Dr. N.G.P. ARTS AND SCIENCE COLLEGE (Autonomous)

REGULATIONS 2022-23 for Under Graduate Programme
(Outcome Based Education model with Choice Based Credit System)

B.Sc. Degree
(For the students admitted during the academic year 2022-23 and onwards)

Programme: B.Sc. CHEMISTRY

Eligibility

A candidate who has A pass in Higher Secondary Examination with Mathematics, Physics, Chemistry, Biology/Computer Science as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent there to by the Academic Council, subject to such conditions as may be prescribed there to are permitted to appear and qualify for the **Bachelor of Science (CHEMISTRY)** Degree Examination of this College after a course study of three academic years.

Programme Educational Objectives

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

1. To understand the interdisciplinary nature of Chemistry and to integrate knowledge of Mathematics, Physics and other disciplines to a wide variety of chemical problems.
2. To enable the students to learn laboratory skills to design, safely conduct and interpret chemical research.
3. To develop the ability to effectively communicate scientific information and research results in written and oral formats.
4. To provide a broad foundation in Chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective.
5. To make students learn professionalism, including the ability to work in teams and apply basic ethical principles.

PROGRAMME OUTCOMES:

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

PO Number	PO Statement
PO1	Apply knowledge in scientific concepts, fundamental principles and varied theories to extend their relevance in day-to-day life.
PO2	Build the foundation in the current trends of chemistry with experimental skills
PO3	Make use research based knowledge in multidisciplinary approaches.
PO4	Extend the role and need of the chemist in societal, environmental contexts and demonstrate the knowledge for sustainable development.
PO5	Plan and organize as a member or leader in the diverse team and ability to engage in independent life – long learning in the broadest context of technological change.

UG - REGULATION (R4)

(Students admitted in the AY 2022-23)

(OUTCOME BASED EDUCATION WITH CBCS)

1.NOMENCLATURE

1.1 Faculty: Refers to a group of programmes concerned with a major division of knowledge Eg. Faculty of Computer Science consists of disciplines like Departments of Computer Science, Information Technology, Computer Technology, Computer Applications, Data analytics, Cognitive Systems 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, Basic Tamil/Advanced Tamil, Innovation and IPR/Innovation, IPR and Entrepreneurship.

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

1.5 Project Work:

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

Internship/Industrial Training

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

1.6 Extra Credits:

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

2. STRUCTURE OF PROGRAMME

2.1 PART- I: LANGUAGE- I

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

2.2 PART- II: LANGUAGE- II

English will be offered during the first four semesters.

2.3 PART- III:

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

2.4 PART- IV:

2.4.1 Ability Enhancement Compulsory Course (AECC):

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

Basic Tamil

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

(OR)

Advanced Tamil

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

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

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

2.5 PART- V: EXTENSION ACTIVITIES

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

3. CREDIT ALLOTTMENT

The following is the credit allotment:

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

4. DURATION OF THE PROGRAMME

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

5.REQUIREMENTS FOR COMPLETION OF A SEMESTER

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

6. EXAMINATIONS

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

a) Mark distribution for Theory Courses

Continuous Internal Assessment (CIA) : 50 Marks

End Semester Exams (ESE) : 50 Marks

Total :100 Marks

i) Distribution of Internal Marks

S.No.	Particulars	Distribution of Marks
1	CIA I (2.5 Units) (On completion of 45th working day)	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 Project/Internship/Industrial Training

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/Internship/ Industrial training presentation	40
2	Viva –voce	10
	Total	**50**

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

7. Credit Transfer

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

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

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

Mandatory

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

Credit transfer will be decided by equivalence committee

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

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

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

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

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

9. Internship/Industrial Training

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

10. Extra Credits: 10

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

A student is permitted to earn a maximum of Ten extra Credits during the programme period.
A maximum of 1 credit under each category is permissible.

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

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

GUIDELINES

Proficiency in foreign language

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

Proficiency in Hindi

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

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

Self study Course

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

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

Typewriting/Short hand

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

CA/ICSI/CMA(Foundations)

Qualifying foundation in CA/ICSI/CMA / etc.

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)

Research Publications in Journals

Oral/Poster presentation in Conference

Lab on Project (LoP)

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

(**Evaluation will be done internally**)

Innovation / Incubation / Patent / Sponsored Projects / Consultancy

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

Representation in State/ National level celebrations

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

Awards/ Recognitions/fellowships

Regional/ State / National level awards/ Recognitions/Fellowships

100 % CIA Courses :

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

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

Modalities for Implementing Internal Assessment Marks:

- Student pertaining to 2022 Batch (2022-25) UG programme for the above mentioned courses shall secure a minimum of 40% out of the maximum marks in the continuous internal assessment (CIA) i.e., 20 marks out of 50 marks.
- Students who have not acquired the minimum marks shall be allowed to reappear to improve their marks in the exam components only within the time duration of the programme, in the forthcoming semesters.

Distribution of Internal Marks for AECC & AEEC (Theory)

S.No.	Particulars	Distribution of Marks
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**

Distribution of Internal Marks for Generic Elective (AEEC) (Practical)

S.No.	Particulars	Distribution of Marks
1	CIA -I (1-5 Exercise)	5
2	CIA-II (6-10 Exercise)	5
3	Class Participation	10
4	Practical Record	10
5	Test-III & Viva –Voce(10+10)	20
	Total	**50**

Question paper pattern AECC & AEEC

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

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

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

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

SECTION	MARKS	DESCRIPTION	TOTAL	Remarks
Section – A	8 x 0.5 = 04 Mark	MCQ	25 Marks	Marks secured will be converted to 15 marks
Section - B	3 x 3 = 09 Mark	Answer ALL Questions Either or Type ALL Questions Carry Equal Marks		
Section - C	2 x 6 = 12 Mark			

Model Test: [3 Hours-5 Units] - 50 Marks

SECTION	MARKS	DESCRIPTION	TOTAL	Remarks
Section – A	5 x 1 = 05 Marks	MCQ	50 Marks	Marks secured will be converted to 15 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			

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		

Credit distribution - Common for R4

For students admitted in AY 22-23 and onwards.
Credit distribution for all UG programmes

Part	Subjects	No.of Papers	Credit	Semester No.
I (12 Credits)	Tamil / Hindi / French/Malayalam	4	4 x 3 = 12	I & IV
II (12 Credits)	English	4	4 x 3 = 12	I & IV
III (108 Credits)	Core (Credits 2,3,4,5)	16-19	70	I to VI
	Inter Departmental Course (IDC)	4	16	I to IV
	Discipline Specific Elective (DSE)	3	3 x 4 =12	V & VI
	Skill Enhancement Course(SEC)	4	8	III ,IV,V& VI
	Industrial Training	1	2	V
IV (8 Credits)	Environmental Studies(AECC)	1	2	I
	Basic Tamil/ Advance Tamil /Human Rights &Women's Rights(AECC)	1	2	II
	Innovation & IPR/Innovation, IPR &Entrepreneurship (AECC)	1	2	VI
	Generic Elective(GE) (AEEC)	1	2	V
V (2 Credits)	NSS/NCC/YRC/RRC/Yoga/Sports/Clubs	-	2	I -II
TOTAL CREDITS			**142**	

CURRICULUM

B.SC. CHEMISTRY PROGRAMME

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										
222CE1A1CA	Core - I	Fundamentals of Chemistry	4	1	-	3	50	50	100	4
222CE1A1CP	Core Practical - I	Volumetric Analysis and Preparation	-	-	6	3	50	50	100	3
222PY1A1IP	IDC - I	Modern Physics	3	-	4	3	50	50	100	5
Part-IV										
223MB1A1AA	AECC-I	Environmental Studies	2	-	-		50	-	50	2
Part - V										
222CE1A1XA	Extension Activity	NSS/NCC/YRC/ RRC/Yoga/Sports/ Clubs	-	-	-		50	-	50	1
Total			**17**	**2**	**11**				**600**	**21**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
Part-I										
221TL1A2TA	Language-I	Tamil–II: Ara Ilakkiyam	4	1	-	3	50	50	100	3
221TL1A2HA		Hindi-II: Modern Literature								
221TL1A2MA		Malayalam-II: Modern Literature								
221TL1A2FA		French –II: Grammar, Translation and Civilization								
Part-II										
221EL1A2EA	Language-II	Professional English -II	4	-	1	3	50	50	100	3
Part-III										
222CE1A2CA	Core - II	General Chemistry	3	-	-	3	50	50	100	3
222CE1A2CB	Core -III	Organic, Physical and Inorganic Chemistry	4	-	-	3	50	50	100	4
222CE1A2CP	Core Practical-II	Organic Analysis and Preparation	-	-	4	3	50	50	100	2
222PY1A2IP	IDC – II	Applied Physics	3	-	4	3	50	50	100	5
Part-IV										
221TL1A2AA	AECC-II	Basic Tamil	2	-	-		50	-	50	2
221TL1A2AB		Advanced Tamil								
225CR1A2AA		Human Rights and Women's Rights								
Part-V										
222CE1A2XA	Extension Activity	NSS/NCC/YRC/ RRC/Yoga/ Sports/Clubs	-	-	-		50	-	50	1
Total			**20**	**1**	**9**				**700**	**23**

01.12.2022
BoS Chairman/HoD
Department of Chemistry
Dr. N. G. P. Arts and Science College
Coimbatore -- 641 048

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

BoS- 12th	AC - 14th	GB - 19th
01/12/2022	19/01/2023	30/01/2023

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

Dr.NGPASC
COIMBATORE | INDIA

B.Sc. Chemistry (Students admitted during the AY 2022-23)

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										
222CE1A3CA	Core- IV	Applied Chemistry	4	-	-	3	50	50	100	4
222CE1A3CB	Core- V	Basic Concepts in Analytical Methods	4	-	-	3	50	50	100	4
222CE1A3CP	Core Practical-III	Inorganic Analysis	-	-	6	3	50	50	100	3
222CE1A3SP	SEC Practical	Computer Applications for Chemistry	-	-	4	3	50	50	100	2
222MT1A3IP	IDC- III	Mathematics with MATLAB	2	-	2	3	50	50	100	3
Total			**16**	**2**	**12**				**700**	**22**

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

Dr.N.G.P. Arts and Science College
APPROVED
BoS- 13th 08/06/23 | AC - 15th 14/07/23 | GB - 20th 05/08/23

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

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										
222CE1A4CA	Core- VI	Inorganic Chemistry - I	4	1	-	3	50	50	100	5
222CE1A4CB	Core- VII	Spectroscopy and Chromatography	4	-	-	3	50	50	100	4
222CE1A4CP	Core Practical- IV	Gravimetric Analysis	-	-	6	3	50	50	100	3
222CE1A4SA	SEC- II	Green Chemistry	3	-	-	3	50	50	100	2
222MT1A4EP	IDC- IV	Statistical Analysis and Tools	2	-	2	3	50	50	100	3
Total			19	3	8				700	23

17.10.23
Chairman/HoD
Department of Chemistry
Dr. N. G. P. Arts and Science College
Coimbatore -- 641 048

Dr.N.G.P. Arts and Science College
APPROVED
BoS- 14th 17.10.23 | AC - 16th 13.12.23 | GB - 21st 05.01.24

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

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fifth Semester										
Part - III										
222CE1A5CA	Core- VIII	Inorganic Chemistry - II	4	-	-	3	50	50	100	4
222CE1A5CB	Core- I X	Organic Chemistry - I	4	-	-	3	50	50	100	4
222CE1A5CC	Core- X	Physical Chemistry - I	4	-	-	3	50	50	100	4
222CE1A5CP	Core Practical– V	Physical Chemistry	-	-	6	3	50	50	100	3
222CE1A5CQ	Core Practical- VI	Applied Chemistry	-	-	4	3	50	50	100	2
222CE1A5SA	SEC- III	Nanomaterials and Nanotechnology	2	-	-	3	50	50	100	2
222CE1A5DA	DSE- I	Industrial Chemistry	4	-	-	3	50	50	100	4
222CE1A5DB		Agricultural Chemistry								
222CE1A5DC		Forensic Chemistry								
222CE1A5TA	IT	Industrial Training					50	50	100	2
Part - IV										
	GE		2	-	-	3	50	-	50	2
Total			**20**	**-**	**10**				**850**	**27**

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

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Academic Council
CHAIRMAN
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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										
222CE1A6CA	Core- XI	Organic Chemistry - II	4	1	-	3	50	50	100	5
222CE1A6CB	Core- XII	Physical Chemistry - II	4	1	-	3	50	50	100	5
222CE1A6CV	Core- XIII	Project and Viva voce	-	-	8	-	50	50	100	4
222CE1A6SA	SEC- IV	Chemistry of Consumer Products	2	-	-	3	50	50	100	2
222CE1A6DA	DSE- II	Polymer Chemistry	4	-	-	3	50	50	100	4
222CE1A6DB		Food Chemistry								
222CE1A6DC		Medicinal Chemistry								
222CE1A6DD	DSE- III	Dye and Textile Chemistry	4	-	-	3	50	50	100	4
222CE1A6DE		Dairy Chemistry								
222CE1A6DF		Pharmaceutical Chemistry								
Part - IV										
223BC1A6AA	AECC- III	Innovation ,IPR and Entrepreneurship	2	-	-		50		50	2
Total			**20**	**2**	**8**				**650**	**26**
***Grand Total**									**4200**	**142**

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Coimbatore – 641 048

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DISCIPLINE SPECIFIC ELECTIVE

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

Semester V (Elective I)

List of Elective Courses

S. No.	Course Code	Name of the Course
1	222CE1A5DA	Industrial Chemistry
2	222CE1A5DB	Agricultural Chemistry
3	222CE1A5DC	Forensic Chemistry

Semester VI (Elective II)

List of Elective Courses

S. No.	Course Code	Name of the Course
1	222CE1A6DA	Polymer Chemistry
2	222CE1A6DB	Food Chemistry
3	222CE1A6DC	Medicinal Chemistry

Semester VI (Elective III)

List of Elective Courses

S. No.	Course Code	Name of the Course
1	222CE1A6DD	Dye and Textile Chemistry
2	222CE1A6DE	Dairy Chemistry
3	222CE1A6DF	Pharmaceutical Chemistry

GENERIC ELECTIVE COURSE (GE)

The following are the course offered under Generic Elective Course
Semester V

S. No.	Course Code	Course Name
1	222CE1A5GA	Chemistry in Daily life

EXTRA CREDIT COURSES

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

S. No.	Course Code	Course Name
1	222CE1ASSA	Chemistry in the Service of Mankind
2	222CE1ASSB	Cosmetic Chemistry

CERTIFICATE PROGRAMMES

The following are the programme offered to earn extra credits:

S. No.	Programme Code and Name	Course Code	Course Name
1	2CE5A Chemical Treatment Processes	222CE5A1CA	Chemical Treatment Processes
2	2CE5B Water and waste water treatment	222CE5B1CA	Water and waste water treatment

Course Code	Course Name	Category	L	T	P	Credit
221TL1A1TA	TAMIL- I:IKKALA 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	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

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

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.

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.	Comprendreunepersonne demande un service à quelqu'un. Demander à quelqu'un de faire quelque chose. Imaginer et raconter au passé à partir de situations dessinées.

Unit V Practical Application 10 h

Make in Own Sentences

Text Book

1 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 of varied genres
- Any spontaneous spoken discourse and respond to them with proper sentence structure
- The transactional concept of English language

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

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

221EL1A1EA	PROFESSIONAL ENGLISH- I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Genre Studies 10 h

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

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

A. G. Gardiner: On Superstitions- Author's biography- Narrative structure- Exploration of the text- passage analysis- insight of ideas- cohesion and context- style- language techniques- 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/EFL Listening and Speaking. Routledge, New York, United States. (Unit II)

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

References

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

2 OnSuperstitions."THEHISTORIAN,thehistorian1947.wordpress.com/2019/03/08/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
222CE1A1CA	FUNDAMENTALS OF CHEMISTRY	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The chemical bonding and the concept of hybridization.
- The fundamentals of thermodynamics.
- The concepts of organic chemistry.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Compare the different atomic model structures.	K2
CO2	Relate the types of bonding nature in various molecules based on their hybridization.	K2
CO3	Classify the Kinetic theory of gases.	K2
CO4	Summarize the concept of thermodynamics to different systems.	K2
CO5	Illustrate the concepts of organic chemistry.	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

222CE1A1CA	FUNDAMENTALS OF CHEMISTRY	SEMESTER I

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Atomic structure 12 h

Rutherford atomic model – Bohr theory of hydrogen atom – Sommerfeld theory – Particle and wave character of electrons – de Broglie's equation – Davisson- Germer experiment - Heisenberg's uncertainty principle - Compton effect – Schrödinger wave equation – Eigen values and Eigen functions – Quantum numbers – Pauli's exclusion principle – Hund's rule and Aufbau principle.

Unit II Chemical bonding 12 h

Types of bonds – ionic, covalent, coordinate and metallic bonds - Hybridization involving s, p and d orbitals – Properties of ionic, covalent and coordinate compounds – Valence bond theory – VSEPR theory. Molecular orbital theory – Molecular orbital configurations of simple homo nuclear and hetero nuclear diatomic molecules – Comparison between VBT and MOT.

Unit III Gaseous state 12 h

Kinetic molecular theory of gases – Maxwell's distribution of molecular velocities (derivation not needed) – Collision diameter – Collision number, collision frequency – Mean free path – Real and ideal gases – Deviation of real gases from ideal behavior-Equations of state -Derivation of Van der Waal's equation. Various methods for expressing concentrations of solutions – Vapour pressure of liquids – ideal and non-ideal solutions – Raoult's law – Vapour pressure of non-ideal solutions – Vapour pressure composition and boiling point composition curves.

Unit IV Thermodynamics -I 12 h

System-Isolated system - Open system - Closed system. Surroundings - Extensive and intensive properties - Types of process. First law of thermodynamics - Internal energy. State function and path function - Exact and inexact differentials - Enthalpy of system, enthalpy of vaporization, enthalpy of fusion - Heat capacity of a system - Relation between Cp and Cv in gaseous system. Joule Thomson effect, Joule Thomson coefficient and inversion temperature. Heat of neutralization - Heat of solution, heat of combustion, Kirchoff's equation - Flame and explosion temperature - Bomb calorimeter - Measuring enthalpy of combustion, Hess's law-

Bond energy - Calculations of bond energy.

Unit V Basic organic chemistry 12 h

Electronic displacements: Inductive effect, electromeric effect, resonance hyperconjugation and steric effect. Strength of organic acids and bases - Factors affecting pK values. Cleavage of bonds: homolysis and heterolysis. Reactive intermediates: Structure and stability of carbocations, carbanions and free radicals.

Text Books

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

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

References

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

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

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

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

222CE1A1CP	VOLUMETRIC ANALYSIS AND PREPARATION	SEMESTER I

Total Credits: 3
Total Instructions Hours: 72 h

S.No	Contents
1	Estimation of HCl by NaOH using a standard oxalic acid solution.
2	Estimation of Na_2CO_3 by HCl using a standard Na_2CO_3 Solution.
3	Estimation of oxlaic acid by $KMnO_4$ using a standard oxalic acid solution.
4	Estimation iron(II) sulphate by $KMnO_4$ using a standard Mohr's salt solution.
5	Estimation of calcium(II) by $KMnO_4$ using standard oxalic acid solution.
6	Estimation of iron(II) by potassium dichromate using standard Mohr's salt solution.
7	Estimation of $KMnO_4$ by thiosulphate using a standard potassium dichromate solution.
8	Estimation of copper(II) sulphate by $K_2Cr_2O_7$ solution.
9	Preparation of Tetraamminecopper(II)sulphate.
10	Preparation of Hexamminecobalt(II) chloride.
11	Preparation of Prussian blue.
12	Preparation of Hexathiourealead(II) nitrate.

Note: Out of 12 – 10 Mandatory

References

1. Venkateswaran. V, Veeraswamy. R and Kulandaivelu. A.R, 2017, "Principles of Practical Chemistry", 1st Edition, Sultan Chand & Sons & New Delhi.
2. Mendham. J, Denney. R.C, Bames. J.D and Thomas. M, 1989. "Vogel's Text book of Quantitative Analysis", 6th Edition, Pearson Education & UK.
3. Gopalan. R, Subramanian. P.S and Rengarajan. K, 2004, "Elements of Analytical Chemistry", 1st Edition, S. Chand and Sons & New Delhi.
4. Giri. S, Bajpai. D.N and Panday. O.P, 2013, "Practical Chemistry Vol. I & II", 30th Edition, S. Chand & Company, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222PY1A1IP	MODERN PHYSICS	IDC	3	-	4	5

PREAMBLE

This course has been designed for students to learn and understand

- The properties of electricity, crystals and electronics
- The mode of spectral lines formation in optics
- The basics of digital electronics

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the applications of electrical circuits	K2
CO2	Classify different types of bonds, bond theory and energy gaps	K2
CO3	Develop the different kinds of spectral formation	K3
CO4	Demonstrate the working of diodes and rectifiers	K2
CO5	Experiment with the logic gates	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

222PY1A1IP	MODERN PHYSICS	SEMESTER I

Total Credits: 5

Total Instruction Hours: 72 h

Syllabus

Unit I Electricity 16 h

Capacitors – Types of capacitors - Spherical capacitor - Cylindrical capacitor - Carey-Foster's bridge – Working of potentiometer - Calibration of voltmeter - Calibration of ammeter

1 Calibration of low range voltmeter using potentiometer

2 Determination of unknown resistance using Carey Foster's bridge

3 Calibration of low range ammeter using potentiometer

Unit II Crystals 13 h

Ionic crystals - Covalent crystals - Metallic bond - Band theory of solids - Tunnel diodes - Energy bands - Superconductivity - Bound electron pairs - Hall effect - Experimental determination of hall coefficient.

4 Determination of band gap of semiconductors using four probe method

5 Determination of band gap of semiconductor by thermal method

Unit III Optics 17 h

Interference in the thin film - Air wedge – Thickness of a thin wire – Newton's rings – Determination of wavelength using Newton's rings - Theory of transmission grating – Normal incidence.

6 Determination of wavelength of mercury lines by grating minimum deviation method

7 Determination of the radius of curvature in Newton's rings

Unit IV Analog Electronics 13 h

Bridge rectifiers – Band gap determination using post office box –Transistor characteristics in common base and common emitter mode - Transistor single stage amplifier- Expression for input impedance - Output impedance and current gain

8 Characterization of junction diode

9 To determine band gap using Post office box method

Unit V Digital Electronics 13 h

1's and 2's complement of a binary number and binary arithmetic - Steps in the fabrication of Monolithic IC's – General applications of IC's - Registers - Flip flops - JK flip flops - Half adder - Full adder.

10 Verification of logic gate truth table

11 Verification of De Morgan's law

12 Construction and working of IC regulated power supply

Text Books

1 Murugesan R., 2016, "Modern Physics", 18th Edition, S.Chand and Co, New Delhi.

2 [E-book]Arthur B, 2003, "Concepts of Modern Physics", 6th Edition, McGraw-Hill, New York.

References

1 Sedha R.S., 2004, "A text book of Digital Electronics", 1st Edition. S. Chand & Co, New Delhi

2 David H, Robert R, Jearl W, 2014, "Fundamentals of Physics", 10th Edition. John Willy Company Hoboken, New Jersey, United States

3 [E-book] Serway A.R., Jewett W.J., 2014, "Physics for Scientists and Engineers with Modern Physics",9th Edition,Brooks/Cole, USA

4 Brijal N and Subramanian, "Text book of optics", S. Chand & Company, New Delhi.

5 Weblink: https://www.askiitians.com/revision-notes/physics/solid-and-electronic-device/

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	Understand the importance of natural resources in order to conserve for the future.	K2
CO2	Infer on Natural resources and its conservation	K2
CO3	Apply the knowledge on Biodiversity and its conservation	K3
CO4	Relate effects, causes and control of air, water, soil and noise pollution etc.	K2
CO5	Build awareness about sustainable development and Environmental protection	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

223MB1A1AA	ENVIRONMENTAL STUDIES	SEMESTER I

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Environmental studies & Ecosystems 5 h

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

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

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

Unit III Biodiversity and Conservation 5 h

Biodiversity and Conservation: Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hot spots. India as a mega-biodiversity nation; Endangered and endemic species of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit IV Environmental Pollution, Environmental Policies & Practices 5 h

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

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

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

Text Books

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

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

References

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

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

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

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.

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

B.Sc. Chemistry (Students admitted during the AY 2022-23)

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

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

BOS - 12th	AC - 14th	GB - 19th
01/12/2022	19/01/2023	30/01/2023

Dr.NGPASC
COIMBATORE | INDIA
B.Sc. Chemistry (Students admitted during the AY 2022-23)

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

- 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

B.Sc. Chemistry (Students admitted during the AY 2022-23)

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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B.Sc. Chemistry (Students admitted during the AY 2022-23)

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

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

B.Sc. Chemistry (Students admitted during the AY 2022-23)

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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B.Sc. Chemistry (Students admitted during the AY 2022-23)

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

- 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

B.Sc. Chemistry (Students admitted during the AY 2022-23)

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

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B.Sc. Chemistry (Students admitted during the AY 2022-23)

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'interdictio n. Donner des conseils à des personnesdans des situations données.

Unit V 10 h

Make in Own Sentences

Text Book

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

B.Sc. Chemistry (Students admitted during the AY 2022-23)

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

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

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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**

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

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

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B.Sc. Chemistry (Students admitted during the AY 2022-23)

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, Aravind R.Nair, Veena Bhambhani. 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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B.Sc. Chemistry (Students admitted during the AY 2022-23)

Course Code	Course Name	Category	L	T	P	Credit
222CE1A2CA	GENERAL CHEMISTRY	CORE	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The Fundamentals of organic chemistry and preparation, reaction of alkenes and alkynes.
- The concepts and reactivity of -s block elements.
- The importance of second law of thermodynamics and entropy changes.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the fundamental concepts of alkanes.	K2
CO2	Illustrate the preparation and properties of alkenes and alkynes.	K2
CO3	Summarize the position and properties of s block elements.	K2
CO4	Construct the basics of crystals and their characteristics.	K3
CO5	Identify the facts and limitations of second law of thermodynamics.	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

B.Sc. Chemistry (Students admitted during the AY 2022-23)

222CE1A2CA	GENERAL CHEMISTRY	SEMESTER II

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Alkanes — 6 h

Nomenclature of alkanes, preparation, physical and chemical properties. Conformation of ethane, butane and cyclohexane - Baeyer's strain - Equatorial and axial bonds- 1, 3– diaxial strain- Conformation and reactivity – Conformation of mono and dimethyl cyclohexane.

Unit II Alkenes and Alkynes — 8h

Preparation of alkenes - Dehydrohalogenation, dehydration, dehalogenation and reduction of alkynes. Reactions of alkenes - Addition of halogens, HX (Markovnikov's rule, peroxide effect), H_2O and HOCl. Hydroxylation with H_2O_2, alkaline $KMnO_4$, hydroboration, oxidation and ozonolysis.

Alkynes – General preparations and reactions – Reduction, addition of H_2O and HOCl. Ozonolysis, polymerization and acidity of alkynes.

Unit III S- Block Elements — 7 h

General characteristics of alkali and alkaline earth metals - Anomalous behavior of lithium and beryllium - Diagonal relationships of lithium with magnesium and beryllium with aluminium. Preparation, properties and uses of lithium hydride, super phosphate of lime, Plaster of Paris and lithopone.

Unit IV Solid State Chemistry — 7 h

Differences between crystalline and amorphous solids - Symmetry in crystal systems - Law of interfacial angles -Law of rational indices - Miller indices - Space lattice and unit cell- Bravis lattices-Bragg's equation - Powder method. Radius Ratio Rule- Packing in crystals - Types of crystals - Structure of sodium chloride (NaCl) and Cesium chloride (CsCl).

Unit V Thermodynamics — 8 h

Second law of thermodynamics - Need for second law- Entropy changes in isothermal expansion of an ideal gas- Entropy changes in reversible and irreversible processes- Entropy as a function of T and V-Entropy as a function of T and P. Entropy of mixing of ideal gases-Physical significance of entropy. General

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B.Sc. Chemistry (Students admitted during the AY 2022-23)

conditions of equilibrium and spontaneity- Conditions of equilibrium and spontaneity under constraints, physical significance of A and G, Temperature and pressure dependence of G, Maxwell's relations, Gibbs – Helmholtz equation.

Text Books

1 Madhan. R.D, 2019, "Modern Inorganic Chemistry", 10th Edition, Mc Graw Hill Company & USA.

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

References

1 Lee. J.D, 2016, "A New Concise Inorganic Chemistry", 5th Edition, ELBS & UK.

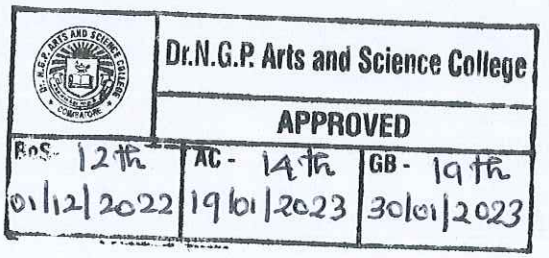
2 Morrison R.T, 2016, "Organic Chemistry", 7th Edition, Prentice Hall of India Pvt. Ltd., New Delhi.

3 Puri. B.R, Sharma. L.R and Kalia. K.C, 2016, "Principles of Inorganic Chemistry", 2nd Edition Vishal Publishing & Co & New Delhi.

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

5 https://nptel.ac.in/courses/104104101

6 https://www.digimat.in/nptel/courses/video/104108098/L01.html



B.Sc. Chemistry (Students admitted during the AY 2022-23)

Course Code	Course Name	Category	L	T	P	Credit
222CE1A2CB	ORGANIC, PHYSICAL AND INORGANIC CHEMISTRY	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of chemical metallurgy and the chemistry of Boron, Carbon, aluminum and Silicon elements.
- The Fundamentals of aromaticity and electrophilic substitution reaction of benzene.
- The Importance of chemical equilibrium, zeroth and third law of thermodynamics.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Classify the different types of metals extraction process and its importance in chemical metallurgy.	K2
CO2	Identify the periodic behavior and their properties of Boron, Carbon, aluminum and Silicon elements.	K3
CO3	Explain the properties of aromatic compounds and their reactions.	K2
CO4	Demonstrate the preparation and properties alkyl and aryl halides.	K2
CO5	Utilize the chemical equilibrium and laws of thermodynamics in different states.	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

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B.Sc. Chemistry (Students admitted during the AY 2022-23)

222CE1A2CB	ORGANIC, PHYSICAL AND INORGANIC CHEMISTRY	SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Process of Metallurgy 10 h

Metallurgy - Minerals and ores - Ore dressing – Separation (gravity separation, froth flotation, magnetic separation, chemical separation) - Calcination and roasting. Extraction of metal - Chemical reduction - Auto reduction - Electrolytic reduction - Metal displacement. Thermodynamic principles of metallurgy-Ellingham diagram, observations and its applications. Refining methods - Fractional crystallization - Van Arkel method - electrolytic refining - Vapour phase refining-ion exchange method. Occurrence, extraction, properties and uses of Germanium and Titanium - preparation, properties and uses of TiO_2.

Unit II Chemistry of Boron, Carbon, Aluminum and Silicon 10 h

Boron family – Physical properties – Anomalous properties of Boron - Diagonal relationship of boron with silicon. Preparation, properties, structure and uses of orthoboric acid, borax, borazine, boron nitride, diborane and bonding in diboranes. Relative strengths of boron trihalides as Lewis acids. Aluminium – Extraction of aluminium from bauxite – Preparation, properties and uses Aluminum chloride. Carbon family – Physical properties – Catenation - Classification of carbides - preparation, structure and uses of silicones.

Unit III Arenes and Aromaticity 10 h

Aromaticity-Huckel's rule (aromatic, non-aromatic, and anti-aromatic molecules) – Structure of benzene – Kekule structure - Molecular orbital structure - Resonance energy and stability of benzene - Benzenoid and non-benzenoid compounds– Cyclic ions - Cyclo propenyl cation, cyclo pentadienyl anion and tropylium ion - Electrophilic substitution reactions – Energy profile diagram - Mechanism of halogenation, sulphonation, and nitration -Friedel-Crafts alkylation and acylation

Unit IV Alkyl and Aryl Halides 10 h

Alkyl halides, preparation, chemical reactions - Mechanisms of nucleophilic aliphatic substitution reactions (SN_1 and SN_2) – Elimination reactions (E_1 and E_2). Substitution vs elimination. Aryl halides (Cl, Br substitution) - Preparation –properties - Uses.

B.Sc. Chemistry (Students admitted during the AY 2022-23)

Electrophilic and nucleophilic aromatic substitution reaction mechanisms. Comparison of alkyl and aryl halides towards nucleophilic substitution reactions.

Unit V **Chemical Equilibrium, Zeroth and Third Law of Thermodynamics** **8 h**

Law of mass action - Thermodynamic treatment of the law of mass action - Van't Hoff reaction isotherm, Temperature dependence of the equilibrium constant – Van't Hoff equation, integrated form of Van't Hoff equation. Homogeneous and heterogeneous systems (NH_3, PCl_5 and $CaCO_3$) - Relationship between Kp and Kc - Factors affecting chemical equilibrium – Le Chatlier principle (Haber's and Contact processes) - Zeroth law of thermodynamics - Absolute temperature scale. Statement of third law - Nernst heat theorem.

Text Books

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

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

References

1 Lee. J.D, 2016, "A New Concise Inorganic Chemistry", 5th Edition, ELBS & UK.

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

3 Puri. B.R, Sharma. L.R and Kalia. K.C, 2016, "Principles of Inorganic Chemistry", 5th Edition, Vishal Publishing & Co & New Delhi.

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

5 https://www.toppr.com/guides/chemistry/the-p-block-elements/trends-and-properties-of-boron-and-aluminium/

6 https://archive.nptel.ac.in/courses/113/105/113105024/

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B.Sc. Chemistry (Students admitted during the AY 2022-23)

222CE1A2CP	CORE PRACTICAL: ORGANIC ANALYSIS AND PREPARATION	SEMESTER II

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Organic Analysis
1	Systematic analysis of Organic compounds containing diamides.
2	Systematic analysis of Organic compounds containing carbohydrate.
3	Systematic analysis of Organic compounds containing carboxylic acids (mono & di).
4	Systematic analysis of Organic compounds containing amines.
5	Systematic analysis of Organic compounds containing amides.
6	Systematic analysis of Organic compounds containing Phenol.
7	Systematic analysis of Organic compounds containing aldehydes.
8	Systematic analysis of Organic compounds containing Ketones.
9	Systematic analysis of Organic compounds containing esters.
10	Preparation of Methyl salicylate from Salicylic acid (esterification).
11	Preparation of Asprin from Salicylic acid (acetylation).
12	Preparation of p-Bromoacetanilide from aniline (bromination)

Note: Any 10 Experiments

References

1 Venkateswaran. V, Veeraswamy. R and Kulandaivelu. A.R, 2017, "Principles of Practical Chemistry", 1st Edition, Sultan Chand & Sons & New Delhi.

2 Mendham. J, Denney. R.C, Bames. J.D and Thomas. M, 1989. "Vogel's Text book of Quantitative Analysis", 6th Edition, Pearson Education & UK.

3 Gnanapragasam N.S and Ramamurthy G, 2009, "Organic Chemistry lab manual", S. Viswanathan and Co. Pvt. Ltd.

4 Gopalan. R, Subramanian. P.S and Rengarajan. K, 2004, "Elements of Analytical Chemistry", 1st Edition, S. Chand and Sons & New Delhi.

B.Sc. Chemistry (Students admitted during the AY 2022-23)

Course Code	Course Name	Category	L	T	P	Credit
222PY1A2IP	APPLIED PHYSICS	IDC	3	-	4	5

PREAMBLE

This course has been designed for students to learn and understand

- The basic principles, theory and concepts of properties of matter.
- The concepts of viscosity and surface tension.
- The basic programming in microprocessor.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the importance and applications of young's modulus.	K2
CO2	Utilize the concepts of viscosity for given liquid.	K2
CO3	Explain the concept of surface tension and modes of vibration.	K3
CO4	Illustrate the gravitational field and related applications.	K2
CO5	Develop the microprocessor architecture of 8085.	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

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222PY1A2IP	APPLIED PHYSICS	SEMESTER II

Total Credits: 5

Total Instruction Hours: 72 h

Syllabus

Unit I **Properties of Matter** **16 h**

Young's Modulus – Rigidity Modulus – Poisson's Ratio – Bending of Beams – Expression for Bending Moment – Measurement of Young's Modulus – Uniform and Non-Uniform Bending.

1 Determine the Young's modulus of a given bar – Uniform bending (Microscopic method).

2 Determine the Young's modulus of given bar - Non Uniform bending (Microscopic method).

3 Determination of rigidity modulus of a string by using static method.

Unit II **Viscosity** **13 h**

Poiseuille's formula for the flow of a liquid through capillary tube – Ostwald's viscometer – Stokes method for coefficient of viscosity of a viscous liquid – Friction and lubrication.

4 Determine the coefficient of viscosity of water by Poiseuille's Method.

5 Determine the coefficient of viscosity of water by Stoke's Method.

Unit III **Surface Tension and Vibration** **17 h**

Explanation of surface tension on kinetic theory – Work done in increasing area of a surface – Pressure difference across a liquid surface - Jaegar's method - Transverse and longitudinal modes of vibration - A.C. frequency measurement using sonometer.

6 Determine the surface tension of water by drop weight method.

7 Study the frequency of a tuning fork by sonometer.

Unit IV **Gravitation** **13 h**

Newton's law of gravitation - Kepler's laws of planetary motion - Determination of 'G' Boy's experiment - Variation of g with altitude & depth - Determination of g

B.Sc. Chemistry (Students admitted during the AY 2022-23)

with compound pendulum.

8 Compound Pendulum - Determination of 'g'.

9 Torsional pendulum - Determination of moment of inertia of given disc.

Unit V Microprocessors 8085 instruction set **13 h**

8085 Machine language - 8085 assembly language - ASCII codes - writing and executing an assembly language program - High level language - Operating system.

10 Write the assembly language program for 8-bit subtraction.

11 Write the assembly language program for 8-bit addition.

12 Write the assembly language program for 8 bit Multiplication.

Note: Any 10 Experiments

Text Books

1 Murugesan R., 2016, "Modern Physics", 18th Edition, S. Chand and Co, New Delhi.

2 Ramesh S. Gaonkar, 2013, Microprocessor architecture, Programming and application with 8085, 6th edition, New age international.

References

1 Brij Lal and Subrahmanyam N, 2017,"Properties of Matter", 7th Edition, S. Chand and Co, New Delhi.

2 Subramanyam N, 2019,"Text book of Sound", 3rd Edition, Vikas publications, New Delhi.

3 Nagoor Kani A, 2012, "Microprocessors and Microcontrollers", 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi

4 E-book: Godse A.P, Godse D.A, 2008, "Microprocessors and Microcontroller System" Technical Publications, Pune.

5 Weblink: https://https://archive.nptel.ac.in/courses/108/105/108105102/

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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**

1. ஊர்வன, பறப்பன, விலங்குகள்
2. மனிதர்களின் உறவுப்பெயர்கள் 05 h
3. ஊர்களின்பெயர்கள் (எண்ணிக்கை 10)

Unit V **பயிற்சிப் பகுதி** 04 h

பயிற்சிப் பகுதி (உரையாடும் இடங்கள்)

B.Sc. Chemistry (Students admitted during the AY 2022-23)

வகுப்பறை , பேருந்து நிலையம், சந்தை– பேசுதல்,எழுதுதல்.

Notes:

அக மதிப்பீட்டுத் தேர்வு - வினாத்தாள் அமைப்பு முறை மொத்த மதிப்பெண்கள் - 50

பகுதி –அ

சரியான விடையைத் தேர்வு செய்தல் 10 x2=20

பகுதி –ஆ

சரியா? தவறா? 10x2=20

பகுதி – இ

ஒரு பக்க அளவில் விடையளிக்க 1x10=10

குறிப்பு:

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

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B.Sc. Chemistry (Students admitted during the AY 2022-23)

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

- The concepts of Human Rights.
- The human right Violations and Redressal Mechanism.
- The 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.

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Course Code	Course Name	Category	L	T	P	Credit
221TL1A3TA	TAMIL - III	LANGUAGE - I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

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 and Reading 09 h

Listening in casual conversation,Small group and Conference setting - Listening for Factual Information, Detail and Situation - Developing Listening skills- Why do we avoid Listening- Poor Listening - Disadvantages- Poor listening vs Effective Listening - Basics of Reading-efficient and inefficient readers-Advantages – Benefits andEffective reading and comprehension skills- Need for Developing Efficient Reading skills- Four Basic steps of Effective Reading- Stumbling blocks in becoming an effective Reader- Improving Vocabulary power- Strategies for Comprehending and Retaining content- Effective Note Taking while Reading

Unit II Speaking 11 h

Purpose of General Conversations- Advantages, features of a good conversation- Tips for improving conversation- public speaking- importance of public speaking- Benefits, Tips, Overcoming fear of public speaking- Preparatory steps - Structuring the contents- Audience Awareness- Mode of Delivery

Unit III Writing Skills 10 h

CV and Job Applications- How to make your letter stand out?- Employers expectation - Organize the material – Useful suggestions-Cover Letter- Content to be included – Tone of the letter - Report Writing- importance – features- Types – main parts – Feasibility report– Accident report-Scientific report- Memos – Introduction – Structure- Proposal Writing-Key factors-Types-Contents- Format-Evaluation

Unit IV EffectiveSkills in Language 10 h

Using Word's Effectively- Mastering Spelling Techniques- Structuring Phrases and Clauses- Writing Effective Sentences– Building Effective paragraphs- Revising, Editing and Proof reading

Unit V SoftSkills 08 h

Introduction-What are soft skills?- Importance of soft skills- Attributes- Social soft skills- Thinking-Negotiating-Exhibiting- Identifying- Improving- Will formal training enhance your soft skills? - Soft Skills training-Train Yourself-Practicing soft skills-Measuring attitude– Self-Discovery: Importance of knowing yourself- Process - SWOT analysis – Benefits – Usage –SWOT Analysis grid

Text Books

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

References

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

Course Code	Course Name	Category	L	T	P	Credit
222CE1A3CA	APPLIED CHEMISTRY	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of Pesticides and Fertilizer
- The basic knowledge in the oils, waxes and petroleum products
- The concept of cement and its processing

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the method of preparation of insecticides, fungicides and their applications	K2
CO2	Classify the chemical fertilizers utility in agriculture	K2
CO3	Acquire the knowledge on oils, fats and Waxes	K2
CO4	Outline the classification and analysis of fuels and their combustion	K2
CO5	Summarize the processes and characteristics of cement	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

222CE1A3CA	APPLIED CHEMISTRY	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Pesticides **10 h**

Insecticides: Definition- Classification- Organic and inorganic insecticides- Structure and mode of action- DDT, methoxychlor, BHC, Gammaxane, malathion, parathion- Benefits of pesticides- Adverse environmental effects of pesticides

Fungicides: Definition - Classification - Structure and mode of action - Bordeaux mixture, mercury compounds, baygon, dithiocarbamates

Unit II Fertilizers **10 h**

Definition - Chemical fertilizers - Classification of chemical fertilizers- Manufacture of urea, superphosphate, triple super phosphate and potassium nitrate. Mixed fertilizer, Organic and Bio fertilizer (Manures, compost, sawdust). Advantages and disadvantages of fertilizers

Unit III Oils, Fats and Waxes **8 h**

Oils and Fats - Difference between oils and fats - Properties of oils and fats - Essential oil - Mineral oil - Difference between drying, semi-drying and non-drying oils - Hydrogenation of oils - Saponification value - Iodine value

Waxes: Properties and Classification, common waxes - Spermaceti, bayberry, bees, chinese insect, candelilla, carnauba wax, montan, ozocerite, paraffin, and synthetic wax- Properties and uses

Unit IV Fuels **10 h**

Petroleum-Cracking of petroleum -Synthetic petrol -Refining of gasoline-Reforming and knocking. Octane Rating of fuels, cetane rating, diesel engine fuel, kerosene as a fuel, LPG and CNG as a fuel

Fuels and Combustion: Classification, calorific value, Dulong's formula, analysis of coal, proximate and ultimate analysis, significance, carbonization of coal, manufacture of metallurgical coke by Otto-Hoffmann's Process. Flue gas analysis by ORSAT method

Unit V Construction materials **10 h**

Introduction - Composition of white cement and waterproof cement. Portland cement - Types - Cementing materials - Raw materials - Manufacture - Reactions in kiln - Mixing of additives - Setting of cement - Properties of cement - Testing of cement. Rotary kiln for wet and dry processes - Gypsum–Plaster of Paris - Setting and hardening of lime-Waterproof chemicals (hydrophobic and hydrophilic)

Text Books

1. Jayashree Ghosh, 2016, "Fundamental Concepts of Applied Chemistry", 1st Edition, S. Chand & Company Pvt Ltd, NewDelhi
2. Sharma B.K, 2014, "Industrial Chemistry", 18th Edition, Krishna Prakash and Media pvt ltd, Meerut

References

1. Jain D.C, 2014, "Engineering Chemistry", 16th Edition: Dhanpatrai publishing Company pvt Ltd, New Delhi
2. Bagavathi Sundari K, 2004, "Applied Chemistry", 1st Edition, MJP Publishers, Chennai
3. Thankamma Jacob A, 1979, "A Text Book of Applied Chemistry", 1st Edition, Mc Millan India Ltd
4. Vermani O.P, 2017, "Applied Chemistry- Theory and Practice", 2nd Edition, New Age International Private Limited, Chennai.
5. https://cosmeticsbusiness.com/news/article_page/Lipid_lore_Oils_fats_and_waxes/153554
6. https://www.accessengineeringlibrary.com/content/book/9780071410373/chapter/chapter4

Course Code	Course Name	Category	L	T	P	Credit
222CE1A3CB	BASIC CONCEPTS IN ANALYTICAL METHODS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the laboratory practices in performing practical
- about principles of gravimetric and volumetric analysis
- the methods and concepts of crystal growth techniques

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Examine the laboratory practices	K3
CO2	Identify the various terms used to express concentration and role of indicators in titration.	K2
CO3	Relate concentration, precipitation and solubility products	K2
CO4	Examine the errors, significant figures and precision of the experimental result	K2
CO5	Outline the principles of crystal growth	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

222CE1A3CB	BASIC CONCEPTS IN ANALYTICAL METHODS	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Laboratory Practices **10 h**

Storage and handling of corrosive, toxic and poisonous chemicals - Simple first aid procedure for acid and alkali in eye, acid and alkali burns, heat burns and cut by glasses. Principle of titrimetric methods - Acidimetry - Alkalimetry - Permanganometry - Dichrometry - Iodometry - Argentometry - Complexometric titrations

Unit II Qualitative analysis **10 h**

Introduction - Dry reactions – Heating and flame tests - Wet reactions – Test tubes - Centrifuge tubes - Stirring rods - Droppers - Reagent bottles - Centrifugation - Transferring of precipitates - Washing the precipitates through Buchner funnel - Sintered crucible - Wash bottles - Heating of solutions - Evaporation - Dissolving of precipitates - Precipitation with hydrogen sulphide - Cleaning of apparatus - Interfering anions and its elimination - Classification of cations into analytical groups (group separation only)

Unit III Quantitative Analysis **8 h**

The mole concept – Atomic, molecular and molar masses – Equivalent mass of an acid, base, oxidizing and reducing agents. Concentration terms – Normality - Molarity - Molality- Mole fraction - Percentage solution – Weight composition - Volume composition. Principles of volumetric analysis – Standard solution (primary and secondary standards) - Titration – Types (acid, base, oxidation and reduction) - Equivalent point - End point - Choice of indicators – Internal and external indicators - Theory of indicators – Precautions to avoid errors in titrimetric analysis

Unit IV Gravimetric Analysis **10 h**

Precipitation methods - Super saturation and precipitate formation – Post precipitation - Co-precipitation - Conditions of precipitation - Precipitation from homogeneous solution - Ignition of the precipitate - Quantitative separations based on precipitation methods - Fractional precipitation - Organic precipitants - Types-Advantages and disadvantages - Sequestering agents - Solubility products and precipitation

Unit V Crystal Growth **10 h**

Introduction to crystal growth - Nucleation – Gibbs - Thomson equation - Kinetic theory of nucleation – Limitations of classical nucleation theory - Homogeneous and heterogeneous nucleation – Different shapes of nuclei – Spherical, cylindrical and orthorhombic – Temkins model – Physical modeling of BCF theory - Crystal Growth Techniques - Bridgman technique - Czochralski method - Verneuil technique - Zone melting – Gel growth and solution growth methods

Text Books

1 Svehla. G, Sivasankar. B, 2012, "Vogel's Qualitative Inorganic Analysis", 7th Edition, Pearson education & New Delhi

2 Venkateswaran. V, Veeraswamy. R, Kulandaivelu. A. R, 1997, "Basic Principles of Practical Chemistry", 2nd Edition, Sultan Chand and Sons, New Delhi

References

1 Gopalan. R, Subramaniam. P.S and Rengarajan. K, 2004, "Elements of Analytical Chemistry", Sultan Chand and Sons & New Delhi

2 Lee. J. D, 2006, "Concise Inorganic Chemistry", 2nd Edition, Black Well Science & UK.

3 Mendham. J, Denney. R.C, Bames. J.D, and Thomas, M, 1989, "Vogel's Text book of Quantitative Analysis, 6th Edition, Pearson Education& UK

4 Bhat H.L, 2014, "Introduction to Crystal Growth: Principles and Practices" 1st Edition, CRC Press Taylor and francis group & USA

5 http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000831ME/P001617/M019047/ET/148456031720_kotru.pdf

6 http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/s000831me/p001617/m019386/et/148704959026_1.pdf

222CE1A3CP	INORGANIC ANALYSIS	SEMESTER III

Total Credits: 3
Total Instructions Hours: 72 h

S.No **INORGANIC ANALYSIS**

Semi micro qualitative analysis of inorganic mixture containing two cations and two anions of which one will be interfering acid radicals.

Cations: Lead, copper, bismuth, cadmium, iron, aluminum, zinc, manganese, cobalt, nickel, barium, calcium, strontium, magnesium and ammonium.

Anions: Carbonate, sulphate, nitrate, chloride, bromide, chromate, iodide, fluoride, borate, oxalate, and phosphate

1	Semi-micro qualitative analysis of inorganic mixture - I
2	Semi-micro qualitative analysis of inorganic mixture - II
3	Semi-micro qualitative analysis of inorganic mixture - III
4	Semi-micro qualitative analysis of inorganic mixture - IV
5	Semi-micro qualitative analysis of inorganic mixture - V
6	Semi-micro qualitative analysis of inorganic mixture - VI
7	Semi-micro qualitative analysis of inorganic mixture - VII
8	Semi-micro qualitative analysis of inorganic mixture - VIII
9	Semi-micro qualitative analysis of inorganic mixture - IX
10	Semi-micro qualitative analysis of inorganic mixture - X
11	Analysis of water quality parameters COD and BOD (Under DBT Star College Scheme)
12	Analysis of water quality parameters pH, Turbidity and Dissolved solids (Under DBT Star College Scheme)

Note: Any 10 Experiments

References

1 Ramanujam. V.V, 1988, "Inorganic Semimicro Qualitative Analysis" 3rd Edition, National Pubs & London

2 Venkateswaran. V, Veeraswamy. R and Kulandaivelu. A.R, 2017, "Principles of Practical Chemistry", 1st Edition, Sultan Chand & Sons & New Delhi

3 Giri. S, Bajpai. D.N and Panday. O.P, 2013, "Practical Chemistry Vol. I & II", 30th Edition, S. Chand & Company & New Delhi

4 Bassart. J, Dennay. R.C, Jeffery. G.H and Mendham, 1989, "Vogels text book of qualitative Inorganic analysis", 5th Edition, The ELBS & Longman & UK

222CE1A3SP	COMPUTER APPLICATIONS FOR CHEMISTRY	SEMESTER III

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Create a short document using word and saving it
2	Document a letter using mail merge concepts
3	Create a work sheet with data and find the sum and average of the data
4	Prepare a work sheet for a company quarterly report using special formatting
5	Creation of power point presentation to illustrate climate change
6	Creation of power point presentation to illustrate air and water pollution
7	Calculation of a work sheet data by applying formulae
8	Preparation of a pie chart to represent the hardness of water
9	Preparation of a bar diagram to represent the Melting point
10	Preparation of a flowchart to represent the thermal stability of the compounds
11	To draw the chemical structure using Chem Draw
12	Plot the UV and IR Graph using ORIGIN software

Note: Any 10 Experiments

References

1. Peter Norton., 2022, "Introduction to computers",2nd Edition, Megrew Hill, New Delhi
2. D.P. Nagpal., 2000, "Matering Microsoft office 2000", 3rd Edition, A.H. Wheeler Publishing and Co Ltd, New Delhi
3. V. Rajaraman and Neeharika Adabala, 2015, "Fundamentals of computers", 2nd Edition, PHI Learning Pvt. Ltd., New Delhi
4. Foundations of Computing: Essential for Computing Studies, Profession and Entrance Examinations - 5th Edition,2000

Course Code	Course Name	Category	L	T	P	Credit
222MT1A3IP	MATHEMATICS WITH MATLAB	IDC	2	-	2	3

PREAMBLE

This course has been designed for students to learn and understand

- The techniques to solve Mathematical problems using programming knowledge
- The applications of maxima and minima of functions
- The method of constructing definite integrals

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 MATLAB	K1
CO2	Describe the vector and matrix	K2
CO3	Identify the maxima and minima of functions	K1
CO4	Describe first order and first degree Differential equations	K2
CO5	Recognize integration by parts	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

222MT1A3IP	MATHEMATICS WITH MATLAB	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **Creating Arrays** 9 h

Creating a one dimensional array (vector) - Creating a two dimensional array (matrix) - Variables in Matlab - Transpose operator - array addressing - adding elements to existing variables - deleting elements - built in functions -strings and strings as variables - problems.

1 Creation of vector and matrix

2 Usage of zeros, ones and eye commands

3 Transposing a vector and matrix by transpose Operator

4 Adding element to a vector and matrix.

Unit II **Mathematical Operations with Arrays** 9 h

Addition and subtraction - array multiplication - array division - element by element operations - using arrays in Matlab - Built in functions for analyzing arrays -generation of random numbers - Matlab applications.

5 Matrix operations such as addition, subtraction and multiplication

6 Inverse of a Matrix

7 Solving three linear equations (array division method)

8 Built in functions for analyzing arrays.

Unit III **Differential Calculus** 10 h

Maximum and minimum value of a function- necessary conditions for extreme values - sufficient condition - use of second order derivative- applications.

9 Derivative of symbolic expressions

10 Evaluate the derivative at some particular point

11 Finding maxima and minima for a function.

Unit IV **Differential Equations of First Order and First Degree** 10 h

Separation of variables–transformation of some equations in the form in which variables are separable–homogeneous equations– working rule–equations reducible to homogeneous form-

Pfaffian differential equation-Exact differential equation–Necessary and sufficient condition for a differential equation of first order and first degree to be exact–working rule–solved examples.

12 Solve the Pfaffiandifferential equation

13 Solve the homogeneous differential equation

14 Solve the exact differential equation.

Unit V Integral Calculus 10 h

Properties of definite integral - Integration by parts - reduction formula - Bernoulli's formula.

15 Definite Integrals of Symbolic Expressions

16 Integrals of Matrix Elements

17 Method of integration by Parts.

Text Books

1 Amos Gilat, 2007, "MATLAB An Introduction with applications ", Wiley India Pvt. Ltd., New Delhi.

2 Shanti Narayan, 2003, "Differential Calculus", Eleventh Edition, S.Chand and Company Limited, New Delhi.

3 Raisinghania .M. D, 2012,"Ordinary and Partial Differential Equations", S.Chand & Co, New Delhi.

4 Narayanan .S and Pillai T.K.M, 2008, "Calculus", Vol 2, Viswanathan Publishers, Chennai.

References

1 Narayanan S and Pillai T.K.M 2008,"Calculus", Vol 1, Viswanathan Publishers, Chennai

2 Shanti Narayan, 2003, "Integral Calculus", Eleventh Edition, S Chand and Company Limited, New Delhi

3 RudraPratap, 2017, "Getting started with MATLAB 7, A Quick Introduction for Scientists and Engineers", Oxford University Press, Oxford

4 William J. Palm III, 2005, "Introduction to MATLAB for Engineers", The McGraw-Hill Companies, Inc., New York.

222CE1ASSA	CHEMISTRY IN THE SERVICE OF MANKIND	SEMESTER III

Total Credit: 1

Syllabus

Unit I Fuels and Energy Resources

Types of fuels - Liquid fuels - Petroleum products – Gaseous fuel - Coal gas, producer gas and bio gas - Rocket fuels - Solid and liquid propellants - Nuclear fuels- Difference between nuclear and chemical fuels. Renewable sources of energy -Solar energy, wind energy and tidal energy

Unit II Polymers and Fertilizers

Chemistry of some important polymers - Synthetic fibres - Nylons, polyester – Synthetic rubber - Polyurethane rubber – Reclaimed rubber - Sponge, foam rubber, thermocol - Polymerization techniques - Bulk, solution, suspension, emulsion polymerization. Plant nutrients - Need and requirements - Natural and artificial fertilizer - Urea, triple super phosphate, muriate of potash – Complex fertilizers

Unit III Vitamins and Drugs

Vitamins - Water soluble vitamins - Vitamin B and C - Fat soluble vitamins - A, D, E & K -Sources - Physiological functions and deficiency symptoms. Drugs - Some important drugs - Antibacterials – Sulphonamide - Antipyretics - Aspirin - Antimalarials - Paludrine - Antibiotics - Penicillin

Unit IV Surface Coatings

Pretreatment of the surface metallic coating - Galvanizing - Tinning - Inorganic coatings - Organic coatings - Oil paints - Water paints - Special paints - Enamels and lacquers

Unit V Industrial Processes

Small scale units - Manufacture of candles - Safety matches - Soap and naphthalene balls - Shoe polish- Gum paste - Fountain pen ink - Chalk crayons - Plaster of paris and silicon carbide crucibles. Large scale units - Manufacture of paper - Sugar-Glass - Ceramics and cement.

Text Books

1. Sharma. B.K, 2001," Industrial Chemistry", 12th Edition, Goel Publishing House & NewDelhi
2. Jain P.C and Monica Jain, 2006,"Engineering Chemistry", 15th edition, Dhanpat Rai and Sons & NewDelhi.

References

1. Williams. R.J.P and Fraústo da Silva J.J.R, 2005, "The Chemistry of Evolution" Elsevier Science & UK.
2. George and T. Austin, 1984, " Shreve's Chemical Process Industries", McGraw Hill Book Co & NewDelhi.
3. Alexander Findlay , 2007, " Chemistry in the Service of Man", Longmans, Green & London.
4. Sharma. B.K, 2003, "Industrial Chemistry", Reprint, Goel Publishing House & Meerut
5. https://www.studocu.com/in/document/university-of calcutta/chemistry/surface-coatings/35681435
6. https://biochem.zsmu.zp.ua/wp-content/uploads/2017/04/biochemistry-of-vitamins.pdf

222CE1ASSB	COSMETIC CHEMISTRY	SEMESTER III

Total Credit: 1

Syllabus

Unit I Hair Care Products

Shampoos – Principal constituents – Thickeners and foam stabilizers– Perfumes – Preservatives – Conditioning agents – Antidandruff shampoos. Hair cream – Composition – Hair dyes – Types – Constituents – Dye removals

Unit II Skin Care Product

Skin cleansers – Classifications – Cold cream – Cleansy milk – Moisturizers – Hand and body lotions – Sun screen lotions – Constituents

Unit III Colour Cosmetics

Lipstick – Constituents – Manufacturing method – Lip glosses – Nail polish – Formulation – Manufacture – Face powder – Constituents

Unit IV Dental Product

Oral care product – Product categories – Toothpaste – Toothpowder – Oral rinses – Mouth washes

Unit V Bath Powder Preparation

Bath powders – Soap and detergents – Constituents – Manufacture

Text Books

1. Niir Board, 2004, "Modern Technology of Cosmetics", Asia Pacific Business Press Inc. & New Delhi.
2. Romanowski. P. Schueller. R. 2009, "Beginning Cosmetic Chemistry: Practical Knowledge for the Cosmetic Industry" 3 rd edition Allured books publisher & New Delhi

References

1. Chattopadhyay. P. K., 2013, "Herbal Cosmetics & Ayurvedic Medicines". 3rd revised edition, Niir Project Consultancy Services & New Delhi.
2. Panda. H, 2015, "Herbal Cosmetics Handbook", 3rd revised edition, Asia Pacific Business Press Inc. & New Delhi.
3. Dar A. M, 2018, "Cosmetic Chemistry", Educreation Publishing & Chhattisgarh.
4. Perry Romanowski, Randy Schueller, 2009, "Beginning Cosmetic Chemistry", 3rd edition, Allured Business Media, New Delhi.
5. https://pharmacy.hebmu.edu.cn/trywhx/resources/43/2019624163611.pdf
6. https://atrium.lib.uoguelph.ca/xmlui/bitstream/handle/10214/3091/Cosmetic_Chemistry_Complete_Activity_Guide.pdf

BoS Chairman/HoD
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APPROVED

BoS - 13th	AC - 15th	GB - 20th
08/06/23	14/07/23	05/08/23

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

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

Unit III 10 h

° Parler de Pavenir.	Discuter de l'organisation d'un voyage de 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. ° Décrirequelqu'un	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 : Regine Mérieux, 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
222CE1A4CA	INORGANIC CHEMISTRY - I	CORE	4	1	-	5

PREAMBLE

This course has been designed for students to learn and understand

- The structure, preparation, properties and uses of transition elements
- The basic knowledge about metal carbonyl compounds
- The acid and base concepts and non-aqueous solvent reactions

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Illustrate the occurrence, extraction, properties and uses of transition elements	K2
CO2	Classify the structure, preparation, properties and uses of d-block elements	K3
CO3	Demonstrate the methods of preparation, structure and bonding of metal carbonyls	K3
CO4	Utilize different approaches of Arrhenius, Bronsted, Lowry concepts and their application and limitations	K3
CO5	Summarize the classification, neutralization and their behavior of non-aqueous solvents	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

222CE1A4CA	INORGANIC CHEMISTRY - I	SEMESTER IV

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I **Transition Elements** **12 h**

Transition Elements – Position in the Periodic Table, occurrence, extraction, properties and uses of zirconium, vanadium, molybdenum and tungsten. Preparation and properties of V_2O_5, $ZrOCl_2$, ammonium molybdate, molybdenum blue, WO_2 and tungsten bronzes

Unit II **d-Block Elements** **12 h**

General characteristics - Electronic configuration - Metallic character - Ionization energy - Variable valency - Reducing property - Colour- Magnetic property - Non-stoichiometric compounds - Catalytic properties and tendency to form complexes. Preparation, properties and uses of potassium dichromate, potassium permanganate and manganese dioxide

Unit III **Metal Carbonyl Compounds** **12 h**

Classification - General methods of preparation - Effective atomic number rule - Structure and bonding of mononuclear carbonyls of nickel, iron and chromium, binuclear carbonyls of iron, cobalt and manganese and trinuclear carbonyls of iron and osmium, tetra nuclear carbonyls of iridium

Unit IV **Acid and Base Theory** **12 h**

Arrhenius, Bronsted, Lowry, Lux flood, Lewis theory. Relative strength of acids and bases - Acidity and basicity of solvolytic reaction. Hard and Soft (Lewis) Acids and Bases (HSAB) - Principle - Application - Limitations. Theories of hardness and softness. Electronegativity, hardness and softness. Bonding contributions

Unit V **Non-aqueous Solvents** **12 h**

Classification, neutralization reaction and solvolysis in liquid ammonia, metal - ammonia solutions and cavity model. Neutralization, Amphoteric behavior, solvolysis and redox reactions in liquid sulphur dioxide and liquid hydrogen fluorides

Text Books

1. Soni P.L. 2000, "Text book of Inorganic Chemistry", 20th Edition, S. Chand & Co. Ltd & New Delhi
2. Malik W. U, Tuli G. D and Madan R. D, 2012, "Selected Topics in Inorganic Chemistry", 3rd Edition, S. Chand & Co. Ltd. & New Delhi

References

1. Lee J. D. 2014, "A New Concise Inorganic Chemistry", 5th Edition, Oxford Publishers & UK
2. Madhan R. D, 2016, "Modern Inorganic Chemistry", 10th Edition, Mc Graw Hill Company & USA
3. Soni P. L, 2000, "Text book of Inorganic Chemistry", 20th Edition, S. Chand & Co. Ltd. & New Delhi
4. Cotton F.A, Wilkinson G, Bochmann M and Murilla C, 2007, "Advanced Inorganic Chemistry", 6th Edition, Wiley India Pvt. Ltd. & India
5. https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_(Physical_and_Theoretical_Chemistry)/Equilibria/Acid-Base_Equilibria/1._Theories_of_Acids_and_Bases
6. https://archive.nptel.ac.in/content/storage2/courses/104106064/lectures.pdf

Course Code	Course Name	Category	L	T	P	Credit
222CE1A4CB	SPECTROSCOPY AND CHROMATOGRAPHY	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basic principles involved in different spectroscopic techniques
- The basic knowledge and applications of spectroscopy
- The importance of chromatographic techniques in organic mixture separation

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic principles, instrumentation of UV-Visible spectroscopy and applications	K3
CO2	Gain the knowledge in principles, instrumentation, functions and simple applications of IR spectroscopy	K3
CO3	Study the basic principles and instrumentation of NMR spectroscopy	K3
CO4	Know about basic principles and instrumentation of mass spectroscopy technique	K3
CO5	Exploring the various chromatography techniques and their applications in separation of organic mixtures	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

222CE1A4CB	SPECTROSCOPY AND CHROMATOGRAPHY	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **UV - Visible Spectroscopy** **10 h**

Electromagnetic radiation - Principle – Instrumentation - Selection rules - Types of electronic transitions in organic molecules - Woodward Fieser rules for calculation of λ_{max} of conjugated dienes and unsaturated carbonyl compounds. Chromophore concept - Auxochromes - Bathochromic – Hypsochromic – Hyperchromic - Hypochromic shifts. Types of absorption bands - Solvent effects - Franck - Condon principle - Applications

Unit II **Infrared Spectroscopy** **8 h**

Principle - Instrumentation - Selection rule - Vibrational modes of H_2O and CO_2 - Degrees of freedom - Types of bands - Finger print region. Applications of IR spectra to identify – Functional groups- Hydrogen bonding – Keto-enol tautomers – Conformational isomers – Geometrical isomers – Rotational isomers

Unit III **Nuclear Magnetic Resonance Spectroscopy** **10 h**

Principle - Instrumentation - Solvents used - Number of signals - Equivalent and non-equivalent protons - Position of signals - Chemical shift - Factors influencing chemical shifts - Peak area and proton coupling - Coupling constant - Splitting of signals. NMR spectra of simple molecules (Ethanol, Ethyl acetate, Ethylamine, Ethyl bromide, Isopropyl ketone, Acetone, Anisole, Benzaldehyde and Toluene)

Unit IV **Mass Spectrometry** **10 h**

Principle – Instrumentation - Mass spectrum - Molecular ion peak. Metastable ion peak – Isotopic ion peak. Nitrogen rule - General fragmentation modes of simple molecules (Pentane, Ethyl benzene, Acetone, Ethanol and cyclohexene). Retro - Diels Alder reaction, McLafferty rearrangement

Unit V **Chromatography** **10 h**

Paper chromatography - Principle - Solvents used - Development of chromatogram - Ascending, descending and radial paper chromatography - Applications

Thin layer chromatography – Principle – Choice of adsorbents and solvents, preparation of TLC plates - Rf values

Column chromatography - Principle - Types of adsorbents, preparation of the column, elution, column efficiency, number of theoritical plates recovery of substances and applications

Text Books

1 Sharma Y.R, 2013, "Elementary Organic Spectroscopy", 5th Edition, S. Chand & Co. Ltd & New Delhi

2 Jag Mohan, 2020, "Organic Spectroscopy - Principles and Applications", 2nd Edition (Reprint), Narosa publishing house & New Delhi

References

1 Kalsi P. S, 2009, "Spectroscopy of Organic Compounds", 6th Edition, New Age International Publishers & New Delhi

2 Silverstein R. M and Webster F.X, 2014, "Spectrometric Identification of Organic compounds", 8th Edition, John Wiley and Sons & USA

3 William Kemp, 2008, "Organic Spectroscopy", 3rd Edition, Palgrave publications & New York

4 Banwell C. N and McCash E. M, "Fundamentals of Molecular spectroscopy", 4th Edition, Tata Mcgraw Hill Education Ltd & USA

5 Sharma B. K, 2003, "Industrial Chemistry", 1st Edition, Goel Publishing House & Meerut

6 https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SCY1612.pdf

222CE1A4CP	GRAVIMETRIC ANALYSIS	SEMESTER IV

Total Credits: 3
Total Instructions Hours: 72 h

S.No	List of Experiments
	GRAVIMETRIC ANALYSIS
1	Estimation of lead as lead chromate
2	Estimation of aluminium as aluminium oxinate
3	Estimation of calcium as calcium oxalate
4	Estimation of barium as barium sulphate
5	Estimation of copper as CuSCN
6	Estimation of iron as Fe_2O_3 by precipitating iron as Fe $(OH)_3$
7	Estimation of nickel as Ni-(DMG) (Under DBT Star College Scheme)
8	Estimation of Zinc as Zinc oxide
9	Estimation of Chromium as Chromium oxide
10	Estimation of lead as lead Sulphate (Under DBT Star College Scheme)
11	Estimation of aluminium as aluminium oxide
12	Estimation of Copper as Copper oxide
13	Estimation of Sulphate as Barium sulphate
14	Estimation of Silver as Silver chloride

Note: Any 10 Experiments

References

1. Venkateswaran V, Veeraswamy R and Kulandaivelu A. R, 2017,"Principles of Practical Chemistry", 1st Edition, Sultan Chand & Sons & New Delhi
2. Giri S, Bajpai. D. N and Panday O.P, 2013, "Practical Chemistry Vol. I & II", 30th Edition, S. Chand & Company & New Delhi
3. Mendham J, Denney.R. C, Bames. J. D and Thomas M. 1989, "Vogel's Text book of Quantitative Analysis", 6th Edition, Pearson Education & New Delhi
4. Ahluwalia V. K, 2008, "College Practical Chemistry", 2nd Edition, Universities Press (India Private Limited) & Hyderabad

Course Code	Course Name	Category	L	T	P	Credit
222CE1A4SA	GREEN CHEMISTRY	SEC	3	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- The basics of green chemistry
- An idea about green chemistry and its limitations
- The reactions and applications of green chemistry

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Gain knowledge on green chemistry principles	K3
CO2	Understand the few methods of green synthesis	K2
CO3	Develop the basic knowledge of the various green reactions	K3
CO4	Compare Aqueous phase, Solid state and PTC reactions	K3
CO5	Analyze the Photochemical, Microwave, Sonication and Ionic liquid reactions	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

222CE1A4SA	GREEN CHEMISTRY	SEMESTER IV

Total Credits: 2

Total Instruction Hours: 36 h

Syllabus

Unit I **Introduction to Green Chemistry** **7 h**

Twelve principles of green chemistry - Explanation. Planning a green synthesis - Percentage atom utilization - Evaluating type of reaction involved - Selection of appropriate solvent - Reagent - Protecting groups - Use of catalyst - Energy requirement

Unit II **Green Synthesis** **7 h**

Adipic acid, catechol, disodiumiminodiacetate, Hoffmann elimination, Benzoic acid from methyl benzoate and toluene, Diels-Alder reaction, Decarboxylation

Unit III **Green Reactions** **7 h**

Introduction - Mechanism and application of Acyloin condensation - Aldol condensation - Arndt-Eistert synthesis - Baeyer-Villiger oxidation - Baker-Venkatraman Rearrangement - Barbier reaction - Barton reaction- Baylis-Hillman Reaction - Beckmann rearrangement- Benzil-Benzilic rearrangement - Biginelli reaction

Unit IV **Aqueous phase, Solid state and PTC reactions** **8 h**

Aqueous phase reaction - Hydrolysis of methyl salicylate - Chalcone - Para ethoxy acetanilide - Para acetamido phenol - Vanillidene acetone. SFE - Liquid CO_2 in green synthesis. Solid state synthesis - Diphenyl carbinol - Phenyl benzoate - Azomethines. PTC reaction - Phenylisocyanide - Diphenyl-7-hydroxy-coumarin

Unit V **Photochemical, Microwave, Sonication and Ionic liquid Reactions** **7 h**

Photochemical reactions - Benzopinacol, trans Azobenzene to cis-azobenzene and trans stilbene to cis-stilbene. Microwave reactions - 3-methyl-1-phenyl-5-pyrazolone and copper phthalocyanine. Sonication reaction - Butyraldehyde, 2-chloro-N-Aryl anthranilic acid. Ionic liquid reactions - 1-Acetyl naphthalene, Ethyl-4-methyl-3-cyclohexene carboxylate

Text Books

1. Ahluwalia V. K, 2011, "Green Chemistry-Greener Alternatives to synthetic alternatives to synthetic organic transformations", 1st Edition, Narora Publishing House & New Delhi.
2. Ahluwalia V. K, 2019, "Green Chemistry", 3rd Edition, Ane Books India & New Delhi

References

1. Asim K. Das and Madhua Das, 2012, "Environmental Chemistry with Green Chemistry", Books and Allied Pvt. Ltd & New Delhi
2. Rashmi S, Srivastava M. M, 2009, "Green Chemistry", 4th Edition Reprint, Narosa Publishing House & New Delhi.
3. Indu Tucker Sidhwani, Rakesh K. Sharma, 2020, "An Introductory Text on Green Chemistry: For Undergraduate Students ", 1st Edition, Wiley & Sons & Germany
4. Kumar V, 2010, "An Introduction to Green Chemistry", Vishal Publishing Co & New Delhi
5. https://www.mlsu.ac.in/econtents/441_green_chemistry_-ramesh_-_gec_clt.pdf
6. https://macmillan.princeton.edu/wp-content/uploads/AM_phase-transfer-catalysis.pdf

Course Code	Course Name	Category	L	T	P	Credit
222MT1A4EP	STATISTICAL ANALYSIS AND TOOLS	IDC	2	-	2	3

PREAMBLE

This course has been designed for students to learn and understand

- the requirements of a good average and differentiate between average and dispersion
- importance and the limitations of Correlation and Regression Analysis
- analysis of Time Series

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Compute the various measures of central tendency	K1
CO2	Identify the measures of dispersion	K2
CO3	Explain the concepts of correlation	K1
CO4	Explain the concepts of regression	K2
CO5	Compute the component of time series	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

222MT1A4EP	STATISTICAL ANALYSIS AND TOOLS	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus
(Embedded)

Unit I Measures of Central Tendency 9 h

Introduction - Arithmetic Mean - Median - Mode - Characteristics of Mean, Median and Mode - Geometric Mean - Harmonic Mean -Merits and Demerits of Mean, Median and Mode.

Practical

1 Calculate Mean

2 Calculate Geometric Mean and Harmonic Mean

3 Calculate Median

4 Calculate Mode.

Unit II Measures of Dispersion 9 h

Introduction - Range - Interquartile Range - Mean Deviation - Coefficient of Mean Deviation - Standard Deviation.

Practical

5 Determine Range

6 Determine Interquartile Range

7 Determine Mean Deviation

8 Determine Standard Deviation.

Unit III Correlation 10 h

Introduction - Types of Correlation - Karl Pearson's Coefficient of Correlation - Properties - Merits and Demerits - Rank Coefficient of Correlation.

Practical

9 Determine Correlation using Pearson method

10 Determine rank correlation for the given data

11 Determine rank correlation for repeated data.

Unit IV Regression **10 h**

Introduction - Definition - Uses - Method of studying Regression - Graphic Method - Algebraic Method - Regression Line - Regression Equation.

Practical

12 Determine regression line using Graphic Method

13 Determine regression line using Algebraic Method

14 Determine regression equation.

Unit V Analysis of Time Series **10 h**

Meaning - uses - Secular Trend - Seasonal variation - Cyclical variation - Irregular variation - Measurement of Secular Trend - Graphic Method - Semi average Method - Moving average Method - Method of least squares.

Practical

15 Draw a Trend line using Semi average Method

16 Draw a Trend line using Moving average Method

17 Determine polynomial using method of Least Square Curve Fitting.

Text Books

1 Pillai R.S.N and Bagavathi V, 2017, "Statistics", 14th Edition, S. Chand and Company Ltd, New Delhi.

2 Dr.Bharti Motwani, 2021, "Data Analytics with R", Wiley India pvt. Ltd, New Delhi.

References

1 Gupta S.P, 2014, "Statistical Methods", 34th Edition, Sultan chand and sons Educational Publishers, New Delhi.

2 Ken Black, 2009, "Business Statistics for Contemporary Decision Making", John Wiley and sons Pvt. Ltd, New Delhi.

3 Beri G C, 2010, "Business Statistics", Second Edition, Tata McGraw- Hill Pvt Ltd, New Delhi.

4 Sancheti. D.C and Kapoor V.K, 2010, "Statistics", Seventh Edition, S. Chand and Company Ltd, New Delhi.

17-10-2023
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Academic Council
CHAIRMAN
Dr.N.G.P. Arts and Science College

CourseCode	Course Name	Category	L	T	P	Credit
222CE1A5CA	INORGANIC CHEMISTRY - II	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The structure, preparation, properties and uses of f-block elements and halogens
- The properties of semiconductors
- The basic knowledge about nuclear chemistry

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Classify the structure, preparation, properties and uses of f-Block elements	K3
CO2	Infer the preparation, comparison and properties of halogens	K3
CO3	Explain the synthesis and crystal structures and properties of semiconductors	K3
CO4	Infer the radioactivity and its types	K3
CO5	Analyze the principle, working and application of nuclear chemistry	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

222CE1A5CA	INORGANIC CHEMISTRY - II	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I f-Block elements **10 h**

General characteristics - Electronic configuration - Oxidation states - Color and magnetic properties. Lanthanide and actinide contraction and their consequences. Magnetic shift reagents - Separation methods of lanthanide- fractional crystallization - ion - exchange. Comparison between d-and f -blocks elements - Uses of lanthanide compounds

Unit II Compounds of Halogens **10 h**

Preparation, properties and uses of hypochlorous acid, sodium hypochlorite - Process of bleaching, constitution of bleaching powder, break point chlorination, adverse of effect of bleaching powder. Preparation, properties and structure of perchloric acid, Fluorine compound - HF, polyhalides – KI_3, $CsBr_5$, pseudohalogens - Cyanogens $(CN)_2$, thiocyanogen $(SCN)_2$- Preparation, properties and uses of iodine – Analysis of iodine

Unit III Semiconductors **8 h**

Synthesis and crystal structures of TiO_2, ZnO, SnO_2. Types of semiconductors - Properties of semiconductors - Valence band - Conduction band -Band-gap calculation - Photon absorption by semiconductor - Applications of semiconductors

Unit IV Nuclear Chemistry – I **10 h**

Radioactivity - Types of radioactivity - Nuclear stability - n/p ratio - Magic numbers - Nuclear binding energy - Mass defect - Nuclear shell model - Groups displacement law - Decay constant - Half life period - Radioactive equilibrium - Artificial transmutation - Application of artificial transmutation - Radioactive series

Unit V Nuclear Chemistry – II **10 h**

Nuclear reactions - Fission and fusion reactions - Principle and working of nuclear reactors - Isotopes, isobars, isotones and isomers. Separation of isotopes - Identification of isotopes - Isotope effect - Application of isotopes in chemistry and

medicine - Detection and measurement of radioactivity –Dosimeter- Wilson cloud chamber-Geiger – Muller counter

Text Books

1. Soni, P.L. 2000, "Text book of Inorganic Chemistry", 20th edition, S. Chand Co. Ltd. & New Delhi
2. Madhan. R.D, 2016, "Modern Inorganic Chemistry", 10th edition, Mc Graw Hill Company & USA

References

1. Malik W. U. Tuli G. D. and Madan R. D. 2012, "Selected topics in Inorganic Chemistry", S. Chand & Co. Ltd. & New Delhi
2. Lee J. D. 2014, "A New Concise Inorganic Chemistry", 5th edition, Oxford Publishers & UK
3. Arnikar H.J. 2011, "Essential of Nuclear Chemistry", 2nd edition, Wiley-Eastern Ltd. & NewDelhi
4. Peter A C Mcpherson 2016, "Principles of Nuclear chemistry", 3rd edition, World Scientific Publishing Company
5. Cotton F. A. Wilkinson G. Bochmann M. and Murilla C. 2007, "Advanced Inorganic Chemistry", 6th edition, Wiley India Pvt. Ltd. & India
6. https://www.studocu.com/in/document/central-university-of-kerala/inorganic-and-solid-state-chemistry/f-block-elements-chemistry-study-notes/22016340
7. https://wou.edu/chemistry/courses/online-chemistry-textbooks/ch103-allied-health-chemistry/ch103-chapter-3-radioactivity/

Course Code	Course Name	Category	L	T	P	Credit
222CE1A5CB	ORGANIC CHEMISTRY - I	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The asymmetry and optical activity of organic molecules
- The naming reactions, organic rearrangements and reagents for oxidation and reductions
- The chemistry of amino acids, proteins and peptides, reactions and properties of heterocyclic compounds

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental aspects of stereochemistry	K3
CO2	Study the various reagents involved in the oxidation and reduction reactions	K3
CO3	Explain the knowledge on the various naming reactions and molecular rearrangements including their detailed mechanistic pathway	K3
CO4	Acquire the knowledge of preparation, properties and synthesis of amino acids, proteins and peptides	K3
CO5	Analyze the heterocyclic compounds in terms of physical and chemical properties and to have insight on their preparation	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

222CE1A5CB	ORGANIC CHEMISTRY - I	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Stereochemistry **10 h**

Optical isomerism, plane polarized light, specific rotation, asymmetric carbon atom, optical isomerism of lactic acid and tartaric acid. Enantiomers and diastereo isomers. Resolution of racemic mixture – Mechanical separation – Kinetic separation – Selective adsorption – Chemical method – Biochemical method. Racemization, asymmetric synthesis. Specifying absolute configuration – R, S system for asymmetric molecule

Unit II Reagents in organic synthesis **10 h**

Oxidation: Osmium tetroxide – Chromyl chloride – Ozone – 2,3-Dichloro-5,6-dicyano-1,4-benzoquinone (DDQ) – Dioxiranes. Lead tetraacetate - Selenium dioxide –Dimethyl Sulfoxide with acetic anhydride and oxalyl chloride – Dess-Martin reagent.

Reduction: Catalytic hydrogenation using Wilkinson catalyst – Reduction with lithium aluminium hydride, sodium borohydride, tritertiarybutoxy aluminum hydride, hydrazines

Unit III Reactions and rearrangements **10 h**

Mechanism and applications of Gattermann-Koch aldehyde synthesis, Kolbe – Schmidt reaction, Michael addition, Mannich reaction and Benzoin condensation.

Mechanism and applications of Pinacol-Pinacolone, Beckmann, Hoffmann, Curtius, Benzilic acid and Claisen Rearrangements

Unit IV Amino acids, Proteins and peptides **10 h**

Amino acids – Nomenclature, isoelectric point, methods of preparation – Amination of halo acids – Strecker synthesis – Gabriel phthalimide synthesis – Koop synthesis.

Nomenclature of peptides – Determination of structure of peptides – End group analysis.

Proteins -Classification – Structure – Primary, secondary, tertiary and Quaternary. Color test for proteins

Unit V Heterocyclic compounds 8 h

Preparation and properties of heterocyclic compounds: Furan, pyrrole, thiophene, pyridine, indole, quinoline and isoquinoline

Text Books

1 M.G Arora, M. G. 2002, Stereochemistry in Organic Compounds, 1st edition, Anmol Publications Private Ltd & New Delhi

2 I.L.Finar, 2009, I. L, Organic Chemistry, Vol I and II, 6th edition, Addison-Wesley Longman & New Delhi

References

1 Morrison R.N. Boyd R.N. and Bhattacharjee, 2010, "Organic Chemistry", 7th Edition, Pearson Education & UK

2 Carruthers. W. and Coldham I. 2004, Modern methods of Organic Chemistry, 4th edition, Cambridge University Press & UK

3 Gilchrist. 2005, Heterocyclic Chemistry, 3rd edition, Pearson education & UK

4 Norman. R.O.C, 2017, Principles of organic Synthesis, Taylor and Francis. Excl. Indian reprint & New Delhi

5 Chatwal. G.R, 2015, Reaction Mechanism and Reagents in Organic Chemistry, 3rd edition, Himalaya Publisher & New Delhi

6 https://www.uou.ac.in/lecturenotes/science/MSCCH-17/CHEMISTRY%20LN.%203%20HETEROCYCLIC%20COMPOUNDS-converted%20(1).pdf

7 https://web.pdx.edu/~wamserc/C336S09/Wade_Ch24.pdf

CourseCode	Course Name	Category	L	T	P	Credit
222CE1A5CC	PHYSICAL CHEMISTRY - I	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The fundamental concepts of conductance
- The electrochemical cells, electrodes and their types
- The application of polarography and fuel cells

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the basic concepts of conductance and to enhance the knowledge on electrolytes	K3
CO2	Infer the theoretical knowledge of conductance and applications of conductance measurements	K3
CO3	Outline the types of electrodes and potentiometric titrations	K3
CO4	Describe fundamental principles of fuel cells	K3
CO5	Analyze the basic concepts of polarography	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

222CE1A5CC	PHYSICAL CHEMISTRY - I	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Fundamental concepts of Conductance **10 h**

Electrolytic conductance- Conductivity cell - Measurement of conductance of solutions – Specific, equivalent and Molar conductance – Variation of equivalent conductance and specific conductance with dilutions. Variation of conductance for strong and weak electrolytes - Migrations of ions - Transport number - Determination by moving boundary method and Hittorf's method - Kohlrausch's law and its application. Arrhenius theory of dissociation and Ostwald's dilution law

Unit II Theories and Applications of Conductance **8 h**

Theory of strong electrolytes: An elementary treatment of Debye-Huckel theory-Debye-Falkenhagen effect and Wien effect. Activity coefficients of electrolytes - Mean ionic activity coefficient, ionic strength, Debye-Huckel theory of mean ionic coefficient. Applications of conductivity measurements-Conductometric titrations and precipitation titrations

Unit III Electrochemical cells **10 h**

Electromotive force & its measurements - Standard cells - Cell reaction & EMF convention for cell representation & sign of EMF. Galvanic cell–Reversible and irreversible cells- Electrode potentials – Standard hydrogen electrode - Kinds of electrode and their potentials. Standard and Single electrode potentials - Calculation of cell EMF from single electrode potentials. Thermodynamics quantities of cell reaction - Thermodynamics of electrode potentials - Nernst equation-Electrochemical series and its applications

Unit IV Concentration Cells and Fuel cells **10 h**

Concentration cells with and without transport - Liquid junction potential-Applications of emf measurements - Calculation of G, H, S and equilibrium constant - Determination of pH using quinhydrone and glass electrodes - Potentiometric titrations – Acid-base and redox titrations- Determination of solubility of a sparingly soluble salt

Fuel cells - Importance, hydrogen-oxygen fuel cell - hydrocarbon - Oxygen cell.

Storage cells - Lead storage cell - Nickel-cadmium cell - Lithium-ion cell (basics only)

Unit V Polarography and Corrosion **10 h**

Polarography – Instrumentation - Advantages and disadvantage of dropping mercury electrode - Limiting current, factors affecting limiting current - Half wave potential-Application of polarography – Decomposition voltage - overvoltage, discharge potential Corrosion – Types - electrochemical nature - Rusting of iron. Prevention - Cathodic protection and galvanizing

Text Books

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

2 Soni. P. L., Dharmarha, O. P. and Dash, U. N. , 2023 "Textbook of Physical Chemistry", 24th Revised edition S.Chand & Co & New Delhi.

References

1 B.S. Bahl and G. D. Tuli, and Arun Bahl, 2012,"Essentials of Physical Chemistry", S. Chand publishing, Revised multicolor edition & New Delhi

2 Syed Aftab Iqbal, 2011, "Text Book of Electrochemistry", Discovery Publishing house Pvt. Ltd. & New Delhi.

3 Samuel Glasstone, 2002, "Introduction to Electrochemistry", EWP (East-West Press) Pvt. Ltd. & New Delhi

4 Keith J. Laidler and John H. Meiser, 2006, "Physical Chemistry", 3rd edition, CBS Publishers & Distributors & New Delhi

5 https://www.vedantu.com/chemistry/polarography

6 https://www.vedantu.com/jee-main/chemistry-arrhenius-theory-of-electrolytic-dissociation

222CE1A5CP	PHYSICALCHEMISTRY	SEMESTER V

Total Credits: 3
Total Instructions Hours: 72 h

S.No	List of Experiments
	Non-Electrical Experiments
1	Determination of rate constant of acid-catalyzed hydrolysis of an ester (Methyl acetate or Ethyl acetate)
2	Determination of Partition coefficient of Iodine between Carbon tetrachloride and water
3	Determination of Critical solution temperature of Phenol-Water system.
4	Determination of K_f/Molecular weight by Rast method (Naphthalene, Diphenyl amine, dinitro benzene as solvents)
5	Phase diagram-Simple Eutectic system
	Electrical Experiments
6	Determination of Cell Constant, Specific conductivity and Equivalent conductivity of strong electrolyte
7	Determination of $\lambda \infty$ of a strong electrolyte using Debye-Huckel-Onsager equation
8	Determination of dissociation constant of a weak acid (Acetic acid)
9	Conductometric Titration(Strong acid Vs Strong base)
10	Potentiometric Titration (Acid-Base Titration HCl Vs NaOH)
11	Potentiometric Titration (Redox Titration FAS Vs $KMnO_4$)
12	Estimation of Copper by colorimetric method
13	Estimation of Iron by colorimetric method

Note: Any 10 Experiments

References

1 Venkateswaran. V, Veeraswamy. R and Kulandaivelu. A.R, 2017,"Principles of Practical Chemistry", 1st edition, Sultan Chand & Sons & New Delhi.

2 Giri. S, Bajpai. D.N and Panday. O.P, 2013, "Practical Chemistry Vol. I & II", 30th edition, S. Chand & Company & New Delhi.

3 Mendham. J., Denney. R.C., Bames. J.D. and Thomas, M. 1989, "Vogel's Text book of Quantitative Analysis", 6 th edition, Pearson Education, New Delhi

4 Satish Kumar. M, 2019 "Practical Physical Chemistry," 1st edition, Sankalp Publication, New Delhi

222CE1A5CQ	APPLIED CHEMISTRY	SEMESTER V

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Estimation of permanent hardness in water sample by EDTA method
2	Estimation of temporary hardness in water sample by EDTA method
3	Estimation of total hardness in water sample by EDTA method
4	Determination of alkalinity in water sample
5	Determination of chloride content of water sample by Argentometric method
6	Estimation of available chlorine in bleaching powder
7	Estimation of calcium in milk powder
8	Estimation of iodine in common salt
9	Determination of Melting point and Boiling point
10	Estimation of Total Fatty Matter (TFM) of a soap
11	Determination of dissolved oxygen in water sample
12	Determination of chemical oxygen demand in water sample

Note: Any 10 Experiments

References

1 Venkateswaran. V, Veeraswamy. R and Kulandaivelu. A.R, 2017,"Principles of Practical Chemistry", 1st edition, Sultan Chand & Sons & New Delhi.

2 Gnanapragasam N.S and Ramamurthy G, 2009,"Organic Chemistry lab manual", S. Viswanathan and Co. Pvt. Ltd.

3 O. P. Vermani and A. K. Narula, Applied Chemistry Theory and Practice, New Age International, 2nd edition, 2017 New Delhi.

4 Giri. S, Bajpai. D.N and Panday. O.P, 2013, "Practical Chemistry Vol. I & II", 30th edition, S. Chand & Company & New Delhi.

CourseCode	Course Name	Category	L	T	P	Credit
222CE1A5SA	NANOMATERIALS AND NANOTECHNOLOGY	SEC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- The fundamentals and current state of the art of nanotechnology
- The synthesis, characterization of nanostructure materials
- The utilization of nonmaterial in diverse applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics in the field of nanotechnology and relationship between the size and properties for various materials.	K3
CO2	Identify the major properties of nano tubes and nanoparticles.	K3
CO3	Examine the synthesis of nano materials using chemical and physical methods	K3
CO4	Explain the various characterization techniques for nano materials	K3
CO5	Evaluate the applications of nano structured materials in different fields.	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

222CE1A5SA	NANOMATERIALS AND NANOTECHNOLOGY	SEMESTER V

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Basics of nano chemistry **5 h**

Nano materials - Nano Science -Nanotechnology - Scale of natural and manmade materials - Properties and classification of nano materials–Origin - Phase composition - Constituents - Dimensions - Size effect of Nano materials - Specific surface area - Quantum confinement - 0D, 1D, 2D and 3D

Unit II Carbon Nanostructures **5 h**

Carbon molecules – Nature of the carbon bond in carbon nano tubes – Fabrication-Properties and structure. Applications of carbon nano tubes – Fuel cells – Chemical sensors – Catalyst. Quantum dots - Fabrication and its applications

Unit III Synthesis of Nano materials **5 h**

Top down and bottom up approaches: Chemical methods - Chemical precipitation-Co-precipitation-Sol-gel synthesis - Solvo thermal synthesis. Physical Methods - Inert gas condensation- Ion sputtering - Laser ablation - Ball Milling. Chemical vapour deposition and Electro deposition

Unit IV Characterization Techniques **5 h**

Structural characterization - Electron microscopy techniques - Scanning electron microscopy, transmission electron microscopy - X-ray diffraction – FT-IR - UV-Visible spectrophotometer. Surface characterization- XPS

Unit V Applications of Nano materials **4 h**

Solar cells - Smart materials - Molecular electronics - Biosensors - Drug delivery and therapy - Food packaging - Detection of cancerous cells - Nano materials for electrodes and wearable electronics - Adverse effects of nano materials in health and environment

Text Books

1 B.S. Murty 2017. Textbook of Nanoscience and Nanotechnology. 4th edition, Springer-Verlag Berlin Heidelberg, Universities Press (India) Private Limited

& New Delhi

2 T. Pradeep. 2018. Nano: The Essentials: Understanding Nanoscience and Nanotechnology, McGraw-Hill Professional Publishing & New Delhi

References

1 Charles P. Poole and Jr and Frank J.Owens. 2020. Introduction to Nanotechnology. Wiley Interscience & UK

2 J. Dutta, H.F. Tibbals and G.L. Hornyak. 2018. Introduction to Nanoscience. CRC press, Boca Raton & UK

3 G. Cao. 2014. Nanostructures & Nanomaterials: Synthesis, Properties &Applications. Imperial College Press & UK

4 CNR Rao et.al. 2016. Chemistry of Nanomaterials: Synthesis, properties and applications. Royal Society of Chemistry, Cambridge & UK.

5 R.W. Kelsall, W.H.M. Geoghegan. 2015. Nanoscale Science and Technology. John Wiley Sons,Ltd & UK

6 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8705396/#:~:text=The%20nanomaterials%20can%20be%20synthesized,fine%20particles%20in%20nano%20dimensions.

7 https://www.iberdrola.com/innovation/nanotechnology-applications

CourseCode	Course Name	Category	L	T	P	Credit
222CE1A5DA	INDUSTRIAL CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The fundamentals of sugar industry and fermentation processes
- The chemical explosives and cement settling process
- The properties and applications of paints

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics in the field of sugar industry process	K2
CO2	Identify the various fermentation process and their applications	K3
CO3	Examine the various chemical explosives	K3
CO4	Understand the process of cement and ceramics manufacture	K2
CO5	Evaluate the properties of paints and their 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

222CE1A5DA	INDUSTRIAL CHEMISTRY	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Sugar Industry **10 h**

Manufacture of cane sugar - Defection - Sulphitation and carbonation. Concentration or evaporation – Crystallization - Separation of crystals- Drying - Refining - Grades. Recovery of sugar from molasses. Manufacture of sucrose from beetroot

Unit II Fermentation **8 h**

Conditions favorable for fermentation. Characteristics of enzymes - Fermentation processes and types - Batch - Fed batch - Continuous - Solid state - Anaerobic - Aerobic Fermentation. Alcohol beverages - Manufacture of beer and wines. Ethyl alcohol from molasses

Unit III Chemical Explosives **10 h**

Types of explosives. Preparation and properties of lead azide, nitroglycerine, nitrocellulose, 2,4,6-Trinitrotoluene (TNT), Royal Demolition eXplosive (RDX), dynamite, cordite, picric acid, gunpowder, Improvised Explosive Devices (IED

Unit IV Cement and Ceramics **10 h**

Cement: Manufacture of cement - Settling of cement (Portland cement).

Ceramics: Manufacturing process - Application of colors to the pottery - Composition and applications of earthenware's and stoneware's. Rectified tiles - M-Sand - P-Sand

Unit V Pigments and Paints **10 h**

Pigments: Requirements of a pigment - Typical inorganic pigments - Applications.

Paints: Classification of paints – Constituents of paints - Requirements of a good paint - Enamels - Distempers- Emulsion paints - Latex paints - Paint removers - Varnishes - Solvents and thinners

Text Books

1 Sharma. B.K, 2023, "Industrial Chemistry", 23rd edition, Goel Publishing House & Meerut

2 White. H.L, 2013, "Introduction to Industrial Chemistry", 10th edition, A Wiley Inter Science Publication & USA

References

1 Gopalan. R, Venkappayya. D, Nagarajan. S, 2020, "Textbook of Engineering Chemistry", 4th edition, Vikas Publishing House Pvt. Ltd & New Delhi

2 Jain &Jain, 2022, "Engineering Chemistry", 17th edition, Dhanpatrai Publications & NewDelhi

3 Uppal. M.M, 20211, "Textbook of Engineering Chemistry", 10th edition, Khanna Publishers & New Delhi

4 Pawar. R.A, Gugale. G.S, Nagawade. A.V, Gadave. K.M, 2017, "A Book of Industrial Chemistry",1st edition, Nirali Prakashan Publishers & Pune

5 https://ghangrekar.com/wp-content/uploads/2016/02/SUGAR-INDUSTRY.pdf

6 https://www.britannica.com/technology/explosive/Dynamite

CourseCode	Course Name	Category	L	T	P	Credit
222CE1A5DB	AGRICULTURAL CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The physical properties of soils
- The chemistry aspects of soil – nitrogen fixation
- The chemistry of pesticides and fungicides

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the basics of soil chemistry and their importance in agriculture	K3
CO2	Outline the physical properties of soil and their importance in the plant growth	K2
CO3	Infer the basic chemical aspects of soil and soil testing	K2
CO4	Discuss the role of plant nutrients in the growth of plant	K3
CO5	Describe the properties, classification and mechanism of pesticides and Fungicides	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

222CE1A5DB	AGRICULTURAL CHEMISTRY	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Origin of soil **10 h**

Definition of soil - Origin - Igneous - Metamorphic and sedimentary rocks - Rock systems - Weathering of rocks and minerals - Main components of soil - Organic, inorganic, liquid and gaseous phase - Minerals of importance with respect to soil, industries and agriculture – Soil formation physical, chemical and biological factors responsible for soil formation

Unit II Physical properties of soil **8 h**

Physical properties of soil - Soil texture and textural classification - Pore space - Bulk density, particle density – Soil structure and soil color - Surface area - Soil colloids plasticity, shrinkage - Flocculation and deflocculation - Soil air, soil temperature, their importance in plant growth - Soil reaction – Ion exchange reaction - Cation exchange - Anion exchange – Buffering capacity – Hydrogen ion concentration

Unit III Chemical aspects of soil **10 h**

Origin of problem soils, their properties acid, alkali and saline soils - Diagnosis - Remediation of acid and salt effected soils – Methods of reaction and after care - Quality of irrigation water – Causes for poor quality waters for irrigation, their effects in soil and crops. Soil testing-Concept, objective and basis - Soil sampling, tools, collection processing, dispatch of soil and water samples

Unit IV Plant nutrients **10 h**

Plant nutrient - Macro and micro nutrients - Their role in plant growth – Sources forms of nutrient absorbed by plants – Factors affecting nutrient absorption deficiency symptoms in plants - Corrective measures - Chemicals used for correcting nutritional deficiencies - Nutrient requirements of crops, their availability, fixation and release of nutrients

Unit V Pesticides and Fungicides **10 h**

Pesticides: Definition – Classification – Organic and inorganic pesticides - Mechanism of action – Characteristics - Safe handling of pesticides – Impact of pesticides on soil, Fungicides Definition – Classification – Mechanism of action

Sulphur, copper-mercury compounds, dithanes, dithiocarbamate - Natural Pesticides

Text Books

1 Biswas, T.D and Mukeherjee, S.K.1987, "Textbook of Soil Science", 1st edition, & New Delhi.

2 Daji, A.J.1970, "Textbook of Soil Sciences", 1st edition, Asia Publishing House & New Delhi.

References

1 Frank Knowles and J. Elphin Watkin, 2011, "The Chemistry of Agricultural Fungicides and Insecticides", 1st edition & New Delhi.

2 Buchel, K.H., 1983, "Chemistry of Pesticides", 1st edition, John Wiley & Sons & New York,

3 Sree Ramula, 1979 "Chemistry of Insecticides and Fungicides", 3rd edition, IBH Publishing Co & New Delhi,

4 Prabhoo Singh, 2022"A Complete Book for Soil Science and Agricultural Chemistry", 5th edition & New Delhi

5 Hesse P.R., 1971, "A Textbook of Soil Chemical Analysis", 1st edition, John Murray Ltd & London,

6 https://lawr.ucdavis.edu/classes/ssc107/SSC107Syllabus/chapter1-00.pdf

CourseCode	Course Name	Category	L	T	P	Credit
222CE1A5DC	FORENSIC CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The significance of forensic analysis
- The role of chemical analysis in forensic science
- The instrumental applications in forensic Science

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the progress of forensic analysis	K2
CO2	Identify the tools and techniques analysis of fingerprints	K3
CO3	Infer the analysis of explosives	K2
CO4	Outline examination of drugs and alcohols	K2
CO5	Interpret the instrumentation application in forensic science	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

222CE1A5DC	FORENSIC CHEMISTRY	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I General Forensic Science **10 h**

Forensic significance of physical evidences in crime scene investigation - Types of evidence - Physical, testimonial or personal, miscellaneous, corpus delicti. Non - Living physical evidences - Glass pieces, soils and natural resources, paint, questioned documents, firearms and ammunition, powder residue, explosives, tool, Foot marks and tire marks, drugs. Living physical evidences - Human Body materials blood, organs, physiological fluids, fingerprints, hair and fibers

Unit II Chemical analysis of fingerprints **10 h**

Types of finger prints - Source of latent fingermark residue - Aqueous and lipid components, Chemical processing of latent fingermarks - Amino acid sensitive reagents - Ninhydrin, 1,2-indanedione, Lipid-sensitive reagents- Oil red O (ORO), nile red, silver nitrate, iodine fuming method - Powder techniques, cyanoacrylate fuming vacuum metal deposition

Unit III Chemical analysis of explosives **8h**

Types of explosives - Inorganic and organic high and low explosives, forensic examination of explosives - Ignition susceptibility test - Colorimetric tests - Diphenylamine test - anthrone spot test, barium chloride and silver nitrate spot tests. Microcrystalline tests for explosives - Cropen microcrystalline test

Unit IV Examination of Drugs and Alcohols **10 h**

Types of drugs - natural and synthetic drugs - Forensic identification of drugs - Chemical tests - Chen's Test - Mecke's Test- Marqui's Test- nitric acid test- primary, secondary, tertiary amine test.

Alcohol intoxication, effects of alcohol on body - Examination of alcohol in liquor - test for ethyl alcohol - Iodoform test, Dichromate test - Test for methanol- Chromotropic acid test, Schiff's reagent test

Unit V Application of Instrumentation in Forensic Science **10 h**

Role of Spectroscopic techniques in Forensic Science – UV Visible - Fluorescence and Phosphorescence - Atomic (Absorption and Emission)- FT-IR- NMR

electrochemical techniques- Potentiometry- Conductometry - Chromatographic Techniques in Forensic Science - Case Study

Text Books

1 Pillay V V 2023, "Textbook of Forensic Medicine and Toxicology", 20th edition, Paras Medical Publisher Publishers & New Delhi

2 Narayan Reddy K.S, 2017, "The Essentials of Forensic Medicine and Toxicology", 4th edition, JayPee Brothers & New Delhi

References

1 Jay Seigal, 2020, "Forensic Chemistry: Fundamentals and Applications", John Wiley Sons & UK

2 James, S.H and Nordby, J.J. 2003, "Forensic Science: An introduction to scientific and investigative techniques". CRC Press & New Delhi

3 Kelly M. E, 2019 "Introduction to Forensic Chemistry" CRC Press & USA

4 Nanda, B.B. and Tewari, R.K. 2001, "Forensic Science in India: A vision for the twenty first century" Select Publisher & New Delhi

5 Richard Saferstein, 2017, "Criminalistics and introduction to forensic science", Prentice Hall of India & New Delhi

6 https://www.ncbi.nlm.nih.gov/books/NBK236259/

7 http://dfs.nic.in/pdfs/EXPLOsive.pdf

222CE1A5GA	CHEMISTRY IN DAILY LIFE	SEMESTER V

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Polymers 5 h

Introduction – Classification - Difference between thermosetting and thermoplastics – Properties and uses of nylon, polyester, synthetic rubber, polyurethane rubber, sponge, foam, and thermocol

Unit II Hair care and Skin care products 5 h

Shampoo – Thickener and foam stabilizer – Perfume – Preservative – Conditioning agent – Antidandruff shampoo - Hair cream – Hair dye – Constituents of dye remover

Unit III Soap, Detergent and Wax 5 h

Soap and detergent - Definition - Ingredients - Cleansing action

Wax - Classification – Spermaceti - Bayberry - Bees - Chinese insect - Candelilla - Carnauba wax - Montan - Ozocerite - Paraffin and synthetic wax- Hydrocarbon in candles – Manufacture of candles – Safety match sticks

Unit IV Food adulteration 5 h

Definition of adulteration of food – Common adulterants in different food – Toxic effects of lead, tin and chromium – Contamination of food with harmful microorganisms – Food additives and preservatives

Unit V Chemistry in housing and household products 4 h

Portland cement - Paints and coatings - Varnishes and polishes - Glass cleaners - Household pesticides - Stain removers - Fire extinguishers

Text Books

1 Sharma. B.K, 2019, "Environmental Chemistry", 12th edition, Goel publication Ltd & New Delhi.

2 Jain. P. C and Monika Jain, 2021, "Engineering Chemistry", 17th edition, Dhanpat Rai & Sons & New Delhi.

References

1 Swaminathan. M, 2020, "Food & Nutrition", 2nd edition, Bappco publications Mysore.

2 Sri Lakshmi. B, 2018, "Food Science", 7th edition, New Age International Publishers & New Delhi.

3 Jayashree Ghosh, 2013, "Applied Chemistry", 3rd edition, S. Chand publications & New Delhi.

4 NIIR Board, 2004, "Modern Technology of Cosmetics", Asia Pacific Business Press Inc & New Delhi.

5 https://www.britannica.com/science/polymer

6 https://byjus.com/biology/food-adulteration/

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

Course Code	Course Name	Category	L	T	P	Credit
222CE1A6CA	ORGANIC CHEMISTRY - II	CORE	4	1	-	5

PREAMBLE

This course has been designed for students to learn and understand

- The chemistry of terpenoids and alkaloids
- The synthetic route of natural products
- Applications of chemotherapeutic drugs

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Study on the classification, structural elucidation and synthesis of few important terpenoids	K3
CO2	To gain the knowledge of alkaloids and to analyze the methods of structural determination and synthesis	K3
CO3	To acquire basic knowledge about vitamins and their deficiency diseases. To study the synthesis and structural elucidation of few important vitamins	K3
CO4	To demonstrate the various applications of mono-and disaccharides including preparation, structural elucidation and chemical reactions	K3
CO5	To analyze the structural aspects, functions and mode of action of various drug molecules	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

222CE1A6CA	ORGANIC CHEMISTRY - II	SEMESTER VI

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I **Terpenoids** **12 h**

Classification and general methods of isolation-Isoprene rule-Structural elucidation and synthesis of Ocimene, Geraniol – Citral – Citronellal, alpha terpineol and menthol

Unit II **Alkaloids** **12 h**

Classification- General methods of determining structures - Structural elucidation and synthesis of Nicotine – Cocaine – Piperine - Ricinine

Unit III **Vitamins** **12 h**

Vitamins and their deficiency diseases -Structural elucidation and synthesis of water soluble vitamins – Thiamine – Riboflavin – Niacin - Structural elucidation and synthesis of fat soluble vitamins: A, D and E

Unit IV **Carbohydrates** **12 h**

Classification – Occurrence – Preparation- Structural elucidation- Properties of Glucose and Fructose - Evidence for open chain cyclic structure of glucose and fructose – Mutarotation- Interconversion of glucose to fructose and vice versa - Structure and properties of sucrose – Maltose – Starch – Cellulose - Applications of cellulose derivatives

Unit V **Chemotherapy** **12 h**

Fundamentals of Chemotherapy-Synthesis and mode of action of antibacterial sulpha drugs - Sulphanilimide and sulphapyridne drugs-Antiviral drugs-Idoxuridine and metisazone- Structure and mode of action of Analgesics – Morphine and pentzocine - Structure and classification of penicillin and tetracyclins

Text Books

1 Bahl A, Bahl B.S, 2016, "Advanced Organic Chemistry" Chand & Co. New Delhi

2 Jain M. K. and Sharma S. C, 2020, "Modern Organic Chemistry", Vishal Publishing Co., Delhi

References

1 Finar I. L, 2020, "Organic Chemistry", Vol. I and II, Addison- esleyLongman

2 Jayshree G. A, 2017, "Textbook Of Pharmaceutical Chemistry", S Chand & Company

3 Gurdeep C, 2019, "Organic Chemistry of Natural Products", Himalaya Publishing House, New Delhi

4 AshutoshKar, 2006, "Medicinal Chemistry", 3rd Edition, Anshan Ltd., New Delhi.

5 https://www.bhu.ac.in/Content/Syllabus/Syllabus_3006312720200418020716.pdf

6 https://www.jsscacs.edu.in/sites/default/files/Department%20Files/carbohydrates.pdf

Course Code	Course Name	Category	L	T	P	Credit
222CE1A6CB	PHYSICAL CHEMISTRY - II	CORE	4	1	-	5

PREAMBLE

This course has been designed for students to learn and understand

- The basics of chemical kinetics and the relationship between temperature and rate of a reaction
- The concept of photochemical reactions and importance of catalytic reactions
- To understand the concept of non-ideal solutions and colligative properties

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Develop the knowledge on principles of chemical kinetics and broadening the concepts of chemical kinetics by theoretical aspects	K3
CO2	Study about various photochemical and photosensitized processes	K2
CO3	Understand various types of catalysis reactions and to explore their applications in industrial sector	K3
CO4	Learn the concept of ideal and on ideal solutions and to interpret the relation between vapor pressure and colligative properties	K3
CO5	Understand the theory of Phase rule and its application to various systems	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

222CE1A6CB	PHYSICAL CHEMISTRY - II	SEMESTER VI

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I Chemical Kinetics **12 h**

Factors affecting rate of a reaction - Order and molecularity - Rate constant determination of zero, first, second and third order reactions - Pseudo unimolecular reaction - Half-life of zero, first, second and third order reactions - Temperature dependence of reaction rates-Arrhenius equation. Theories of reaction rates - Collision theory - Absolute reaction rate theory - Significance of the free energy of activation and entropy of activation - Unimolecular reactions - Mechanism of Lindmann theory and Hinshelwood theory

Unit II Photochemistry **12 h**

Laws of photochemistry – Grothus - Drapper law – Stark-Einstein law of photochemical equivalence – Quantum efficiency – determination of quantum efficiency – chemical actinometry – consequence of light absorption – Jablonski diagram – radiative and non-radiative transitions – Theory of Fluorescence and Phosphorescence – Chemiluminescence and bioluminescence - spin crossover - photochemical reactions – kinetics of photochemical combination of H_2-Cl_2, H_2-Br_2 and decomposition of HI – Energy transfer in photochemical reactions – photosensitization - photosynthesis in plants

Unit III Surface Chemistry -Adsorption and Catalysis **12 h**

Types of adsorptions, adsorption of gases by solids. Adsorption isotherms – Freundlich, Langmuir. Theories of catalysis - Types of catalysis – Characteristics of catalytic reactions – Promoters – Catalytic poisoning–Autocatalysis –Negative catalysis – Intermediate Compound Formation Theory- Adsorption Theory– Enzyme catalysis–kinetics of enzyme catalysis–Michaelis Menton equation-applications of enzyme catalysis

Unit IV Solutions and Colligative Properties **12 h**

Thermodynamics of ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law – non-ideal solutions. Vapour pressure-composition and temperature composition curves of ideal and non-ideal solutions. Distillation of solutions. Lever rule. Azeotropes. Partial miscibility of liquids: Critical solution temperature; effect of impurity on partial miscibility of liquids. Immiscibility of liquids- Principle of steam distillation. Nernst distribution law and its applications

Colligative properties- elevation of boiling point, depression in freezing point – Abnormal behavior of solutions of electrolyte

Unit V Phase Equilibria **12 h**

Phase Rule: Concepts of phase, component and degrees of freedom, with examples. Gibb's phase rule – derivation. One-component system: Phase diagrams: Water system and sulphur system. Two component system: (i) Simple eutectic: Lead-silver system- Formation of compound with congruent melting point: Ferric chloride – water system. Clausius - Clapeyron equations and their applications to equilibria in phase transitions. (solid – liquid, liquid – vapour, solid –vapour)

Text Books

1 Arun B, Bahl B.S, TuliG.D, 2018,"Essentials of PhysicalChemistry",28th Edition, S. Chand & Co

2 Puri B.R, Sharma L.R, and Pathania M.S,2020, "Principles of PhysicalChemistry", 47th Edition,S.Chand & Co.,New Delhi

References

1 Atkins P, Paula J.D, Keeler J, 2018,"Physical Chemistry", 11th Edition, Oxford University Press, UK

2 Gurudeep Raj, 2019,"Advanced Physical Chemistry", Goel Publishing House, Meerut

3 Rohatgi Mukherjee K.K,2017,"Fundamentals of Photochemistry",3rd Edition, New age International Publishers

4 KeithJ. Laidler and John H. Meiser, 2006,"PhysicalChemistry",3rd Edition, CBS Publishers & Distributors, New Delhi

5 https://tech.chemistrydocs.com/Books/Physical/Advanced-Physical-Chemistry-Experiments-by-J-N-Gurtu-&-Amit-Gurtu.pdf

6 https://tech.chemistrydocs.com/Books/Physical/Physical-chemistry-by-R-L-Madan.pdf

Course Code	Course Name	Category	L	T	P	Credit
222CE1A6SA	CHEMISTRY OF CONSUMER PRODUCTS	SEC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- Preparation of various soaps and detergents
- The Manufacture of shampoos and skin preparations
- The preparation and uses of domestic products

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Impart knowledge on manufacture of soaps	K3
CO2	Gain knowledge on preparation of detergents and their action of mechanism	K3
CO3	Acquire knowledge on preparation of shampoos and their testing procedures	K3
CO4	Understand the preparation of skin products	K3
CO5	Attain knowledge on the domestic products	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

222CE1A6SA	CHEMISTRY OF CONSUMER PRODUCTS	SEMESTER VI

Total Credits: 2
Total Instruction Hours: 24 h

Syllabus

Unit I Soaps **5 h**

Saponification of oils and fats - Manufacture of soaps - Formulation of toilet soaps - Different ingredients use and their functions. Medicated soaps - Herbal soaps - Mechanism of action of soap - Soft soaps - Shaving soaps and creams, testing procedures

Unit II Detergents **5h**

Anionic detergents: Manufacture of LAB (Linear Alkyl Benzene) - Sulphonation of LAB – Preparation of acid slurry. Different ingredients in the formulation of detergent powders and soaps - Liquid detergents - Foam boosters. Cationic detergents - Manufacture and applications. Non-ionic detergents - Manufacture of ethylene oxide condensates. Mechanism of action of detergents. Comparison of soaps and detergents - Biodegradation – Environmental effects

Unit III Shampoos **5 h**

Manufacture of Sodium Lauryl Sulfate (SLS) and Sodium Laureth Sulfate (SLES) - Ingredients - Functions - Different kinds of shampoos – Anti-dandruff, anti-lice, herbal and baby shampoos. Hair dye, manufacture of conditioners. Coco betaine and coco diethanolamide – Testing procedure

Unit IV Skin Preparations **5 h**

Face and skin powders - Ingredients, functions - Different types - Snows and face creams - Chemical ingredients. Anti-perspirants - Sunscreen preparations - UV absorbers - Skin bleaching agents - Depilatories - Turmeric and neem preparations, vitamin oil. Nail polishes: nail polish preparation, nail polish removers. Lipsticks, eyebrow pencils - Ingredients and functions – Hazards

Unit V Domestic Products **4 h**

Domestic products - Scouring powder, liquid blue, phenoil, pain balm, candles, naphtha balls and soft liquids - Preparation and uses

Text Books

1. Gobala Rao. S , 1997, Outlines of chemical technology, Affiliated East West press
2. Sharma, B. K, 2014, Industrial Chemistry, 17th Edition, Krishna Prakashan Media pvt. Ltd

References

1. Sawyer. W, 2000, Experimental cosmetics, Dover publishers, New york
2. William R. Stine,1978, Chemistry for the Consumer, Allyn & Bacon
3. Florence Barrett-Hill, 2009, Cosmetic Chemistry, Virtual Beauty Corporation
4. W.A. Poucher, 2012, Perfumes, Cosmetics and Soaps: Volume II, 9th Edition, Springer
5. https://rjtcsonline.com/HTMLPaper.aspx?Journal=Research%20Journal%20of%20Topical%20and%20Cosmetic%20Sciences;PID=2021-12-2-5
6. https://www.scribd.com/document/630136482/Preparation-of-domestically-useful-chemical-products

Course Code	Course Name	Category	L	T	P	Credit
222CE1A6DA	POLYMER CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Preparation and properties of polymers and their industrial importance
- The mechanism of polymerization
- The properties and uses of commercial polymers and their technology

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Impart knowledge on the basics of polymers and plastics	K3
CO2	Gain knowledge on different types of mechanism of polymerization	K3
CO3	Acquire knowledge on concept in stereochemistry of polymers and their physical properties	K3
CO4	Understand the preparation, properties and uses of commercial polymers	K2
CO5	Attain knowledge on the polymerization and polymer processing techniques	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

222CE1A6DA	POLYMER CHEMISTRY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Polymers — 10 h

Basic concepts such as monomers, polymers, polymerization, degree of polymerization, classification of polymers - Plastics - Thermoplastic and thermosetting plastics. Natural and synthetic rubber -Smoked rubber -Reclaimed rubber -Foam rubbers - Spongy rubber - Laminate rubber. Specialty polymers – Biopolymers, Conducting polymers, engineering polymers – Applications

Unit II Chemistry of Polymerization — 10 h

Addition polymerization – Free radical polymerization – Ionic polymerization – cationic and anionic – Co-ordination polymerization – Condensation polymerization – Three dimensional polymerization – Cross linking – Gel point – Ring scission polymerization

Unit III Polymer Stereochemistry — 8 h

Tacticity of polymers – Zeigler-Natta polymerization (Mono metallic mechanisms) - Glass transition temperature (Tg) - Factors influencing Tg - Determination of Tg - Glass transition temperature of copolymer, importance of Tg

Unit IV Commercial Polymers — 10 h

General methods of preparations - Properties and uses of the following polymers: Polyethylene - Low Density Polyethylene (LDPE), High Density Polyethylene (HDPE), Polyvinyl Chloride (PVC), Polymethyl Methacrylate (PMMA), Polyacrylonitrile (PAN), Polyacrylic acid, Polymethacrylic acid, Polystyrene, Polyester, Phenol formaldehyde resin, Polycarbonates – Acetal resins – Polysulphones, Nylon - 6, polyamide (kevlar) - Polymers for biomedical applications

Unit V Plastic Processing — 10 h

Basic principles of processing – Shape and size – Processing parameters – Effects and behavior. Polymer compounding – Additives – Filers, plasticizers, antioxidants, stabilizers, colourants. Process techniques: Injection moulding, compression moulding, blow moulding, extrusion moulding, calendering, foaming, laminating. Coating and spinning

Text Books

1. Gowariker V. R, Viswanathan N. V, Jayadev S, 2019, "Polymer science", New Age International Ltd., New Delhi
2. Sharma B. K, 2019, "Polymer Chemistry", Krishna Prakashan Pvt, Ltd., New Delhi

References

1. Fred W Billmeyer, 2002, "Text book of polymer science", 3rd Edition, Wiley Eastern Ltd., New Delhi
2. Bahadur and Sastry N. V,2005, "Principles of Polymer Science" 2nd Edition, Narosa Publishers, New Delhi
3. Stevens M. P, 2009, "Polymer Chemistry - An Introduction", 3rd Edition, Oxford Publications, New Delhi
4. Arora M. G, Singh M, 2002, "Polymer chemistry", Anmol publications Pvt. Ltd., New Delhi
5. https://www.eng.uc.edu/~beaucag/Classes/Properties/Books/Paul%20C.%20Hiemenz,%20Timothy%20P.%20Lodge%20-%20Polymer%20Chemistry-CRC%20Press%20(2007).pdf
6. https://archive.nptel.ac.in/courses/104/105/104105124/

Course Code	Course Name	Category	L	T	P	Credit
222CE1A6DB	FOOD CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basics of food adulteration
- The fundamentals of food preservative
- The vinegar and vegetable acids

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the food adulteration and the toxic chemicals present in foods	K2
CO2	Relate the Food preservation process	K3
CO3	Summaries the properties of fruit and vegetable acids	K4
CO4	Classify the various types of Beverages	K3
CO5	Illustrate the calorific value of food products	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

222CE1A6DB	FOOD CHEMISTRY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Food Adulteration and Hygiene** **10 h**

Definition – Food standards – Food Standards in India – Standards for ensuring quality of Products – Common adulterants in different foods –Contamination of foods with toxic chemicals, pesticides and insecticides. Contamination of food with harmful micro-organisms – Bacterial infections – Fungal contaminations of foods – Toxicants naturally occurring in some foods – Insect and rodent contamination of stored foods

Unit II **Preservation of Food** **10 h**

Introduction - Chemical Preservatives - Cold Storage - Foods preserved in Tinned Iron and Glass Containers - Inspection of Tinned foods - The action of Tinned foods on the container. Poisonous Metals in foods -Detection and determination of Tin, Lead and Copper, Zinc and Aluminium in foods - Arsenic in foods - The Gutzeit test for Arsenic – Examination of glucose for the presence of Arsenic, Antimony in beverages

Unit III **Vinegar, Fruit Juices and Vegetable Acids** **10 h**

Vinegar, Fruit Juices and Vegetable Acids Mineral acids in Vinegar, Colour reactions for the detection of mineral acids, Hydrogen ion Concentration, pH Value, Methods of determining pH, detection of mineral acids in Vinegar by pH Value, Alcohol in Vinegar. Fruit Juices and Vegetable Acids: Examination of Lime Juice, Lemon Squash

Unit IV **Beverages** **10 h**

Tea - Nature and Properties of Tea - Adulteration of Tea - Tea Infusions. Coffee - Nature and Properties of Coffee - Adulteration of Coffee with Chicory. Cocoa and Chocolate - Nature and properties of Cocoa and Chocolate - Adulteration of Cocoa. Alcoholic Beverages - Introduction -Determination of Alcohol - Proof Spirit - Denaturing of Alcohol

Unit V **The Calorific Value of Foods** **8 h**

Introduction - The Bomb Calorimeter - Determination of the Calorific Value of a Substance, Outline of Method - Determination of the Water Equivalent of the Apparatus - Determination of the Calorific Value of Olive Oil and of Cooked Potato

Text Books

1 Kenneth Tinkler C. and Helen Masters, 2005, Applied Chemistry, Vol. II, 2nd Edition, London

2 Swaminathan M. 2003, Advanced Text Book on Food and Nutrition, Vol. II, 2nd Edition, India

References

1 Sri Lakshmi B. 2002, Nutrition science, New Age International Pvt. Ltd., NewDelhi

2 Swaminathan M. 2003, Handbook of Food and Nutrition, The Bangalore Printing and Publishing Co. Ltd, 5th Edition, India.

3 Sri Lakshmi B. 2003, Food Science, New Age International Pvt. Ltd., 3rd Edition, New Delhi

4 Venkataiah S. D. 2004, Nutrition Education, Anmol Publication Pvt. Ltd., India.

5 https://egyankosh.ac.in/bitstream/123456789/12397/1/Unit-15.pdf

6 https://nios.ac.in/media/documents/srsec321newE/321-E-Lesson-9.pdf

Course Code	Course Name	Category	L	T	P	Credit
222CE1A6DC	MEDICINAL CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The drug metabolism and biotransformation
- The Synthesis and mode of action of antipyretic analgesics and diuretics
- The Synthesis and mode of action of adrenergic and cholinergic drugs

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Interpret drug metabolism, biotransformation and detoxification of endogenous & exogenous complex	K3
CO2	Identify synthesis and mode of action of antipyretic analgesics	K3
CO3	Analyze synthesis and mode of action of diuretic	K3
CO4	Appraise the synthesis and mode of action of adrenergic drugs	K3
CO5	Analyze the synthesis and mode of action of cholinergic drugs	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

222CE1A6DC	MEDICINAL CHEMISTRY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Drug Metabolism** **10 h**

Drug action, Terminologies - Pharmacy, pharmacology, pharmacognosy - Pharmacophore - Pharmacodynamics - Antimetabolites - Chemotherapy - Pharmacopoeia

Introduction to drug metabolism - Phase-I and Phase-II - Drug bio transformation - Detoxification of endogenous and exogenous complex - First pass effect - Role of Cytochrome P-450 in biotransformation

Unit II **Antipyretic Analgesics** **10 h**

Introduction - Classification and synthesis of Aniline and P-Amino Phenol - Salicylic acid - Quinoline derivative - Pyrazolones and Pyrazolodiones. Preparation, properties, uses and mechanism of action of Aspirin – Paracetamol - Sodium salicylate

Unit III **Diuretics** **8 h**

Introduction - Synthesis and Mode of action of Mercurial diuretics - Chlornerodrim Hg-Meralluride. Non-Mercurial diuretics – Chlorothiazides - Methazolamide-Chlorlidone - Furosemide. Structure and Mode of action of - Purine and xanthine derivatives - Osmotic diuretics

Unit IV **Adrenergic Drugs** **10 h**

Introduction - Classification- Synthesis and mode of action of Phentolamine-Tolazoline – Prazosin – Propranolol – Atenolol – Metoprolol - Labetolol

Unit V **Cholinergic Drugs** **10 h**

Introduction - Classification - Synthesis and mode of action of Acetylcholine chloride - Methacholine chloride – Pilocarpine - Neostigmine bromide - Pyridostigmine bromide - Endrophonium chloride- Pralidoxime chloride

Text Books

1. Razdan B., 2019," Medicinal Chemistry", 2nd Edition, CBS Publishers and Distributors & New Delhi
2. Ahluwalia V.K and Madhu Chopra, 2012, "Medicinal Chemistry", 2nd Edition, AneBooks & NewDelhi.

References

1. Ashutosh Kar, 2018,"Medicinal Chemistry", 7th Edition, New Age International Ltd & New Delhi
2. Jayashree G, 2017,"A Text Book of Pharmaceutical Chemistry", 5th Edition, S. Chand and Company Ltd & New Delhi
3. Graham L. P, 2013, "An Introduction to Medicinal Chemistry", 5th Edition, Oxford university press & UK
4. Malleshappa N, Anurekha Jain and Harun M, 2014,"Textbook of Medicinal Chemistry Volume I", 1st Edition, CBS publishers and distributors Pvt Ltd & New Delhi
5. https://uogqueensmcf.com/wpcontent/uploads/2020/BA%20Modules/Pharmacy/Year%20II%20(semester%202)/Medicinal%20Chemistry%20I/Reference%20books/MC%20Ashutoshkar.pdf
6. https://archive.nptel.ac.in/courses/104/106/104106106/

Course Code	Course Name	Category	L	T	P	Credit
222CE1A6DD	DYE AND TEXTILE CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The synthesis of various dyes
- The mechanism of drug action and chemotherapy
- The Manufacture and properties of natural fibres, vegetable fibres and animal fibres

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Analyze and classify dyes based on their chemical structure and applications	K3
CO2	Describe the synthesis of di and triphenyl methane dyes and their applications	K4
CO3	Describe the synthesis of di and triphenyl methane dyes and their applications	K3
CO4	The nature of fibers and its applications to materials	K3
CO5	Compare the application of synthetic fibers with natural fibers	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

222CE1A6DD	DYE AND TEXTILE CHEMISTRY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Classification of Dyes **10 h**

Azo Dyes - Principles of azo coupling - Mechanism of diazotization - Coupling with amines and phenols - Monoazoanddiazo dyes - Synthesis and applications - Tautomerism in azo dyes - Chemistry of Dyestuff Intermediates: Primaries, Intermediates, Manufacture of Intermediates- Aliphatic compounds (alcohols, halogen compounds, carboxylic acids, esters, aldehydes, ketones and amines)

Unit II Di and Triphenylmethane Dyes **10 h**

Synthesis and applications of diphenylmethane dyes - Auramin G. Triphenyl methane dyes - Leuco bases - Pseudo bases - Dye salts; amino triphenyl methane dyes - Malachite Green, Rosanilineand Crystal Violet -Hydroxytriphenyl methane dyes - Aurin, Chrome Violet -Phthalein Dyes- Phenolphthale, -Fluorescein, Rhodamine-B, Rhodamine-G

Unit III Pigments **10 h**

Requirements of a pigment: Typical organic and inorganic pigments- Application and their uses in paints - Reaction of dyes with fibres and water- Fluorescent brightening agents - Application of dyes in other areas- Medicine, Chemical analysis, Cosmetics, Colouring agents, Food and Beverages

Unit IV Vegetable Fibres and Animal Fibres **8 h**

Classification of textile fibres- Essential and desirable properties of textile fibres-- Physical and Chemical properties of Cotton -Jute -Silk -Wool

Unit V Regenerated and Synthetic Fibres **10 h**

Rayon – Different types of rayon- Manufacture, Physical and chemical properties of acetate rayon and viscose rayon derivatives- Preparation, properties and uses of Poly amide fibres (nylon 6 and 66), polyester (PET) and polyacrylonitrile

Text Books

1. Arora M.G, 2002,"Text Book of Dyes", Anmol Publications Private Ltd., New Delhi
2. Shenai V. A, 1991, "Textile Fibres" (Vol. I), Mahajan Publishers, Ahmedabad, India

References

1. Gopalakrishnan R, 1988, "Textile Fibres", SSM - Institute of Textile Technology, Mahajan Publishers, Ahmedabad
2. Schafer F. P, 1976, "Physical and Chemical Applications of Dyestuffs", Springer, New york
3. Venkataraman K, 2009, "The Chemistry of Synthetic Dyes", Elsevier, India
4. Yadav M. S, Tyagi O.D, 2002,"A Textbook of Synthetic Dyes", Anmol Publisher, New Delhi
5. https://ugcmoocs.inflibnet.ac.in/assets/uploads/1/127/4424/et/28%20Script200302070703034646.pdf
6. https://textileengineering.net/vegetable-fibres-properties-types-and-application/#google_vignette

Course Code	Course Name	Category	L	T	P	Credit
222CE1A6DE	DAIRY CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basic chemistry of milk and milk products
- The manufacture of milk products
- Cleaning and sanitization of dairy equipment

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the chemistry of milk and milk products	K2
CO2	Demonstrate the basics of milk proteins and vitamins	K3
CO3	Understand the preparation process of creams and ghee	K2
CO4	To acquire the knowledge on fermented milk products	K3
CO5	Outline the cleaning and sanitization of dairy equipment	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

222CE1A6DE	DAIRY CHEMISTRY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Milk Products** **10 h**

Milk: General composition of milk- Physical properties of milk - Recknagel effect Viscosity and conductivity - Physico-chemical change taking place in milk due to processing parameters-Boiling pasteurization- Sterlilzation and homogenization – Adulterants –Detection of Preservatives and neutralizers -Estimation of fat, specific gravity, acidy and total solids in milk

Unit II **Milk Proteins and Vitamins** **10 h**

Milk proteins-Chemistry of proteins in general structure- Physical properties of milk proteins - Non-protein nitrogen constituents of milk -Effect of heat on milk protein, milk enzyme -Milk carbohydrate - Lactose: Structure, solubility, hydrolysis, oxidation, reduction and estimation - Milk vitamins- Water soluble vitamins -Effect of heat and light on vitamins - Ash and mineral matters in milk

Unit III **Preparation of Creams and Ghee** **10 h**

Creams – Composition- Chemistry of creaming process - Factors influencing cream separation - Cream neutralization - Estimation of fat in cream. Butter: Composition and Manufacture-Estimation of fat, acidity, salt and moisture content. Ghee - Major constituents- Common adulterants added to ghee and their detections

Unit IV **Fermented Milk Products** **10 h**

Fermented milk products - Fermentation of milk and conditions – Cultured milk: examples and conditions. Indigenous products - Composition, ingredients preparation process. Physicochemical changes take place during khoa-making-khoa sweet–gulabjamum, chana sweet - Rossogolla. Ice cream: Composition – types- Manufacture of ice-cream – Stabilizers- Emulsifiers and their role

Unit V **Cleaning and Sanitization of Dairy Equipments** **8 h**

Current trends in cleaning and sanitization of dairy equipment- Biological methods – Detergents-Automation. Ultrasonic techniques in cleaning, bio-detergents -Development of sanitizers. Radiation -Mechanism of fouling and soil removal - Bio-films -Assessing the effectiveness of cleaning and sanitization of dairy products

Text Books

1 RangappaK. S, Achaya K.T, 2018, "Indian Dairy Products", Reprint, Goel Publishing House, Meerut

2 Sukumar De, 2017, "Outlines of Dairy Technology", 16th Edition, Dhanpatrai Publications, New Delhi

References

1 LampertL. M, 2017, "ModernDairy Products", 6th Edition, Khanna Publishers, New Delhi

2 Robert J Patorn, S, 2008, "Principles of Dairy Chemistry ", 1st Edition, Wiley Interscience Publication, USA

3 Peterson W.E, 2010, "Dairy Science", 1st Edition, Nirali Prakashan Publisher, Pune

4 Edjar R Ling, 2007, "Textbook of dairy chemistry", 2nd Edition, Chapman Hall, USA

5 https://www.eolss.net/sample-chapters/c10/E5-08-04-03.pdf

6 https://gcwgandhinagar.com/econtent/document/15880676171FSTSE0601_TechnologyOfGheeMaking.pdf

Course Code	Course Name	Category	L	T	P	Credit
222CE1A6DF	PHARMACEUTICAL CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The common diseases and cure-terms of pharmacology
- The mechanism of drug action and chemotherapy
- The various health promoting drugs and their functions

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the common diseases and terms involved in pharmacology	K2
CO2	Illustrate the availability of drugs, classification and their mode of action	K2
CO3	Outline the basic principles of physiological actions of drugs	K2
CO4	Explain the concepts of common body drugs	K2
CO5	Summarize the health promoting drugs and their functions	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

222CE1A6DF	PHARMACEUTICAL CHEMISTRY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Drug Terminology and Classification **10 h**

Drug action, Terminologies – Pharmacy, pharmacology, pharmacognosy - Pharmacophore - Pharmacodynamics - Antimetabolites – Chemotherapy – Pharmacopoeia

Classification of Drugs – Biological and chemical classification – Roots of drug administration, mechanism of drug action, metabolism of drugs - Biotransformation, absorption of drugs, factors affecting the absorption

Unit II Antibacterial and Antiviral **10 h**

Sulpha drugs - Examples and actions - Prontosil, sulphathiazole, sulphafurazole. Antibiotics-penicillin, streptomycin, chloramphenicol, erythromycin, tetracyclin – Specific Absorption Rate (SAR) of chloramphenicol

Antiviral drug - Remdesivir, galidesivir, favipiravir, baloxavir – Structure and mode of action

Unit III Analgesics, antiseptics and disinfectants **8 h**

Analgesics - Definition, classification, action of analgesics, aspirin, paracetamol, narcotic analgesics. Antiseptics and disinfectants - Definition and distinction, uses of phenols, dyes, chloroamine, formaldehyde and cationic surface - Active agents

Unit IV Anesthetics **10 h**

Anesthetics - Definition and classification, uses of volatile anesthetics - Ether, chloroform, halothanes, trichloroethylene, Ferguson principle. Gaseous anesthetic - Cyclopropane, nitrous oxide. Non-volatile anesthetics – Thiopental sodium.

Local anesthetics – Classification, structure and uses of procaine, cocaine and amethocaine

Unit V Diagnostic agents **10 h**

Diagnostic agents – Radio opaques, preservatives, anti-oxidants, sweetening agents, emulsifying agents, ointment bases, coloring agents

Text Books

1. Jayashree Ghosh, A Text book of Pharmaceutical Chemistry, S. Chand & Co., 3rd Edition, New Delhi,2009
2. Ashutoshkar, Medicinal Chemistry, New Age International Publisher, 3rd Edition, New Delhi, 2006

References

1. David William & Thomas Lemke, Principles of Medicinal Chemistry, Foyers, 5th Edition BI publishers, New Delhi, 2005
2. Lakshmi S., Pharmaceutical Chemistry, S. Chand & Sons, 6th Edition New Delhi, 1995
3. Ashutosh Kar, Medicinal Chemistry, Wiley Eastern Ltd., 7th Edition New Delhi, 1993
4. Romas Nogrady, Medicinal Chemistry, II Edition, Oxford Univ. Press., 2004
5. https://uogqueensmcf.com/wpcontent/uploads/2020/BA%20Modules//Pharmacy/Year%20II%20(semester%202)/Medicinal%20Chemistry%20I/Reference%20books/Wilson%20&%20Gisvold's.pdf
6. https://archive.nptel.ac.in/courses/104/106/104106106/

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	✓	✓		✓	

COURSE FOCUSES ON

✓	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

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