓	✓	✓		✓

COURSE FOCUS ON

✓	Skill Development	-	Entrepreneurial Development
✓	Employability	-	Innovations
-	Intellectual Property Rights	-	Gender Sensitization
-	Social Awareness/ Environment	-	Constitutional Rights/ Human Values/ Ethics

231TL1A4MA	MALAYALAM- IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **Drama** 10 h

Saketham- Sreekandan Nair

Unit II **Drama** 10 h

Saketham- Sreekandan Nair

Unit III **Drama** 10 h

Saketham- Sreekandan Nair

Unit IV **Screen Play** 10 h

Perumthachan- Vasudevan Nair

Unit V **Screen Play** 08 h

Perumthachan- Vasudevan Nair

Text Books

1. Nair, Sreekandan C.N. 2023. Saketham, Drama. DC Books Kottayam, Kerala, India. (Unit I to III)
2. Nair, Vasudevan M.T. 1994. Perumthachan- Screenplay. DC Books Kottayam, Kerala, India. (Unit IV & V)

Reference

1. Sankarapillai. 2005. Malayala Nataka Sahithya Charithram, Kerala Sahithya Akademi Publishers, Kerala, India.

Course Code	Course Name	Category	L	T	P	Credit
231TL1A4FA	FRENCH - IV	LANGUAGE- I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the Competence in General Communication Skills – Oral + Written- Comprehension & Expression
- the Culture, life style and the civilization aspects of the French people as well as of France
- the students to acquire Competency in translating simple French sentences into English and vice versa

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents	K1
CO2	Apply the adjectives and the classroom environment in France	K2
CO3	Select the Plural, Articles and the Hobbies	K2
CO4	Measure the Cultural Activity in France	K3
CO5	Evaluate the sentiments, life style of the French people and the usage of the conditional tense	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓				✓
CO2	✓	✓			
CO3			✓	✓	
CO4	✓	✓			✓
CO5	✓		✓	✓	✓

COURSE FOCUSES ON

✓	Skill Development	_	Entrepreneurial Development
✓	Employability	_	Innovations
_	Intellectual Property Rights	_	Gender Sensitization
_	Social Awareness/ Environment	_	Constitutional Rights/ Human Values/ Ethics

231TL1A4FA	FRENCH - IV	SEMESTER IV

Total Credits: 3
Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

°Décrirequelqu'un. ° Comparer	En milieu professional, recruiter quelquún et justifier sonchoix.	S'exprimersur les styles de vêtemantReconnaitre des personnes à partit de descriptions.	Comprendre la description de personnesdans un extrait de roman.

Unit II 10 h

ExprimerPaccord ou le désaccord. ° Se situerdans le temps.	En milieu professional, recruiter quelquún et justifier sonchoix.	Décrire des personnes. Comprendre des personnes qui experiment leur accord ouleurdésaccord.	Comprendre des différences de points de vueexprimétesdans de message électronique. Raconter unsourvenir.

Unit III 10 h

° Parler de Pavenir.	Discuter de l'organisation d'un voyage de groupepuispréparerune fiche projet et la templit.	Comprendreune chanson. Echangersursesprojets de vacancy	Comprendre le message d'une carte d'anniversaire

Unit IV 10 h

° Exprimer des souhaits. ° Décrirequelq u'u n	Discuter de l'organisation d'un voyage de groupepuispréparerune fiche projet et la templit.	Discuter du programme de la soire à venir. Addresser des souhaits à quelqu'un.	Comprendre le message d'une carte d'anniversaire

Unit V 08 h

Make in Own Sentences based on the above Lessons

Text Book

1 LATITUDES 1 (Méthode de français) Pages from 128-151, Author : Regine Mérieux, Yves Loiseau (Unit I to IV)

Course Code	Course Name	Category	L	T	P	Credit
231EL1A4EA	ENGLISH - IV	LANGUAGE II	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- how language shapes society, enhancing critical reading, writing, and thinking skills through various literary forms
- the fundamentals of writing, including essay composition, persuasive communication, and creative expression
- the process of critical thinking through the analysis of literature

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Summarize main points and supporting details from listening to public addresses and demonstrate poem comprehension.	K2
CO2	Demonstrate clear and expressive speech while engaging in role-play and dramatization activities.	K3
CO3	Interpret textual elements such as themes, tone, and authorial intent in various reading materials.	K3
CO4	Produce clear summaries and paraphrases, maintaining the essence of the original text.	K3
CO5	Prepare for job interviews by employing appropriate interview techniques, confidence, and professionalism.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓		✓	✓
CO2		✓		✓	
CO3	✓		✓		
CO4		✓			✓
CO5	✓		✓		✓

COURSE FOCUSES ON

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
✓	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

231EL1A4EA	ENGLISH - IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **Listening** 10 h

Nissim Ezekeil - Goodbye Party for Miss Pushpa T.S.
D.H. Lawrence - Last Lessons of the Afternoon
Dr. APJ Abdul Kalam's speech at European Union
Listening for subtext – Tone and Emotion – Vivid Language and Pacing – Listening for Vision and Hope – Use of Storytelling
Punctuations: Periods, Commas, Semicolons, Colons, Apostrophes, Ellipses, Exclamation Points

Unit II **Speaking** 10 h

Oscar Wilde - The Importance of Being Earnest
Direct Speech and Indirect Speech - Commands and Requests, Exclamations and Wishes, Conversion of Indirect to Direct
Rules for changing direct speech into indirect speech

Unit III **Reading** 09 h

Gita Hariharan - The Remains of the Feast -
Langston Hughes - Thank You M'am
Making Inferences and Predictions - Identifying Author's Purpose and Tone- Contextual Vocabulary Building
Tenses: The Uses of Present, Past and Future Tenses

Unit IV **Writing Skills** 10 h

George Orwell - Why I Write
Summarizing vs. Paraphrasing - Expressing Purpose and Intent in Writing- Constructing Strong Arguments and Opinions
Grammar - Paraphrasing - Use of Paraphrasing, Characteristics of a good paraphrase, The Paraphrase of Poetry, Special Hints, Method of Procedure

Unit V **Soft Skills** 09 h

Steve Jobs - 2005 Stanford Commencement Address - Effective Communication - Presentation Skills
Business Corporate Soft Skills - Six common corporate conversation faux pas, Decision making Techniques, Negotiation Styles Job Interviews - Preparatory Steps for Job Interviews - Interview Skill Tips

Text Books

1. Straus, Jane, Lester Kaufman, and Tom Stern, editors. The Blue Book of Grammar and Punctuation: An Easy-to-Use Guide with Clear Rules, Real-World Examples, and Reproducible Quizzes. 12th ed., Jossey-Bass, 2021. (Unit I)
2. Wilde, Oscar. The Importance of Being Earnest. Edited by Norman Page, 2nd ed., Penguin Classics, 2000. (Unit II)
3. Hariharan, Gita. The Remains of the Feast. 1st ed., Penguin Books India, 1992. (Unit III)
4. Orwell, George. "Why I Write." George Orwell: An Anthology of His Prose, edited by John Carey, Harcourt, 2000. pp. 232-237. (Unit IV)
5. Meyer, John. The Soft Skills Handbook for Corporate Success: Essential Strategies for Business Professionals. 2nd ed., Business Insights, 2020. (Unit V)

References

1. Lawrence, D.H. The Complete Poems of D.H. Lawrence. Edited by V.J. Harding, 1st ed., Heinemann, 1992.
2. Buczynski, Mark. Soft Skills for the Workplace: How to Build Successful Relationships and Advance Your Career. 2nd ed., Wiley, 2018.
3. Hughes, Langston. "Thank You, M'am." The Penguin Anthology of American Poetry, edited by Rita Dove, Penguin Books, 2006, pp. 530-533.
4. Nelson, Brian. The Soft Skills Handbook: Essential Skills for the Workplace. 3rd ed., Business Publishing, 2019.

Course Code	Course Name	Category	L	T	P	Credit
233BC1A4CA	INTERMEDIARY METABOLISM	CORE	5	-	-	5

PREAMBLE

This course has been designed for students to learn and understand

- importance of high energy compounds, electron transport chain
- biochemical processes in a biological organism that maintain the healthy operation of cells
- the combined activities of all the metabolic pathways that interconvert precursors, metabolites and products of Low Molecular Weight substances.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the basic concepts of Bioenergetics, Electron Transport chain and mechanisms of oxidative phosphorylation	K2
CO2	Explain the pathways of carbohydrate metabolism and its energetics	K2
CO3	Illustrate the chemical logic of lipid metabolic pathways.	K3
CO4	Explain the nitrogenous Compound metabolism, biochemical basis of some diseases arising in amino acid metabolism and interrelations of Carbohydrate, fat and protein	K3
CO5	Analyze the nucleic acid metabolic pathways	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

233BC1A4CA	INTERMEDIARY METABOLISM	SEMESTER IV

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I Bioenergetics & Electron transport chain 13 h

Bioenergetics: - Free energy and the laws of thermodynamics; Role of high- energy compounds as energy currency of the cell; free energy of hydrolysis of ATP and other organophosphates. The basic metabolic pathways - anabolic, catabolic and amphibolic pathways.

Electron transport chain: - Role of respiratory chain in mitochondria; in energy capture; respiratory control. Oxidative phosphorylation: - Mechanism of oxidative phosphorylation; Chemiosmotic theory; uncouplers of oxidative phosphorylation.

Unit II Carbohydrate Metabolism 12 h

Glycolysis: - Pathways and energetics; Oxidation of pyruvate to acetyl CoA. TCA Cycle: Pathway and energetics; Gluconeogenesis; Glycogenesis and glycogenolysis. Pentose Phosphate Pathway (HMP shunt). Cori Cycle, Glucuronic Acid Cycle. Metabolism of other hexoses:- Fructose and galactose. Case studies.

Unit III Lipid Metabolism 12 h

Blood lipids. Oxidation of fatty acids: - Carnitine cycle; beta oxidation, alpha oxidation and omega oxidation. Biosynthesis of propionyl CoA. Biosynthesis of saturated fatty acids. Biosynthesis of unsaturated fatty acids: - Monounsaturated and polyunsaturated fatty acids. Biosynthesis and degradation:- Lecithin, cholesterol. Case studies.

Unit IV Amino acid Metabolism 12 h

Detoxification of Ammonia- Urea Cycle. Catabolism of amino acid: Oxidative deamination, non-oxidative deamination, transamination, amino acid decarboxylation, Metabolism of amino acid : Glycine, methionine, phenyl alanine, tyrosine, Leucine, lysine. Metabolic disorders: Maple syrup Urine Disease, Phenylketouria, tyrosinemia, homocystinuria. Interrelation between carbohydrates, fat and protein metabolism.

Unit V Nucleic Acid Metabolism 11 h

Nucleic acid: Metabolism of purines: de-novo synthesis, salvage pathways; catabolism of purine.

Metabolism of pyrimidines - de novo synthesis, salvage pathways; catabolism of pyrimidine.

Biosynthesis of deoxy ribonucleotides

Text Books

1 Bery J M Tymoezko and Stryer I, 2015 "Biochemistry", 8th edition, W.H.Freeman and Company, Newyork

2 Vasudevan D M, Sreekumari S, Kannan Vaidyanathan, 2022, "Textbook of Biochemistry for Medical Students", 10th Edition, Jaypee Brothers Medical Publishers, New Delhi.

References

1 Rodwell V W Bender D Botham K M Kennelly P J and Weil PA, 2018, "Harper's Illustrated Biochemistry", 31st Edition, he McGraw-Hill Inc, New York.

2 David L Nelson and Michael M Cox, 2017, "Lehninger Principles of Biochemistry",7th Edition, W.H.Freeman and company, Newyork.

3 Donald Voet Judith G Voet and Charlotte W Pratt, 2016, "Fundamentals of Biochemistry: Life at the Molecular Level", 5th Edition, Wiley Publishers,US

4 West, E S, Todd, W R, Mason H S and Van Brugge T J, 2001, 4th Edition, "The text book of Biochemistry", Macmillan Company, London.

Course Code	Course Name	Category	L	T	P	Credit
233BC1A4CB	NUTRITIONAL BIOCHEMISTRY	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Overview of human nutrition and nutritional disorders.
- The nutritional requirements of the human body and nutritional diseases.
- The measurement of energy expenditure

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the composition of food and how foods are grouped. Construct a dietary chart.	K2
CO2	Measure the energy content in food. Relate the factors, which influence the BMR and SDA.	K2
CO3	Apply the nutritive values of macromolecules in a dietary chart.	K3
CO4	Identify the various primary nutritional diseases and conditional nutritional disorders.	K3
CO5	Illustrate the concept and plan of balanced diet for the prevention and treatment of nutritional disorders.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

233BC1A4CB	NUTRITIONAL BIOCHEMISTRY	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Food and nutrition 9 h

Function of foods and its relation to nutrition and health, essential nutrients, analysis of food composition, food habits and food groups. Antioxidants in Foods. Required dietary allowance (RDA) for different age groups. Carcinogens and Food additives, Fetal origin of Adulthood Diseases (FOAD). Microbiomes- Gut microbiota, Prebiotics, Probiotics.

Unit II Energy Metabolism 9 h

Measurement of energy expenditure: Direct & Indirect calorimetry. Definition of RQ, BMR and BMI, factors affecting RQ, BMR and BMI. Thermogenic effects of foods and factors affecting thermogenic effect. Energy requirements of men and women and factors affecting energy requirements. Role of dietary fibers in health.

Unit III Dietary Carbohydrates , lipids and Health 10 h

Physiological role and nutritional significance of carbohydrates and lipids. Carbohydrates - Chemical composition and importance, Glycemic index of foods and its uses, Artificial sweeteners. Sources and physiological functions of Essential fatty acids, Saturated fatty acids, Monounsaturated fatty acids and Polyunsaturated fatty acids, Omega 3 and omega 6 fatty acids and ratio. Phospholipids, Triacylglycerols and Cholesterol in the body.

Unit IV Dietary Proteins, Vitamins, Minerals and Health 11 h

Primary nutritional diseases: Essential and non-essential amino acids – their role in growth and development. Protein energy malnutrition (Marasmus and Kwashiorkar), Starvation, Techniques for the study of starvation. Protein metabolism in prolonged fasting. Protein sparing treatments during fasting. Basic concept of high protein low caloric weight reduction diets. Calcium, Phosphorus and Iron - Distribution in the body digestion, Sources, RDA, Absorption, Utilization, Transport, Excretion, Balance, Deficiency, Toxicity. Calcium: Phosphorus ratio, Role of iron in prevention of anemia. Importance of Iodine in human metabolism.

Unit V Clinical Nutrition 9 h

Role of diet and nutrition in prevention and treatment of diseases: Dental Caries, Lactose Intolerance, Galactosemia and Glycogen Storage Diseases, Fluorosis, Atherosclerosis and Rheumatic disorders.

Vitamin deficiency disorders, Hypervitaminosis, Nutritional anaemias.

Conditional nutritional disorders: Disorders of gastrointestinal tract, liver, biliary tract, pancreas, heart and Diabetes, Obesity.

Text Books

1 Smolin and Grosvenor, 2016. Nutrition: Science and Applications, 4th Edition, Wiley

2 Gibney, Lanham-New, Cassidy and Vorster, 2013. Introduction to Human Nutrition, 2nd Edition, Wiley-Blackwell

References

1 Trueman P, 2011. Nutritional Biochemistry, 5th Edition, MJP Publishers.

2 Gibney, Margetts and Kearney, 2013. Public health Nutrition, The Nutrition Society, Blackwell Science.

3 Joshi Y K, 2010. Basic Clinical Nutrition, 2nd Edition, Jaypee Brothers, New Delhi.

4 Catharine Ross A, Benjamin caballero, Robert J Cousins, Katherine L Tucker, Thomas R Ziefer, 2014, "Modern Nutrition in Health and Disease", 11th Edition, Lippincott Williams and Wilkins-Newyork-London.

233BC1A4CP	CORE PRACTICAL: METABOLISM AND NUTRITIONAL BIOCHEMISTRY	SEMESTER IV

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Uric acid by Phosphotungstate method
2	Phosphorus by ANSA method
3	Glucose by O-Toluidine Method
4	Hemoglobin by Cyanmethemoglobin method
5	Protein by Biuret method
6	Computation of energy needs in males, females and special catogeries
7	BMI calculation and Waist-hip ratio
8	Estimation of ascorbic acid in fruit
9	Estimation of lactose in milk
	DBT Star Practicals
10	Detection of Adulteration in food
11	Estimation of calcium in Ragi and Iron in Drumstick
12	Methylene Blue dye Reduction Test (MBRT) for milk
13	Alkaline phosphatase test and lactometer analysis for milk
14	Effect of inhibitor on protein synthesis

References

1 Gowenlock A H, 2002," Varley's Practical Clinical Biochemistry", 6th Edition, CBS Publishers, New Delhi

2 Sadasivam S and Manickam A, 2018, "Biochemical Methods" 3rd edition, New Age International Publishers, New Delhi.

3 Rama Sastri B V and ICMR, Gopalan C, 2016, "Nutritive Value of Indian Foods", Indian Council of Medical Research (ICMR), India.

Course Code	Course Name	Category	L	T	P	Credit
234CS1A4EP	PYTHON FOR BIOLOGISTS	IDC	3	-	2	4

PREAMBLE

This course has been designed for students to learn and understand

- problem solving using Python programming language
- basic operations in Python
- The concepts of Biopython

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Recognize Digital computer as Data Analytics tool through Python	K1
CO2	Illustrate Problem solving strategies using Functions	K2
CO3	Demonstrate the method of solving simple problems using strings and lists	K3
CO4	Apply the theory behind tuples and dictionaries	K3
CO5	Demonstrate on using Biopython	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓		✓	✓	✓
CO2	✓	✓	✓		
CO3	✓	✓		✓	
CO4	✓		✓		✓
CO5		✓			

234CS1A4EP	PYTHON FOR BIOLOGISTS	SEMESTER IV

Total Credits: 4]
Total Instructions Hours: 60 h

Syllabus

Unit I Introduction to Digital Computer and Python 12 h

Digital Computer: Von Neumann concept - Storage - Programming Languages - Translators - Problem Solving Strategies: Problem Analysis - Algorithms - Flow Charts - Introduction to Python: Python overview– Comments – Python Identifiers – Reserved keywords – Variables – Standard data types – Operators - Statements and Expressions - Boolean Expressions.

1. Write a python program to implement Set and its operations.
2. Create a python program to implement the different Operators

Unit II Control Statements and Functions 12 h

Control Statements: Iteration - for loop – While statement – if elif else statement – Input from keyboard - Functions: Built-in functions – Composition of Functions - Type conversion - Type coercion - Date and time function - dir() function - help() function - User defined functions – Parameters & arguments – Function calls – return statement – Python recursive function - Writing Python Scripts.

3. Write a python program to implement Branching and Looping.
4. Create a python program for User Defined functions and Recursion.

Unit III Strings and Lists 12 h

Strings- Compound data type - len function - String slices - String traversal - Escape characters - String formatting operator - String formatting functions. Lists – Values and accessing elements - Traversing a list - Deleting elements from list - Built-in list operators - Built-in list methods.

5. Write a Python program to implement String Operations.
6. Create a python program to implement List and its operations.

Unit IV Tuples and Dictionaries 12 h

Tuples: Creating tuples - Accessing values in tuples - Tuple assignment - Tuples as return values - Basic tuple operations - Built-in tuple functions. Dictionaries - Creating dictionary - Accessing values in a dictionary - Updating dictionary, Deleting elements from dictionary - Operations in dictionary - Built-in dictionary methods.

7. Create a python program to implement various operations on Tuples.
8. Create a python program to print Employee details using Dictionaries.

Unit V Biopython 12 h

Biopython Installation - Biopython Components: Alphabet, Seq, MutableSeq, SeqRecord, Align, ClustalW, SeqIO, AlignIO, BLAST - Biological Related Data - Entrez - PDB - PROSITE - SeqUtils - Sequencing.

9. Write a python program to implement Biopython components.
10. Write a program to count all ordered atoms in a PDB file.

Text Books

1. E. Balagurusamy, 2016, Introduction to Computing and Problem Solving Using Python, First Edition, McGraw Hill publication, New Delhi.(Unit I to IV)
2. Sebastian Bassi, 2018, Python for Bioinformatics, Second Edition, CRC Press (Unit V)

References

1. Fabio Nelli ,2018, Python Data Analytics, Second Edition,Apress,New York,.
2. Wes McKinney,2011, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPythony, O'Reilly, USA.
3. Zed Shaw,2014, Learn Python the Hard Way, 3rd Edition, Addison-Wesley,USA,.
4. Mark Summerfield ,2018, Programming in Python 3, Second Edition, Pearson India Education Services Pvt. Ltd, Noida,.

Course Code	Course Name	Category	L	T	P	Credit
233BC1A4EP	BIOINFORMATICS	SEC	2	-	2	2

PREAMBLE

This course has been designed for students to learn and understand

- The basic concepts and scope of bioinformatics
- The genomic data acquisition and analysis, comparative and predictive analysis of DNA and protein sequence, Phylogenetic inference etc
- The approaches to drug discovery using bioinformatics techniques

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Develop elementary knowledge of Bioinformatics	K3
CO2	Identify Nucleotide and protein sequencing and their analysis	K3
CO3	Construct global and local alignment search tool using BLAST and FASTA programs	K3
CO4	Analyze protein structure prediction using laboratory- based approaches	K4
CO5	Develop various approaches for target identification and validation in drug discovery	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

233BC1A4EP	BIOINFORMATICS	SEMESTER IV

Total Credits: 2

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Bioinformatics 9 h

Definition, scope and application of Bioinformatics, Human Genome Project-Science, applications and ELSI. Useful Bioinformatics sites on www. Search Engines, Boolean search ("BUT", "NOT", "AND"). Data retrieval tool – NCBI, Entrez, DBGET, SRS and Ensembl

1 Data retrieval tools and methods-NCBI, PubMed, PMC, ENTREZ, SRS and Ensembl

Unit II Biological Databases 9 h

Nucleic acid sequence databases - EMBL, GEN BANK, DDBJ. Protein databases-SWISS PROT, TrEMBL, PIR, UniProt and Structure databases-PDB. Tools for screening gene mutations – Pmut, Sist

2 Sequence Database-GEN BANK, SWISSPROT

3 Structure Databases-PDB

Unit III Sequence Alignment 10 h

Sequence Alignment - Definition, Local alignment (BLOSUM) and Global alignment (PAM), Pairwise alignment (BLAST and FASTA) and multiple sequence alignment (Clustal W). Phylogenetic analysis– WPGMA, UPGMA methods

4 Sequence similarity searching (NCBI, BLAST and FASTA

5 Multiple sequence alignment (Clustal)

6 Molecular phylogeny (PHYLIP

Unit IV Gene identification and prediction 10 h

Gene identification and prediction-pattern recognition. Protein primary structure analyses and prediction: identification and characterization

7 Sequence analysis using EMBOSS or GCG Wisconsin Package

8 Gene structure and function prediction (using Gen Scan, GeneMark and search tool for the retrieval of interacting Genes/Proteins - STRING)

9 Protein sequence analysis (ExPASy proteomics tools)

Unit V Drug Discovery 10 h

Introduction to drug discovery, Structure based drug design- Pharmacophore identification and Mapping, target identification, lead identification and optimization, high throughput screening, validation, Molecular Docking – Lipinski's rule-Swiss ADME

10 Downloading a PDB file and visualization of the same using RASMOL

11 Molecular Docking - SwissDock

12 Homology Modeling using SPDBV

Text Books

1 Rastogi S C, Mendiratla N D and Rastogi P,2013," Bioinformatics methods and applications- Genomics, Proteomics and Drug Discovery", 4th edition Prentice Hall India

2 Lesk A M, 2019, "Introduction to Bioinformatics", 5th edition, Oxford University Press, New York

References

1 Baxevanis A D and Francis Ouellette B F, 2020," Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins", 3rd Edition, Wiley and Sons,UK

2 Polansski A and Kimmel M, 2010," Bioinformatics", first edition, Springer Pvt. Ltd., India

3 David Mount W, 2013, "Bioinformatics sequence and genome analysis", 2ndedition , CBS Publishers, New Delhi

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