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

REGULATIONS 2022-23 for Under Graduate Programme

(Outcome Based Education model with Choice Based Credit System)

B. Sc Clinical Laboratory Technology

(For the students admitted during the academic year 2022-23 and onwards)

B. Sc Clinical Laboratory Technology

Eligibility:

A pass in Higher Secondary Examination with Physics / Botany/ Chemistry / Zoology / Biology/ Nursing/ Microbiology/ Bio Chemistry/ Home Science or Diploma in Pharmacy / DMLT / Pharmacology as one of the subjects as one of the subject and as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Science (Clinical Laboratory Technology)** Degree Examination of this College after a course study of three academic years.

Programme Objectives:

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

1. Attain careers as practicing laboratory technicians in fields such as clinical laboratories, hospitals, clinical research centers, biotechnology laboratories, equipment manufacturing industries.
2. Attain advanced studies in disciplines such as Microbiology, Medical Laboratory Technology, Biochemistry, Biotechnology, Hospital Administration, Hospital Records Management, etc.,.
3. Assume professional leadership roles.

PROGRAM OUTCOMES:

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

PO Number	PO Statement
PO1	The students are familiarized with theoretical and practical aspects of life science education.
PO2	Students are encouraged to recognize and appreciate life processes taking place in human body.
PO3	Students are exposed to modern tools and techniques adopted in the medical field and are motivated to apply the contextual knowledge for analysis and interpretation of data.
PO4	Students are kindled to realize the need for lifelong learning and need for sustainable development.
PO5	Students are encouraged to understand and follow ethical principles and practices and function effectively as an individual or team thereby achieve employability/entrepreneurship skills.

Credit distribution for Part I to Part V for Two Semesters Language:

Part	Subjects	No. of Papers	Credits	Semester No.
I	Tamil / Hindi / French/Malayalam	2	2 x 3 = 6	I & II
II	English	2	2 x 3 = 6	I & II
III	Core (Credits 2,3,4,5)	20	78	I to VI
	Inter Departmental Course (IDC)	5	16	I to IV
	Discipline Specific Elective (DSE)	3	3 x 4 =12	V & VI
	Skill Enhancement Course(SEC)	4	4 x 3=12	III to VI
	Generic Elective(GE)	2	2 x 2=4	III & IV
	Industrial Training	-	Grade A to C	V
IV	Environmental Studies(AECC)	1	2	I
	Basic Tamil/ Advance Tamil/ Human Rights and Women's Rights (AECC)	1	2	II
	Innovation, IPR and Entrepreneurship (AECC)	1	Grade A to C	VI
V	Extension Activity (NSS/NCC/YRC/RRC/Yoga/ Sports/Club)	-	2	I - II
TOTAL CREDITS			**140**	

CURRICULUM

B.Sc. CLINICAL LABORATORY TECHNOLOGY

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
First Semester										
Part - I										
221TL1A1TA	Language - I	Tamil-I: Ikkala Ilakkiyam	4	1	-	3	50	50	100	3
221TL1A1HA		Hindi-I: Modern Literature								
221TL1A1MA		Malayalam-I: Modern Literature								
221TL1A1FA		French –I: Grammar, Translation and Civilization								
Part - II										
221EL1A1EA	Language - II	Professional English - I	4	-	1	3	50	50	100	3
Part – III										
223CL1A1CA	Core - I	Human Anatomy and Physiology	4	-	-	3	50	50	100	4
223CL1A1CB	Core - II	General Biochemistry	4	-	-	3	50	50	100	4
223CL1A1CP	Core Practical - I	Biochemistry	-	-	6	6	50	50	100	3
224IT1A1IA	IDC - I	Basics of Information Technology	4	-	-	3	50	50	100	3
Part – IV										
223MB1A1AA	AECC-I	Environmental Studies	2	-	-	-	50	-	50	2
Part – V										
223CL1A1XA	Extension Activity	NSS/NCC/YRC/ RRC/Yoga/Sports/ Club	-	-	-	-	50	-	50	1
Total			**22**	**1**	7				**700**	**23**

5/8/22

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

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BoS- 13	AC - 13	GB - 18
5/8/22	6/9/22	10/9/22

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Dr.V. Rajendran
CHAIRMAN

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
Part – I										
221TL1A2TA 221TL1A2HA 221TL1A2MA 221TL1A2FA	Language - I	Tamil-II: Ara Ilakkiyam Hindi-II: Modern Literature Malayalam- II: Modern Literature French –II : Grammar, Translation and Civilization	4	1	-	3	50	50	100	3
Part – II										
221EL1A2EA	Language - II	Professional English - II	4	-	1	3	50	50	100	3
Part – III										
223CL1A2CA	Core - III	Bioanalytical Techniques	3	-	-	3	50	50	100	3
223CL1A2CB	Core - IV	Intermediary Metabolism and Metabolic Disorders	4	-	-	3	50	50	100	4
223CL1A2CP	Core Practical -II	Clinical Biochemistry-I	-	-	4	4	50	50	100	2
224IT1A2IP	IDC - II	Computer Applications in Clinical Laboratory	3	-	4	3	50	50	100	5
Part – IV										
221TL1A2AA 221TL1A2AB 225CR1A2AA	AECC-II	Basic Tamil/ Advanced Tamil/ Human Rights and Women's Rights	2	-	-	-	50	-	50	2
Part – V										
223CL1A2XA	Extension Activity	NSS/NCC/YRC/ RRC/Yoga/Sports/ Club	-	-	-	-	50	-	50	1
Total			**20**	**1**	**9**				**700**	**23**

6/12/22
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BoS- 14th	AC - 14th	GB - 19th
06.12.2022	19.01.2023	30.01.2023

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Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
Part - I										
221TL1A3TA	Language - I	Tamil-III	3	1	-	3	50	50	100	3
221TL1A3HA		Hindi-III								
221TL1A3MA		Malayalam- III								
221TL1A3FA		French – III								
Part - II										
221EL1A3EA	Language - II	Professional English - III	3	1	-	3	50	50	100	3
Part - III										
223CL1A3CA	Core- V	Clinical Pathology	5	-	-	3	50	50	100	5
223CL1A3CB	Core- VI	Histopathology	5	-	-	3	50	50	100	5
223CL1A3CP	Core Practical- III	Pathology	-	-	6	6	50	50	100	3
223FN1A3IA	IDC - III	Clinical Nutrition	3	-	-	3	50	50	100	3
223CL1A3SA	SEC-I	Laboratory Automation and Quality Control	3	-	-	3	50	50	100	2
Total			**22**	**2**	**6**				**700**	**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										
221TL1A4TA	Language - I	Tamil-IV	3	1	-	3	50	50	100	3
221TL1A4HA		Hindi-IV								
221TL1A4MA		Malayalam- IV								
221TL1A4FA		French – IV								
Part - II										
221EL1A4EA	Language - II	Professional English - IV	3	1	-	3	50	50	100	3
Part - III										
223CL1A4CA	Core- VII	Molecular Biology	3	-	-	3	50	50	100	3
223CL1A4CB	Core- VIII	Clinical Biochemistry - Functional Tests	4	-	-	3	50	50	100	4
223CL1A4CP	Core Practical - IV	Clinical Biochemistry - II	-	-	4	4	50	50	100	2
223MB1A4IA	IDC - IV	Basic Microbiology	3	-	-	3	50	50	100	3
223MB1A4IP	IDC Practical	Microbiology	-	-	5	9	50	50	100	2
223CL1A4SA	SEC – II	Blood Banking and Blood Transfusion	3	-	-	3	50	50	100	2
Total			**19**	**2**	9				**800**	**22**

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Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fifth Semester										
Part – III										
223CL1A5CA	Core- IX	Immunology	5	-	-	3	50	50	100	5
223CL1A5CB	Core - X	Hematology	4	-	-	3	50	50	100	4
223CL1A5CP	Core Practical- V	Hematological Techniques	-	-	6	6	50	50	100	3
223CL1A5CQ	Core Practical - VI	Molecular and Immunotechniques	-	-	6	6	50	50	100	3
223CL1A5SA	SEC -III	Research Methodology and Biostatistics	3	-	-	3	50	50	100	2
223CL1A5DA	DSE-I	Organisation of Clinical Laboratory and Lab Management	4	-	-	3	50	50	100	4
223CL1A5DB		Human Genetics and Foetal Medicine								
223CL1A5DC		Clinical Enzymology								
223CL1A5TA	IT	Industrial Training	-	-	-	-	50	50	100	2
Part – IV										
223CL1A5GA	GE	Concepts of Health	2	-	-	3	50	-	50	2
Total			**18**	**-**	**12**	-	-	-	**750**	**25**

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Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Sixth Semester										
Part – III										
223CL1A6CA	Core- XI	Cytology	5	-	-	3	50	50	100	5
223CL1A6CB	Core- XII	Diagnostic Molecular Techniques	5	-	-	3	50	50	100	5
223CL1A6CV	Core -XIII	Project and Viva Voce	-	-	6	3	50	50	100	3
223CL1A6SP	SEC-IV	Cytological and Molecular Diagnostics	-	-	4	4	50	50	100	2
223CL1A6DA	DSE-II	Good Laboratory Practices and Professional Ethics	4	-	-	3	50	50	100	4
223CL1A6DB		Stem Cell Technology								
223CL1A6DC		Forensic Science and Toxicology								
223CL1A6DD	DSE-III	Bio-safety and Bio waste Management	4	-	-	3	50	50	100	4
223CL1A6DE		Genetic Engineering								
223CL1A6DF		Tumor markers and Immunohistochemistry								
Part – IV										
223BC1A6AA	AECC-III	Innovation, IPR and Entrepreneurship	2	-	-	-	50		50	2
Total			**20**	**-**	**10**				**650**	**25**
Grand Total									**4300**	**142**

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8.11.2024 26.11.2024

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GENERIC ELECTIVE COURSES (GE)

The following are the courses offered under Generic Elective:

Semester - III (GE-I)

S. No.	Course Code	Course Name
1	223CL1A3GA	Anatomy, Physiology and Laboratory Science

Semester - IV (GE-II)

S. No.	Course Code	Course Name
1	223CL1A4GA	Concepts of Health

SELF STUDY COURSES

The following are the courses offered under self study:

S. No.	Course Code	Course Name
1	223CL1ASSA	Disaster Management
2	223CL1ASSB	Community Medicine

CERTIFICATE PROGRAMMES

The following are the programmes offered:

S. No.	Course Code	Course Name
1	3CL5A	Basic Laboratory Tests
2	3CL5B	Lab Quality Control and Record Management
3	3CL5C	Medical Coding

UG - REGULATION (R4)

(2022-23 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, Cognitive Systems and Artificial Intelligence and Machine Learning.

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 2022–25 refers to students belonging to a 3 year Degree programme admitted in 2022 and completing in 2025.

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, IPR and Innovation, IPR, Innovation and Entrepreneurship.

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.

1.6 Extra Credits:

Extra credits shall be awarded for achievements in identified co-curricular 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 two / four semesters.

2.2 PART- II: LANGUAGE- II

English will be offered during the first two / four semester.

2.3 PART- III:

- Core Course
- Inter Departmental Course (IDC)
- Discipline Specific Elective (DSE)
- Skill Enhancement Course (SEC)
- Generic Elective (GE)
- 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.

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

(OR)

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 second semester.

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

A student is normally expected to complete the B.Sc. /B.Com. / B.A. Programme in 6 semesters. However, in any case not more than 7 consecutive semesters. Failing which the concern BoS will identify suitable/ equivalent course.

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 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) : 50 Marks

End Semester Exams (ESE) : 50 Marks

Total : 100 Marks

i) Distribution of Internal Marks

S.No.	Particulars	Distribution of Marks	Remarks
1	CIA I (2.5 Units) (On completion of 45th working day)	15	
2	Model (All 5 Units) (On completion of 85th working day)	15	
3	Assignment	05	
4	Attendance	05	
5	Library Usage	05	
6	Skill Enhancement *	05	
	Total	**50**	

Assignment Rubric
(Maximum -20 marks converted to 5 marks)

Criteria	4 marks	3 Marks	2 Marks	1 MArk
Language	Excellent spelling and Grammar	Good spelling and Grammar	Reasonable spelling and Grammar	Bad spelling and Grammar
Style	Outstanding style beyond usual college level	Attains College level style	Approaches College level style	Elementary form with little or no variety in sentence structure
Referencing	Good use of wide range of reference sources	Moderate use of suitable reference materials	Shows signs of plagiarism & using sources without referencing	No reference material used
Development	Main points well developed with high quality and quantity support	Main points developed with quality and quantity supporting details	Main points are present with limited details and development	Main points lack detailed development
Critical thinking/Problem solving	Advanced attempt to interpret the process, content/ analyse and solve the problem	Proficient attempt to interpret the process, content/ analyse and solve the problem	Adequate attempt to interpret the process, content/ analyse and solve the problem	Limited attempt to interpret the process, content/ analyse and solve the problem

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, 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.

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

ii) Distribution of External Marks

Total	**:**	**50**
Written Exam	**:**	**50**

Marks Distribution for Practical course

Total	**:**	**100**
Internal	**:**	**50**
External	**:**	**50**

i) Distribution of Internals Marks

S. No.	Particulars	Distribution of Marks
1	Experiments/Exercises	15
2	Test 1	15
3	Test 2	15
4	Observation Notebook	05
	Total	**50**

ii) Distribution of Externals Marks

S.No.	Particulars	External Marks
1	Materials and methods/ Procedures/Aim	10
2	Experiment/ Performance/ Observations/ Algorithm	10
3	Results/ Calculations/ Spotters/ Output	10
4	Inference/Discussion/ Presentation	10
5	Record	6
6	Viva- voce	4
	Total	**50**

A) Mark Distribution for UG Project

Total : 100
Internal : 50
External : 50

i) Distribution of Internal Marks

S.No.	Particulars	Internal Marks
1	Review I	20
2	Review II	20
3	Attendance	10
	Total	**50**

ii) Distribution of External Marks

S.No	Particulars	External Marks
1	Project Work & Presentation -PPT	40
2	Viva -voce	10
	Total	**50**

Project Work shall be evaluated jointly by Internal and External Examiners (40 Marks) and viva voce to be conducted jointly by them (10 Marks).

Evaluation of Project Work and conduct of Viva-voce shall be done jointly by Internal and External Examiners

7 . Credit Transfer

a. Upon successful 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 5th semester. The proposed NPTEL course should cover content/syllabus of exempted core paper in 5th 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 5th semester. Out of 2 NPTEL proposed courses, **at least 1 course** should cover content/syllabus of exempted core paper in 5th semester.

Mandatory

The exempted core paper in the 5th semester should be submitted by the students for approval before the end of 4th semester

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 – III.					
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 5th 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. Industry embedded training

Industry embedded training for Advanced Learners: 3/6 months in reputed industry identified by Centre for Academic and Industry Collaboration.

Mandatory: Report on the training should be submitted by the student for evaluation

Based on the performance Grade will be awarded as follows:

Marks Scored	Grade to be awarded
75 and above	A
60-74	B
40-59	C
< 40	Re- Appearance

10. Internship/Industrial Training

UG:

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.

A Candidate who have completed 3 months industry embedded training, are exempted from internship/industrial training during the IV Semester summer vacation.

Based on the performance Grade will be awarded as follows:

Marks Scored	Grade to be awarded
75 and above	A
60-74	B
40-59	C
< 40	Re- Appearance

Extra Credits: 10

Earning extra credit is mandatory. However, it is not essential for programme completion. Student is entitled to earn extra credit for achievement in 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
Sports and Games	1
Publications / Conference Presentations (Oral/Poster)/Awards	1
Lab on Project	1
Innovation / Incubation / Patent / Sponsored Projects / Consultancy	1
Representation in State / National level celebrations	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.

Sports and Games

The Student can earn extra credit based on their Achievement in sports in University/ State / National/ International.

Publications / Conference Presentations (Oral/Poster)/Awards

Research Publications in Journals/ oral/poster presentation in Conference and winning awards

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 V semester.

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 etc.

Question Paper Pattern

100 % CIA Courses (GE&AECC)

S.No	Type of Course	Remarks
1	Generic Elective I&II	MCQ (50x1=50 Marks)
2	Environmental Studies	MCQ (50x1=50 Marks)
3	Human Rights and Women's Rights	MCQ (50x1=50 Marks)
4	Innovation &IPR/ Innovation, IPR and Entrepreneurship	Grade A-C

Innovation &IPR/ Innovation, IPR and Entrepreneurship (Grade A-C)	
Marks Scored	**Grade to be awarded**
30 and above	A
25-29	B
21-24	C
< 20	Re- Appearance

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

SECTION	MARKS	DESCRIPTION	TOTAL
Section – A	8 x 0.5 = 04 Marks	MCQ	25 Marks
Section - B	3 x 3 = 09 Marks	Answer ALL Questions Either or Type ALL Questions Carry Equal Marks	
Section - C	2 x 6 = 12 Marks	Answer ALL Questions Either or Type ALL Questions Carry Equal Marks	

Model and End Semester Examination: [3 Hours-5 Units] - 50 Marks

SECTION	MARKS	DESCRIPTION	TOTAL
Section – A	5 x 1 = 05 Marks	MCQ	50 Marks
Section - B	5 x 3 = 15 Marks	Answer ALL Questions (Either or Type Questions) Each Questions Carry Equal Marks	
Section - C	5 x 6 = 30 Marks	Answer ALL Questions (Either or Type Questions) Each Questions Carry Equal Marks	

Course Code	Course Name	Category	L	T	P	Credit
221TL1A1TA	TAMIL- I: IKKALA ILAKKIYAM	LANGUAGE- I	4	1	-	3

PREAMBLE

This course has been 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(LifeSkills)-மாணவர்களின் செயலாக்கத்திறனை ஊக்குவித்தல்	K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K4
CO3	பாடஇணைச்செயல்பாடுகள் (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				✓	✓

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

221TL1A1TA	TAMIL- I: IKKALA ILAKKIYAM	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 - நாமக்கல்கவிஞர்
5. தமிழ்க் கொலை புரியாதீர் - புலவர் குழந்தை
6. திரைத்தமிழ்

அ) 'விஞ்ஞானத்த வளர்க்கப் போறண்டி' எனத்தொடங்கும் பாடல் - உடுமலை நாராயண கவி

ஆ) 'சும்மா கிடந்த நிலத்தை' எனத்தொடங்கும் பாடல் - பட்டுக்கோட்டை கல்யாண சுந்தரனார்

இ) 'சமரசம் உலாவும் இடமே' எனத்தொடங்கும் பாடல்- மருதகாசி

ஈ) 'உன்னை அறிந்தால்' எனத்தொடங்கும் 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,னவேறுபாடு - 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 , டாக்டர்என்.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

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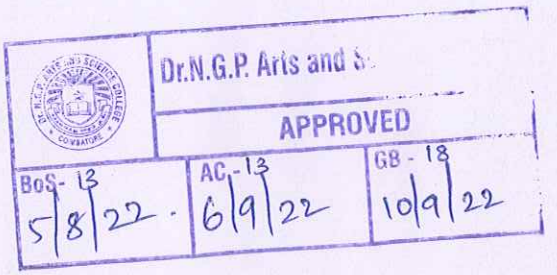


Course Code	Course Name	Category	L	T	P	Credit
221TL1A1HA	HINDI- I: MODERN LITERATURE	LANGUAGE-1	4	1	-	3

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	Apply the knowledge writing critical views on fiction	K3
CO4	Build creative ability	K3
CO5	Expose the power of creative reading	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

221TL1A1HA	HINDI– I: MODERN LITERATURE	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

Dr.N.G.P. Arts and Sci... Co...
APPROVED
BoS- 13 5/8/22 | AC- 13 6/9/22 | GB - 13 10/9/22

Course Code	Course Name	Category	L	T	P	Credit
221TL1A1MA	MALAYALAM- I: MODERN LITERATURE	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	Apply the knowledge writing critical views on fiction.	K3
CO4	Build creative ability.	K3
CO5	Expose the power of creative reading	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

221TL1A1MA	MALAYALAM- I: MODERN LITERATURE	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I **Novel** 14 h

PathummayudeAdu

Unit II **Novel** 10 h

PathummayudeAdu

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, "PathummayudeAdu" (NOVEL), DC Books & Kottayam

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

References

1 MalayalaNovel Sahithyam.

2 MalayalaCherukathaInnale Innu.

Dr.N.G.P. Arts and Science College
APPROVED
BoS-13 5/8/22 | AC-13 6/9/22 | GB-18 10/9/22

Course Code	Course Name	Category	L	T	P	Credit
221TL1A1FA	FRENCH- I: GRAMMAR, TRANSLATION AND CIVILIZATION	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	Evaluate the Plural, Articles and the Hobbies	K3
CO4	Measure the Cultural Activity in France	K3
CO5	Select the sentiments, life style of the French people and the usage of the conditional tense	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

221TL1A1FA	FRENCH- I: GRAMMAR, TRANSLATION AND CIVILIZATION	SEMESTER I

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

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

Objectifs de Communication	Tâche	Activités deréception et de production orale
• Saluer • Enter en contact • avecquelqu'un. • Se presenter. • S'excuser	Encours 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 deréception 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'adoreI Page 30** 12 h

Objectifs de Communication	Tâche	Activités deréception et de production orale
• Exprimerses gouts.	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation.	• Dans une soirée de recontresrapid 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'adoreI Page 30** 14 h

Objectifs de Communication	Tâche	Activités deréception et de production orale
• Présenterquelqu'un	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation	• Exprimersesgoûts. • 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. Parlerd'actions passes. Tuveuxbien?	Organiser un programme d'activités pour accueillirunepersonneimportante.	Comprendreunepersonnedemande 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 RegineMerieux, Yves Loiseau, "LATITUDES - 1" (Page No: 9-55)(Methode de Français), Goyal Publisher &DistributorsPvt.Ltd., 86 UB JawaharNagar (Kamala Nagar),Delhi-7 Les Editions Dider, Paris,2008- Imprime en Roumanie par Canale en Janvier 2012.

Course Code	Course Name	Category	L	T	P	Credit
221EL1A1EA	PROFESSIONAL ENGLISH- I	LANGUAGE- II	4	-	1	3

PREAMBLE

This course has been designed for students to learn and understand

- the effect of dialogue, the brilliance of imagery and the magnificence ofvaried 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

221EL1A1EA	PROFESSIONAL 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

NiyiOsundare: 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- Annotations

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

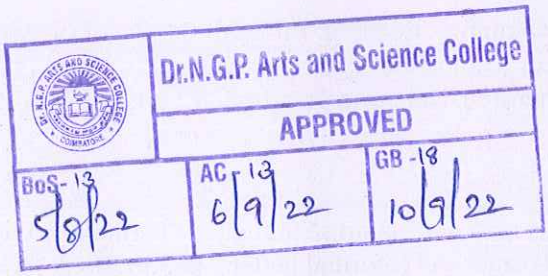
Sentence patterns, Note- making and note taking-Strategies - Paragraph writing: Structure and Principles - Academic Writing - Formal and Informal Letters, Report, Book /Movie Review

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/EFLListening 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 NiyiOsundare." Studocu.Com, tudocu.com/in/document/ bangalore-university/bachelor-of-computer-applications/1586771577-our-earth-will-not-die/27675462. Accessed 3 Aug. 2022.
2. On Superstitions."The Historian"1947.wordpress.com/2019/03/08/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.
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
223CL1A1CA	HUMAN ANATOMY AND PHYSIOLOGY	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of human anatomy
- The anatomy of various organs of the human body
- The physiological roles of various organ systems

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the definition of anatomical terms, general anatomy and physiology of central nervous system	K2
CO2	Describe the circulatory system and understand functions of cardiac system	K3
CO3	Describe the anatomy and physiology of respiratory and digestive system	K3
CO4	Understand the structure and functions of excretory and reproductive system	K3
CO5	Know the anatomy and physiology of lymphatic and sensory systems and appreciate the anatomical techniques	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

223CL1A1CA	HUMAN ANATOMY AND PHYSIOLOGY	SEMESTER I

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **General Anatomy** 10 h

Anatomical terms. Organization of the human body. Tissues –Definition, Types, characteristics, classification, location, functions and formation. Blood – Morphology, composition and functions. Peripheral Nervous system and Central Nervous system: Spinal cord- Anatomy and functions. Structure of neuron. Neurotransmitters – Acetyl choline and Dopamine. Transmission of nerve impulse- myelinated and non-myelinated nerve, Brief account of resting membrane potential, action potential. Exocrine and Endocrine glands- an overview.

Unit II **Cardiovascular System** 8 h

Circulatory system – Structure of the heart. Blood Vessels -Structure of arterial and venous system, blood capillaries. Functions of Heart. Definitions of cardiac output and stroke volume. Principles of measurement of cardiac output. Normal values of blood pressure, heart rate and its regulation in brief.

Unit III **Respiratory System and Gastro enteric system** 10 h

Respiratory system- Parts- Nasal cavity and Paranasal air sinuses, trachea. Gross and microscopic structure of lungs, Diaphragm and Pleura. Functions of Lungs- Principles of respiration, respiratory muscles, lung volume and capacity. Collection and composition of inspired alveolar and expired airs. Transport of oxygen and carbondioxide. Digestive System: Parts of digestive system, Structure of tongue, salivary glands, stomach, intestines, liver and pancreas. Functions of gastro intestinal tract- intestinal secretions and movements of gastro intestinal tract.

Unit IV **Excretory system and Reproductive system** 10 h

Parts, structure of Kidney, Ureters, Urinary Bladder and Urethra. Structure and functions of nephron. Measurement and regulation of glomerular filtration rate. Mechanism of urine formation. Clearance tests- urea and creatinine. Reproductive System: Gross structure of male and female reproductive organs. Physiology of male and female reproductive system.

Unit V **Lymphatic System** 10 h

Gross and microscopic structure of lymphatic tissue – Thymus, Spleen and Lymph Node, Functions of lymphatic organs. Special Senses: Structure of Skin, Eye, Nose, Tongue (Auditory and Olfactory apparatus). Anatomical Techniques: Embalming of human cadaver, Museum Techniques, Principles of Karyotyping.

Text Books

1 William F G, 2005, "Review of Medical Physiology", 22nd edition, McGraw Hill, New Delhi.

2 Khurana I and Khurana A, 2014,"Textbook of Anatomy and Physiology for Nurses and Allied Health Sciences", 1st Edition, CBS Publishers and Distributors, New Delhi.

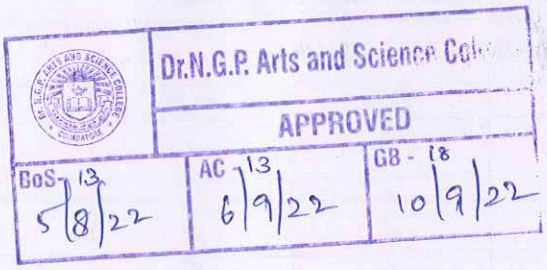
References

1 Arnould-Taylor W E, 2001, "A Textbook of Anatomy and Physiology", 3rd Edition, Stanley Thomas publishers, UK.

2 Sembulingam K and Sembulingam P, 2010, "Essentials of Medical Physiology", 5th Edition, Jaypee Medical Pub, New Delhi.

3 Jain AK, 2017, "Human Anatomy and Physiology", 3rd edition, Arya Publications, New Delhi.

4 https://www.khanacademy.org/science/health-and-medicine/human-anatomy-and-physiology.



Course Code	Course Name	Category	L	T	P	Credit
223CL1A1CB	GENERAL BIOCHEMISTRY	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The complex architecture and functioning of cells.
- The basics of various biomolecules such as carbohydrates, proteins, lipids, nucleic acids.
- The physiological functions and disorders of hormones.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the distinguishing characteristics of prokaryotic and eukaryotic cells.	K2
CO2	Understand the types, properties and significance of Carbohydrates and Lipids.	K3
CO3	Understand the structure and importance of Aminoacids and Proteins.	K3
CO4	Understand the classification, structure of Nucleic acids, Vitamins and Minerals.	K3
CO5	Understand the types and importance of enzymes and functions of various endocrine hormones and their 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

223CL1A1CB	GENERAL BIOCHEMISTRY	SEMESTER I

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Cell structure and function** 12 h

An overview of cells and their molecular composition:- Cell Definition, Struture of prokaryotic and eukaryotic cells and difference between prokaryotic and eukaryotic cells , Function of cells. Cell organelles and their functions: Cell membrane, Cytosol, Endoplasmic reticulum, Ribosome, Golgi apparatus, Lysosomes, Peroxisomes , Glyoxysomes, Mitochondria, Cytoskeleton and Nucleus.

Unit II **Carbohydrates and Lipids** 8 h

Carbohydrates: Classification, Properties, Linear and cyclic Structure of monoscaaharides, biological significance and functions of monosaccharides, Disaccharides, Polysaccharides. Lipids: Definition; classification, significance and functions of lipids-simple, compound and derived lipids. Steroids- functions.

Unit III **Aminoacids and Proteins** 10 h

Amino acids: Definitions, classification of essential and non-essential amino acids. Classification of proteins-, Peptide linkage, Structure of proteins- primary, secondary - α Helix, Beta-Pleated sheets, tertiary and Quartenary structure. Properties of peptides and proteins, Examples: albumin, globulins. Protein denaturation.

Unit IV **Nucleic acids and Vitamins** 8 h

Structure of purines and pyrimidines; nucleotides and nucleosides, DNA - Double helical structure, A, B & Z forms of DNA; DNA denaturation and renaturation, functions. RNA: Types and functions. Vitamins: Definition, classification, Sources, physiological functions and Deficiency of water and fat soluble vitamins. Minerals: Mineral requirement, essential macro and micro minerals: - Sources and functions.

Unit V **Enzymes and Hormones** 10 h

Enzymes: International classification of enzymes - six main classes of enzymes. Factors affecting enzyme activity. Endocrine System - Hormones, Names of endocrine glands and their secretions, functions of various hormones- Hypothalamus, Pituitary, Thyroid, Adrenal, Male and Female reproductive hormones. Brief account of these hormonal disorders.

Text Books

1 Jain J L, Jain S and Jain N, 2012, "Biochemistry", 1st Edition, S. Chand and Company pvt Ltd, New Delhi.

2 Satyanarayana U and Chakrapani U, 2018, "Biochemistry", 5th Edition, Elsevier, India.

References

1 Deb, AC, 2001, "Fundamentals of Biochemistry", 7th Edition, New central agency, Calcutta..

2 Devlin T M, 2010, "Textbook of Biochemistry with Clinical Correlations", 7th Edition, John Wiley and Sons, USA.

3 Vasudevan DM, Sreekumari S., Kannan Vaidyanathan , 2019. Textbook Of Biochemistry For Medical Students, 9th Edition, Jaypee Brothers Medical Publishers, India.

4 https://www.khanacademy.org/search?page_search_query=biochemistry.

223CL1A1CP	CORE PRACTICAL: BIOCHEMISTRY	SEMESTER I

Total Credits: 3
Total Instructions Hours: 72 h

S.No	Contents
1	Reagent preparation - Normal solution, Molar solution , Molal solution, Percentage solution
2	Qualitative analysis of Monosaccharides – Pentose - Arabinose
3	Qualitative analysis of Hexoses - Glucose, Fructose
4	Qualitative analysis of Disaccharides - Sucrose, Maltose and Lactose.
5	Qualitative analysis of Polysaccharide - Starch.
6	Qualitative analysis of Histidine
7	Qualitative analysis of Tyrosine
8	Qualitative analysis of Tryptophan
9	Qualitative analysis of Arginine
10	Estimation of Acid Number and Iodine Number
11	Estimation of Saponification Number
12	Protein estimation by Lowry's method

Note: Out of 12- 10 Mandatory

References

1 Sadasivam S and Manikam A, 1996, "Biochemical methods ", 2nd Edition, New Age International publishers, New Delhi.

2 Plummer D T, 2004, " An Introduction to practical Biochemistry", 3rd Edition, Tata McGraw-Hill Education Pvt. Ltd, New Delhi.

3 Jayaraman J, 2015, "Laboratory manual in Biochemistry" 5th Edition, New Age International (P) Ltd.

4 Pattabiraman T N and SitaramaAcharya U, 2015, "Laboratory Manual in Biochemistry", 4th Edition. , All India Traveller Book Seller.

Course Code	Course Name	Category	L	T	P	Credit
224IT1A1IA	BASICS OF INFORMATION TECHNOLOGY	IDC	4	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The components of computer system and architecture
- The ideas about system software and application software
- The development of laboratory and management information system

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the components of computer system and architecture	K2
CO2	Relate the terminology between software and hardware	K2
CO3	Outline the data transmission medium and topologies	K3
CO4	Understand the basics of internet applications with protocols	K2
CO5	Apply and manage e-healthcare system	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

224IT1A1IA	BASICS OF INFORMATION TECHNOLOGY	SEMESTER I

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **Introduction to Computers** 8 h

Introduction to Computers: Characteristics of Computers - Generation of Computers – Components of the Computer System, Computer Architecture: CPU –Memory unit – Input and Output Devices.

Unit II **Computer Software** 10 h

Software – Definition, Relationship between Hardware and Software – Software categories: System Software, Application Software- Terminology Software: Firmware, Liveware, Freeware, Shareware.

Operating System: Evolution, Types, Functions

Unit III **Networking** 10 h

Data Communication: Components, Data Transmission Mode- Transmission Media: Guided/ Wired Media, Unguided/ Wireless Media, Analog and Digital Transmission- Multiplexing: Multiplexers – Computer Networks: LAN, MAN, WAN – Network Topologies: Mesh, Bus, Ring, Star, Tree.

Unit IV **Internet basics** 10 h

Evolution of Internet – Basic Internet Terms: WWW, Web Page, Website, Home Page, Browser, URL, Hypertext, Web Server– Internet Applications: Email, FTP, Telnet, Chatting and Instant Messaging, Sending and Receiving emails, Email Address Structure, Advantages and Disadvantages.

Unit V **Laboratory and Hospital Information System** 10 h

Fundamentals: Overview of LIS Development and Project Planning – Data Management and Basic LIMS: Functional Requirements and Features - Data Management and Advanced LIMS: Functional Requirements and Features.

Hospital Information System: Introduction to E-Healthcare- Managing a Hospital with Information – Quantitative Techniques for Decision Support.

Text Books

1 Jennifer Sargunar, 2011, "Introduction to Computer Science", Pearson edition, Second Edition.

2 Kelkar S. A, 2010, "Hospital Information System", PHI Learning Publisher, Eastern Economy Edition.

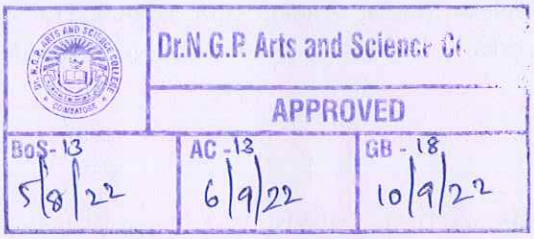
References

1 Niranjan Shrivastava, 2013, "Fundamentals of Computers and Information System", Wiley, India.

2 ITL Education Solutions, 2012, "Introduction to Information Technology", 2nd Edition, Pearson Education, India.

3 Christine Paszko, Elizabeth turner, 2002, "Library Information Management System", Second edition.

4 https://www.tutorialspoint.com/basics_of_computers/index.htm



Course Code	Course Name	Category	L	T	P	Credit
223MB1A1AA	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., and 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.*

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

Dr.N.G.P. Arts and Science College
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Course Code	Course Name	Category	L	T	P	Credit
221TL1A2TA	TAMIL - II: ARA ILAKKIYAM	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

221TL1A2TA	TAMIL - II: ARA ILAKKIYAM	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I அற இலக்கியம் 13 h

1. இலக்கிய வரலாறு- பதிணென்கீழ்க்கணக்குநூல்கள்

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 பாடல்கள்-6,7,9,10,14,16,17,23,26,30

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-2022-2023,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

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Course Code	Course Name	Category	L	T	P	Credit
221TL1A2HA	HINDI - II: MODERN LITERATURE	LANGUAGE- I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- Writing ability and develop reading skill
- Various concepts and techniques for criticizing literature
- 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	Apply the knowledge writing critical views on fiction	K3
CO4	Build creative ability	K3
CO5	Expose the power of creative reading	K2

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

221TL1A2HA	HINDI – II: MODERN LITERATURE	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 अपार्ट्मेंट्स , 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)

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Course Code	Course Name	Category	L	T	P	Credit
221TL1A2MA	MALAYALAM - II: MODERN LITERATURE	LANGUAGE -I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- Writing ability and develop reading skill
- Various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- 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	Apply the knowledge writing critical views on fiction	K3
CO4	Build creative ability	K3
CO5	Expose the power of creative reading	K2

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

221TL1A2MA	MALAYALAM- II: MODERN LITERATURE	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 MalayalaNovel Sahithyam, DC Books Kottayam, Kerala, India.

2 MalayalaSahithyaCharithram, National Books Kottayam, Kerala, India.

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Course Code	Course Name	Category	L	T	P	Credit
221TL1A2FA	FRENCH- II: GRAMMAR, TRANSLATION AND CIVILIZATION	LANGUAGE- I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- Competence in General Communication Skills – Oral + Written- Comprehension & Expression
- Culture, life style and the civilization aspects of the French people as well as of France
- 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	Evaluate the Plural, Articles and the Hobbies	K3
CO4	Measure the Cultural Activity in France	K3
CO5	Select the sentiments, life style of the French people and the usage of the conditional tense	K2

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

221TL1A2FA	FRENCH- II: GRAMMAR, TRANSLATION AND CIVILIZATION	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.	Organiser une soirée au cinéma avec des amis, par téléphone et par courriel.	Comprendre des personnes qui fixentunrendez-vous par téléphonique. Prendreun rendez-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.	Engroupes, choisir un cadeau pour un ami.	Exprimer son point de vuesur des idées de cadeau. Faire des achatsdans un magasin

Unit IV

14h

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'interdiction. 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 Canaleen Janvier 2012.(Unit I toIV)

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Course Code	Course Name	Category	L	T	P	Credit
221EL1A2EA	PROFESSIONAL ENGLISH - II	LANGUAGE- II	4	-	1	3

PREAMBLE

This course has been designed for students to learn and understand

- Language for specific purposes through various literary manuscripts
- Process of communicative competences in academics through authentic contexts
- 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	Relate and appreciate the eminent writers works of various genres	K1
CO2	Construct and comprehend complex situational talks	K3
CO3	Identify formal and informal communicative context to speak fluently	K3
CO4	Infer the denotative and connotative meanings while reading specialized texts	K2
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

221EL1A2EA	PROFESSIONAL ENGLISH - II	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Genre Studies 12 h

John Keats: La Belle Dame Sans Merci - Author's Note - title indications- outline- paraphrasing the poem- context of poem- form- poetic devices- enjambment- techniques- Annotations

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

Charles Lamb: A Dissertation upon Roast Pig- Author's Note - title indications- outline- paraphrasing the Essay- context of Essay- form-devices- Narrative techniques

John Galsworthy: The Silver Box- Author's Note- Plot Summary- Critical Analysis- Themes- Characters- Description - analysis- Terms- Symbols

Unit II Listening Skills 10 h

Detailed:

Naomi Wolf: The Beauty Myth- Author's note- passage analysis- cohesion and context- devices implemented- Annotation

Unit III Speaking Skills 14 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- Reading Advertisements- 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 <https://www.poetryfoundation.org/poems/44475/la-belle-dame-sans-merci-a-ballad/> (Unit I)

2 <https://sittingbee.com/on-keyhole-morals-a-g-gardiner/> (Unit I)

3 <https://www.gradesaver.com/charles-lamb-essays/study-guide/summary- a-dissertation-upon-roast-pig/> (Unit I)

4 <https://public-library.uk/ebooks/41/61.pdf- The Silver Box- John Galsworthy/> (Unit I)

5 Hart, Steve,AravindR.Nair, VeenaBhambhani. 2016. Embark: English for Undergraduates. Cambridge University Press, New Delhi, India. (Unit II)

6 Lakshminarayanan. 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.(Unit V)

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, Lalitha Krishnaswamy & 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.

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Course Code	Course Name	Category	L	T	P	Credit
223CL1A2CA	BIOANALYTICAL TECHNIQUES	Core	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- Principle and working of various instruments in clinical laboratories
- Applications of various instruments in separation and purification of biomolecules
- Analysis of biomolecules using various techniques

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Discuss the principle and working of pH meter and buffer preparations	K2
CO2	Illustrate the principle, methodology and applications of chromatographic techniques	K3
CO3	Apply the principle and applications of electrophoresis and immuno techniques.	K3
CO4	Illustrate colorimetric and spectroscopic techniques.	K3
CO5	Apply the process of centrifugation and its applications	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

223CL1A2CA	BIOANALYTICAL TECHNIQUES	SEMESTER II

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Buffers 7 h

pH meter-principle, instrumentation. pH scale, Henderson- Hasselbalch equation, Buffer solutions, Acidic buffer and basic buffers, Buffer systems of blood- Haemoglobin, Protein and Phosphate buffer system. Various ways of expressing the solute and solvent concentrations - molality, molarity, normality, mole fraction - Definitions only.

Unit II Chromatographic Techniques 8 h

Paper chromatography-principle, materials, methods and applications. Thin Layer chromatography- principle, Technique and applications. Gas liquid chromatography- principle and applications. Ion-exchange chromatography, Affinity chromatography and Molecular sieve chromatography- Principle and applications. High Performance Thin Layer Chromatography (HPTLC) - principle, Instrumentation, Application, High performance Liquid Chromatography (HPLC), Fast protein liquid chromatography (FPLC), Gas chromatography–mass spectrometry (GC-MS) [principles only].

Unit III Electrophoretic Techniques and Immunoassays 7 h

Principles and applications of paper electrophoresis, Gel electrophoresis- Agarose gel, and SDS-PAGE. Immuno electrophoresis- principle and technique, applications of Immuno electrophoresis. Principles and applications of Immunoassays- Radio immuno Assay, Isoelectric focusing Enzyme Linked Immuno Sorbent Assay.

Unit IV Photometry 7 h

Colorimetry- Principle- Beer - Lambert's Law. Types of filters, instrumentation and applications of colorimeter. Spectrophotometer- principle, Components of spectrophotometer and its applications, Difference between Colorimeter and spectrophotometer. Spectrofluorimeter- principle, components and applications of spectrofluorimeter. Flame photometry- principle, basic components of flame photometer. Types- Emission flame photometer, Atomic absorption spectrophotometer, Basic maintenance, Quality control and Calibration of instruments.

Unit V Centrifugation 7 h

Principle of Centrifugation. Centrifuges - Rotors, types - Fixed angle, swinging bucket, vertical rotors and functions of rotor. Types of Centrifuge - Bench top, high speed, ultra centrifuge and analytical centrifuge - Principles and applications. Determination of Molecular weight by sedimentation velocity method. Differential centrifugation - principle, separation of cell organelles by differential centrifugation.

Text Books

1 Sabari Ghosal and Srivastava,A.K, 2010, "Fundamentals of Bioanalytical Techniques and instrumentation", 5th Edn, Eastern Economy Edition.

2 Asokan, P., 2001, "Basics of Analytical Biochemistry", 1st Edition, Chinna Publications, Tamilnadu.

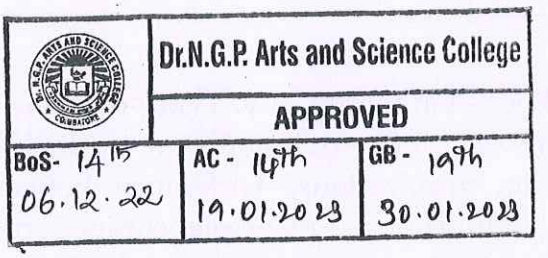
References

1 Plummer, D T., 2004, "An introduction to Practical Biochemistry", 3rd Edition, Tata McGraw-Hill Education Pvt. Ltd, New Delhi.

2 Wilson.K. Walker J., 2000, "Practical Biochemistry", 10th Edition, Cambridge University Press, UK.

3 Katoch, R. , 2011, "Analytical Techniques in Biochemistry & Molecular Biology", 1st Edition, Springer, UK.

4 Ghosal, Sabari, Avasthi, Anupama Sharma, 2018,"Fundamentals of Bioanalytical Techniques And Instrumentation", Second Edition, PHI Learning Pvt. Ltd, Delhi..



Course Code	Course Name	Category	L	T	P	Credit
223CL1A2CB	INTERMEDIARY METABOLISM AND METABOLIC DISORDERS	Core	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- General aspects of metabolism of biomolecules
- Disorders associated with various metabolic pathways of biomolecules
- Clinical manifestations and diagnosis of metabolic disorders

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the pathways involved in carbohydrate metabolism and metabolic disorders	K2
CO2	Interpretation of lipid metabolism and lipid storage diseases	K3
CO3	Illustrate metabolism of proteins and its disorders	K3
CO4	Sketch the metabolic reactions of nucleic acids and disorders associated with it	K3
CO5	Illustrate biological oxidation and mitochondrial shuttle system	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

223CL1A2CB	INTERMEDIARY METABOLISM AND METABOLIC DISORDERS	SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Carbohydrate metabolism and metabolic disorders 12 h

Introduction to metabolism: Types of metabolic reactions- Anabolism, catabolism and amphibolism. Carbohydrate metabolism: Glycolysis, Tri Carboxylic Acid (TCA) cycle, Glycogenesis and Glycogenolysis. Alternative pathways: Hexose Monophosphate (HMP) Shunt, gluconeogenesis (Structures not needed).

Disorders of carbohydrate metabolism: Hypoglycemia. Hyperglycemia- Diabetes mellitus: types, clinical manifestation and diagnosis, Galactosemia and Glycogen storage diseases.

Unit II Lipid metabolism and metabolic disorders 10 h

Lipid metabolism: Fatty acid oxidation – a, ß oxidation (odd numbered fatty acid-propionic acid, even numbered chain fatty acid- palmitic acid), ω oxidation. Biosynthesis of saturated- and unsaturated fatty acids. Biosynthesis of cholesterol (Structures not needed). Disorders of Lipid Metabolism: Hyperlipoproteinemia and Hypolipoproteinemia. Lipid storage diseases: Artherosclerosis, TaySach'sdisease and Niemann - Pick disease.

Unit III Protein metabolism and metabolic disorders 8 h

Protein metabolism: general breakdown of protein- Deamination, Transamination, Decarboxylation and Urea cycle (Structures not needed). Overall reaction and energetics. Disorders of amino acid metabolism and its clinical manifestation: Phenylketonuria, Maple syrup disease, Alkaptonuria and Hartnup's disease.

Unit IV Nucleic acid metabolism and metabolic disorders 10 h

Nucleic acid metabolism: Biosynthesis and degradation of purine and pyrimidine nucleotides- Salvage pathway and denova synthesis (Structures not needed)
Disorders of purine metabolism: Hyperuricemia and Gout, Hypouricemia, Xanthinuria, Von Gierke diseases. Disorders of Pyrimidine metabolism: Orotic aciduria.

Unit V Biological oxidation 8 h

Mitochondrial electron transport chain (ETC): High energy compounds, electron carriers, Synthesis of adenosine tri phosphate (ATP), Electron Transport Chain-components of ETC, Inhibitors of ETC, Oxidative phosphorylation, Inhibitors of oxidative phosphorylation, Mitochondrial shuttle system.

Text Books

1 Jain J L, Jain S and Jain N, 2016, "Biochemistry", Revised Edition, S. Chand and Company Pvt Ltd, New Delhi

2 U.Satyanarayana and U.Chakrapani, 2018, "Biochemistry", 5th Edition, Elsevier, India.

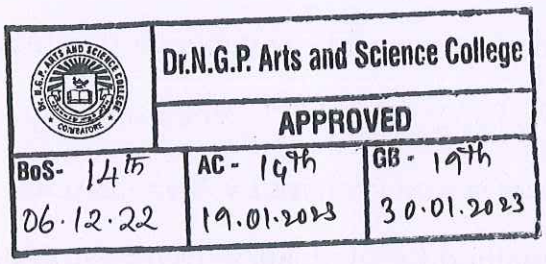
References

1 Burtis C.A, 2005,"Tietz Textbook of Clinical Chemistry and Molecular Diagnosis" 5th Edition, William Heinmann, Medical Books Ltd, New Zealand.

2 Voet D, 2012,"Fundamentals of Biochemistry", 4th Edition, John Wiley and Sons, New Jercy..

3 Nelson D.L., 2017,"Lehninger Principles of Biochemistry", 7th Edition, W.H. Freeman & Co, New York.

4 Murray KR, Granner KD, Mayes PA and Rodwell WV, 2018, "Harper's Biochemistry", 31st Edition, Appleton and Lange Stamford.



223CL1A2CP	CORE PRACTICAL: CLINICAL BIOCHEMISTRY- I	SEMESTER II

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Preparation of buffers
2	Measurement and adjustment of pH
3	Urine collection and Preservation
4	Quantitative analysis of urea in urine
5	Quantitative analysis of uric acid in urine
6	Quantitative analysis of creatinine in urine
7	Quantitative analysis of phosphorus in urine
8	Quantitative analysis of calcium in urine
9	Quantitative analysis of protein in urine
10	Quantitative analysis of sodium and potassium in urine
11	Separation of amino acids by paper chromatography
12	Separation of sugars by thin layer chromatography
13	Separation of serum proteins by SDS - PAGE
14	Strip test method for pregnancy- Demonstration

Note: End Semester Practical Examination requires completion of 12 experiments out of 14.

References

1. Geetha Damodaran.K.2016, "Practical Biochemistry", J. P Medical Publishers Pvt. Ltd.
2. Sawhney S.K., 2005, "Introductory Practical Biochemistry", Narosa Publishers, New Delhi.
3. Rashmi A.Joshi and Manju Saraswat, 2002, A Text Book of Practical Biochemistry", 1st Edition, B.Jain Publishers Pvt. Ltd., New Delhi.
4. Rafi Mohammed, 2020, "Manual Of Practical Biochemistry", 3rd Edition, Orient Blackswan Pvt Ltd.

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Course Code	Course Name	Category	L	T	P	Credit
224IT1A2IP	COMPUTER APPLICATIONS IN CLINICAL LABORATORY	IDC	3	-	4	5

PREAMBLE

This course has been designed for students to learn and understand

- Professional-looking documents, presentations, and spreadsheets.
- Statistical analysis on data.
- Patterns, trends and outliers in large data sets.

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 word processing	K2
CO2	Apply the animation in the presentations	K3
CO3	Prepare and store data in a spreadsheet	K3
CO4	Analyze the Dataset in spreadsheet	K4
CO5	Apply the Data Visualization for various data set	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

224IT1A2IP	COMPUTER APPLICATIONS IN CLINICAL LABORATORY	SEMESTER II

Total Credits: 5

Total Instruction Hours: 84 h

Syllabus

Unit I Word Processing 17 h

Word Processing: Create a word document - Enter, Select and Copy text - Save the document - Correct Proofing Errors - Apply Styles - Insert a Picture - Page Layout - Create a table - convert text to table - Print Document.

1 Create and Format a word documents

2 Create Healthcare Organizational Chart

3 Mail merge for advertising Master Health Check-up

Unit II Presentation software 17 h

Presentationsoftware : Create a Slide - Insert a Picture - Apply a Theme - Animations - Run the Slideshow - Presenter view - Choose and Use the template - Rehearse the timings - Print the slideshow.

4 Preparation of Blood Donation Camp presentation using PowerPoint

5 Create Agenda for clinical laboratory practice

6 Create professional medical presentation using transition

Unit III Spreadsheet 17 h

Spreadsheet: Entering Data in Excel - Transforming and Managing data - Sorting and Filtering - Formulae and Functions: Summing and Subtracting values - Basic calculations - Count function - Text functions.

7 Formatting an Excel Sheet for patient billing statements

8 Sorting and Filtering the Blood group from Blood bank in Excel

9 Calculation using formulae in Excel

Unit IV Data Analysis in Spreadsheet 17 h

Data Analysis: Pivot tables - Create a pivot table - Calculation and grouping - Power Pivot and Power Query - Analysis ToolPak - Activate Analysis ToolPak add-in - Components of Analysis ToolPak - Analyzing data using ToolPak.

10 Import medical data from webpage, text file and remove duplicates

11 Analyze clinical trial dataset using ToolPak

12 Create a Pivot Table for COVID-19 clinical trial dataset with pivot chart

Unit V Data Visualization 16 h

Data Visualization: Charts - Insert a chart - Add or remove chart elements - Different types of charts - Column and Bar charts - Line Charts - Pie Chart or Doughnut chart - Histogram chart - Area Chart - Scatter Chart and Bubble Chart.

13 Visualize the patient history details using chart in Excel

14 Categorize the diabetes dataset and visualize it in various chart elements

15 Classify any medical related dataset and prepare various chart

Text Books

1 Michael Price, 2019, "Office 2019", First Edition, BPB Publication, India.

2 Manisha Nigam, 2020, "Advanced Analytics with Excel 2019", First Edition, BPB Publication, India.

References

1 Lokesh Lalwani, 2022, "Excel 2019 All-in-One", Reprint Second Edition, BPB Publication, India.

2 Joan Lambert, 2016, "Microsoft PowerPoint 2016 Step by Step", First Edition, Microsoft Press.

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BoS- 14th 6.12.22	AC - 14th 19.01.2023	GB - 19th 30.01.2023

221TL1A2AA	PART - IV : BASIC TAMIL	SEMESTER II

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2022 – 23ஆம் 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. ஊர்களின் பெயர்கள் (எண்ணிக்கை 10)

Unit V **பயிற்சிப் பகுதி** 04 h

பயிற்சிப் பகுதி (உரையாடும் இடங்கள்)

வகுப்பறை, பேருந்து நிலையம், சந்தை – பேசுதல், எழுதுதல்.

Notes:

அக மதிப்பீட்டுத் தேர்வு - வினாத்தாள் அமைப்பு முறை — மொத்த மதிப்பெண்கள் -50

பகுதி – அ	
சரியான விடையைத் தேர்வு செய்தல்	10x2=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 - 2022-2023 , தொகுப்பு: தமிழ்த்துறை , டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி , கோயம்புத்தூர் – 641048, 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.

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BoS- 14th	AC - 16th	GB - 19th
6.12.22	19.01.2023	30.01.2023

221TL1A2AB	PART- IV:ADVANCED TAMIL	SEMESTER II

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2022– 2023 ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது

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

(பருவத் தேர்வு இல்லை)

Syllabus

Unit I **கவிதைகள்** 06 h

1தமிழ்நாடு - 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 - 2022-2023 , 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,சென்

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

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Course Code	Course Name	Category	L	T	P	Credit
225CR1A2AA	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 FOCUSES ON:

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

225CR1A2AA	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.

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).

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.

Text Books

1 LalitParmar, 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, BharatiyaVidyaBhavan Publications, Mumbai.

2 Paras Diwan and PiyushDiwan, 1994, "Women and Legal Protection", South Asia Books, Andhra Pradesh.

3 Venkataramand 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.

6/12/22
BoS Chairman/HoD
Department of Clinical Laboratory Technology
Dr. N. G. P. Arts and Science College
Coimbatore – 641 048

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221TL1A3TA	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 நாயனார் புராணம்

Unit III **சிற்றிலக்கியங்கள்** 10 h

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

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

Unit IV **இலக்கிய வரலாறு** 10 h

1.காப்பியங்களின் தோற்றமும் வளர்ச்சியும்

2.சிற்றிலக்கியங்களின் தோற்றமும் வளர்ச்சியும்

3.நாடகத்தின் 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 : மத்திய மற்றும் மாநில அரசு விருது பெற்ற தமிழ்த் திரைப்படங்கள் மட்டும்

Text Book

1 தமிழ் மொழிப்பாடம் - 2022-2023, 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
221TL1A3HA	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

221TL1A3HA	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

संवाद लेखन

Unit V 08 h

अनुवाद अभ्यास-III (केवल हिन्दी से अंग्रेजी में)

(पाठ 10 to 20)

Text Books

1 प्रकाशक: जवाहर पुस्तकालय सदर बाजार, मथुरा उत्तर प्रदेश-281001 (Unit I)

2 आचार्य रामचन्द्र शुक्ल लोकभारती प्रकाशन इलाहाबाद. (Unit II)

3 प्रकाशक: विनोद पुस्तक मंदिर आगरा-282002 (Unit III)

4 पुस्तक: व्याकरण प्रदिप - रामदेव प्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024 (Unit IV)

5 प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17 (Unit V)

Course Code	Course Name	Category	L	T	P	Credit
221TL1A3MA	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

221TL1A3MA	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

Vayalar Ramavarma

Unit V **Poetry** 08 h

Vayalar Ramavarma

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
221TL1A3FA	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

221TL1A3FA	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 : Regine Mérieux, Yves Loiseau (Unit I to IV)

Course Code	Course Name	Category	L	T	P	Credit
221EL1A3EA	PROFESSIONAL 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 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	Assume the sentence construction and paragraph development	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

221EL1A3EA	PROFESSIONAL ENGLISH - III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Listening 08 h

Listening is casual conversation and small group and conference setting - Listening for factual - Developing Listening skills - Listening to Situation - Why do we avoid Listening - poor listening disadvantages of - Poor listening vs Effective Listening - Advantages of effective listening

Unit II Reading 09 h

Effective reading - Benefits of effective reading - Differences between efficient and inefficient readers- Four Basic steps of Effective Reading - Stumbling blocks in becoming an effective Reader- Tips to improve reading comprehension skills

Unit III Speaking 10 h

Purpose of General situation- Advantages of Conversations - Features of a good conversation- Tips for improving conversation - Public speakers - importance of public speaking- (Speeches for special occasions) – preparatory steps for speaking - Structuring the contents - Audience Awareness - Mode of Delivery

Unit IV Advanced English and Writing Skills 11 h

Common Errors in English-Vocabulary Building-Words often confused-Importance of professional content - Using Word's Effectively - Writing effective sentences – Building Effective paragraph - Proof reading-Writing a Resume-Cover Letter-Business Letters

Unit V Soft Skills 10 h

Introduction-What are soft skills?- Importance of soft skills- Attributes regarded as soft skills- soft skills- Social- Soft skills-Thinking- soft skills-Negotiating-Exhibiting your soft skills-Identifying your soft skills-Improving your soft skills-Will formal training enhance your soft skills- Soft Skills training-Train Yourself-Practicing soft skills-Measuring attitude

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. Mohan, Krishna and Banerji, Meera. 2009. Developing Communication skills. 2nd Edition, Macmillcan, India. (Unit I,II, III, IV)
3. Kumar, Sanjay and Lata Pushp. 2018. Language and Communication Skills for Engineers. First Edition, Oxford University Press, India. (Unit I,II, III)
4. Alex. Soft Skills. 2009. S. Chand Publishing, New Delhi, India. (Unit V)

References

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

Course Code	Course Name	Category	L	T	P	Credit
223CL1A3CA	CLINICAL PATHOLOGY	CORE	5	-	-	5

PREAMBLE

This course has been designed for students to learn and understand

- The terminologies used in clinical laboratory
- The techniques in clinical pathology
- The normal and abnormal components of body fluids

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the overall organization, documentation and quality control in the laboratory	K2
CO2	Demonstrate a working understanding of the urine chemistry and pathogenesis of diseases	K3
CO3	Interpret a working understanding of the stool chemistry and pathogenesis of diseases	K3
CO4	Illustrate the various body fluids and interpretation of laboratory data	K3
CO5	Extend the basics of semen collection, analysis and interpretation	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

223CL1A3CA	CORE : CLINICAL PATHOLOGY	SEMESTER III

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I Analytical Measures 12 h

Analytical measures-Importance of pre-analytical measures and post-analytical measures, generation of request, instructions for sample collection, rejection criteria and preservation, dispatch of reports, records keeping, coding and indexing

Unit II Urine Analysis 12 h

Formation of urine, Macroscopic Examination -Volume, Colour, transparency, pH and Specific gravity. Normal and Abnormal constituents in urine. Microscopical examination - Cells (RBC, WBC), casts, crystals, Bacteria. Detection of microalbumin and 24 hours urine protein estimation (Isomorphic and dismorphic RBCs)

Unit III Stool Analysis 12 h

Macroscopicexamination and Microscopic examination of motion for colour, mucus, consistency, ova, ameba, cysts, parasites, pus cells, RBC and crystals. Detection of occult blood in stool and concentration techniques

Unit IV Body Fluids 12 h

Examination of body fluids, cell counts and biochemical Analysis : Collection and preservation, Examination of ascitic fluid , pleural fluid, synovial fluid collection and examination, pericardial fluid collection and examination, cerebro spinal fluid and amniotic fluidand pathological studies

Unit V Semen analysis 12 h

Sample Collection protocol, Macroscopic Examination and Microscopic examination of semen, liquefactiontime, volume, colour, pH, motility of sperm, sperm count and other findings. Staining, morphological study, pathophysiology and vitality of spermatozoa, semen fructose determination and antisperm antibodies

Text Books

1 Sood R, 1996.Laboratory technology (Methods and interpretations) 4th Ed. J.P. Bros, New Delhi

2 Mukherjee KL, 2010.Medical Laboratory Technology-A procedure manual for routine Diagnostic tests -Volumes I, II, III. Tata McGraw Hill Publishing Company ltd. New Delhi.

References

1 Satish K. Gupta, 1991.Text book of medical laboratory for technicians,8th edition, J.P. Bros, New Delhi.

2 William F.Ganong.2005. Review of Medical Physiology, 22nd edition, McGraw Hill, New Delhi.

3 Gupta, M.L, 2002. General Pathology Review, 2nd edition, C. B. S Publishers, New Delhi.

4 Talib V.H., 2014. Handbook of Medical Laboratory Technology, Vol. 1, 2nd Ed., CBS Publishers, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A3CB	HISTOPATHOLOGY	CORE	5	-	-	5

PREAMBLE

This course has been designed for students to learn and understand

- The terminologies used in histopathology
- The techniques in histopathology
- The museum techniques and ICDS classifications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand basic concepts, techniques and methods in histopathology	K2
CO2	Describe the instruments and its applications employed in histotechniques	K3
CO3	Learn about principle, working, instrumentation, types and applications of microscopes	K3
CO4	Know the principle, concepts, techniques of section making, staining and mounting process	K3
CO5	Recognize about record maintenance, microphotography, museum techniques and ICDS classifications	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

223CL1A3CB	CORE : HISTOPATHOLOGY	SEMESTER III

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to histopathology 12 h

Guidelines for receiving specimen in laboratory –Examination of specimen, specimen containers, Grossing and Preservation. Preservatives - Various fixatives – Mode of action, Indications, preparation, Decalcification, Processing of tissues for routine paraffin sections and methods of embedding, Introduction on different types of stains, Discarding of histopathological specimens and safe disposal of reagents.

Unit II Instrumentation 12 h

Tissue Processor- Difference between Manual tissue processor and Automated tissue processor, Types of microtome, Parts of Microtome- knives and Knife sharpener, Instruments for grossing, Automatic slide stainer, Automated cover slipper and Digital slide scanner.

Unit III Microscopy 12 h

Principle and Types of Microscopy - . Use of microscope – Polarisers, Introduction to Electron Microscopy, Introduction to immunohistochemistry and preparation and processing, technique of preparing slides, Types of glass slides and cover slips.

Unit IV Frozen section techniques 12 h

CO2 Freezing, cryostat and freezing microtome. Principles and techniques of sections cutting, staining and staining principles, preparation of reagents and techniques , routine staining ,special staining (any five) , Mounting techniques and care of cryostat.

Unit V Maintenance of records 12 h

Maintenance of records, filing and storage of specimen, wax blocks and slides. Microphotography – Photography and interfacing technique. Museum technology - preservation and organisation, Coding - ICDS – Introduction and importance.

Text Books

1 Sood R, 2009. Laboratory technology (Methods and interpretations) 6th Edition, J.P.Bros, New Delhi

2 Mukherjee K L 2010.Medical Laboratory Technology-A procedure manual for routine Diagnostic tests -Volumes I, II, III. Tata McGraw Hill Publishing Company ltd. New Delhi.

References

1 Culling C F A, 1983. Histopathology Techniques.3rd Edition Butterworth - Heinemann Publication, London

2 Matthew J Lynch, 1996. Lynch's medical laboratory Technology.3rd Edition, W.B Saunders Co Publications

3 Todd J C, Davidson I and Henry J B 2016.Clinical diagnosis by laboratory methods. 22nd Edition, Saunders Publications Pvt. Ltd, Pennsylvania

4 Todd J C, Davidson I and Henry J B 2016.Clinical diagnosis by laboratory methods. 22nd Edition, Saunders Publications Pvt. Ltd, Pennsylvania

223CL1A3CP	CORE PRACTICAL: PATHOLOGY	SEMESTER III

Total Credits: 3
Total Instructions Hours: 72h

S.No	CONTENTS
1	Collection ,Preservation and Physical Examination of urine
2	Chemical Examination of urine
3	Microscopic Examination of urine
4	Physical Examination of Stool
5	Chemical Examination of stool
6	Microscopic Examination of stool
7	Preparation of staining reagents
8	Preparation of various fixatives
9	Tissue processing
10	Tissue embedding and Section cutting
11	Staining and mounting of tissues
12	Body Fluids - CSF, Pleural, Peritoneal, Synovial, Semen Analysis-Demonstration

References

1. Sood R, 1994 Medical Laboratory Technology, Jaypee Brothers, New Delhi
2. Mukherjee, KL 2010. Medical Laboratory Technology-A procedure manual for routine diagnostic Tests - Volume 1, 2 and 3, Tata McGraw Hill Publishing Company ltd, New Delhi
3. Chakraborty, P.2002.Practical Pathology, Reprint, New Central Book Agency, Kolkata

Course Code	Course Name	Category	L	T	P	Credit
223FN1A3IA	CLINICAL NUTRITION	IDC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The basic concepts of nutrition and health
- The nutritional requirements and nutritional disorders
- The role of diet in prevention and treatment of diseases

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand basic concepts of nutrition , health, essential nutrients, food habits and food groups	K3
CO2	Understand the physiological role and nutritional significance of carbohydrates, lipids and protein	K3
CO3	Know the energy content of foods, nutritional requirements and conditional nutritional disorders	K3
CO4	Interpret and identify primary nutritional diseases and Basic concept of high protein low caloric weight reduction diets	K3
CO5	Identify the role of diet and nutrition in prevention and treatment of 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

223FN1A3IA	IDC : CLINICAL NUTRITION	SEMESTER III

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Introduction to nutrition 7 h

Function of foods and its relation to nutrition and health, essential nutrients, analysis of food composition, food habits and food groups. Role of water and fat soluble vitamins, minerals and antioxidants in health. Required dietary allowance for an average adult.

Unit II Nutrition 7 h

Physiological role and nutritional significance of carbohydrates, lipids and protein. 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. Classification of amino acids – their role in growth and development.

Unit III Energy content of foods 7 h

Measurement of energy expenditure, physical activity and energy utilization of cells. Energy requirements of men and women and factors affecting energy requirements. Role of dietary fibers in nutrition. Conditional nutritional disorders: Disorders of gastrointestinal tract, liver, biliary tract, pancreas, heart and Diabetes.

Unit IV Primary nutritional diseases 8 h

Protein energy malnutrition (Marasmus and Kwashiorkar), Starvation, Protein metabolism in prolonged fasting. Protein sparing action. Basic concept of high protein low caloric weight reduction diets. Obesity, Vitamin deficiency disordersHypervitaminosis, vitamin A deficiency, vitamin D deficiency, vitamin B12 deficiency and vitamin K deficiency. Minerals –iron and types of anemia, calcium and iodine deficiency.

Unit V Clinical Nutrition 7 h

Role of diet and nutrition in prevention and treatment of diseases: Dental Caries, Fluorosis, Atherosclerosis and Rheumatic disorders. Inherited metabolic disorders: Phenylketonuria, Maple Syrup disease, Homocystinuria & Alkaptonuria.

Text Books

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

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

References

1 Swaminathan M. S, 1985. Essentials of Food and Nutrition, 2nd Edition, Bangalore Press. .

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

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

4 Gibney, Margetts and Kearney, 2013. Public Health Nutrition, The Nutrition Society, Blackwell Science.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A3SA	LABORATORY AUTOMATION AND QUALITY CONTROL	SEC	3	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- The organization and basic needs of clinical laboratory
- The maintenance of common equipments
- The internal ,external quality control and bar coding

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the organization of clinical Laboratory and basic needs of clinical laboratory	K2
CO2	Know the maintenance and care of common laboratory glassware and common equipments	K3
CO3	Recognize common terms used in quality control, Internal and External quality control	K3
CO4	Identify the autoanalyzer and different types of analyzers and barcoding	K3
CO5	Perceive the Laboratory informatics, laboratory information management system	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

223CL1A3SA	SEC : LABORATORY AUTOMATION AND QUALITY CONTROL	SEMESTER III

Total Credits: 2
Total Instruction Hours: 36 h

Syllabus

Unit I **Clinical Laboratory** 7 h

Functional components of clinical laboratories, cleanliness, precautions to be taken with respect to patients, reports and analysis. Communication between physician, patients and the medical laboratory professional. Basic needs of clinical laboratory technician and awareness of soft skills.

Unit II **Laboratory glassware and equipments** 7 h

Identification, use and maintenance of equipments, Handling and cleaning of common laboratory glassware. Principle and use of Centrifuge, Colorimeter, Oven, Incubator, Laminar air flow chamber, Microscope, Neubauer chamber, Autoclave and Makler chamber for Semen analysis.

Unit III **Quality Control in Clinical lab** 7 h

Quality Assurance in clinical Laboratory - Introduction, Common terms used in Quality control (QC), Westgard rules and L.J. Chart. External QC and Internal QC, Proficient testing and inter lab comparison -Assessment, corrective action and preventive action. Total Quality management- water quality, electrical stability, equipment calibration, glassware and preventive measures.

Unit IV **Automation in Clinical Laboratory** 8 h

Automation and Recent advances - Need for Automation, Advantages of Automation Types of Auto Analysers - Semi and Fully automated, Routine biochemistry analysers, Ion selective electrodes (ISE), Immuno-based analysers, Hematology analysers - Cell counters, Coagulometers, ESR Analyser, Peripheral smear makers and stainers, Platelet aggregation analysers , Bar coding and Total Laboratory Automation (TLA)

Unit V **Laboratory informatics** 7 h

Laboratory informatics- data acquisition, data processing, laboratory information management system (LIS), scientific data management and Hospital information management system (HIS). Auto validation of reports and Artificial intelligence in lab.

Text Books

1 Kanai L. Mukherjee, 2010, Medical laboratory technology Vol.1, 2nd Edition,Tata McGraw Hill

2 Fischbach, 2015. Manual of lab and diagnostic tests, 9th Edition, Lippincott Williams Wilkins, New York.

References

1 Gradwohls, 2000. Clinical laboratory methods and diagnosis. (ed) Ales C. Sonnenwirth and leonardjarret, M.D.B.I., New Delhi.

2 J Ochei and Kolhatkar, 2002. Medical laboratory science theory and practice, Tata McGraw- Hill, New Delhi.

3 A Dasgupta and A Wahed, 2014. Clinical Chemistry, Immunology and Laboratory Quality Control, (1st edition) Elsevier.

4 Kumar, Vijay, Gill, Kiran Dip, 2018. Basic Concepts in Clinical Biochemistry: A Practical Guide. Springer Singapore.

223CL1ASSA	SELF STUDY: DISASTER MANAGEMENT	SEMESTER III

Total Credits: 1

Syllabus

Unit I Natural Disasters

Natural Disasters - Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, Volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion

Unit II Man Made Disasters

Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents

Unit III Disaster Preparedness

Disaster Preparedness: Concept & Nature, Disaster Preparedness Plan, Disaster Preparedness for People and Infrastructure

Unit IV Disaster Management

Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements

Unit V Organizations in disaster management

Role of various organizations in disaster management- Role of NGOs, community – based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations

Text Books

1. Together Towards a Safer India Part III, Central Board of Secondary Education, 2006
2. Natural Hazards and Disaster Management, Central Board of Secondary Education, 2006

References

1. Sharma, R.K. & Sharma, G. (2005) (ed) Natural Disaster, APH Publishing

223CL1ASSB	SELF STUDY: COMMUNITY MEDICINE	SEMESTER III

Total Credits: 1

Syllabus

Unit I **Concepts of health**

WHO definition of health; Positive health, Determinants of health, Responsibility for health. Health service philosophies: - Health case, Health system, Levels of health case. Concepts of disease and concept of causation – germ theory of disease, Epidemiological triad, Multifactorial causation.

Unit II **Nutrition and Health**

Definition: Food, Nutrition, Classification of foods, Sources and functions of Proteins, fats, carbohydrates. Souces and functions of vitamins and minerals. Balanced Diet – PEM , Malnutrition and its effects – Kwashiorkor and Marasmus.

Unit III **Environment and Health**

Basic health requirements in the environment; Water: Sources and uses of water, Water pollution; Air: Composition and cause of discomfort; Air pollution: Source, Air pollutants, need for proper ventilation.

Unit IV **Microbiology of the environment**

Microbiology of air, water and soil; Air, water, food and soil borne diseases. Bacteriological examination of air, water, milk and other food stuff. Surveillance cultures in the ICU's and other high risk areas, Zoonotic diseases, their epidemiology and diagnosis; Ornithosis

Unit V **Epidemiology in health and disease**

Definition of epidemics, endemics and pandemics; Study of an epidemic; Factors related to environment and host; Host – parasite interactions; Virulence factors of microbes; Epidemiology and molecular biology of antibiotic resistance

Text Books

1 Park. K., 2011 - Social and preventive medicine, 18th edition, Bhanot publishers.

2 Patil R.S., 1995 Practical Community Health, Vora medical publisher.

References

1 Ashtekar. S., 2001Health and Healing – A Manual of Primary health care, Orient Longmans publishers..

2 Dash. B.N., 2003, Health and physical, Neelkamal, 2nd Edition.

3 Text Book of Epidemiology—Leon Gordis..

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

Dr.N.G.P. Arts and Scn.
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9/6/2023	14/7/2023	5/8/2023

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Dr.N.G.P. Arts and Science College

Course Code	Course Name	Category	L	T	P	Credit
221TL1A4TA	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

221TL1A4TA	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 - 2022- 23

1 தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, வெளியீடு : நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை – 600 098. (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
221TL1A4HA	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

221TL1A4HA	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 – डॉ 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
221TL1A4MA	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

221TL1A4MA	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
221TL1A4FA	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

221TL1A4FA	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

ExprimerPaccordou 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. Raconterunsourvenir.

Unit III 10 h

° Parlerde Pavenir.	Discuter de l'organisation d'un voyage de groupepuisprépar erune 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. °Décrirequel qu'u n	Discuter de l'organisation d'un voyage de groupepuisprépar erune 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 : ReginеMérieux, Yves Loiseau(Unit I to IV)

Course Code	Course Name	Category	L	T	P	Credit
221EL1A4EA	PROFESSIONAL ENGLISH - IV	LANGUAGE- II	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the skill-based learning for better communication
- the prevalent issues logically and present coherently
- the ideas accurately and clearly

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Develop the ability to appreciate ideas and think critically	K1
CO2	Integrate academic success into practical life skills	K2
CO3	Express challenges of a competitive environment and select the profession that best suits them	K2
CO4	Discuss with confidence in conversations, to initiate, sustain and close a conversation	K3
CO5	Identify a sense of social commitment	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

221EL1A4EA	PROFESSIONAL ENGLISH - IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Career 08 h

Leadership- Everyday leadership- Everyday leaders motivation- Qualities of a good leader- Professionalism- Creativity- Practical Application- Ways to become more creative- Six Thinking hats techniques

Unit II Art of Promoting 11 h

Selling your skills- Neuromarketing as a tool for influencing leaders- Using neuromarketing and psychology to get ahead- Recruiters and Clients decision making skills- Three steps to use neuromarketing for a successful life- Attention- storytelling- Perception and reputation- Recognize opportunities and openings before the competition- observation– Matching yourself with your leaders

Unit III Facing Challenges 10 h

Introduction-Panicky people- Negative people- Positive people- Facing challenges and taking initiatives – Importance of youth to face challenges and take initiative Benefits of Facing challenges- Facing challenges in life

Unit IV Effective Decision Making 10 h

Decision Making Process- Methods of Decision Making- Steps in DM- Theoretical Approaches to individual Decision Making- Optimizing Decision Theory- The Subjective Expected Utility Model- Steps to Effective Decision- Making- Effective Decision Making in Terms- Methods for team decision making- Confusion and decision making- Decision making styles

Unit V Practising Corporate Social Responsibility (CSR) 09 h

Corporate Social Responsibility (CSR)- definitions- Goal- Areas- Need- Benefits - Argument in favour/against of CSR- Factors that promote CSR – Limitations for implementing- India and Corporate Social Responsibility- Activities carried out by Companies in India- List of projects for funding under CSR- Implementation of CSR commitments

Text Books

1 Sharma, Prashant. 2022. Soft Skills. BPB Publications, 3rd Edition, New Delhi, India. (Unit I & II)

2 Alex. 2013. Managerial Skills. S. Chand Publishing, New Delhi, India. (Unit III to V)

3 Alex. 2009. Soft Skills. S. Chand Publishing, New Delhi, India. (Unit II)

4 E H McGrath S J. 2011. Basic Managerial Skills for All, 9th Edition, New Delhi, India. (Unit III)

References

1 Adair J. 1986. Effective Team Building: How to make a winning team. Pan Books, London, United Kingdom.

2 Dhanavel S P. 2010. English and Soft Skills, Orient Blackswan, Hyderabad, India.

3 Singh S R. 2011. Soft Skills. APh Publishing Corporation, New Delhi, India.

4 Lakshminarayanan K R, Murugavel T. 2015. Managing Soft Skills. Scitch Publications, Chennai, India.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A4CA	MOLECULAR BIOLOGY	Core	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- Fundamental knowledge in molecular biology
- Concepts of central dogma of life
- Mutation and repair mechanism

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 molecular genetics and central dogma of life.	K2
CO2	Know the mechanism of DNA synthesis and regulation.	K3
CO3	Know the mechanism and regulation of transcription.	K3
CO4	Understand translation mechanism and regulation.	K3
CO5	Understand the concept of mutation and repair mechanism.	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

223CL1A4CA	MOLECULAR BIOLOGY	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Genetic material 07 h

DNA- structure and types, DNA as a genetic material: - Griffith, Hershey –Chase experiment. Central dogma of life, Concepts of Gene and Genome. Genetic code Codon and anticodon.

Unit II Replication 07 h

DNA replication in Prokaryotes-Enzymes involved- Mechanism of replication Theta type replication. DNA replication in Eukaryotes - Enzymes and mechanism of replication. Regulation of replication in prokaryotes and eukaryotes.

Unit III Transcription 08 h

Prokaryotic transcription mechanism - Enzymes and Transcription factors, transcription mechanism. Eukaryotic transcription - Enzymes and transcription factors, Mechanism of transcription. Post transcriptional modification - Capping, polyadenylation, splicing, Micro RNA, RNA editing and gene silencing.

Unit IV Translation 07 h

Protein synthesis in prokaryotes and eukaryotes- activation, initiation, elongation and termination of protein synthesis. Inhibitors of protein synthesis, Post translational modification, Gene regulation- lac operons and trp operons.

Unit V Mutation 07 h

Definition, causes of mutation; mutagens and carcinogens; Types of mutation missense, nonsense, insertion, deletion, duplication, frame shift mutation; Transposons, site directed mutagenesis. DNA repair mechanisms -Direct enzymatic repair, Base excision repair, Nucleotide excision repair, Mismatch repair, Recombinational repair mechanism.

Text Books

1 Robert Schleif, 1993, "Genetics and Molecular Biology", 2nd Edition, The Johns Hopkins University Press ltd, London.

2 Rastogi, S.C., 2012, "Cell and Molecular Biology", 3rd Edition, New age International Publishers, India.

References

1 Lodish, H. et al, 2003, "Molecular Cell Biology", 5th Edition, USA.

2 Cooper, G.M., Hausman, R.E, 2009, "The cell: Molecular approach", 5th Edition , American Society of Microbiology press, USA

3 Karp, G., 2007, "Concepts and Experiments", 5th Edition, John Wiley and Sons, USA.

4 Freifelder ,D.and Malacinski,G.M ,1996, "Essential of Molecular Biology", 2nd Edition, Panima publishing Co., New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A4CB	CLINICAL BIOCHEMISTRY - FUNCTIONAL TESTS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The significance of organ function tests in diagnosis
- The function of human body and pathophysiological conditions
- Common diseases and the chemical and biochemical methods used to study

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Examine the functions and pathophysiology of Gastric and pancreatic secretions	K2
CO2	Understand the functions and pathophysiology of Intestinal function	K3
CO3	Understand the significance functions and pathophysiology of Liver	K3
CO4	Understand the significance and pathophysiology of kidney	K3
CO5	Understand the significance and pathophysiology of hormonal secretions	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

223CL1A4CB	CLINICAL BIOCHEMISTRY - FUNCTIONAL TESTS	SEMESTER IV

Total Credits: 4
Total Instruction Hours: 48 h

Syllabus

Unit I Gastric function 8 h

Introduction, Tests for gastric function - The Insulin Stimulation test, determination of Gastrin in serum and Tubeless gastric analysis. Pancreatic function: Introduction, pancreatic function tests, serum amylase and lipase; direct stimulation test, indirect stimulation test

Unit II Intestinal function 10 h

Introduction, Intestinal function, Test used in the diagnosis of malabsorption, determination of total faecal fat (fat balance test), test of monosaccharide absorption (Xylose excretion test)

Unit III Liver function 10 h

Introduction, bilirubin metabolism and jaundice, Types of Jaundice, Liver function tests: Estimation of conjugated Unconjugated and total bilirubin in serum (Diazo method), total protein- Albumin globulin ratio, detection of bilirubin and bile salts in urine (Fouchet's test and Hay's sulphur test), Prothrombin time.. Serum enzymes in liver disease – Alkaline Phosphatase, SGPT, SGOT, Gamma GT and Lactate dehydrogenase (LDH)

Unit IV Kidney Function 10 h

Introduction, Urine collection and Preservation, physical examination of urine, elimination tests, Clearance tests - Clearance formulas, Creatinine clearance and Urea clearance tests, Blood urea, serum creatinine and electrolytes – sodium ,potassium ,calcium and phosphorus, Micro albumin, protein creatinine ratio, renal blood flow and filtration fraction.

Unit V Hormone function 10 h

Endocrine function tests- Thyroid stimuting hormone (TSH), T3 and T4, Diagnostic importance of TSH, vitamin D, Pancreatic hormone – Insulin and its clinical significance. Follicle Stimulating hormone, Leutinizing hormone, Growth hormone, Adrenal hormones- cortisol, Gonadal hormone-Testosterone and estradiol- Clinical significance.

Text Books

1 Burtis CA, Ashwood ER and Bruns DE (eds), 2005, "Tietz Textbook of Clinical Chemistry and Molecular Diagnosis", 5th edition, William Heinmann, Medical Books Ltd, New Zealand

2 Mayne PD, 1998, "Clinical Chemistry in Diagnosis and Treatment", 6th Edition, Hodder Arnold Publications, London

References

1 Swaminathan R, 2004, "Handbook of Clinical Biochemistry", 1st Edition, Oxford University Press, London..

2 Devlin T M, 1997, "Textbook of Biochemistry with Clinical Correlations", 1st Edition, John Wiley & Sons, New York.

3 Khurana I and Khurana A, 2014, "Textbook of Anatomy and Physiology for Nurses and Allied Health Sciences", 1st Edition, CBS Publishers and Distributors, New Delhi

4 Chatterjee, C C, 2005, "Human Physiology", 10th Edition, Medical Allied Agency, Kolkata.

223CL1A4CP	CORE PRACTICAL: CLINICAL BIOCHEMISTRY - II	SEMESTER IV

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Blood Collection and Serum Separation.
2	Estimation of Urea in Serum.
3	Estimation of Uric acid in Serum.
4	Estimation of Creatinine in Serum.
5	Estimation of Phosphorus in Serum.
6	Estimation of Protein in Serum.
7	Estimation of Glucose in Serum.
8	Estimation of Cholesterol in Serum.
9	Estimation of Sodium and potassium in Serum.
10	Assay of Alkaline phosphatase in Serum.
11	Assay of Alpha- Amylase in Serum.
12	Assay of SGPT & SGOT in Serum.
13	Assay of Gamma GT in Serum.

Note: End Semester Practical Examination requires completion of 12 experiments out of 13

References

1. Wilson K and Walker J, 2000, "Practical Biochemistry" 5th Edition, Cambridge University Press, UK.
2. Plummer D T, 2004, "Practical Biochemistry", 3rd Edition, Tata McGraw Hill Publisher Pvt. Ltd, New Delhi.
3. Sadasivam,S. and Manickam,A 2008, "Biochemical methods" Revised second edition, New age International, New Delhi.
4. Devlin T M, 1997, "Textbook of Biochemistry with Clinical Correlations" 1st Edition, John Wiley & Sons, New York.

Course Code	Course Name	Category	L	T	P	Credit
223MB1A4IA	BASIC MICROBIOLOGY	IDC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- History and Scope of Microbiology
- Microscopy , staining, Sterilization methods and Culture media
- General characteristics of Fungi, Algae and Protozoa

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Provide the details about the History of Microbiology	K1
CO2	Gives technical ideas about the handling of Microscopes develop route map for bacteriological study	K1
CO3	Understand the aseptic techniques which are applicable in day today life	K2
CO4	Describe the cultivation of various types of microbes and their handling.	K2
CO5	Interpret the knowledge of fungi and Algae for human welfare.	K3

MAPPING WITH PROGR6AMME OUTCOMES

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

COURSE FOCUS ON:

☑ Skill Development	☐ Entrepreneurial Development
☑ Employability	☐ Gender Sensitization
☐ Intellectual Property Rights (IPR)	☐ Social Awareness / Environment
☐ Innovations	☐ Constitutional Rights / Human Values / Ethics

223MB1A4IA	BASIC MICROBIOLOGY	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I History of Microbiology 7 h

History and Scope of Microbiology- Spontaneous generation theory and its disproval- Contribution of Leuwenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Joseph Lister, Jchn Tyndall, Salmon A. Waksman.

Unit II Microscopy and Staining 7 h

Microscopy- Principles and Applications – Bright field , Dark field, Confocal, TEM and SEM. Staining- Staining reactions- Types of staining- Simple, Differential (Gram, Spore, AFB).

Unit III Methods of Sterilization 7 h

Sterilization and Disinfection- Principles, Methods of Sterilization- Physical methods- Dry heat, Moisture heat, Filtration and Radiation. Chemical Methods- Formaldehyde, Alcohol, Phenol and gaseous Sterilizing agents. Sterility testing

Unit IV Culture Methods 7 h

Culture media- Types of media- Enriched, Selective, Differential and Special purpose media, transport media (Stuart's media). Media for anaerobic (Robertson cooked meat medium), Pure culture techniques -Maintenance and Preservation of Microbial cultures

Unit V General characteristics of fungi, Algae and Protozoa 8 h

Morphology, General characteristics and Economic importance of fungi (*Aspergillus sp,*) Algae (Spirogyra) Protozoa (Nostac)

Text Books

1 Joanney Wiley, Linda Sherwood, Christopher J Woolverton, 2016, Prescott's Microbiology, 10th edition, Mc Graw Hills company and New york, United States.

2 Michael J Pelczar, JR Chan ECS, Noel R K Rieg, 1985, Microbiology, 5th edition Mc Graw Hills company and New york, United States.

References

1 Salley AJ, 2014 Fundamental Principles of Bacteriology, 7th edition, TATA Mc Graw Hills publishing company and New york, United States

2 Michael Madigan, John Martinko, Kello bender, Daniel buckley and David Stahl,2015, Brock Biology of Microorganism, 14th edition Pearsons education LTd,and London, UK.

223MB1A4IP	IDC PRACTICAL: MICROBIOLOGY	SEMESTER IV

Total Credits: 2
Total Instructions Hours: 60h

S.No	Contents
1	Safety precautions in Microbiology Laboratory
2	Handling Use and care of instruments- Inoculation loop, Hot air Oven, Autoclave, Laminar Air flow chamber, Incubator, Anaerobic jar, Centrifuge and Metabolic shaker.
3	Culture Media Preparation liquid and solid : Streak plate, Pour plate and Spread plate method
4	Preparation of differential medium and selective medium (EMB & MacConkey, Mannitol Salt Agar.)
5	Staining Technique: Simple
6	Staining Technique: Gram Staining
7	Staining Technique: Acid Fast staining
8	Determination of motility in bacteria- Hanging drop method
9	Isolation of bacteria from Air
10	Isolation of bacteria from Soil
11	Cultural characteristics of Aspergillus sp, Penicillium sp and Candida sp
12	LPCB staining for fungal identification

Note: 10 Experiments mandatory out of 12

References

1 James. C. Cappuccino, 2017. Microbiology A Laboratory manual. 11th edition, Pearson education publishers.

2 Aneja K. R. 2012 Experiments in Microbiology, plant pathology and biotechnology, 4th edition, New age publishers.

3 Kannan. N 2003. Hand book of Laboratory culture media . 1st edition, Panima publishers house.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A4SA	BLOOD BANKING AND BLOOD TRANSFUSION	SEC	3	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- The basic concept of blood grouping and transfusion process
- The hemolytic disorders and transfusion reactions
- The organization and functioning of blood bank

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 blood grouping system	K2
CO2	Apply screening methods of cross matching	K3
CO3	Know the criteria for donor selection and screening tests	K3
CO4	Understand blood transfusion reactions	K3
CO5	Understand the organization of blood bank	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

223CL1A4SA	BLOOD BANKING AND BLOOD TRANSFUSION	SEMESTER IV

Total Credits: 2

Total Instruction Hours: 36 h

Syllabus

Unit I Blood Grouping System — 07 h

Blood Grouping System; ABO Blood group system, Rh typing and weaker variants in Rh system, Subgroup and weaker variants of A and B and Bombay phenotype

Unit II Antibodies and Cross matching — 07 h

Antibodies and Cross matching: Coomb's cross matching - Direct and Indirect method, Preparation and standardization of anti human globulin reagent, Auto and allo antibodies, Major and Minor Cross matching – Tube method, Slide method and Gel method

Unit III Donors and blood donation — 07h

Donors and blood donation: Donor selection – donor eligibility criteria, Importance of Donor consent. Phlebotomy- Blood collection methods, Storage of whole blood , Serological screening test on donor's blood sample. Autologous donation and specialized donation. Apheresis and plasmapheresis. Role of irradiation, Discarding of positive and expired blood

Unit IV Transfusion Reaction — 08 h

Transfusion Reaction: Storage of whole blood, Preparation of blood components-Anticoagulants, Preservation and storage. Hemolytic disease of newborn, blood transfusion reaction-acute transfusion reactions and delayed transfusion reactions, Transfusion related complications- Transfusion-related acute lung injury (TRALI), Transfusion associated circulatory overload and investigation of transfusion reaction, Documentation in blood bank

Unit V Organization of blood bank — 07 h

Organization of blood bank: Area for whole blood and components, staff requirement, equipment requirement for whole and component blood preparation, process of licensing. Discarding of blood bank wastes

Text Books

1 Mukherjee KL, 2010. Medical Laboratory Technology-A procedure manual for routine Diagnostic tests -Volumes I, II, III. Tata McGraw Hill Publishing Company ltd. New Delhi

2 Sood R, 1996. Laboratory technology (Methods and interpretations) 4th Ed. J.P. Bros, New Delhi..

References

1 Blaney K D and Howard P R, 2012. Basic & Applied Concepts of Blood Banking and Transfusion Practices, 3rd Ed, Elsiever Mosby publishers, Missouri.

2 Rudmann S V, 2005. Textbook of Blood Banking and Transfusion Medicine.2nd Ed. Elsiever Saunders publishers, Pennsylvania.

3 Satish Gupte, 2000. The Text book of Blood Bank and Transfusion Medicine, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi..

4 Roa, 2016. Handbook of Blood Banking & Transfusion Medicine. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

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

Dr.N.G.P. Arts and Science College
APPROVED

BoS - 16th	AC - 16th	GB - 21st
16.10.2023	13.12.2023	5.10.2024

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Dr.N.G.P. Arts and Science College

Course Code	Course Name	Category	L	T	P	Credit
223CL1A5CA	IMMUNOLOGY	CORE	5	-	-	5

PREAMBLE

This course has been designed for students to learn and understand

- The immunological reactions and manifestation of immuno diseases
- The applications of advanced techniques in disease diagnosis and therapy
- Know the advancements in immunology vaccination

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Know the basics of immunity and organs of immune system	K2
CO2	Understand the antigen and antibody reactions	K3
CO3	Appreciate the techniques involved in detection and quantification of immune components	K3
CO4	Gain knowledge on manifestation of various immune diseases	K3
CO5	Understand immuno therapy and vaccination	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

223CL1A5CA	IMMUNOLOGY	SEMESTER V

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I Immune System and Lymphoid organs 12 h

Historical development of the science of the immunology. Innate and acquired immunity, Antibody mediated and cell mediated immunity. Primary and secondary lymphoid organs. Cells of immune system- T, B and NK cells. Receptors on the surface of lymphocytes. Structure and functions of neutrophils, Macrophages (phagocytosis and inflammation), eosinophils and basophils.

Unit II Antigen and Antibodies 12 h

Antigen: Properties, Specificity and Cross reactivity, antigenicity, immunogenicity, antigen determinants, Haptens, adjuvants, Self-antigens (MHC) an outline only. Antibodies: Properties, classes and subclasses of immunoglobulin: Structure, specificity and distribution, Clonal selection theory of antibody formation. Cytokines and their functions. Complement system and Complement components.

Unit III Antigen - Antibody interaction 12 h

Antigen-antibody interaction – Precipitation and agglutination. Precipitation in gel. Immuno diffusion and Immuno electrophoresis. Agglutination: Slide agglutination, Widal test. Principle and application of RIA, ELISA, Fluorescent antibody technique. Applications of immuno assay turbidometric, electro chemiluminescence assay. Monoclonal antibodies and their application.

Unit IV Hypersensitivity 12 h

Allergy and Hypersensitivity – Type I, II, III and IV and clinical manifestations. Immuno Disease: Rheumatoid arthritis, Myasthenia gravis and Muscular dystrophy. Immunity to bacteria and viruses. Skin Test: Montex and Penicillin test.

Unit V Transplantation Immunology and Vaccination 12 h

Transplantation: Tissue cross matching, HLA – class I & II. Allograft rejection: Graft Vs Host Diseases: Immuno suppressors: mechanism of graft rejection. Resistant to tumors: NK Cells: Tumor immuno therapy. Vaccination: Passive and active immunization, Recombinant vaccines: DNA vaccines and RNA Vaccine. Benefits and adverse effects of vaccination. AIDS - structure of HIV and clinical manifestation.

Text Books

1 Tizzard J R, 1995. Immunology - An introduction. Saunders College Pub., Philadelphia

2 Kindtt T J, Gosby R A, Osborne BA and Kuby J, 2016. Immunology, 6thedition, W.H. Freeman and Company, New York.

References

1 Roitt I, Brastoff J and Male D, 2012. Immunology, Mosby - Elsiever, 8 th ed

2 Ananthanarayan R and Panicker C K J, 2005. Textbook of Microbiology, 8rd edition, Orient Longman Private Limited, Hyderabad

3 Janis Kuby, 1997. Immunology. 3rd edition, W H Freeman & Co (Sd).

Course Code	Course Name	Category	L	T	P	Credit
223CL1A5CB	HEMATOLOGY	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basic hematological techniques
- Diagnosis of various diseases with reference to hematology
- Know the advancements in laboratory automation

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic tests in hematology laboratory	K2
CO2	Know the patho-physiology of anemia	K3
CO3	Know the mechanism of coagulation and diagnosis of hemorrhagic disorders	K3
CO4	Understand fibrinolysis and tests used for its diagnosis	K3
CO5	Understand lab automation in hematology	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

223CL1A5CB	HEMATOLOGY	SEMESTER V

Total Credits: 4
Total Instruction Hours: 48 h

Syllabus

Unit I Basic Hematological techniques 8 h

Blood, Blood collection, Anticoagulants used in Hematology, Normal values in Hematology, Basic Hematological tests: RBC Count, Hemoglobin estimation, Packed cell volume, WBC counts - Total and differential, Absolute eosinophil Count, Platelet count, Erythrocyte sedimentation rate, Reticulocyte count.

Unit II Preparation of blood films 12 h

Preparation of blood films, Stains used in Hematology, Morphology of red cells, Morphology of Leukocytes and platelets, Bone marrow - Techniques of aspiration, preparation and staining of films, Bone marrow biopsy, Preparation of buffy coat smears.

Unit III Investigation of anemia 10 h

B12 and folate assay, Serum iron and iron bonding capacity - saturation capacity, Laboratory methods used in the investigation of hemolytic anemias : Osmotic fragility , Investigation of G-6 PD deficiency , Test for sickling , Estimation on of Hb-F,Hb-A2 , Test for auto immune hemolytic anemia - Direct Coombs test , Measurements of abnormal Hb pigments.

Unit IV Investigation of Hemorrhagic disorders 10 h

Mechanism of coagulation, Bleeding time and clotting time, other coagulation studies: PT, aPTT, Mean Prothrombin Time (MPT), International normalized Ratio (INR), Fibrinogen. Assay of clotting factors. Test for blood fibrinolytic activity, fibrinogen mixing study, Prothrombin time, detection of D-dimers, Platelet function tests.

Unit V Automation in hematology 08 h

Automated ESR, Automated coagulometers, Diagnosis of hemoglobinopathies by HPLC, Hemoglobin electrophoresis, Cell counts (Automated hematology analysers), Organization and quality control in hematology laboratory.

Text Books

1 Mukherjee KL, 2010.Medical Laboratory Technology-A procedure manual for routine Diagnostic tests -Volumes I, II, III. Tata McGraw Hill Publishing Company ltd. New Delhi

2 Sood R, 1996. Laboratory technology- Methods and interpretations 4thEd. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

References

1 Talib V H, 2000. Handbook of Medical Laboratory Technology 2nd Edition, CBS Publishers and Distributors, New Delhi

2 Gupte, S, 1998. A Short Text Book of Medical Laboratory for Technicians. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi

3 Bain B J, Bates I, Laffan M A and Lewis M, 2011.Dacie and Lewis Practical Hematology, 11th Edition, Churchill Livingstone, China

4 Silberstein LE, Anastasi J, 2017. Hematology: Basic Principles and Practice. Elsevier Health Sciences

223CL1A5CP	CORE PRACTICAL: HEMATOLOGICAL TECHNIQUES	SEMESTER – V

Total Credits: 3
Total Instructions Hours: 72 h

S.No	Contents
1	Hemoglobin estimation by Cyanmethemoglobin method.
2	Total R.B.C count and W.B.C count.
3	Differential W.B.C Count.
4	Platelet count.
5	Absolute Eosinophil and Reticulocyte count.
6	Bleeding time, clotting time, PT and aPTT Tests
7	ABO blood grouping and Rh Titre
8	Preparation of blood smears and staining with Leishmann's stain.
9	Preparation of Buffy coat smears.
10	Packed cell volume- Wintrobe's method.
11	Erythrocytes sedimentation rate- Westergren method.
12	Osmotic fragility test.
13	Sickling test
14	Demonstration of malarial parasites and microfilaria by thick and thin smear method
15	Demonstration of malarial parasites and microfilaria by fluorimetric method.

References

1 Sood R, 1996. Laboratory technology- Methods and interpretations 4th Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

2 Talib V H, 2000. Handbook of Medical Laboratory Technology 2nd Edition, CBS Publishers and Distributors, New Delhi.

3 Gupta, S,1998. A Short Text Book of Medical Laboratory for Technicians. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

4 Bain B J, Bates I, Laffan M A and Lewis M, 2011.Dacie and Lewis Practical Hematology, 11th Edition, Churchill Livingstone, China.

223CL1A5CQ	CORE PRACTICAL: MOLECULAR AND IMMUNOTECHNIQUES	SEMESTER V

Total Credits: 3
Total Instructions Hours: 72 h

S.No	Contents
1	Estimation of DNA by diphenylamine method
2	Estimation of RNA by orcinol method
3	Separation of DNA by agarose gel electrophoresis
4	Separation of protein by SDS-PAGE
5	Blotting Technique- Southern and Western blotting (Group Experiment)
6	Polymerase chain Reaction- Demonstration
7	Coomb's Test
8	Haemagglutination Test
9	Single radial Immunodiffusion
10	Double radial Immuno diffusion
11	Rocket Immuno electrophoresis
12	Immuno assay Demonstration-ELISA

References

1. Dr. David A Thompson. 2011. Cell and Molecular Biology Lab Manual.
2. Jack Bradshaw,L. 1995. Laboratory Immunology. 2nd Edition. Saunders College Publishing.
3. Ivan Lefkovits. 1996. Immunology Methods Manual: The Comprehensive Sourcebook of Techniques. 1st edition. Academic Press Inch.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A5SA	RESEARCH METHODOLOGY AND BIOSTATISTICS	SEC	3	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- Research and types of research.
- Preparation of research papers and dissertation.
- biostatistics and diagrammatic representation.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand research and types of research	K2
CO2	Describe the approaches of investigation of solutions for research problem	K3
CO3	Learn about preparation of research papers and Dissertation	K3
CO4	Know the Biostatistics, methods of sampling and statistical laws	K3
CO5	Know the diagrammatic representation of data and measures of central tendency	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

223CL1A5SA	RESEARCH METHODOLOGY AND BIOSTATISTICS	SEMESTER V

Total Credits: 2

Total Instruction Hours: 36 h

Syllabus

Unit I **Introduction of Research** 07 h

Meaning of Research, Types of Research. Research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

Unit II **Research problems** 08 h

Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations. Effective literature studies approaches, analysis Plagiarism and Research ethics.

Unit III **Preparation of Research Papers and Dissertation** 07 h

Preparation of Research Papers and Dissertation, Illustrations and Tables. Guidelines for writing the research paper. Efficient technical writing and how to write a report. Developing a Research Proposal, Format of research proposal.

Unit IV **Biostatistics** 07 h

Introduction Biostatistics - Definition, steps in statistics, Sampling Design- Principles of sampling, Census and sampling, Essential of sampling, Methods of sampling – Random sampling and Non- random sampling, Statistical laws- law of statistical regularities, law of inertia of large numbers, Statistical errors. (Theory only)

Unit V **Diagrammatic representation** 07 h

Classification and Tabulations, Diagrammatic representation of data- Bar diagram, Pie diagram, Graphical presentation of data - Histogram, Frequency polygon, Frequency curve, Ogive, Pictograph. Measures of Central Tendency- Definition, Objectives, Characteristics, Types- Mean, median and mode, Standard Deviation, t–test Merits and demerits.

Text Books

1. Perter Pruzan, (2016), Research Methodology: The Aims, Practices and Ethics of Science. Springer, Switzerland
2. Gupta S.P., Statistical Methods 2006, 6th edition, Sultan Chand & Sons, New Delhi.

References

1. Thomas, C.G. (2015) Research Methodology and Scientific Writing. Ane Books Pvt. Ltd.: New Delhi.
2. Kothari, C.R. Garg, G. (2009) Research Methodology Methods and Techniques. New Age International Publishers, New Delhi.
3. Rohatgi V K and Md.Ehsanes saleh A K, An Introduction to Probability & Statistics, 2009, Wiley India.
4. Chow S C, Shao J and Wang H. Sample size calculations in clinical research, 2008, Chapman & Hall, CRC press.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A5DA	ORGANISATION OF CLINICAL LABORATORY AND LAB MANAGEMENT	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The managerial skills and responsibilities in clinical lab
- The knowledge of Medical ethics , Good practices and Quality management system
- The practices of audit in a Medical Laboratory

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the Administrative process in clinical laboratory.	K2
CO2	Understand the Ethical Principles and Good Laboratory Practice.	K3
CO3	Understand the Sample analysis and Quality management system.	K3
CO4	Understand the Patient management.	K3
CO5	Understand the Audit in a Medical Laboratory.	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

223CL1A5DA	ORGANISATION OF CLINICAL LABORATORY AND LAB MANAGEMENT	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Laboratory Organisation 08 h

Introduction, Functional Components of Clinical Laboratories, Clinical Laboratory Set up -Laboratory building and space, Physical aspects of laboratory, Universal work precautions (UWP) for lab personnel, Personal Protective Equipment, Medico-legal aspects of clinical practice.

Unit II Laboratory Safety and Biomedical Waste 12 h

Laboratory Safety - Common causes of Laboratory Hazards, Types of laboratory hazards, Biomedical Waste – Classification, Eye wash, Body wash treatment and disposal, Biosafety Levels.

Unit III Sterilization Techniques 10 h

Sterilization techniques - Sterilization by heat (Hot air oven, Autoclave), Sterilization by filtration (Membrane filter and HEPA), Sterilization by radiation (Ionizing and Non- ionizing), Sterilization by chemical (Alcohol, Phenols, Aldehydes, Ethylene oxide)

Unit IV Lab Management 10 h

Operations Management- planning of activities, organizing, directing and controlling. Personnel management - Personnel policy manual; job descriptions, conducting job interviews; motivation, recognizing job distress syndrome; delegation to a laboratory manager. Service Management - Patient management for clinical sample collection, transportation and preservation, Sample accountability, Purpose of accountability, Methods of accountability.

Unit V Quality Management and Audit 08 h

Total quality management; Lab Quality Manager - Role and Responsibilities development and monitoring of performance indicators Introduction and Importance of Audit, NABL, NABH and CAP. Responsibility, Planning, Horizontal, Vertical and Test audit, Frequency of audit, Documentation.

Text Books

1. Mukherjee KL, 2010.Medical Laboratory Technology-A procedure manual for routine Diagnostic tests -Volumes I, II, III. Tata McGraw Hill Publishing Company ltd. New Delhi
2. Bishop ML, Fody EP and Schoeff LE, 2013. "Clinical Chemistry: Principles, Techniques, and Correlations", 7th Edition, Jones & Bartlett Learning, USA.

References

1. McPherson and Pincus, 2013. "Henry's Clinical Diagnosis and Management by Laboratory Methods", 22nd Edition, Elsevier, USA.
2. Lynne SG and Paul B, 2013. "Clinical Laboratory Management", 2nd Edition, Wiley, USA
3. Candis AK, 2011. "Laboratory Management Quality in Laboratory Diagnosis" Springer Publishing Company
4. Jane Hudson, 2004. "Principles of Clinical Laboratory Management" Pearson Prentice Hall, USA

Course Code	Course Name	Category	L	T	P	Credit
223CL1A5DB	HUMAN GENETICS AND FOETAL MEDICINE	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basics of human genetics and foetal medicine
- The principle of recombination and gene mapping
- The multiple pregnancies and perinatal infectious diseases

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand basic concepts, techniques and methods in genetic analysis	K2
CO2	Describe of Laws of inheritance and chromosome theory	K3
CO3	Understand the principle of recombination and gene mapping, and sex inheritance	K3
CO4	Understand principle, concepts, techniques of embryology and fetal development	K3
CO5	Know about multiple pregnancies and perinatal infectious diseases	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

223CL1A5DB	HUMAN GENETICS AND FOETAL MEDICINE	SEMESTER V

Total Credits: 4
Total Instruction Hours: 48 h

Syllabus

Unit I **Model Organisms in Genetic Analysis** 8 h

Model systems in Genetic Analysis: Bacteriophage –Lytic and Lysogenic cycle, E. coli – Fission and Conjugation, Yeast, Maize, Drosophila, Rattus albicans, Homo sapiens - General outline of life cycle and importance in Genetic analysis.

Unit II **Introduction to Genetics** 10 h

Principle of Genetic Transmission – Gene, Mendel's Laws - Laws of inheritance, Concept of dominance, Law of segregation, Independent assortment, Chromosome theory of inheritance, Allelic and Non-allelic interactions: Concept of alleles, Types of dominance with example, Alleles types, Test of allelism- Compliment Test and Epistasis.

Unit III **Linkage** 8 h

Concepts of linkage, recombination, gene mapping in prokaryotes and eukaryotes, Sex-linked inheritance: Conceptual basis, sex influenced traits, mechanism of sex determination in Drosophila and Human. Quantitative inheritance – Concept, Genes and Environment - heritability, penetrance and expressivity.

Unit IV **Embryology and Foetal development** 12 h

General embryology –Sperm and Ovum, Ovulation to implantation – Zygote formation, Development of amniotic sacs, Placenta and Membranes, Placental and Cord blood components, Development of main organ systems, Teratogens - Mechanism of teratrogenesis, Types of teratrogens and its effects.

Unit V **Multiple pregnancies and antenatal complications** 10 h

Twins (Homo and heterozygous), Triplets and more, Inherited antenatal complications – Down Syndrome, Tay-Sachs disease, Anomaly scan, IUF death. Perinatal infectious diseases – Toxoplasmosis, CMV, Herpes, HBV, HIV, HPV, Rubella, streptococcal infection and syphilis.

Text Books

1 Robert Schley, (1993). Genetics and Molecular Biology; 2nd Edition The Johns Hopkins University Press ltd; London.

2 Lodish, H et al, 2003. Molecular cell biology, 5th Edition, USA.

References

1 Karp, G. John Wiley and Sons, 2007. Cell and Molecular Biology: Concepts and Experiments. 5th Edition. USA.

2 Charles H.Rodeck and Martin J whittle. (2008). Fetal Medicine: Basic science and Clinical practice, 2nd Edition.

3 Rastogi, S.C. 2012, Cell and Molecular Biology, 3rd Edition. New age International Publishers, India.

4 Jorde, L.B. et al, 2016.Medical genetics:5th Edition, Elsevier Publishers, Philadelphia.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A5DC	CLINICAL ENZYMOLOGY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Basics of Enzymes and its measurements
- The clinical enzymes and therapeutic applications of enzymes
- The significance of diagnostic enzymes in various diseases

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the classification and characteristics of enzymes	K2
CO2	Understand various coenzymes and its importance	K3
CO3	Know clinical enzymes and plasma enzyme assays	K3
CO4	Appreciate the production and significance of Therapeutic Enzymes	K3
CO5	Understand the diagnostic significance of enzymes in various diseases	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

223CL1A5DC	CLINICAL ENZYMOLOGY	SEMESTER V

Total Credits: 4
Total Instruction Hours: 48 h

Syllabus

Unit I Enzymes 8 h

Introduction to enzymes: nomenclature, classification and characteristics of enzymes, enzyme specificity, activators, inhibitors, active site, metalloenzymes, isozymes and multienzyme complexes, units of enzyme activity, factors affecting enzyme activity, measurement of enzyme activity.

Unit II Coenzymes 10 h

Coenzymes - prosthetic group, classification - vitamin and nonvitamin coenzymes, thiamine pyrophosphate, FMN and FAD - flavoprotein enzymes, NAD and NADP role in enzyme catalysis, PALP and PAMP, coenzyme A, biotin, folate coenzymes, coenzyme vitamin Bl2, Cofactors and prosthetic group.

Unit III Clinical Enzymes 10 h

Clinical Enzymology - functional plasma enzymes and nonfunctional plasma enzymes. Sources of non-functional plasma enzymes. Medical importance of non-functional plasma enzymes. Diagnostic precision of plasma enzyme analysis. Factors affecting results of plasma enzyme assays.

Unit IV Therapeutic uses of Enzymes 10 h

Therapeutic use of asparginase, streptokinase. Diagnostic enzymes. Immobilization of enzymes and their applications. Therapeutic uses of Abzymes and Isoenzymes. Isolation and purification of enzymes from liver and blood.

Unit V Diagnostic Enzymology 10 h

Serum enzymes in heart diseases: CK, LDH, Aspartate aminotransferase, Alanine aminotransferase, γ-glutamyltransferase and Histaminase. Serum enzymes in Liver diseases: SGOT, SGPT, Serum Alkaline phosphatase. Serum enzymes in GI Tract diseases: Amylase, Lipase, Serum enzymes in Muscles diseases: Aldolase, CPK, Serum enzymes in Bone diseases and Enzymes in Malignancy.

Text Books

1 Buchholz, Klaus, Volker Kasche, and Uwe Theo Bornscheuer, 2012. Biocatalysts and Enzyme Technology, John Wiley & sons.

2 Copeland, Robert, 2004. Enzymes: A practical introduction to structure, mechanism, and data analysis, John Wiley & sons.

References

1 Palmer T, 2001. Enzymes: Biochemistry, Biotechnology and Clinical Chemistry, Horwood publishing, Cichester, UK.

2 Price NC and Stevens I, 1999. Fundamentals of Enzymology, 3rd edition, oxford University press inc., New York.

3 William J. Marshall, 2000, Clinical Chemistry, 4th edition, illustrated, reprint, Mosby.

4 Mullan D. P, 2013, Studies in Clinical Enzymology, Elsevier Science.

223CL1A5GA	GE: CONCEPTS OF HEALTH	SEMESTER V

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Health and Obesity 5 h

Health- Definition, Health and quality of life, Hygiene. Food factors for human beings and their requirements. Calorific value of food. Obesity: Definition and classification, Genetic and environmental factors leading to obesity, Obesity related diseases.

Unit II Diabetes 5 h

Diabetes: Normal level of Blood sugar, types of Diabetes mellitus, GTT ,HbA1c, Insulin and Glucagons, Etiology and pathogenicity, Diabetic insipidus, Management of diabetes.

Unit III Cardiac diseases 5 h

Cardiovascular diseases: Reference level of Lipid profile, Cholesterol and Lipoproteins, Types of Cardiac diseases- Myocardial infarction- Signs and Symptoms, Risk factors.

Unit IV Kidney stones and cancer 5 h

Kidney Stones – Types of kidney stones and factors causing kidney stones, Diet and Prevention. Cancer – Types, Food habits and its preventive measures.

Unit V Health Insurance 4 h

Health Insurance: Different types of health insurance policy, Individual, family mediclaim policy, domiciliary hospitalization, Group Mediclaim Policy, health insurance for senior citizens, Government and private policies.

Text Books

1. Heinmann W, 2012, "Chemistry and Molecular Diagnosis", 5th edition, Medical Books Ltd. New Zealand.
2. Varley H, 1985, "Practical clinical Biochemistry", 4th Edition, Heinemann Medical publishers, New Zealand.

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

Dr.N.G.P. Arts and Science College
APPROVED
BoS- 17.04 05.04.22 | AC- 17.04 17.04.22 | GB -

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

Dr.NGPASC
COIMBATORE | INDIA

Course Code	Course Name	Category	L	T	P	Credit
223CL1A6CA	CYTOLOGY	CORE	5	-	-	5

PREAMBLE

This course has been designed for students to learn and understand

- The basic cell types and their functions and basic staining techniques.
- Various types of cytological samples and morphological differences.
- The principles of automation and immunohistochemistry.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the principles involved in collection, preparation, fixation and staining of samples	K1
CO2	Understand the normal and malignant cytology of FNAC and non-gynae cytology	K2
CO3	Understand the normal and malignant cytology of cervix, significance of cervical screening	K2
CO4	Understand the principle and procedure of flow cytometry	K3
CO5	Understand the principles involved in production and use of monoclonal antibodies and interpretation of immunohistochemical analysis	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

223CL1A6CA	CYTOLOGY	SEMESTER VI

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I **Cell structure and Staining** 14 h

Normal cell structure and function, Normal Histology and cytology of epithelial and connective tissue, Collection and preparation of samples Fixation, fixatives, Staining - Principles, Preparations of reagents, techniques: a. Papanicolaou's stain, b. May – Grunwald Giemsa stain.

Unit II **FNAC and non-gynae cytology** 12 h

Normal and malignant cytology in Gastrointestinal tract, Respiratory tract, Effusions, CSF and Urinary tract. FNAC of Breast, Lymph node, Thyroid and Salivary glands, liver, pancreas and biliary system.

Unit III **Gynae cytology** 10 h

Normal cervix, cervical neoplasia, Pathogenesis of cervical cancer, cervical screening, cervical cytopathology. Collecting cellular samples from the cervix: Conventional Pap smear, Types of Liquid based cytology.

Unit IV **Flow cytometry** 15 h

Flow cytometry Principles, General components of a flow Cytometer: (a) Fluidics (b) Optics: Laser (argon), Dichroic Filters and Mirrors, Photodiode, PMT (photo multiplier tubes) (c) Detectors (d) Electronics. Fluorochromes, Fluorochrome conjugated Antibodies, Benchtop Flow Cytometers, Immunophenotyping, Data analysis and gating, procedure and evaluation. Image analysis Clinical applications and Research applications.

Unit V **Immuno-cytochemistry** 9 h

Introduction, Basic concepts of immunocytochemistry - Antigen, Antibody, Antigen Retrieval, Antigen - Antibody interaction, HLA B27, CD4, CD8, Monoclonal antibodies preparations and their dilution, Polyclonal antibodies, Basic principles in fluorescence reactions.

Text Books

1. Mukherjee KL, 2023. Medical Laboratory Technology-A procedure manual for routine diagnostic Tests - Volume 1, 2 and 3, 4 th Edition, Tata McGraw Hill Publishing Company Ltd, New Delhi.

2. Sood R, 2008. Medical Laboratory Technology, Jaypee Brothers, 6 th Edition, New Delhi.

References

1. Gupta S, 1998. A Short Text Book of Medical Laboratory for Technicians. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

2. Bain B J, Bates I, Laffan M A and Lewis M, 2011. Dacie and Lewis Practical Haematology, 11th edition, Churchill Livingstone, China.

3. Todd J C, Davidson I and Henry J B, 2016.Clinical diagnosis by laboratory methods, 22nd Edition, Saunders Publications Pvt. Ltd, Pennsylvania.

4. NABH NIBL & NABL Guidelines, Clinical Laboratory manual, WHO Manual, CLSI Manual.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A6CB	DIAGNOSTIC MOLECULAR TECHNIQUES	CORE	5	-	-	5

PREAMBLE

This course has been designed for students to learn and understand

- The procedures used in a Molecular Diagnostic Laboratory.
- The fundamental principles and applications of molecular technique.
- Molecular analyses in disease diagnosis.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the types of disease and sample preparation	K2
CO2	Understand the infectious disease diagnosis and molecular aspects	K3
CO3	Understand the molecular diagnosis of genetic diseases	K3
CO4	Basic molecular techniques and diagnostic applications	K3
CO5	Understand sequencing and nucleic acids hybridization techniques	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

223CL1A6CB	DIAGNOSTIC MOLECULAR TECHNIQUES	SEMESTER VI

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I **Diseases and sample preparation** 10 h

Introduction: Diseases- infectious diseases, physiological and metabolic errors, genetic basis and inherited diseases. General approach to clinical specimens - Sample collection, transport ,Storage, Discarding and processing of samples for diagnosis.

Unit II **Infectious disease diagnosis** 15 h

Infectious disease of bacteria, viruses and fungal and its diagnosis: Diagnosis of infection caused by Streptococcus, Salmonella, Vibrio and Mycobacterium sp., Diagnosis of fungal diseases: Candidiasis and Dermatophytosis. Diagnosis of RNA and DNA viruses - Pox viruses, Adenoviruses, Hepatitis Viruses and Retroviruses, Corona virus. Diagnosis of Protozoan diseases and helminthic disease: Amoebiasis, Malaria and Filariasis.

Unit III **Inherited diseases and Diagnosis** 10 h

Genetic disorders and sex-linked disorders –Hemophilia, Sickle cell anemia, Retinoblastoma, Cystic Fibrosis, Duchenne muscular Dystrophy, Identification of inherited disorders, Cancer genetics - Dominant and recessive allele, oncogenes and tumor suppressor genes.

Unit IV **Molecular Diagnostic Tools** 10 h

Nucleic acid amplification methods - PCR and its types- Reverse Transcription PCR (RT-PCR), Real time PCR, Inverse PCR. Proteins and Amino acids - Qualitative and quantitative techniques: Amino acid sequence analysis

Unit V **Hybridization techniques and DNA sequencing methods** 15 h

Blotting Techniques- Southern, Northern, and Western blotting, In-situ hybridization - FISH, DNA microarrays – types and applications, Automated DNA sequencing - Sanger's sequencing methods and its principle and application, Advances in DNA sequencing- New Generation sequencing Methods and Pyrosequencing

Text Books

1. Boyer, Rodney F Benjamin and Cummins. 2001, "Modern Experimental Biochemistry", 2nd edition. Pearson Education.
2. Lodish, H. & Baltimore. D, 1994, "Molecular cell Biology". 2nd edition, American Scientific Books.

References

1. Rakesh S. Sengar , Amit Kumar , Reshu Chaudhary , Ashu Singh , 2018, "Advances in Molecular Techniques", 1 edition, CRC Press..
2. Patrinos G, P. Patrinos G, Ansorge W, 2010, "Molecular Diagnostics", 2nd Ed, Academic Press.
3. Stefan Surzycki, 2000, "Basic techniques in molecular biology", Springer.
4. Walt Ream, Katharine G. Field, 1998, "Molecular Biology Techniques: An Intensive Laboratory", Academic Press.

223CL1A6SP	CYTOLOGICAL AND MOLECULAR DIAGNOSTICS	SEMESTER VI

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Collection of sample and processing
2	Cytological fixatives and fixation
3	Collection and preparation of fluid sediment for cytological examination
4	Preparation and fixation of sputum smears for cytology.
5	Papanicolaou staining-principles and staining procedure.
6	Identification of malignant and benign cells
7	Isolation of DNA from biological sample
8	Isolation of RNA from biological sample
9	Identification of viral antigen by ELISA technique
10	Conventional PCR- Setting up and optimization of PCR reaction
11	RT-PCR for mRNA analysis- Demonstration
12	Quality Control and Validation in Molecular Diagnostics

References

1. Dr. David A Thompson. 2011. Cell and Molecular Biology Lab Manual
2. Pranab Dey, *2014*. Diagnostic Cytology. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
3. Diwakar Singh, 2020. Molecular Diagnostics : A Practical Manual. New India Publishing Agency., New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A6DA	GOOD LABORATORY PRACTICES AND PROFESSIONAL ETHICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The scope and levels of laboratories.
- The maintenance of record and data management.
- The documentation practices.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the Levels of clinical laboratories	K2
CO2	Know the Laboratory facilities and equipment's.	K3
CO3	Know the medical records and data management in clinical laboratories.	K3
CO4	Understand the documentation practice.	K3
CO5	Know the quality assurance in clinical laboratories.	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

223CL1A6DA	GOOD LABORATORY PRACTICES AND PROFESSIONAL ETHICS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Scope and Levels of laboratories** 10 h

Scope, Levels of laboratories, Infrastructure, Personnel, Training & development, Equipment, Reagents, materials. Storage of reagents, materials and methods of disposal. Standard operating procedure, Safety in laboratories and Ethical considerations.

Unit II **Laboratory facilities** 10 h

Laboratory facilities- design and physical aspects of design. Laboratory equipment management-Instrument selection, budgeting, installation, training and maintenance.

Unit III **Record and data management** 10 h

Requisition form, Accession list, specimen collection, transport, turn around time and Critical value worksheet. Reporting test results, specimen rejection record and data management.

Unit IV **Documentation practices** 10 h

Good documentation practices, purpose of laboratory documentation, types of documentation and records, documentation process and errors, principles of good documentation practices and benefits.

Unit V **Quality assurance** 08 h

Quality assurance, quality assurance programme, internal quality control, external quality assessment, Validation and Verification. Internal audit and summary of QAP activities.

Text Books

1. Good Clinical Laboratory Practices, Indian Council of Medical Research, 2008
2. Good Clinical Laboratory Practices, World Health Organisation, 2009.

References

1. Understanding the principles of Good Clinical Laboratory Practices (GCLP), Global Health Laboratories, 2014.
2. Constance L and Elizabeth A, 2012. Essentials of Medical Laboratory Practice F. A. Davis Company, USA.
3. Dasgupta A and Wahed A, 2014. Clinical Chemistry, Immunology and Laboratory Quality Control, (1st edition) Elsevier.
4. Kanai L. Mukherjee, 2010, Medical laboratory technology Vol.1, 2nd Edition,Tata McGraw Hill.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A6DB	STEM CELL TECHNOLOGY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basics of stem cell technology
- The Stem Cell Concept in Animals.
- Therapeutic applications of stem cells

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic stem cell technology	K2
CO2	Know the types of stem cells	K3
CO3	Understand the Stem Cell Concept in Animals	K3
CO4	Understand the Haemopoietic Stem Cell	K3
CO5	Know the Therapeutic applications of stem cells.	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

223CL1A6DB	STEM CELL TECHNOLOGY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Introduction to stem cells** 10 h

Definition and history of stem cells, Source of stem cells, Properties – concepts of stem cells – differentiation, maturation, proliferation. Stem cell categories, Medical applications of stem cells

Unit II **Types of stem cells** 10 h

Stem Cell biology and therapy, types- embryonic stem cell, Adult stem cell, induced pluripotent stem cells, mesenchymal stem cells, culture and the potential benefits of stem cell technology.

Unit III **Stem Cell Concept in Animals** 10 h

Skeletal muscle stem cell – Mammary stem cells – intestinal stem cells – keratinocyte stem cells of cornea-Umbilical card stem cells – skin and hair follicles – Tumour stem cells, Embryonic stem cell biology - factors influencing proliferation and differentiation of stem cells – hormone role in differentiation.

Unit IV **Haemopoietic Stem Cell** 10 h

Biology – growth factors and the regulation of haemopoietic stem cells. Hematopoietic stem cell niche, Embryonic stem cell-derived Hematopoietic stem cells. Cord blood hematopoietic stem cells- Cord blood transplantation Characteristics of cord blood stem cells Genomics and proteomics of cord blood stem cells.

Unit V **Therapeutic applications of stem cells** 08 h

Cellular therapies – vaccines – Gene therapy – immunotherapy – tissue engineering – blood and bone marrow – Fc cells. Stem cells for the treatment of muscular dystrophy and Neurological disorder - Cellular environment of a dystrophic muscle, Myogenic stem cells from embryonic stem cells and inducible pluripotent stem cells. Ethical consideration of stem cell technology.

Text Books

1. Hossein Baharvand, 2016. Trends In Stem Cell Biology And Technology, Springer Science & Business Media, Humana Press..
2. Robert Paul Lanza, 2006. Essentials of stem cell biology, 2nd edition, Academic Press.

References

1. Song Li, Nicolas L'Heureux, Jennifer Elisseeff. 2011. Stem Cell and Tissue Engineering, 1st edition, World Scientific Publishers..
2. Robert Lanza, John Gearhart, Brigid Hogan. 2006. Essentials of Stem Cell Biology, 2nd edition, Macmillan Publishing Solutions.
3. CS Potten , 1997. Stem cells. Elsevier.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A6DC	FORENSIC SCIENCE AND TOXICOLOGY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basics of forensic pharmacology and metabolism and excretion of drug.
- Forensic toxicology and radioisotopes effect in organs and tissues.
- Forensic significance of DNA profiling and Certification and Accreditation.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Outline Forensic Pharmacology, metabolic pathways of drug function and excretion of drugs and poisons	K2
CO2	To know the scope of forensic toxicology and Fate of drug in body.	K2
CO3	Outline the acute and chronic effect of radioisotopes.	K3
CO4	To understand the DNA Profiling in Forensic Science.	K3
CO5	Understand the Forensic Significance of DNA profiling.	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

223CL1A6DC	FORENSIC SCIENCE AND TOXICOLOGY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Forensic Pharmacology** 10 h

Pharmacology and its branches, Forensic Pharmacological studies, absorption, distribution, pharmokinetics, metabolic pathways of common drugs and poisons, Drug toxicity, excretion of drugs and poisons.

Unit II **Forensic Toxicology** 10 h

Introduction and scope of forensic toxicology. Different types of toxic substances and its analysis, Types of poisons, Different routes of ingestion, toxicity of poisons. Fate of drug in body. Samples in fatal and non- fatal cases. Packing and preservations of viscera.

Unit III **Radioactive isotopes and compounds** 10 h

Radioisotopes, radioactive sources of exposure and contact, acute and chronic effect on the organs of the body, methods of detection and measurements, handling and disposal of body and tissues containing radioactive material.

Unit IV **DNA Profiling** 08 h

Introduction, DNA typing systems- RFLP analysis, PCR amplifications, Analysis of SNP, Y- STR. Mitochondrial DNA, Quality control, Certification and Accreditation.

Unit V **Forensic Significance of DNA profiling** 10 h

Applications in disputed paternity cases, child swapping, missing person's identity- civil immigration. The Combined DNA Index System (CODIS - legal standards for admissibility of DNA profiling, procedural and ethical concerns, technologies - DNA chips, SNPs and limitations of DNA profiling.

Text Books

1. Sharma, B. R., 2020. Forensic Science in Criminal Investigation and Trials, 6 th Ed, Universal Law Publishing Co. Ltd. New Delhi. Edition, Tata McGraw Hill.

2. Jim Fraser and Robin Williams, 2009. Handbook of Forensic Science, Willan Publishing, New York

References

1. James, S. H. and Nordby, 2003. Forensic Science - An Introduction to Scientific and Investigative Techniques, J. J. (Eds), CRC Press, London.

2. Tripathi K.D, 2018. Essentials of Medical Pharmacology, 8th edition, Jaypee Brothers Medical Publishers, India.

3. Saferstein, Richard, Criminalistics, 1998. An Introduction to Forensic Science, 6th Ed, Prentice-Hall, New Jersey.

4. Dr. K. S. Narayan Reddy and Dr. O. P. Murthy, 2017. The Essentials of 4 Forensic Medicine and Toxicology, 33rd Edition, Jaypee Brothers Medical Publishers, India.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A6DD	BIO-SAFETY AND BIO WASTE MANAGEMENT	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basics of biosafety and biowaste management.
- The safety practices, bioethics in biomedical laboratories.
- The generation and disposal of biowastes, and biowastes management.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the safety guidelines and practices in clinical laboratory.	K2
CO2	Realize the significance of bioethics and responsibilities of clinicians in laboratory.	K3
CO3	Know the Indian regulations regarding biowastes segregation and disposal.	K3
CO4	Identify the sources of biowastes, types and segregation.	K3
CO5	Understand the need for biowaste management and the technologies applied for biowaste management	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

223CL1A6DD	BIO-SAFETY AND BIO WASTE MANAGEMENT	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Biosafety** 10 h

Biosafety in laboratory, Laboratory associated infections and other hazards. Standard precautions, Hazard identification and risk analysis. Code of good and safe laboratory practice for support staff and responsibilities of the workers regarding biosafety. Personal safety measures- Use of glove, mask and personal grooming. Set up of a laboratory on the basis of safety priority and Laboratory Biosafety Guidelines. Laboratory Biosafety Level Criteria (BSL-1- 4).Chemical, electrical, fire and radiation safety. General Safety checklist, Hazardous properties of instruments and Laboratory chemicals.

Unit II **Bioethics** 10 h

Co-operation and working relationship with other health professionals, Confidentiality of patient information and test result- dignity and privacy of patient, Responsibility from acquisition of the specimen to the production of data, Accountability for quality and integrity of clinical laboratory services. Institutional ethical committee and its role, Health & Medical surveillance. Segregation of biowastes, Concern to air and water, biomedical authorization and environmental clearance.

Unit III **Biowaste regulations** 08 h

Categories of Biowaste, Regulatory Requirements - State and Central regulation regarding biomedical waste disposal and management.

Unit IV **Types of biowaste and segregation** 10 h

Sources of biomedical waste; Types and color coding for different biomedical wastes, Importance of segregate at source ,Types of health care waste: Infectious and non-infectious waste, hazardous waste, solid and liquid waste, biodegradable and non-biodegradable waste.

Unit V Biowaste management 10 h

Wastes management- life cycle of bio-medical wastes. Decontamination and disposal: Disinfection methods – Sterilization - steam sterilizing (Auto cleaving) - Non-burn treatment technology, Microwave, wet thermal treatment, dry thermal treatment, chemical based technologies. Disposal of hazardous wastes and radioactive wastes. Generation of Biogas from food wastes, Hazardous gases and its safe disposal.

Text Books

1 Joshi RM, 2006. Biosafety and Bioethics. Gyan Books Pvt Ltd, India.

2 Singh A, Kaur S 2012.Biomedical waste disposal, Jaypee Publishers, India

References

1 Fleming DO, Hunt DL, 2006. Biological Safety: Principles and Practices, ASM Press, Washington DC.

2 Kishore J and Ingle GK, 2004. Biomedical waste management in India. Century Publications, New Delhi.

3 Singh, 2012. Biomedical Waste Disposal, Jaypee Brothers Medical Publishers, New Delhi.

4 NABH guidelines, WHO guidelines.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A6DE	GENETIC ENGINEERING	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basics of genetic engineering and methodology of gene cloning
- The gene transfer and identification of recombinant gene
- The significance of gene technology and fermentation technology

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the gene cloning methods and basics of vectors	K2
CO2	Understand the gene transfer and identification of recombinant gene	K3
CO3	Understand the applications of sequencing methods	K3
CO4	Appreciate the production and significance of recombinant proteins g	K3
CO5	Understand the basic concepts and applications of fermentation	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

223CL1A6DE	GENETIC ENGINEERING	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Basics of gene cloning** 10 h

Gene cloning operations. Restriction endonucleases – Types and Features; Ligations- Linkers and Adaptors. Vectors of gene cloning: - Plasmid Vectors – Basic feature, pBR332. Bacteriophage vectors; Cosmids. Cloning hosts. Preparation of Plasmid DNA from bacteria.

Unit II **Transformation** 10 h

Introduction of DNA into bacterial cells: Transformation of E. coli, selection of transformed cells, Identification of recombinants. Introduction of phage DNA into bacterial cell, Identification of recombinant phage. Genomic library and cDNA library

Unit III **Sequencing Methods** 10 h

DNA sequencing: Maxam Gilbert's method, Outline of Sanger's method – Applications, Computers for sequencing and analysis of DNA sequences. Genetic Finger Printing – Oligonucleotide directed mutagenesis; Protein engineering. PCR – Technique and Applications.

Unit IV **Gene Expression** 10 h

Expression vectors for E. coli - Constituents; Examples of promoters – Expression cassettes – Problems caused in expression of eukaryotic genes: Fusion proteins: - Applications of gene technology: Recombinant insulin; Cloning HBV surface antigen in yeast. Safety aspects and hazards of genetic engineering.

Unit V **Bioprocess technology Fermentation** 08 h

Design of a commercial fermenter; Solid substrate fermentation: Media for industrial fermentations; Batch culture and fed – batch culture. Down – stream processing. Production of amino acids; Single cell protein; Penicillin and alcohol.

Text Books

1 T.A. Brown, 1995. Gene cloning- An introduction, Chapman and Hall.

2 Balasubramaniam, D, C.F.A., Bryce, K. Dharmalingam, J. Green, Kunthala Jayaraman, 1996. Concepts in Biotechnology, COSTED – IBN university press.

References

1 R.W. Old & S.B. Primrose, 1994. Principles of Gene manipulation, Black well scientific publications.

2 Glick.R, Bernard and Pasternak.J, Jack, 1994. Molecular Biotechnology, ASM press, Washington D.C.

3 Glazier. N. Alexander, Hiroshnikaido, 1995. Microbial Biotechnology, W.H. Freeman & co., New york.

4 Priti Patel & Khushbu Panchal, 2020. Bioprocess Technology: Fundamentals of Microbial Process, Scholars' Press, Mauritius.

Course Code	Course Name	Category	L	T	P	Credit
223CL1A6DF	TUMOR MARKERS AND IMMUNOHISTOCHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concept of tumor and tumor markers
- The structure and roles of various biological tumor markers
- The immune techniques for diagnosis of cancer

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the morphological and biochemical characteristics of normal and tumor cells	K2
CO2	Understand the concept of tumour markers and significance	K3
CO3	Know the significance of carbohydrates as tumour markers in screening and diagnosis	K3
CO4	Realize the significance of different proteins as tumour markers	K3
CO5	Understand the Immunological techniques and monoclonal antibodies	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

223CL1A6DF	TUMOR MARKERS AND IMMUNOHISTOCHEMISTRY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Carcinogens and Oncogenes** 10 h

Introduction to cancer. Carcinogens - definition. Oncogene – definition. Hereditary Oncogenes. General mechanism of Oncogenes. Characteristics of growing tumor cells- general and morphological changes, biochemical changes.

Unit II **Tumor Markers** 08 h

Tumor Markers- Introduction, Clinical applications of tumor markers. Enzymes as tumor markers, Alkaline Phosphatase (ALP), Creatine kinase (CK), Lactate dehydrogenase (LDH), Prostate specific antigens (PSA).

Unit III **Hormone tumor markers** 10 h

Hormones as tumor markers- Structure and mechanism. Oncofetal antigens. Alpha feto protein (AFP), Beta Human Chorionic Antigen (β HCG), Carcino embryonic antigen (CEA) Squamous cell carcinoma (SCC) antigen. Carbohydrate markers - CA 15-3, CA 125.

Unit IV **Bladder cancer markers** 10 h

Blood group antigen (brief introduction of each type) CA 19-9, CA 50, CA 72-4, CA 242. Bladder cancer markers (introduction in brief) - Bladder tumor antigen (BTA), D-Dimer. Nuclear matrix protein (NMP22). TRAP assay, hyaluronic acid and Hyaluronidase.

Unit V **Immunological techniques** 10 h

Immunological techniques - immunofixation, Antigen retrieval, immunochemistry, turbimetry Immunohistochemistry – Polyclonal and monoclonal antibodies, Direct and Indirect immunohistochemistry, labels, detection, tissue preparation, antigen retrieval, blocking, rinsing, controls. Tumour markers – AFP, B2M, Beta hCG.

Text Books

1. Gerhard Seifert, 2012. Morphological Tumor Markers: General Aspects and Diagnostic Relevance, illustrated, Springer Science & Business Media.
2. Manjul Tiwari, 2012. Tumor Marker and Carcinogenesis, River Publishers.

References

1. Carl A. Burtis, David E. Bruns, 2014. Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics, 7th edition, Elsevier Health Sciences.
2. William J. Marshall, 2000. Clinical Chemistry, 4th edition, illustrated, reprint, Mosby.
3. Eleftherios P. Diamandis, 2002. Tumor Markers: Physiology, Pathobiology, Technology, and Clinical Applications, Amer. Assoc. for Clinical Chemistry.
4. Hebermann and Mercer, 1990. Immunodiagnosis of Cancer, 2nd edition, illustrated, revised, CRC Press.

Course Code	Course Name	Category	L	T	P	Credit
223BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	AECC-III	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- The role of Entrepreneurship in Economic Development and basics of Intellectual Property Rights, Copy Right Laws, Trade Marks and Patents
- ethical and professional aspects related to intellectual property law context
- Intellectual Property(IP) as an career option

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 innovation, IPR, entrepreneurship and its role in economic development	K2
CO2	Know the value , purpose and process of Patent	K2
CO3	Understand the basics of trademarks and industrial designs	K2
CO4	Acquire knowledge about copyright and copyright law	K2
CO5	Identify Geographical Indications	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

223BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	SEMESTER VI

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I **Introduction to Innovation and Entrepreneurship** 05 h

Meaning of Creativity, Invention and innovation - Types of Innovation - Introduction and the need for Intellectual Property Right (IPR) - Kinds of IPR – National and International IPR Policy. Entrepreneurs-Concept, characteristics, Functions, need and types, Entrepreneurial decision process. Role of Entrepreneurship in Economic Development.

Case Study: Jayabharati Viswanath: A case of Ladel to Leather.

Unit II **Patents** 05 h

Introduction and origin of Patent System in India- Conceptual Principles of Patent Law in India - Process for obtaining patent - Rights granted to a Patentee -Validity of patent- Infringement of Patent.

Case Study: Apple Inc. v. Samsung Electronics Co. Ltd. (2020)

Unit III **Trademarks** 05 h

Origin of Trade Marks System - Types - Functions - Distinctiveness and Trademarks - Meaning of Good Trademark - Rights granted by Registration of Trademarks - Infringement of trademark.

Case Study: Merck v. Mylan Pharmaceuticals (2016)

Unit IV **Copyright** 05 h

Introduction and Evolution of Copyright - Objectives and fundamentals of Copyright Law - Requirements for Copyrights - Works protectable under Copyrights - Authorship and Ownership - Rights of Authors and Copyright owners - Infringement of Copyright.

Case Study: J.K. Rowling and Warner Bros. v. Steve Vander Ark (2007)

Unit V **Geographical Indications** 04 h

Introduction and Concept of Geographical Indications - History - Administrative Mechanism - Benefits of Geographical Indications - Infringement of registered Geographical Indication

Case Study: Darjeeling Tea v. Tea Board of India (2012)

Note: Case studies related to the above topics to be discussed (Examined internal only)

Text Books

1 Nithyananda, K V. 2019, "Intellectual Property Rights" Protection and Management. Cengage Learning India Private Limited, New Delhi, India.

2 Dr.S.S.Khanka, 2020,"Entrepreneurial Development", S Chand and Company Limited, New Delhi, India.

References

1 Ahuja, V K. 2017, "Law relating to Intellectual Property Rights", 3rd Edition, Lexis Nexis, Gurgaon, India.

2 Neeraj, P., & Khusdeep, D. 2014, "Intellectual Property Rights",1st Edition, PHI learning Private Limited, New Delhi,India.

3 http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf.

4 https://knowledgentia.com/knowledgeate

BoS Chairman/HOD
Department of Clinical Laboratory Technology
Dr.N.G.P. Arts and Science College
Coimbatore – 641 048

Dr.N.G.P. Arts and Science College
APPROVED
BoS- 18th 8-11-2024
AC - 18th 26.11.2024
GB -

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