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

REGULATIONS 2019-20 for Under Graduate Programme
(Outcome Based Education model with Choice Based Credit System)

B.Sc. Degree

(For the students admitted during the academic year 2020-21 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.

Guidelines for Programmes offering Part I& Part II for Two Semesters:

Part	Subjects	No.of Papers	Credit	Semester No.
I	Tamil / Hindi / French/Malayalam	4	4 x 3 = 12	I & IV
II	English	4	4 x 3 = 12	I & IV
III	Core (Credits 2,3,4)	14-16	58	I to VI
	Inter Departmental Course (IDC)		16	I to IV
	Discipline Specific Elective (DSE)	3	3 x 4 =12	V & VI
	Skill Enhancement Course(SEC)	4	4 x 3=12	III ,IV,V& VI
	Generic Elective(GE)	2	2 x 2=4	III & IV
	Lab on Project (LoP)	1	1	III to V
IV	Environmental Studies(AECC)	1	2	I
	Value Education (VE) (Human Rights, Womens' Rights) (AECC)	2	4	II and III
	General Awareness(On-Line Exam) (AECC)	1	2	IV
	RM (AECC)	1	2	V
	Innovation, IPR, Entrepreneurship (AECC)	1	2	VI
V	Extension Activity NSS / Sports / Department Activity	-	1	I to VI
TOTAL CREDITS			**140**	

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										
191TL1A1TA	Language - I	Tamil-I	4	1	-	3	25	75	100	3
201TL1A1HA		Hindi-I								
201TL1A1MA		Malayalam-I								
201TL1A1FA		French – I								
Part - II										
191EL1A1EA	Language - II	English – I	4	-	1	3	25	75	100	3
Part - III										
192CE1A1CA	Core - I	General Chemistry-I	4	1	-	3	25	75	100	4
192CE1A1CP	Core Practical - I	Volumetric Analysis and Preparation of Inorganic Complexes	-	1	5	3	40	60	100	3
192PY1A1IA	IDC - I	Properties of Matter, Thermal Physics and Optics	3	-	-	3	25	75	100	3
202PY1A1IP	IDC Practical - I	Physics –I	-	-	4	3	40	60	100	2
Part - IV										
193MB1A1AA	AECC - I	Environmental Studies	2	-	-	3	-	50	50	2
		Total	**17**	**3**	**10**	**-**	**-**	**-**	**650**	**20**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
Part - I										
191TL1A2TA	Language - I	Tamil-II	4	1	-	3	25	75	100	3
201TL1A2HA		Hindi-II								
201TL1A2MA		Malayalam-II								
201TL1A2FA		French – II								
Part – II										
201EL1A2EA	Language - II	English – II	4	-	1	3	25	75	100	3
Part – III										
192CE1A2CA	Core - II	General Chemistry - II	4	-	-	3	25	75	100	4
192CE1A2CB	Core - III	Applied Chemistry	3	-	-	3	25	75	100	3
192CE1A2CP	Core Practical - II	Organic Analysis and Single Stage Preparation	-	-	4	3	40	60	100	2
192PY1A2IA	IDC - II	Electricity, Electronics, Atomic and Nuclear Physics	3	-	-	3	25	75	100	3
202PY1A2IP	IDC Practical - II	Physics – II	-	-	4	3	40	60	100	2
Part - IV										
196BM1A2AA	AECC - II	Human Rights	2	-	-	3		50	50	2
		Total	**20**	**1**	**9**				**750**	**22**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
Part - I										
191TL1A3TA	Language - I	Tamil - III	3	1	-	3	25	75	100	3
191TL1A3HA		Hindi - III								
191TL1A3MA		Malayalam - III								
201TL1A3FA		French - III								
Part – II										
191EL1A3EA	Language - II	English - III	3	-	1	3	25	75	100	3
Part – III										
192CE1A3CA	Core - IV	General Chemistry - III	3	1	-	3	25	75	100	3
192CE1A3CB	Core - V	General Chemistry - IV	3	1	-	3	25	75	100	3
192CE1A3CP	Core Practical - III	Inorganic Analysis	-	-	4	3	40	60	100	2
192MT1A3IA	IDC - III	Mathematics - I	3	-	-	3	25	75	100	3
192CE1A3SA	SEC - I	Water & Food Quality Analysis	3	-	-	3	25	75	100	3
	GE - I		2	-	-	3	-	50	50	2
	LoP	Lab on Project	-	-	-	-	-	-	-	-
Part - IV										
191TL1A3AA	AECC - III	Basic Tamil	2	-	-	3	-	50	50	2
191TL1A3AB		Advance Tamil								
195CR1A3AA		Women's Rights								
		Total	**22**	**3**	**5**				**800**	**24**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fourth Semester										
Part - I										
191TL1A4TA	Language - I	Tamil - IV	4	-	-	3	25	75	100	3
191TL1A4HA		Hindi - IV								
191TL1A4MA		Malayalam - IV								
201TL1A4FA		French - IV								
Part – II										
191EL1A4EA	Language - II	English - IV	4	-	-	3	25	75	100	3
Part – III										
192CE1A4CA	Core - VI	Inorganic Chemistry - I	4	1	-	3	25	75	100	4
192CE1A4CP	Core Practical - IV	Gravimetric Analysis	-	1	5	3	40	60	100	3
192MT1A4IA	IDC - IV	Mathematics - II	3	1	-	3	25	75	100	3
192CE1A4SA	SEC - II	Computer Applications in Chemistry	2	-	1	3	25	75	100	3
	GE - II		2	-	-	3	-	50	50	2
	LoP	Lab on Project	-	-	-	-	-	-	-	-
Part - IV										
191TL1A4AA	AECC - IV	Basic Tamil	2	-	-	3	-	50	50	2
191TL1A4AB		Advance Tamil								
192PY1A4AA		General Awareness								
		Total	**21**	**3**	**6**				**700**	**23**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fifth Semester										
Part – III										
192CE1A5CA	Core - VII	Inorganic Chemistry - II	4	1	-	3	25	75	100	4
192CE1A5CB	Core - VIII	Organic Chemistry - I	4	1	-	3	25	75	100	4
192CE1A5CC	Core - IX	Physical Chemistry - I	4	1	-	3	25	75	100	4
192CE1A5CP	Core Practical – V	Physical Chemistry Practical	-	1	5	3	40	60	100	3
192CE1A5SA	SEC - III	Spectroscopy and Chromatography	3	-	-	3	25	75	100	3
192CE1A5LA	LoP	Lab on Project	-	-	-	-	50	-	50	1
192CE1A5DA	DSE - I	Industrial Chemistry	4	-	-	3	25	75	100	4
192CE1A5DB		Agricultural Chemistry								
192CE1A5DC		Pharmaceutical Chemistry								
192CE1A5TA	IT	Industrial Training	Grade A to C							
Part - IV										
192MT1A5AA	AECC - V	Research Methodology	2	-	-	3	-	50	50	2
		Total	**21**	**4**	**5**				**700**	**25**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Sixth Semester										
Part – III										
192CE1A6CA	Core - X	Organic Chemistry - II	4	1	-	3	25	75	100	4
192CE1A6CB	Core - XI	Physical Chemistry - II	4	-	-	3	25	75	100	4
192CE1A6CV	Core-XII	Project	-	-	8	-	40	60	100	4
192CE1A6SA	SEC - IV	Textile Chemistry	3	-	-	3	25	75	100	3
192CE1A6DA	DSE - II	Dye Chemistry	4	-	-	3	25	75	100	4
192CE1A6DB		Nano and Green Chemistry								
192CE1A6DC		Forensic Science and Crime Investigation								
192CE1A6DD	DSE - III	Polymer Chemistry	4	-	-	3	25	75	100	4
192CE1A6DE		Dairy Chemistry								
192CE1A6DF		Leather Chemistry								
Part - IV										
193BC1A6AA	AECC - VI	Innovation, IPR & Entrepreneurship	2	-	-	3	-	50	50	2
Part - V										
192CE1A6XA		Extension Activity	-	-	-	-	50	-	50	1
		Total	**21**	**1**	**8**	-	-	-	**700**	**26**
								Grand Total	**4300**	**140**

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.	192CE1A5DA	Industrial Chemistry
2.	192CE1A5DB	Agricultural Chemistry
3.	192CE1A5DC	Pharmaceutical Chemistry

Semester VI (Elective II)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	192CE1A6DA	Dye Chemistry
2.	192CE1A6DB	Nano and Green Chemistry
3.	192CE1A6DC	Forensic Science and Crime Investigation

Semester VI (Elective III)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	192CE1A6DD	Polymer Chemistry
2.	192CE1A6DE	Dairy Chemistry
3.	192CE1A6DF	Leather Chemistry

GENERIC ELECTIVE COURSES (GE)

The following are the courses offered under Generic Elective Course

Semester III (GE-I)

S. No.	Course Code	Course Name
1	192CE1A3GA	Chemistry in Daily life - I

Semester IV (GE-II)

S. No.	Course Code	Course Name
1	192CE1A4GA	Chemistry in Daily life - II

EXTRA CREDIT COURSES

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

S. No.	Course Code	Course Name
1	192CE1ASSA	Chemistry in the service of Mankind
2	192CE1ASSB	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 Certificate Course in Basis of Water and Waste water Treatment	192CE5A1CA	Basis of Water and Waste water Treatment
2	2CE5B Certificate Course in Water and Waste water analysis	192CE5B1CP	Water and Waste water analysis

MOOC (NPTEL/SWAYAM/ SPOKEN TUTORIAL)

The following are the online courses offered:

Please refer the following link to select the courses

- www.swayam.org
- www.nptel.ac.in
- www.spoken-tutorial.org

REGULATION 2019-20

Effective from the academic year 2019-20 and applicable to the students admitted to the Degree of Bachelor of Science / Commerce/Arts.

1. NOMENCLATURE

1.1 Faculty: Refers to a group of programmes concerned with a major division of knowledge are. Eg. Faculty of Computer Science consists of disciplines like Departments of Computer Science, Information Technology, Computer Technology and Computer Applications.

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 2015–2018 refers to students belonging to a 3 year Degree programme admitted in 2015 and completing in 2018.

1.4 Course Refers to a component (a paper) 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 and learning needs and the credits may be assigned suitably.

a) Core Courses

   A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

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: DSE courses are the courses offered by the respective disciplinary/ interdisciplinary programme.

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

e) Ability Enhancement Courses (AEC): AECC courses are the courses based upon the content that leads to Knowledge enhancement. These

are mandatory for all disciplines. Environmental Science, Human Rights, Women's Rights, General Awareness, IPR and Innovation, Entrepreneurship Development and Research Methodology.

All these courses should be taught according to Outcome based Education.

1.5 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.

1.6 Project work

It is considered as a special 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.

Extra credits

Extra credits will be awarded to a student for achievements in co-curricular activities carried out outside the regular class hours. The guidelines for the award of extra credits are given in section- these credits are not mandatory for completing the programme.

Advanced Learner Course (ALC):

ALC is doing work of a higher standard than usual for students at that stage in their education. Research work carried out in University/ Research Institutions/ Industries of repute in India or abroad for a period of 15 to 30 days will be considered as Advanced Learners Course.

2. STRUCTURE OF PROGRAMME

2.1 PART – I: LANGUAGE

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

2.2 PART – II : ENGLISH

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

2.3 PART – III :

- Core course
- Inter Departmental Course (IDC)
- Discipline Specific Elective (DSE)
- Skill Enhancement Course (SEC)
- Generic Elective (GE)
- Lab on Project (LoP)
- Industrial Training (IT)

2.4 PART IV

2.4.1 Ability Enhancement Compulsory Course

The ability enhancement courses such as i)Environmental Studies, ii) Human Rights, iii) Womens' Rights, iv) General Awareness, v) Research Methodology, vi) Intellectual Property Rights(IPR), Innovation and Entrepreneurship or IPR and Innovation from I to VI Semester.

a) Those who have not studied Tamil up to XII Std and taken a non-Tamil language under Part-I shall take Tamil comprising of two courses.

(OR)

b) Those who have studied Tamil up to XII std and taken a non-Tamil language under Part-I shall take Advanced Tamil comprising of two courses in the third and fourth semesters.

(OR)

c) Students who come under the above a+b categories are exempted from Women's Rights and General awareness during III and IV semester respectively.

2.5 PART V: EXTENSION ACTIVITIES

The following co-curricular and extracurricular activities are offered under institutional / department Association/ club/ extension programmes for the students under extension activities from I to IV semester.

a) Institutional

- National Service Scheme (NSS)
  Participation in any one of the camps organized by NSS unit.
- Friends of Police(FoP)
  Active participation in traffic regulation and other extension activities
- Sports
  Active participation in any one of the sports activities
- Youth Red Cross (YRC)
  Active participation in YRC programmes

b) Department Association

Membership and active participation in the department association activities.

c) Clubs

Membership and active participation in any one club activities.

1. CREDIT ALLOTTMENT

The following is the credit allotment:

- Lecture Hours (Theory) : Max.1 credit per lecture hour per week,
  1 credit per tutorial 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

2. DURATION OF THE PROGRAMME

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

3. REQUIREMENTS FOR COMPLETION OF A SEMESTER

Candidate shall be permitted to appear for the End Semester examinations for any semester (practical/theory) if

i) He/she secures not less than 75% of attendance in the number of working days during the semester.
ii) He/she earns a progress certificate from the Head of the institution, of having satisfactorily completed the course of study prescribed in the scheme of examinations for that semester as required by these regulations, and
iii) His/her conduct / character is satisfactory.

- Provided that it shall be open to the Academic council, or any authority delegated with such powers by the Academic council, to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed, for valid reasons, subject to usual conditions. (Refer the Ordinance No.1 of 1990 of the Bharathiar University)
- A candidate who earned 75% of attendance and more in the current semester are eligible to write the examination in current semester subjects.
- A candidate who has secured less than 65% but 55% and above attendance in any semester has to compensate the shortage in attendance in the subsequent semester besides earning the required percentage of attendance in that semester and appear for both semester papers together at the end of the later semester.
- A candidate who has secured less than 55% of attendance in any semester shall not be permitted to appear for the regular examinations and to continue the study in the subsequent semester. He/she has to rejoin the semester in which the attendance is less than 55%.
- A candidate who has secured less than 65% of attendance in the final semester has to compensate his/her attendance shortage in a manner as decided by the concerned Head of the department after rejoining the same course.

4. 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 (including the project work and Viva-Voce examination in the final Semester) shall be 100 with the following breakup.

(i) Theory Courses

Continuous Internal Assessment (CIA) : 25 Marks

End Semester Exams (ESE) : 75 Marks

(ii) For Practical/ Courses

Continuous Internal Assessment (CIA) : 40 Marks

End Semester Exams (ESE) : 60 Marks

a. The following are the distribution of marks for the Continuous Internal Assessment in Practical, Project / Industrial Training Courses.

Continuous Internal Assessment for Practical Courses:

S.No	For - UG practical courses	Distribution of Marks					
1	Minimum 10 experiments to be conducted/practical paper/semester	20	15	10	8	5	4
2	Tests : Two tests out of which one shall be during the mid semester and the other to be conducted as model test at the end of the semester.)	16	10	10	8	6	6
3	Observation Note Book	4	5	5	4	4	-
	TOTAL MARKS	40	30	25	20	15	10

Project viva-voce / Industrial Training

The following are the distribution of marks for the continuous Internal assessment in UG Project/Industrial Training courses.

S.no	For - UG Project courses//Industrial Training	Distribution of Marks	
1	Review-I	5	10
2	Review-II	5	10
3	Review-III	5	10
4	Document, Preparation and Implementation	10	10
	TOTAL MARKS	25	40

b. Following are the distribution of marks for the External Examination in UG Project /Industrial Training courses

S.no	For - UG Project //Industrial Training courses	Distribution of Marks	
1	Record Work and Presentation	35	40
2	Viva-Voce	15	20
	TOTAL MARKS	50	60

Part – IV

The courses offered under Part – IV shall have only End Semester Examinations (ESE) for a maximum of 50 Marks. However, Students who select "Tamil" under Part IV, will be assessed only by Continuous Internal Assessment (CIA). The marks shall be furnished to the COE by the concerned Course teacher through the Head of the Department.

6.1CONTINUOUS ASSESSMENT EXAMS

6.1 Theory courses

a) Continuous Internal Assessment test (CIA)

There will be a Minimum of two Continuous Assessment Exams, for each Theory course. The first and Second Assessment Exams will be conducted for a Maximum of 50 Marks and 75 marks respectively. The total marks secured in the Two Assessment Exams will be converted to 15 Marks.

b) Utilization of Library

Marks will be awarded to the student based on the hours spent in the library after the working hours and submission of report by the student.

Hours spent in Library	Marks	Type of Document submitted
2	1	Report/ Assignment/ Class presentation
4	2	
6	3	
8	4	
10	5	
12	6	

- During the Library hour, the student must spend time in reading the articles, books, journals of their subject of interest
- Each student should borrow minimum three books during the semester
- Student is expected to submit one Report / Assignment / Class Presentation per Course.

c) Class Participation

Active participation in classroom discussion by the student will be evaluated based on Integration of knowledge, Interaction and Participation and demonstration of knowledge.

d) Papers / Reports/ Assignments/ Class Presentation

The student will be evaluated based on his ability to do analysis of application of theory to real world problems or creative extension of class room learning and his/her ability to communicate the given topic effectively and clearly.

Continuous Assessment OBE Rubrics Score Sheet

Degree: _____ Branch: _____ Semester: _____

Course Code: _____ Course: _____

Max. Marks: Internal:_____ External: _____ Total: _____

S.No.	REG. NO	THEORY / PRACTICAL & LIBRARY CLASS PARTICIPATION (15) (Compulsory)				RUBRICS ASSESSMENT (SELECT ANY ONE)									Total Marks out of : 30	Total Marks out of : 16 / 10 / 08 / 04
						PAPERS / REPORTS (15)			ASSIGNMENTS (15)			CLASS PRESENTATION (15)				
		Library	Integration of Knowledge	Interaction & Participation	Demonstration of Knowledge	Organization & Knowledge	Format & Spelling	Reference / Experiments	Demonstration of Knowledge	Format & Spelling	Reference	Content & Coherence	Creativity and Speaking Skills	Duration of Presentation		
		6	3	3	3	5	5	5	5	5	5	5	5	5		
1																

The following are the distribution of marks for the continuous internal assessment in UG practical courses

S.No	For - UG Practical Courses	Distribution of Marks					
1	Minimum 10 experiments to be conducted/practical paper/semester	20	15	10	8	5	4
2	Tests : Two tests out of which one shall be during the mid semester and the other to be conducted as model test at the end of the semester.)	16	10	10	8	6	6
3	Observation Note Book	4	5	5	4	4	-
	TOTAL MARKS	40	30	25	20	15	10

7. FOR PROGRAMME COMPLETION

Programme Completion (for students admitted in the A.Y.2019-20 and Onwards)

Student has to complete the following:

i) Part I, II,III,IV,V as mentioned in the scheme
ii) Industrial/ Institutional training

Students must undertake industrial / institutional training for a minimum of 15 days and not exceeding 30 days during the IV semester summer vacation. The students will submit the report for evaluation during V semester.

Based on the performance Grade will be awarded as follows:

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

iii) Skill Enhancement Training

Student must undergo Skill Enhancement training on Communication skills (I and II Semester) and Quantitative aptitude (III and IV Semester) respectively each for 40 h.

8. EXTRA CREDITS

- Earning extra credit is mandatory. However, it is not essential for programme completion
- Extra Credits will be awarded to a student for achievement in co-curricular/ extracurricular activities carried other than the regular class-hours.
- The detailed guidelines for the award of extra credits are as follows:
- A student is permitted to earn a maximum of five extra Credits during the programme duration of UG from I to V Semester.
- Candidate can claim a maximum of 1 credit under each category listed.

The following are the guidelines for the award of Extra credits:

8.1 Proficiency in foreign language

Qualification	Credit
A pass in any foreign language in the examination conducted by an authorized agency	1

8.2 Proficiency in Hindi

Qualification	Credit
A pass in the Hindi examination conducted by Dakshin Bharat Hindi Prachar Sabha	1

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

8.3 Self-study Course

Qualification	Credit
A pass in the self-study courses offered by the department	1

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

8.4 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.

Qualification	Credit
A pass in the type writing / short hand examination offered by TNDTE	1

8.5 Diploma / Certificate

Courses offered by any recognized University / NCVRT

Qualification	Credit
A pass in any Certificate course/ Diploma / PG Diploma	1

8.6 CA/ICSI/CMA

Qualification	Credit
Qualifying foundation / Inter level / Final in CA/ICSI/CMA / etc.,	1

8.7 Sports and Games

The Student can earn extra credit based on their Achievement in sports as given below:

Qualification	Credits
Achievement in University/ State / National/ International	1

8.8 Online Courses

Pass in any one of the online courses

Qualification	Credit
SWAYAM/NPTEL/Spoken Tutorial etc.,	1

8.9 Publications / Conference Presentations (Oral/Poster)/Awards

Qualification	Credit
Research Publications in Journals/ oral/poster presentation in Conference	1

8.10 Innovation / Incubation / Patent / Sponsored Projects / Consultancy

Qualification	Credit
Development of model/ Products /Prototype /Process/App/Registration of Patents/ Copyrights/Trademarks/Sponsored Projects /Consultancy	1

8.11 Representation

Qualification	Credit
State / National level celebrations such as Independence day, Republic day Parade, National Integration camp etc.,	1

Course Code	Course Name	Category	L	T	P	Credit
191TL1A1TA	தமிழ்த் தாள் - I	மொழி- I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடு , 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) – மாணவனின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1,K2,K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2,K4
CO3	பாட இணைச் செயல்பாடுகள் (Co-curricular activities)	K2,K3,K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு (Tamil knowledge)	K5, K6

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A1TA	தமிழ்த்தாள் - I	SEMESTER I

Total Credits: 03

Total Instruction Hours: 60 h

Syllabus

Unit I மறுமலர்ச்சிக் கவிதைகள் 12 h

1. உயிர் பெற்ற தமிழர் பாட்டு - பாரதியார்
2. படி - பாரதிதாசன்
3. போராடப் புறப்பட்டோம் - தமிழ் ஒளி
4. தமிழ்க் கொலை புரியாதீர் - புலவர் குழந்தை
5. திரைத்தமிழ்

அ) சும்மா கிடந்த நிலத்தை எனத்தொடங்கும் பாடல் -

_ பட்டுக்கோட்டை கல்யாண சுந்தரனார்

ஆ) சமரசம் உலாவும் இடமும் எனத்தொடங்கும் பாடல் - மருதகாசி

இ) உன்னை அறிந்தால் எனத்தொடங்கும் பாடல் - கண்ணதாசன்

Unit II புதுக்கவிதைகள் 12 h

1. கடமையைச் செய் - மீரா
2. அம்மாவின் பொய்கள் - ஞானக்கூத்தன்
3. செருப்புடன் ஒரு பேட்டி - மு.மேத்தா
4. ஒரு சிங்கவால் குரங்கின் மரணம் - சிற்பி
5. கடல்கோள் 2004 - முத்தமிழ் விரும்பி
6. கரிக்கிறது தாய்ப்பால் - ஆரூர் தமிழ்நாடன்
7. பள்ளி - நா. முத்துக்குமார்
8. ஹைகூ கவிதைகள் - 15 கவிதைகள்

Unit III பெண்ணியம் 08 h

1. ஒரு கதவும் கொஞ்சம் கள்ளிப்பாலும் - தாமரை
2. நீரில் அலையும் முகம் - அ. வெண்ணிலா
3. தொட்டிச் செடி - இளம்பிறை
4. ஏனிந்த வித்தியாசங்கள் - மல்லிகா

Unit IV சிறுகதைகள் 15 h

1. வேப்பமரம் - ந. பிச்சமூர்த்தி
2. அகல்யை - புதுமைப்பித்தன்
3. ஒருபிடி சோறு - ஜெயகாந்தன்
4. காய்ச்சமரம் - கி. ராஜநாராயணன்
5. நிராசை - பாமா
6. எருமை சீமாட்டி - பெருமாள் முருகன்
7. குதிரை மசால் தாத்தா - சு. வேணுகோபால்

Unit V இலக்கியவரலாறு, இலக்கணம் மற்றும் பயிற்சிப் பகுதி 13 h

அ. இலக்கிய வரலாறு

1. மறுமலர்ச்சிக் கவிஞர்களின் தமிழ்ப்பணிகள்
2. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்
3. சிறுகதையின் தோற்றமும் வளர்ச்சியும்

ஆ. இலக்கணம்

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

இ. படைப்பாக்கப் பயிற்சி

1. கவிதை, சிறுகதை எழுதுதல்

Text Books

1 செய்யுள் மற்றும் உரைநடைத் திரட்டு . 2019. தொகுப்பு : தமிழ்த் துறை , டாக்டர் என். ஜி.பி. கலை மற்றும் அறிவியல் கல்லூரி. நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட். சென்னை.

References

1 பேராசிரியர் முனைவர் பாக்கியமேரி. இலக்கணம் இலக்கிய வரலாறு மொழித்திறன். முதல் பதிப்பு 2013 . பூவேந்தன் பதிப்பகம். சென்னை

2 தமிழண்ணல் . புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு . பதினாறாம் பதிப்பு 2000 மீனாட்சி புத்தக நிலையம். மதுரை.

3 பேராசிரியர் புலவர் இளவரசு ,சோம. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு. எட்டாம் பதிப்பு ஜூலை 2012.மணிவாசகர் பதிப்பகம்.சென்னை

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

Course Code	Course Name	Category	L	T	P	Credit
201TL1A1HA	HINDI-I	Language 1	4	1	-	03

PREAMBLE

This course has been designed for students to learn and understand

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

  communicate Hindi

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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

201TL1A1HA	HINDI-I	SEMESTER I

Total Credits: 03

Total Instruction Hours: 60 h

Syllabus

Unit I गद्य – नूतन गद्य संग्रह (जय प्रकाश) 12 h

पाठ 1- रजिया

पाठ 2- मक्रील

पाठ 3- बहता पानी निर्मला

पाठ 4- राष्ट्रपिता महात्मा गाँधी

Unit II कहानी कुंज- डॉ वी.पी. 'अमिताभ' 12 h

कहानी कुंज- डॉ वी.पी. 'अमिताभ' (पाठ 1-4)

Unit III व्याकरण 12 h

शब्द विचार (संज्ञा, सर्वनाम, कारक, विशेषण)

Unit IV अनुच्छेद लेखन 12 h

अनुच्छेद लेखन

Unit V अनुवाद 12 h

अभ्यास-III (केवल अंग्रेजी से हिन्दी में)

Text Books

1. प्रकाशक: सुमित्र प्रकाशन 204 लीला अपार्ट्मेंट्स, 15 हेस्टिंग्स रोड' अशोक नगर इलाहाबाद-211001 (Unit - I)
2. प्रकाशक: गोविन्द प्रकाशन सदर बाजार, मथुरा उत्तर प्रदेश – 281001 (Unit-II)
3. पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 टेगोर नगर इलाहाबाद – 211024 (Unit-III)
4. पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024 (Unit-IV)
5. (पाठ 1 to 10) प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17 (Unit – V)

Course Code	Course Name	Category	L	T	P	Credit
201TL1A1MA	MALAYALAM	Language - I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- develop the writing ability and develop reading skill.
- various concepts and techniques for criticizing literature, to learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

201TL1A1MA	MALAYALAM - I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Novel 12 h

1. Alahayude penmakkal

Unit II Novel 12 h

1. Alahayude penmakkal

Unit III Short Story 14 h

2. Nalinakanthi

Unit IV Short Story 10 h

2. Nalinakanthi

Unit V 12 h

Composition & Translation

Text Books

1 Alahayude penmakkal (NOVEL) By Sara Joseph Published by Current books Thrissur.

2 Nalinakanthi (Short story) By T.Padmanabhan Published by DC.Books Kottayam

3 Expansion of ideas,General Essay And Translation.

References

1 Malayala Novel Sahithyam

2 Malayala cherukatha Innale Innu.

Course Code	Course Name	Category	L	T	P	Credit
201TL1A1FA	FRENCH- I	Language - I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents.	K1
CO2	learn the adjectives and the classroom environment in France.	K2
CO3	Learn the Plural, Articles and the Hobbies.	K3
CO4	learn the Cultural Activity in France.	K3
CO5	learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

201TL1A1FA	FRENCH- I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Salut I Page 10 12 h

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

Unit II Enchanté I Page 20 12 h

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

Unit III J'adore I Page 30 12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
• Exprimer ses gouts.	Dans un café, participer à une soirée de rencontres	• Dans une soirée de recontres rapid comprendre des personnes qui échangent sur elles et sur leurs goût • Comprendre une personne

	rapides et remplir de taches d'appréciation.	qui parler des goûts de quelqu'un d'autre.

Unit IV J'adore I Page 30 14 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
• Présenter quelqu'un	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation	• Exprimer ses goûts. • Comprendre une demande laissée sur un répondeur téléphonique. • Parler de ses projets de week-end.
Autoévaluation du module I Page 40 – Préparation au DELF A1 page 42		

Unit V Tu veux bien? Page 46 10 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
• Demander à quelqu'un de faire quelque chose. • Demander poliment. • Parler d'actions passes.	Organiser un programme d'activités pour accueillir une personne importante.	• Comprendre une personne demande un service à quelqu'un. • Demander à quelqu'un de faire quelque chose. • Imaginer et raconter au passé à partir de situations dessinées.

Text Books

1 Regine Merieux, Yves Loiseau, LATITUDES 1(Methode de Français), Goyal Publisher & Distributors Pvt.Ltd., 86 UB Jawahar Nagar (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
191EL1A1EA	ENGLISH - I	Language - II	4	0	1	3

PREAMBLE

This course has been designed for students to learn and understand

- To experience the effect of dialogue, the brilliance of imagery and the magnificence of varied genre
- To strengthen the student's English vocabulary and understanding of English sentence structure
- To communicate effectively and acquire knowledge on 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	Extend interest in and appreciation of the works of eminent writers from various literatures	K2
CO2	Interpret the genres in literature through the master works of great visionaries	K3
CO3	Perceive the language gaps through a clear model of the grammatical structure	K5
CO4	Analyze the concepts of texts in the course of different lessons which are realistic and discursive in nature	K4
CO5	Value the integral concepts of English grammar necessarily required in their linguistic competence	K5

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191EL1A1EA	ENGLISH - I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Genre Studies - I 10 h

The Road Not Taken – Robert Frost
All the World's a Stage – William Shakespeare
Whitewashing the Fence – Mark Twain
The Face of Judas Iscariot - Bonnie Chamberlain
Soul Gone Home – Langston Hughes

Unit II Genre Studies - II 11 h

Ode on a Grecian Urn – John Keats
Mending Wall – Robert Frost
My Early Days – Dr. A.P.J. Abdul Kalam
Nightfall – Isaac Asimov
A Kind of Justice – Margret Atwood

Unit III Grammar - I 14 h

Parts of Speech
Articles and Prepositions
Subject Verb Agreement
Degrees of Comparison
Sequence of Tenses

Unit IV Genre Studies - III 11 h

On his Blindness - John Milton
Small - Scale Reflections on a Great House – A.K. Ramanujan
On Prayer – Khalil Gibran
The Garden Party – Katherine Mansfield
The Tell - Tale Heart – Edgar Allen Poe

Unit V Grammar - II 14 h

If Conditionals

Modal Auxiliary Verbs

Question Types/Tags

Voice

Direct and Indirect Speech

Text Books

1 Prabha, Vithya. R and S. Nithya Devi. 2019. Sparkle: English Textbook for First Year. McGraw Hill Education, Chennai.

2 Wren and Martin. 2006. High School English Grammar and Composition. S. Chand Publishing, New Delhi.

References

1 Bajwa and Kaushik. 2010. Springboard to Success- Workbook for Developing English and Employability Skills. Orient Black Swan, Chennai

2 Syamala. V. 2002. Effective English Communication for You. Emerald Publishers, Chennai.

3 Krishnaswamy. N, Lalitha Krishnaswamy & B.S. Valke. 2015. Eco English, Learning English through Environment Issues. An Integrated, Interactive Anthology. Bloomsbury Publications, New Delhi.

4 Krishnaswamy. N. 2000. Modern English: A Book of Grammar, Usage And Composition. Macmillan, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A1CA	GENERAL CHEMISTRY - I	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basics of chemical bonding and appreciate the concept of hybridization.
- The fundamentals of thermodynamics and thermo chemistry.
- About the alkanes and their conformations.

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 and the basics of thermo chemistry.	K2
CO5	Illustrate the preparation, properties of alkanes, free radicals and conformations of alkanes.	K2

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A1CA	GENERAL CHEMISTRY – I	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 –Orbits and Orbitals.

Unit II Chemical Bonding 12 h

Types of bonds – ionic, covalent, coordinate and metallic bonds - condition for the bond formation - concept of hybridization – hybridization involving s-, p- and d orbital – 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 – basic concept of resonance.

Unit III Gaseous State 12 h

Kinetic 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 – van der Waal's equation. Various units of expressing concentrations of solutions – solutions of liquid in liquids – ideal and non-ideal solutions – Raoult's law – vapour pressure of nonideal solutions – vapor pressure composition and boiling point composition curves – fractional distillation of binary liquid solutions – steam distillation – solutions of gases in liquid.

Unit IV Thermodynamics -I 12 h

Definition- System, surroundings, isolated system, open system and closed systems, extensive and intensive properties, Types of process. First law of thermodynamics-Internal energy, internal energy and first law. 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.

Thermo chemistry

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 Alkanes, free radicals and conformation 12 h

Nomenclature of alkanes, preparation, properties, reaction. Free radicals- formation- structure, stability- reactivity. 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.

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.

3 Bahl. A and Bahl. B.S, 2016, "A Textbook of Organic Chemistry", 22nd Edition, S. Chand & Company & New Delhi

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.

192CE1A1CP	CORE PRACTICAL: VOLUMETRIC ANALYSIS AND PREPARATION OF INORGANIC COMPLEXES	SEMESTER I

Total Credits: 3
Total Instructions Hours: 72 h

S.No	Contents
	Acidimetry and Alkalimetry:
1	Estimation of HCl by NaOH using a standard oxalic acid solution.
2	Estimation of Na2CO3 by HCl using a standard Na2CO3 Solution
	Permanganametry:
3	Estimation of oxlaic acid by KMnO4 using a standard oxalic acid solution.
4	Estimation iron(II) sulphate by KMnO4 using a standard Mohr's salt solution.
5	Estimation of calcium(II) by KMnO4 using standard oxalic acid solution.
	Dichrometry:
6	Estimation of iron(II) by potassium dichromate using standard Mohr's salt solution.
	Iodometry:
7	Estimation of KMnO4 by thiosulphate using a standard potassiumdichromate solution.
8	Estimation of copper(II) sulphate by K2Cr2O7 solution.
	Preparation of Inorganic Complexes
9	Tetraamminecopper(II)sulphate
10	Hexamminecobalt(II) chloride
11	Potassiumtrioxalatochromate(III),
12	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
192PY1A1IA	PROPERTIES OF MATTER, THERMAL PHYSICS AND OPTICS	IDC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The basic Properties of matter like elasticity, viscosity and surface tension.
- The mode of heat transfer and the basic laws in thermodynamics.
- The Optical properties and its applications.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the importance and applications of elasticity modulus.	K2
CO2	Utilize the basic properties of matter and do the experiments in laboratory to evaluate the properties.	K3
CO3	Demonstrate the differences in heat transfer mechanisms	K2
CO4	Classify the Reversible and irreversible process in thermodynamics.	K2
CO5	Experiment with the application of Interference and Diffraction.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A1IA	PROPERTIES OF MATTER, THERMAL PHYSICS AND OPTICS	SEMESTER I

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Properties of matter 7 h

Young's modulus – Rigidity modulus – Poisson's ratio (definition alone) – Bending of beams – Expression for bending moment – determination of young's modulus – uniform and non-uniform bending. Torsional oscillations of a body– Rigidity modulus of a wire and M.I. of a disc by torsion pendulum

Unit II Viscosity 7 h

Viscosity – Viscous force – Co-efficient of viscosity – Poiseuilles formula for co-efficient of viscosity of a liquid – determination of co-efficient of viscosity using burette and comparison of Viscosities

Unit III Conduction, Convection and Radiation 7 h

Specific heat capacity of solids and liquids – Dulong and Petit's law – Newton's law of cooling – thermal conduction –coefficient of thermal conductivity by Lee's disc method. Black body radiation – Planck's radiation law – Rayleigh Jean's law, Wien's displacement law.

Unit IV Thermodynamics 7 h

Zeroth and I Law of thermodynamics – II law of thermodynamics – Carnot's engine and Carnot's cycle – Efficiency of a Carnot's engine – Entropy – Change in entropy in reversible and irreversible process – change in entropy of a perfect gas.

Unit V Optics 8 h

Interference – conditions for interference maxima and minima – Air wedge – thickness of a thin wire – Newton's rings – determination of wavelength using Newton's rings. Diffraction – Difference between diffraction and interference – Theory of transmission grating – normal incidence.

Text Books

1 Murugesan. R, 2003, "Properties of matter and sound", 1st Edition, S.Chand and Co & New Delhi.

2 Brijlal Subramanyam and Hemne. P.S, 2016, "Heat Thermodynamics and Statistical Physics", Revised Edition, S.Chand and Co & New Delhi.

References

1 Ajoy Ghaktak, 2012, "Optics", 4th Edition, Tata McGraw-Hill Education private limited & New Delhi.

2 David Halliday, Robert Resnick and Jearl Walker, 2014, "Fundamentals of Physics", 10th Edition, John Willy Company Hoboken & USA.

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

4 Manna. A, 2011, "Heat and Thermodynamics", 5th Edition, Dorling Kindersley (India) Pvt. Ltd & New Delhi.

202PY1A1IP	IDC PRACTICAL : PHYSICS - I	SEMESTER I

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Young's Modulus-Uniform Bending (Microscopic Method)
2	Young's Modulus-Non-uniform Bending (Microscopic Method)
3	Meter Bridge- Specific resistance of a coil
4	Determination of Rigidity modulus of a string.
5	Compound Pendulum – determination of 'g' and 'K'
6	Rigidity Modulus – Static Torsion-Scale and Telescope
7	Spectrometer – Refractive Index of a glass Prism
8	Moment of a Magnet – Tan C position
9	Viscosity – Poiseuille's Method
10	Sonometer – Frequency of a tuning fork
11	Post office box- Determination of Specific Resistance
12	Sonometer – Frequency of a alternating current

Note: Out of 12 - 10 Mandatory

References

1. Chattopadhyay. D, 2011, "Advanced course in practical physics", 8th Revised Edition, NCBA publishers & New Delhi.
2. Samir kumar ghosh, 2008, "Textbook of Advanced Practical Physics", 4th Revised Edition, NCBA publishers & New Delhi.
3. Arora. C.L, 2010, "B.Sc. Practical Physics", Revised Edition, S. Chand and Co & New Delhi.
4. Harnam singh and Heme. P.S, "B.Sc. Practical Physics", Revised Edition, S. Chand and Co & New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
193MB1A1AA	VALUE EDUCATION- 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	inculcate the knowledge on structure, function and energy flow in the Eco system.	K3
CO3	impart knowledge on Biodiversity and its conservation.	K3
CO4	create awareness on effects, causes and control of air, water, soil and noise pollution etc.	K2,K3
CO5	build awareness about sustainable development and Environmental protection	K2,K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

193MB1A1AA	VALUE EDUCATION- ENVIRONMENTAL STUDIES	SEMESTER I

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Environmental studies& Ecosystems 4 h

Multidisciplinary nature of environmental studies; components of environment – atmosphere, hydrosphere, lithosphere and biosphere. Scope and importance; Concept of sustainability and sustainable development. What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession. Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

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

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). Heating of earth and circulation of air; air mass formation and precipitation. Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit III Biodiversity and Conservation 5 h

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. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit IV Environmental Pollution, Environmental Policies & Practices 5 h

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; Air (Prevention & Control of Pollution) Act; Water (Prevention and

control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; International agreements; Montreal and Kyoto protocols and conservation on Biological Diversity (CBD). The Chemical Weapons Convention (CWC). Nature reserves, tribal population and rights, and human, wildlife conflicts in Indian context.

Unit V Human Communities and the Environment& Field Work 5 h

Human population and growth: Impacts on environment, human health and welfares.Carbon foot-print. Resettlement and rehabilitation of project affected persons; case studies. Disaster management: floods, earthquakes, cyclones and landslides. Environmental movements: Chipko, Silent valley, Bishnios of Rajasthan. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi). Visit to an area to document environmental assets; river/forest/flora/fauna, etc. Visit to a local polluted site – Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds and basic principles of identification. Study of simple ecosystems-pond, river, Delhi Ridge, etc.

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.
3. Gleeson,B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P.H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
7. McCully, P.1996. Rivers no more: the environmental effects of dams(pp. 2964). Zed Books.
8. McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, h.T. & Andrews, J.1971. Fundamentals of Ecology. Philadelphia: Saunders.

References

1. Pepper, I.L., Gerba, C.P. &Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
2. Rao, M.N. &Datta, A.K. 1987. Waste Water Treatement. Oxford and IBH Publishing Co. Pvt. Ltd.
3. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
4. Rosencranz, A., Divan, S., & Noble, M.L. 2001. Environmental law and policy in India. Tripathi 1992.

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
Part - I										
191TL1A2TA	Language - I	Tamil-II	4	1	-	3	25	75	100	3
201TL1A2HA		Hindi-II								
201TL1A2MA		Malayalam- II								
201TL1A2FA		French – II								
Part – II										
201EL1A2EA	Language - II	English – II	4	-	1	3	25	75	100	3
Part – III										
192CE1A2CA	Core - II	General Chemistry - II	4	-	-	3	25	75	100	4
192CE1A2CB	Core - III	Applied Chemistry	3	-	-	3	25	75	100	3
202CE1A2CP	Core Practical - II	Organic Analysis and Single Stage Preparation	-	-	4	3	40	60	100	2
202PY1A2IA	IDC - II	Electricity, Electronics, Atomic and Nuclear Physics	3	-	-	3	25	75	100	3
202PY1A2IP	IDC Practical - II	Physics – II	-	-	4	3	40	60	100	2
Part - IV										
196BM1A2AA	AECC - II	Human Rights	2	-	-	3		50	50	2
		Total	**20**	**1**	**9**				**750**	**22**

Course Code	Course Name	Category	L	T	P	Credit
191TL1A2TA	பகுதி-1: தமிழ் - தாள்- II	மொழி	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப் பாடங்களின் வாயிலாகத் தமிழரின் பண்பாடு, பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல்
- கலை மற்றும் மரபுகளை அறியச் செய்தல்
- மாணவர்களின் படைப்பாக்கத் திறன்களை 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) – மாணவனின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1,K2,K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2,K4
CO3	பாட இணைச் செயல்பாடுகள் (Co-curricular activities)	K2,K3,K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு (Tamil knowledge)	K5

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A2TA	பகுதி-1: தமிழ் - தாள்- II	SEMESTER II

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

Unit I **அற இலக்கியம்** 12 h

1. திருக்குறள்

அ.அறன் வலியுறுத்தல் (அ. எண்: 04)

ஆ.நட்பாராய்தல் (அ. எண்: 80)

இ.சான்றாண்மை (அ. எண்: 99)

ஈ.குறிப்பறிதல் (அ. எண்: 110)

2. மூதுரை - ஔவையார் (10 பாடல்கள் - 6,7,9,10,14,16,17,23,26,30)

Unit II **அற இலக்கியம்** 10 h

1. நாலடியார் - அறிவுடைமை

2.பழமொழி நானூறு - வீட்டு நெறி

3. கார்நாற்பது - தோழி பருவங்காட்டி தலைமகளை வற்புறுத்திய பாடல்கள் (1முதல் – 18பாடல்கள்)

Unit III **உரைநடை** 10 h

1. பெற்றோர்ப் பேணல் - திரு.வி.க.

2. உள்ளம் குளிர்ந்தது - மு.வரதராசனார்

3. சங்கநெறிகள் - வ.சுப.மாணிக்கம்

Unit IV **உரைநடை** 13 h

1.பெரியார் உணர்த்தும் சுயமரியாதையும் சமதர்மமும் - வே. ஆனைமுத்து

2. வீரவணக்கம் - கைலாசபதி

3.மொழியும்நிலமும் - எஸ். ராமகிருஷ்ணண்

Unit V **இலக்கிய வரலாறு, இலக்கணம் மற்றும் பயிற்சிப் பகுதி** 15 h

அ.இலக்கிய வரலாறு

1. பதினெண் கீழ்க்கணக்கு நூல்கள்

2. தமிழ் உரைநடையின் தோற்றமும் வளர்ச்சியும்

ஆ. இலக்கணம்

1. வழு, வழுவமைதி, வழாநிலை

இ. பயிற்சிப் பகுதி

1. நூல் மதிப்பீடு மற்றும் திரைக்கதை திறனாய்வு

2. தன்விவரக் குறிப்பு எழுதுதல்

Note : பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது

Text Books

1 தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி (தன்னாட்சி) செய்யுள் மற்றும் உரைநடைத் திரட்டு. (முதல்பதிப்பு.) சென்னை: நியூ செஞ்சுரி புக்ஹவுஸ் (பி) லிட்.

References

1 பேராசிரியர் புலவர் இளவரசு, சோம. (ஜூலை2012). தமிழ் இலக்கிய வரலாறு. (எட்டாம் பதிப்பு) சென்னை: மணிவாசகர் பதிப்பகம்.

2 பேராசிரியர் முனைவர் பாக்கியமேரி (2013). இலக்கணம் இலக்கிய வரலாறு மொழித்திறன். (முதல் பதிப்பு) சென்னை பூவேந்தன் பதிப்பகம்.

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

Course Code	Course Name	Category	L	T	P	Credit
201TL1A2HA	HINDI -II	LANGUAGE	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To develop the writing ability and develop reading skill.
- To learn various concepts and techniques for criticizing literature, to learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

201TL1A2HA	HINDI -II	SEMESTER II

Total Credits: 03

Total Instruction Hours: 60 h

Syllabus

Unit I — 12 h

आधुनिक पद्य – शबरी (श्री नरेश मेहता

प्रकाशक: लोकभारती प्रकाशन

पहली मंजिल, दरबारी बिल्डिंग,

महात्मा गाँधी मार्ग, इलाहाबाद-211001

Unit II — 12 h

उपन्यास: सेवासदन-प्रेमचन्द

प्रकाशक: सुमित्र प्रकाशन

204 लीला अपार्ट्मेंट्स, 15 हेस्टिंग्स रोड'

अशोक नगर इलाहाबाद-211001

Unit III — 12 h

कहानी-किरीट- डा उषा पाठक / डा अचला पाण्डेय

पाठ 1. उसने कहा था

पाठ 2. कफ़न,

पाठ 3. चीफ़ की दावत

प्रकाशक: राधाकृष्ण प्रकाशन दिल्ली

Unit IV — 12 h

पत्र लेखन: (औपचारिक या अनौपचारिक)

पुस्तक: व्याकरण प्रदिप – रामदेव

प्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024

Unit V — 12 h

अनुवाद अभ्यास-III (केवल हिन्दी से अंग्रेजी में)

(पाठ 1 to 10)

प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17

Course Code	Course Name	Category	L	T	P	Credit
201TL1A2MA	MALAYALAM - II	LANGUAGE	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To develop the writing ability and develop reading skill.
- To learn various concepts and techniques for criticizing literature, to learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

201TL1A2MA	MALAYALAM -II	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I 12 h

Travelogue

Unit II Novel 12 h

Travelogue

Unit III 14 h

Travelogue

Unit IV 10 h

Autobiography

Unit V 12 h

Autobiography

Text Books

1. Dubai Puzha (Travelogue) By K.Krishna Das, Published by Green books Thrissur.
2. Vazhithirivukal (Autobiography) By Dr.APJ Abdul Kalam Published by DC.Books Kottayam

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Course Code	Course Name	Category	L	T	P	Credit
201TL1A2FA	FRENCH -II	LANGUAGE	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To Acquire Competence in General Communication Skills – Oral + Written – Comprehension & Expression.
- To Introduce the Culture, life style and the civilization aspects of the French people as well as of France.
- To help 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	To learn the adjectives and the classroom environment in France.	K2
CO3	Learn the Plural, Articles and the Hobbies.	K3
CO4	To learn the Cultural Activity in France.	K3
CO5	To learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

201TL1A2FA	FRENCH -II	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I 12 h

• Proposer, accepter, refuserune invitation. • Indiquer la date.	Organiser une soirée au cinéma avec des amis, par téléphone et par courriel.	• Comprendreunemessage d'invitationsurunrépondeurt éléphonique. • 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 vuepositifetnégatif. • S'informersur le prix. • S'informersur la quantitité. • Exprimer la quantitité.	En groupes, choisir un cadeau pour un ami.	• Exprimer son point de vuesur des idées de cadeau. • Faire des achatsdans un magasin

Unit IV 12 h

• Demander etindiquerune direction. • Localiser (près de, en face de ….).	Suivre un itinéraire à l'aided'indications par telephone et d'un plan.	• Comprendre des indications de direction. • Comprendre des indications de lieu.

Unit V 12 h

• Exprimerl'obligationl'interdit. • Conseiller.	Par courrierélectronique, donner des informations et des conseils à un ami qui veut voyager.	• Comprendreune chanson. • Comprendre de courts messages qui experiment l'obligationoul'interdiction • Donner des conseils à des personnesdans des situations données.

Text Books

1	LATITUDES 1 (Méthode de français) Pages from 56 to 101, Author : RÉGINE MÉRIEUX Publisher : GOYAL Publishers & Distributors Pvt

Course Code	Course Name	Category	L	T	P	Credit
201EL1A2EA	ENGLISH - II	LANGUAGE	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
- The vocabulary and to frame 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	Interpret skills in communication and to shape their attitude	K2
CO2	Develop oral and written language skills in a business context	K3
CO3	Analyze to gain key strategies and expressions for communicating with professionals	K3
CO4	Inspect the knowledge to the corporate needs	K4
CO5	Formulate Inter and Intrapersonal skills	K5

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

201EL1A2EA	ENGLISH - II	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Technical English 12 h

Communication: Process- Methods- Channels- Barriers of Communications

Phonetics: Basics of phonetics - Consonants and Vowel sounds

Reading Skills: Skimming and Scanning- Reading Different Kinds of Texts- Types- Developing a Good Reading Speed

Writing Skills: Note- Making and note taking, Paragraph Writing: Structure and principles

Unit II Business English 12 h

Structure and Planning of Letters: Elements of Structure- Forms of Layout- Style- Writing Business Letters

Quotation, Order and Tender: Inviting - Sending Quotation letter - Placing Orders- Inviting Tenders

E-mail Correspondence: Structure- Procedure- Style- Guidelines- Jargon and Acronyms- Security Precaution

Seminar and Meetings: Introduction- Organizing a Seminar- Sample Brochure- Conducting and Participating in a Meeting

Unit III Professional English 12 h

Report Writing: Importance- Process- Types- Structure

Memo: Importance- Structure

Notice, Agenda and Minutes: Meeting- Notice- Agenda- Minutes: Preparation- Structure- Delivery

Brochures: Purpose- Audience- Qualities

Unit IV Employment Communication 12 h

Resume Writing : Elements of Resume - difference between CV and Resume - Writing Job Application
Art of Conversation: Small Talk- Body Language- Principles of Good Conversation
Interview: Organizational role- Goals- Types- Interview Process
Group Discussion: Importance- Features- Strategies- Barriers

Unit V Soft Skills 12 h

Self - Discovery and Goal Setting: Self - Discovery - Goals and Types- Benefits, Areas and Clarity of Goal Setting

Positive Thinking (PT) and Attitude: Benefits of PT and Attitude- Develop Positive Attitude and Thinking- Drive out Negative Thinking and Attitude

Etiquettes and Manners: Home, Table and Business, Time Management

Text Books

1 Prabha, Dr. R. Vithya & S. Nithya Devi. 2019. Sparkle. (1st Edn.) McGraw - Hill Education. Chennai. [Unit I - V]

References

1 Ghosh, B.N. Editor. 2017. Managing Soft Skills for Personality Development. McGraw - Hill Education, Chennai.

2 Adams, Katherine L. and Gloria I. Galanes. 2018. Communicating in Groups- Applications and Skills. McGraw - Hill Education, Chennai.

3 Koneru, Aruna. 2017. Professional Communication. McGraw - Hill Education, Chennai.

4 Koneru, Aruna. 2011. English Language Skills. McGraw - Hill Education, Chennai.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A2CA	GENERAL CHEMISTRY – II	CORE	4	-	-	4

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 need for 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 in organic chemistry.	K2
CO2	Illustrate the preparation and properties of alkenes and alkynes.	K2
CO3	Summarize the position and properties of –s block elements.	K2
CO4	Outline the basics of crystals and their characteristics.	K2
CO5	Interpret the facts and limitations of second law of thermodynamics.	K2

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong **M** Medium **L** Low

192CE1A2CA	GENERAL CHEMISTRY – II	SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Fundamentals of Organic Chemistry 10 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.

Unit II Alkenes and Alkynes 10 h

Preparation of alkenes - dehydrohalogenation, dehydration, dehalogenation and reduction of alkynes. Reactions of alkenes - addition of halogens, HX (Markovnikov's rule, peroxide effect), H2O and HOCl. Hydroxylation with H2O2, alkaline KMnO4, hydroboration, oxidation and ozonolysis.

Alkynes – general preparations and reactions – reduction, addition of H2O and HOCl. Ozonolysis, polymerization and acidity of alkynes.

Unit III s Block Elements 9 h

General characteristics of alkali and alkaline earth metals - anomalous behaviour of lithium and beryllium - diagonal relationships of lithium with magnesium and beryllium with aluminium. Preparation, properties and uses of lithium hydride, sodium peroxide, potassium iodide, calcium-carbide, super phosphate of lime, Plaster of Paris and lithopone.

Unit IV Crystalline State 9 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. Packing in crystals - types of crystals - structure of sodium chloride and CsCl - concept of conductor, semiconductor and superconductor- band theory.

Unit V Thermodynamics 10 h

Second law of thermodynamics - Need for second law, different statements, entropy-definition, 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 conditions of equilibrium and spontaneity- Conditions of equilibrium and spontaneity under constraints, definition of A and G, physical significance of A and G, Temperature and pressure dependence of G, Maxwells relations, Gibbs – Helmholtz equation.

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, 2019, "Modern Inorganic Chemistry", 10th Edition, Karnataka, McGraw Hill Company..

3 Jain M.K., 2019, "Modern Organic Chemistry", 10th Edition, Vishal publishing Co., New Delhi.

References

1 Lee J.D, 2016, "A New Concise Inorganic Chemistry", 5th Edition, Hoboken, John Wiley and Sons.

2 Soni, P.L. 2000, "Text book of Inorganic Chemistry", 20th Edn., S. Chand & Co. Ltd., New Delhi.

3 Bahl. A and Bahl. B.S, 2015, "Advanced Organic Chemistry", Revised multicolor edition, S. Chand and Co, New Delhi.

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

Course Code	Course Name	Category	L	T	P	Credit
192CE1A2CB	APPLIED CHEMISTRY	CORE	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The nature, types and nutrients of soil
- The basic knowledge in the 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	Relate the nature of soil and corrective measures.	K2
CO2	Explain the method of preparation of insecticides, fungicides and their applications.	K2
CO3	Classify the chemical fertilizers utility in agriculture.	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	M	M	M	S	M
CO2	M	M	M	S	M
CO3	M	M	M	S	M
CO4	S	S	S	S	S
CO5	M	M	M	S	M

S Strong **M** Medium **L** Low

192CE1A2CB	APPLIED CHEMISTRY	SEMESTER II

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Soil Chemistry 7 h

Classification of soil - properties of soil: soil water, soil texture, soil temperature, soil minerals, soil colloids, buffering of soil, soil pH, soil acidity, soil salinity and alkalinity, soil fertility and soil formation. Plant nutrients – macro and micro nutrients – their role in plant growth.

Unit II Pesticides 7 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 III Fertilizers 7 h

Definition - chemical fertilizers - classification of chemical fertilizers – manufacture of urea, superphosphate, triple superphosphate and potassium nitrate. Mixed fertilizer and organic fertilizer (Manures, compost, saw dust). Advantages and disadvantages of fertilizers.

Unit IV Petroleum, Fuels & Combustion 8 h

Petroleum: Petroleum, cracking, synthetic petrol, refining of gasoline, reforming and knocking. Octane Rating of fuels, cetane rating, diesel engine fuel, kerosene as a fuel, LPG as a fuel.

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

Unit V Cement 7 h

Definition – composition – types – white cement, 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 – lime – manufacture – properties – setting and hardening of lime.

Text Books

1 Jayashree Ghosh, 2016, "Fundamental concepts of applied chemistry", 1st Edition, S. Chand & Company Pvt Ltd, New Delhi.

2 Sharma B.K, 2014, "Industrial chemistry", 18th Edition, Krishna Prakashan Media pvt ltd, Meerut.

References

1 Jain D.C, 2014, "Engineering Chemistry", 16th Edition: Dhanpat rai 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.

202CE1A2CP	CORE PRACTICAL: ORGANIC ANALYSIS AND SINGLE STAGE PRAPARATION	SEMESTER II

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Experiments
	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
	Single Stage Preparation
10	Preparation of Methyl salicylate from Salicylic acid (esterification)
11	Preparation of Asprin from Salicylic acid (acetylation)
12	Preparation of p-Bromoacetanilide from acetanilide (bromination)

Note: Out of 12 – 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 Gopalan R, 2003, "Elements of analytical chemistry", S. Chand & Sons.

Course Code	Course Name	Category	L	T	P	Credit
202PY1A2IA	ELECTRICITY, ELECTRONICS, ATOMIC AND NUCLEAR PHYSICS	IDC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the concepts of current electricity, inductance and circuit connections.
- the structure of atom and properties of nucleus.
- the basic operations of semiconductor devices and digital electronic circuits.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the basic circuit connections and charge flow in them.	K2
CO2	Infer knowledge about induction of current in magnetic field.	K2
CO3	Identify the structure model of atoms and properties of nucleus.	K3
CO4	Explain the fundamentals and applications of transistors.	K2
CO5	Construct different logic gates.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong **M** Medium **L** Low

202PY1A2IA	ELECTRICITY, ELECTRONICS, ATOMIC AND NUCLEAR PHYSICS	SEMESTER II

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Current Electricity 7 h

Ohm's law – Kirchoff's laws – Applications of Krichhoff's laws to Wheatstone's network – Condition for balance - Carey-Foster's bridge – Measurement of resistance – Measurement of specific resistance – Determination of temperature coefficient of resistance – Potentiometer – Calibration of Voltmeter.

Unit II Electromagnetism 7 h

Electromagnetic Induction – Faraday's laws – Self Inductance – Mutual Inductance – Experimental determination of mutual Inductance - A.C. Circuits – Mean value – RMS value – Peak value – LCR in series circuit – Impedance – Resonant frequency – Sharpness of resonance.

Unit III Atomic and Nuclear Physics 8 h

Bohr's atom model – Bohr Formula and Total energy – Atomic excitation – Ionization potential – Experimental determination of critical potentials by Frank and Hertz Method - Nucleus – Nuclear properties – Mass defect – Binding energy - Radio isotopes (Definition)– Applications of radio isotopes

Unit IV Analog Electronics 7 h

Semiconductor – PN junction diode – V-I characteristics of a Junction diode - Zener diode – Regulated power supply - Bridge rectifier -Transistor – Working of an NPN transistor – Common Emitter characteristics of a Transistor – Current gain - Applications of Transistor.

Unit V Digital Electronics 7 h

Number system – Binary – Octal and Hexadecimal system - Conversion of one number system to another number system – Binary addition, subtraction - Logic gates – OR, AND, NOT, XOR, NAND and NOR gates – Truth tables – Half adder and Full adder – Laws of Boolean's algebra – De Morgan's theorems.

Text Books

1. Murugesan. R, 2014, "Electricity and Magnetism", S. Chand and Co., New Delhi.
2. Murugesan. R and Kiruthiga Sivaprasath, 2014, "Modern Physics", S. Chand and Co., New Delhi.

References

1. David Halliday, Robert Resnick, Jearl Walker, 2015, "Fundamentals of Physics", 6th Edition, John Willy Company, Hoboken, New Jersey, United States.
2. Tayal, D.C, 2017, "Nuclear Physics", 2nd Edition, Himalaya Publishing House, Mumbai
3. Theraja B.L., 2012, "Basic Electronics", 2nd Edition, S Chand & Co, New Delhi.
4. Malvino and Leach, 2016, "Digital Principles and Applications", Tata McGraw Hill Publishing Company Ltd, New York.

202PY1A2IP	IDC PRACTICAL: PHYSICS II	SEMESTER II

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Experiments
1	Determination of resistivity of semiconductors using Four Probe method.
2	Study and verify the I-V characteristics of a PN junction diode.
3	Calibration of low range voltmeter using potentiometer.
4	Calibration of low range Ammeter using potentiometer.
5	Study and verify the I-V characteristics of a Zener diode.
6	Design of Regulated Power supply for fixed voltage using IC 7805.
7	Verification of Truth tables of IC gates: OR, AND, NOT, XOR, NOR and NAND.
8	Verification of Truth tables of IC gates : NAND as universal building block- AND, OR, NOT.
9	Verification of Truth tables of IC gates : NOR as universal building block - AND, OR, NOT.
10	Verification of Truth tables of IC gates through De Morgan's theorem.

Note: Any Eight Experiments

References

1. Chattopadhyay.D, 2015, "Advanced Course in Practical Physics", 8th Edition, NCBA Publishers, Kolkata.
2. Samir Kumarghosh, 2013, "Textbook of Advanced Practical Physics", NCBA Publishers.
3. Arora. C.L., 2013, "B.Sc. Practical Physics", 19th Edition, S.Chand and Company Limited, New Delhi.
4. Ouseph C.C., 2014, "Practical Physics and Electronics", S.Chand and Company Limited, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
196BM1A2AA	HUMAN RIGHTS	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- To study how human values and personality traits help to develop the characteristics of each individual
- Understanding the moral values towards the enrichment of the society
- Identify the impact of ethics and values on the global development of the current scenario

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 human values, personality traits and character formation.	K2
CO2	Acquire the knowledge through value education towards national and global development.	K1
CO3	Introduce the basic concepts of conflict, emotions and adolescent emotions.	K1
CO4	Illustrate the techniques in therapeutic measures like yoga and meditation.	K2
CO5	Learn the concepts of human rights, rights for women and children and domestic violence.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

196BM1A2AA	HUMAN RIGHTS	SEMESTER II

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Human Values 05 h

Concept of Human Values - Value Education Towards Personal Development - Aim of education and value education - Evolution of value oriented education - Concept of Human values - Types of values - Components of value education - Personal Development: Self analysis and introspection - Sensitization towards gender equality - Physically challenged - Intellectually challenged - Respect to age - Experience - Maturity - Family members - Neighbours - Co-workers - Character Formation towards Positive Personality: Truthfulness - Constructivity - Sacrifice - Sincerity - Self Control - Altruism - Tolerance - Scientific Vision.

Unit II Value Education and Social Values 05 h

Value Education Towards National and Global Development National and International Values: Constitutional or national values - Democracy - Socialism - Secularism - Equality - Justice - Liberty - Freedom and fraternity -Social Values - Pity and probity - Self control - Universal brotherhood - Professional Values - Knowledge thirst - Sincerity in profession - Regularity - Punctuality and faith - Religious Values - Tolerance - Wisdom - Character - Aesthetic values - Love and appreciation of literature and fine arts and respect for the same - National Integration and international understanding.

Unit III Global Development on Ethics and Values 04 h

Impact of Global Development on Ethics and Values: Conflict of cross-cultural influences - Mass media - Cross-border education - Materialistic values - Professional challenges and compromise - Modern Challenges of Adolescent Emotions and behave or Sex and spirituality: Comparison and competition - Positive and negative thoughts - Adolescent Emotions - Arrogance - Anger - Sexual instability - Selfishness - defiance.

Unit IV Yoga and Meditation 05 h

Therapeutic Measures: Control of the mind through - Simplified physical exercise - Meditation – Objectives - Types - Effect on body - Mind - Soul - Yoga – Objectives - Types - Asanas - Activities: Moralisation of Desires -Neutralisation of Anger - Eradication of Worries - Benefits of Blessings.

Unit V Human Rights and Rights of Women and Children 05 h

Human Rights - Concept of Human Rights – Indian and International Perspectives - Evolution of Human Rights - Definitions under Indian and International documents - Broad classification of Human Rights and Relevant Constitutional Provisions - Right to Life - Liberty and Dignity - Right to Equality - Right against Exploitation - Cultural and Educational Rights - Economic Rights - Political Rights - Social Rights - Human Rights of Women and Children - Social Practice and Constitutional Safeguards - Female Foeticide and Infanticide - Physical assault and harassment - Domestic violence - Conditions of Working Women - Institutions for Implementation - Human Rights Commission - Judiciary - Violations and Redressel Violation by State - Violation by Individuals - Nuclear Weapons and Terrorism Safeguards.

References

1. Brain Trust Aliyar, 2008, Value Education for health, happiness and harmony. Vethathiri publications, Erode
2. Grose. D. N, 2005, A text book of Value Education. Dominant Publishers and Distributors, New Delhi.
3. Yogesh Kumar Singh & Ruchika Nath, 2005, Value Education, P. H Publishing Corporation, New Delhi.
4. Venkataram & Sandhiya. N, 2001, Research in Value Education, APH Publishing Corporation, New Delhi.
5. Seetharam. R. (Ed), 1998, Becoming a better Teacher Madras Academic Staff College.
6. Brain Trust Aliyar, 2004, Value Education for Health, Happiness and Harmony. Vethathiri publications, Erode.
7. Swami Vivekananda, 2008, Personality Development. Advaita Ashrama, Kolkata.
8. Dey A. K, 2002, Environmental Chemistry. New Delhi – Vile Dasaus Ltd.

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
Part - I										
191TL1A3TA	Language - I	Tamil - III	3	1	-	3	25	75	100	3
191TL1A3HA		Hindi - III								
191TL1A3MA		Malayalam - III								
201TL1A3FA		French - III								
Part – II										
191EL1A3EA	Language - II	English - III	3	-	1	3	25	75	100	3
Part – III										
192CE1A3CA	Core - IV	General Chemistry - III	3	1	-	3	25	75	100	3
192CE1A3CB	Core - V	General Chemistry - IV	3	1	-	3	25	75	100	3
192CE1A3CP	Core Practical - III	Inorganic Analysis	-	-	4	3	40	60	100	2
192MT1A3IA	IDC - III	Mathematics - I	3	-	-	3	25	75	100	3
192CE1A3SA	SEC - I	Water & Food Quality Analysis	3	-	-	3	25	75	100	3
	GE - I		2	-	-	3	-	50	50	2
	LoP	Lab on Project	-	-	-	-	-	-	-	-
Part - IV										
191TL1A3AA	AECC - III	Basic Tamil	2	-	-	3	-	50	50	2
191TL1A3AB		Advance Tamil								
195CR1A3AA		Women's Rights								
		Total	**22**	**3**	**5**				**800**	**24**

EXTRA CREDIT COURSES

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

S. No.	Course Code	Course Name
1	192CE1ASSA	Chemistry in the service of Mankind
2	192CE1ASSB	Cosmetic Chemistry

ourse Code	Course Name	Category	L	T	P	Credit
191TL1A3TA	தமிழ்த் தாள்– III	மொழி-I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடு , 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) – மாணவனின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1,K2,K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2,K4
CO3	பாட இணைச்செயல்பாடுகள் (Co-curricular activities)	K2,K3,K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு(Tamil knowledge)	K5

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A3TA	பகுதி – 1 : தமிழ் தாள் : 3	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

1. காப்பியங்களின் தோற்றமும் வளர்ச்சியும்
2. சிலப்பதிகாரம் – மனையறம் படுத்த காதை
3. மணிமேகலை – வஞ்சிமாநகர் புக்க காதை

Unit II 10 h

1. கம்பராமாயணம் – கும்பகர்ணன் வதைப்படலம் (பா. எண் : 60 – 100)
2. பெரிய புராணம் – அதிபத்தநாயனார் புராணம்

Unit III 10 h

1.சிற்றிலக்கியங்களின் தோற்றமும் வளர்ச்சியும்

2.தமிழ்விடு தூது – தூதுப்பொருள்கள் மட்டும் 101 முதல் 112 வரை(12 கண்ணிகள்)

3.திருக்குற்றாலக்குறவஞ்சி – வசந்தவல்லி பந்தாடிய சிறப்பு (6: 4கண்ணிகள்)

4.கலிங்கத்துப்பரணி – களம் பாடியது (போர்க்களக் காட்சி –பா.எண்: 472–502)

Unit IV 10 h

1. நாடகங்களின் தோற்றமும் வளர்ச்சியும்
2. நாடகம் - ஔவை–ஆசிரியர் இன்குலாப்

Unit V 08 h

1. 'பா' வகைகள் : வெண்பா, ஆசிரியப்பா, கலிப்பா, வஞ்சிப்பா - பொது இலக்கணம் மட்டும்.
2. அணி: உவமையணி, உருவக அணி, இல்பொருள் உவமையணி விளக்கம், உதாரணம்.

3. பயிற்சிப்பகுதி

அ) அலுவலகம் சார்ந்த கடிதம்: விண்ணப்பங்கள், வேண்டுகோள், முறையீடு, ஆ) NOTICE

ஆ) வாசகர் கடிதம்: நாளிதழ், வானொலி, செய்தி ஊடகங்களுக்கு

விமர்சனம் எழுதுதல்.

Text Books

1 மொழிப்பாடம் - 2020, தொகுப்பு : தமிழ்த்துறை , டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி.

2 இன்குலாப் – 2017. ஒளவை (நாடகம்), அன்னம் வெளியீடு, சென்னை.

References

1 புலவர் சோம. இளவரசு - 2014. இலக்கிய வரலாறு , மணிவாசகர் பதிப்பகம் , சென்னை – 108,

2 பேராசிரியர் முனைவர் பாக்யமேரி – முதற் பதிப்பு 2013 , இலக்கணம் இலக்கிய வரலாறு மொழித்திறன், பூவேந்தன் பதிப்பகம், சென்னை.

3 இணையதள முகவரி : www.tamilvirtual.com

Course Code	Course Name	Category	L	T	P	Credit
191TL1A3HA	HINDI-III	Language - I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To develop the writing ability and develop reading skill.
- To learn various concepts and techniques for criticizing literature, to learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

191TL1A3HA	HINDI-III	SEMESTER III

Total Credits: 03

Total Instruction Hours: 48 h

Syllabus

Unit I — 10 h

पद्य – काव्य पराशर (भोलानाथ)

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

प्रकाशक: जवाहर पुस्तकालय

सदर बाजार, मथुरा

उत्तर प्रदेश - 281001

Unit II — 10 h

हिन्दी साहित्य का इतिहास: (साधारण ज्ञान)

आचार्य रामचन्द्र शुक्ल

लोकभारती प्रकाशन इलाहाबाद

Unit III — 10 h

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

प्रकाशक: विनोद पुस्तक मंदिर

आगरा - 282002

Unit IV — 10 h

संवाद लेखन

पुस्तक: व्याकरण प्रदिप - रामदेव

प्रकाशक: हिन्दी भवन 36 इलाहाबाद - 211024

Unit V — 08 h

अनुवाद अभ्यास-III (केवल हिन्दी से अंग्रेजी में)

(पाठ 10 to 20)

प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17

Course Code	Course Name	Category	L	T	P	Credit
191TL1A3MA	MALAYALAM - III	Language - I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To develop the writing ability and develop reading skill.
- To learn various concepts and techniques for criticizing literature, to learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

191TL1A3MA	MALAYALAM - III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

Kumaranasan

Unit II 10 h

Kumaranasan

Unit III 10 h

Kumaranasan

Unit IV 10 h

Kavyanchali Collection of Poems.

Unit V 08 h

Kavyanchali Collection of Poems.

Text Books

1 Chinthavishtayaya Sitha By Kumaranasan DC.Books Kottayam

2 Kavyanchali -Group of Authors DC.Books Kottayam

References

1 Kavitha Sahithya Charithram –Dr.M.Leelavathy Sahithya academy Thrissur.

Course Code	Course Name	Category	L	T	P	Credit
201TL1A3FA	FRENCH -III	LANGUAGE- 1	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To Acquire Competence in General Communication Skills – Oral + Written – Comprehension & Expression.
- To Introduce the Culture, life style and the civilization aspects of the French people as well as of France.
- To help 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	To learn the adjectives and the classroom environment in France.	K2
CO3	Learn the Plural, Articles and the Hobbies.	K3
CO4	To learn the Cultural Activity in France.	K3
CO5	To learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

201TL1A3FA	FRENCH - III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

◦ Décrireun lieu. ◦ Situer ◦ Se situerdans le temps.	A partird'unerecherche de documents, composer une presentation touristique pour un magazine ou un site internet.	Comprehendre la description d'un lieu. Décrireunevilleouunerégionqu'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 8 h

◦ Raconter. ◦ Décrire les étapesd'une action.	Raconterune scene insoliteà l'oreal et à l'écrit.	Comprehendrele récitdún voyage. Raconterses actions quotidiennes.	Décrireunebiographie a partird'elémentsécrits.

Unit III 10 h

◦ EsprimerI'intensiteet la quantité. ◦ Interroger.	Raconterune scene insoliteà l'oreal et à l'écrit.	Comprehendrele récitdún voyage. Raconterses actions quotidiennes.	Décrireunebiographie a partird'elémentsécrits.

Unit IV 10 h

◦ Décrirequelqu'un. ◦ Comparer ◦ ExprimerPaccord ou le désaccord. ◦ Se situerdans le temps.	En milieu professional, recruiter quelquún et justifier sonchoix.	S'exprimersur les styles de vêtemantReconnaitre des personnes à partit de descriptions. Décrire des personnes. Comprendre des personnes qui experiment leur accord ouleurdésaccord.	Comprendre la description de personnesdans un extrait de roman. Comprendre des différences de points de vueexprimétesdans de message électronique. Raconter unsourvenir.

Unit V 10 h

° Parlerde Pavenir. ° Exprimer des souhaits. ° Décrirequelqu'un.	Discuter de l'organisation d'un voyage de groupepuispréparerune fiche projet et la templit.	Comprendreune chanson. Echangersursesprojets de vacancy Discuter du programme de la soire à venir. Addresser des souhaits à quelqu'un	Comprendre le message d'une carte d'anniversaire.

Text Books

1 LATITUDES 1 (Méthode de français) Pages from 102-151, Author : Regine Mérieux, Yves Loiseau

Course Code	Course Name	Category	L	T	P	Credit
191EL1A3EA	ENGLISH - III	Language II	4	0	0	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	Learn English grammar and its specific usage	K2
CO2	Know the methods of improving reading skills	K3
CO3	Understand the importance of speaking skills and developing it through various practices	K3
CO4	Comprehend the basic steps of reading and its necessity	K3
CO5	Acquire the writing skills and mandatory similar practices	K4

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191EL1A3EA	ENGLISH - III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Basics of English 10 h

Phrasal verb - Notions and Conventional Idiomatic Expressions - One-Word Substitution - Word Formation - Homophones - Spelling - Sentence Completion – Sentence Pattern

Unit II Listening 08 h

Listening and Hearing - Principles of listening - Types of listening - incidental listening - active and effective listening - discriminative listening - critical listening - listening vs practice - Barrier to Listening - Guidelines for Improving Listening

Unit III Speaking 10 h

Monologues - Dialogue - Role Play - JAM (Just A Minute talk) - Debate - Public Speaking - Group Discussion - Interview - Showing Directions - Accent and Neutralization

Unit IV Reading 10 h

Mechanics of Reading - Types of Reading - Summarization - Paraphrasing - Analysis and Interpretation - Reading Comprehension – Reading with purpose and making predictions - Cloze Passage

Unit V Writing 10 h

Paraphrase Writing - Techniques and Methods of Paraphrasing - Precis Writing - Difference between Paraphrase and Precis - review writing - Hints Developing - Editorial Writing - Tabloid - Column Writing

Text Books

1. Bhatnagar R. P. 2013. English for Competitive Examinations. Macmillan Publishers, Chennai.
2. KoneruAruna. 2011. English Language Skills. McGraw Hill Education, Chennai.

References

1. Radhakrishna Pillai G. 2000. English for Success. Emerald Publishers, Chennai.
2. Gauri Mishra, Ranjana Kaul. 2016. Language Through Literature. Primus Books, New Delhi.
3. Miles Craven. 2008. Cambridge English Skills Real Listening and Speaking. First Edition, Cambridge University Press, India.
4. Teaching Adult: A Literary Resource Book. 2012. New Readers Press, New York, United States.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A3CA	GENERAL CHEMISTRY – III	CORE	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of chemical metallurgy and the chemistry of group 13 and 14 elements.
- About the 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	Choose the different types of metals extraction process and its importance in chemical metallurgy.	K3
CO2	Identify the periodic behavior and their properties of groups 13 & 14 elements.	K3
CO3	Outline the properties of aromatic compounds and their reactions.	K2
CO4	Compare the preparation and properties alkyl and aryl halides.	K4
CO5	Apply the chemical equilibrium and laws of thermodynamics in different states.	K2

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A3CA	GENERAL CHEMISTRY – III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Process of Metallurgy 10 h

Metallurgy - minerals and ores - ore dressing – 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 - their important compounds such as GeCl4 and TiO2.

Unit II Chemistry of Groups 13 & 14 Elements 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 – Alums (ferric alum and Potash alum). Carbon family – Physical properties – Catenation - Classification of carbides - preparation, structure and uses of silicones-classification and structure of silicates.

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 - 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 (SN1 and SN2) – elimination reactions (E1 and E2). Substitution vs elimination. Aryl halides (Cl, Br substitution) - preparation – properties - uses. Electrophilic and nucleophilic aromatic substitution reaction mechanisms. Comparision 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.
3. Bahl. A and Bahl. B.S, 2016, "A Textbook of Organic Chemistry", 22nd Edition, S. Chand & Company & New Delhi

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.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A3CB	GENERAL CHEMISTRY – IV	CORE	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The structure, preparation, properties and uses of p-block elements, interhalogen compounds and inert gases.
- The methods of preparation and reactions of alcohols, ethers, aldehydes and ketones
- About the action of colloids and their role in daily life.

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 group 15 & 16 elements.	K4
CO2	Analyze the structure, preparation and properties of inetrhalogen and noble gases (Xenon).	K4
CO3	Compare the preparation, properties and manufacture of mono, di, tri alcohol, ethers and epoxide.	K4
CO4	Examine the mechanism of aldehyde and ketone with naming reaction.	K4
CO5	Apply the action of colloids in daily life.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A3CB	GENERAL CHEMISTRY – IV	SEMESTER III

Total Credits: 3
Total Instruction Hours: 48 h

Syllabus

Unit I Chemistry of Groups 15 & 16 Elements 10 h

Classification of oxides based on their chemical behaviour- oxygen content- Structures of oxyacids of phosphorus, nitrogen and sulphur. Preparation, properties and uses of nitrogen dioxide, nitric acid, phosphorous pentoxide, orthophosphoric acid, ozone, Hydrogen peroxide, H_2SO_4, H_2SO_5, $H_2S_2O_8$ and $H_2S_2O_7$

Unit II Halogens and Inert Gases 10 h

General characteristics, comparison of oxidizing action of halogens. Structure of oxy acids of halogens. Preparation, properties and structure of interhalogen compounds. Chemistry of noble gases- Isolation of Noble gases, Chemistry of Xenon, Structure and bonding in Xenon compounds – XeF_2, XeF_4, XeO_3,XeF_6, $XeOF_4$.

Unit III Alcohols and Ethers 10 h

Classification of alcohols and distinguishing the alcohols-Preparation of Alcohols – Grignard synthesis of alcohols, oxymercuration-demercuration, hydroboration-oxidation. Glycol - preparation, reaction of glycol - periodic acid oxidation and Oppenaeur oxidation – uses. Preparation, properties and applications of glycerol. Preparation of ethers, substituted ethers and cyclic ether (Epichlorohydrin and dioxirane).

Unit IV Aliphatic carbonyl compounds 10 h

General preparation, mechanism of nucleophilic addition and condensation reactions, formation of acetal, imine, oxime, hydrazone, semicarbazone, aldol, mixed aldol. Cannizaro, Claisen and Haloform reactions. $LiAlH_4$ and $NaBH_4$ reductions, Clemmensen's reduction, Wolf- Kishner reduction -Test for aldehydes

Unit V Colloids 8 h

Classification of Colloids - lyophilic and lyophobic colloids, preparation of colloids – mechanical dispersion, electrical dispersion. Purification of colloids- dialysis and ultra filtration, properties – Kinetic, Optical and Electrical. Stability of colloids - electrical double layer- Zeta potential-electrophoresis - coagulation of colloids - Hardy Schulze law - gold number - applications of colloids in pharmaceutical industry and water treatment process. Types, preparation, properties and applications of emulsions and gels.

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.

3 Bahl. A and Bahl. B.S, 2016, "A Textbook of Organic Chemistry", 22nd Edition, S. Chand & Company & New Delhi

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.

192CE1A3CP	CORE PRACTICAL: INORGANIC ANALYSIS	SEMESTER III

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
	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	Semi-micro qualitative analysis of inorganic mixture - XI
12	Semi-micro qualitative analysis of inorganic mixture - XII

Note: Out of 12 – 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.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A3IA	MATHEMATICS - I	IDC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- method of solving differential equations in various field.
- various forms of Partial differential equations, its existence and solution methods.
- laplace transforms and its application.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	describe and understand the concept of differential equations.	K2
CO2	explain the existence of a partial differential equations.	K2
CO3	apply the concept of first order linear partial differential equation	K2
CO4	solve Laplace transform of some functions	K3
CO5	analyze inverse Laplace transforms to solve differential equations.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	L
CO2	S	M	M	M	L
CO3	S	S	S	S	M
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S Strong M Medium L Low

192MT1A3IA	MATHEMATICS - I	SEMESTER III

Total Credits: 3
Total Instruction Hours: 36 h

Syllabus

Unit I Differential Equation 8 h

Ordinary differential equation - Partial differential equation - Order of a differential equation - Degree of a differential equation – linear and non linear differential equations – Solution of a differential equation -Family of curves – Formation of differential equation

Unit II Partial Differential Equation 7 h

Partial differential equation - Order of a partial differential equation - Degree of a Partial differential equation - linear and nonlinear partial differential equation - Classification of first order partial differential equations - Rule I Derivation of Partial differential equations by the elimination of arbitrary constants - Objective problems

Unit III Linear Partial Equations of order one 7 h

Lagrange's equations -Lagrange's method of solving Pp+Qq=R-working rule for solving Pp+Qq=R by Lagrange's method-Example based on working rule - Type 1 based on rule I - Type 2 based on rule II - Type 3 based on rule III - Type 4 based on rule IV - Solved examples

Unit IV Laplace Transform 7 h

Integral Transform - Definition of Laplace Transform – Piecewise continuous functions – Functions of exponential order – Functions of class A – sufficient condition for existence of Laplace Transform – Linearity property of Laplace Transforms – Table of Laplace Transforms – First Translation Theorem – Change of Scale property - Laplace transforms of derivatives

Unit V Inverse Laplace Transform 7 h

Inverse Laplace Transform of elementary functions - Linearity property of inverse Laplace Transform – First translation theorem - Second translation theorem - Change of scale property - Inverse Laplace Transform of derivatives - Inverse Laplace Transform of integrals - Multiplication by powers of p – Convolutions of two functions - Convolution theorem

Note: Theory 20% and Problem 80%

Text Books

1. Raisinghania M.D, 2014, 'Ordinary and Partial Differential Equations', 2nd edition, S.Chand & Co, New Delhi.
2. Raisinghania M.D, 2002, 'Integral Transforms', 1st edition, S.Chand & Co, New Delhi.

References

1. Shanti Narayan, 2002,' Differential & Integral Calculus', 1st edition, S.Chand & Co, New Delhi.
2. Erwin Kreyszig, 2005, 'Advanced Engineering Mathematics', 2nd edition, Wiley India Pvt Ltd, New Delhi.
3. Grewal B.S, 2014, 'Higher Engineering Mathematics', 2nd edition, Khanna Publishers, New Delhi.
4. Nita H.Shah, 2015, 'Ordinary and Partial Differential Equations Theory and Applications', 3rd edition, Prentice Hall of India, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A3SA	WATER AND FOOD QUALITY ANALYSIS	SEC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The analysis of the pollutants in water and the methods of purification of water.
- About food adulteration and the toxic chemicals present in foods.
- The instrumental methods used for analyzing the adulterant products.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Examine the water quality by chemical and physical methods.	K4
CO2	Construct the waste water treatment from sewage and industry effluent.	K3
CO3	Identify the food adulteration and the toxic chemicals present in foods.	K3
CO4	Explain the food preservatives and identify the various poisonous metal present in it.	K4
CO5	Analyze the adulterant products present in different food materials.	K4

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A3SA	WATER AND FOOD QUALITY ANALYSIS	SEMESTER III

Total Credits: 3
Total Instruction Hours: 36 h

Syllabus

Unit I Analysis of water quality parameters 7 h

Physical, chemical and biological standards and their significances. Analysis of water quality – specific conductance - turbidity - pH, total solids, TDS -alkalinity - hardness - chlorides - DO - BOD- COD - TOC – nitrate and nitrite – sulphate, fluoride – phenols – pesticides – surfactants.

Unit II Sewage and industrial effluent treatment 7 h

Sewage - characteristics - purpose of sewage treatment - methods of sewage treatment - primary - secondary and tertiary - Role of algae in sewage treatment. Sources, characteristics, effects and treatment options of some typical industries wastes – textile industry – pulp and paper industry – electroplating industry – leather tanning industry – fertilizer industry – eutrophication – effects – control.

Unit III Food Adulteration 7 h

Adulteration and adulterant- adulterated food -common adulterants found in food - comparison of adulterants and additives–food additives-antioxidants-natural oxidants- synthetic oxidants-colour-stabilizers-surface active agents-artificial sweeteners-flavor enhancers- Intentional adulterants-Incidental adulterants - common ill effects on human.

Unit IV Preservation of Food 7 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 V Analysis of Adulterant products 8 h

Adulterants in milk: water-urea-sodium chloride- detergent-starch. Simple chemical method of detecting adulterated milk.
Adulterants in Ghee: mashed potatoes and Vanaspati – Adulterants in curd: cane sugar, washing powder.
Adulterants in spices - adulterated turmeric powder: Metanil yellow and yellow clay.
Adulterated red chilly powder: water soluble coal tar colour and Rhodamine-B.
Adulterated edible oils-sunflower oil and gingelly oil: argemone oil, mineral oil and rancidity.
Analysis of adulterants using qualitative and spectrophotometric methods.

Text Books

1 De. A. K, 2013, "Environmental Chemistry", 1st Edition, Wiley Eastern Ltd & India.

2 Sri Lakshmi. B, 2002, "Nutrition science", 1st Edition, New Age International Pvt. Ltd & New Delhi.

3 Swaminathan. M, 2003, "Advanced Text Book on Food and Nutrition, Vol. II", 2nd Edition, Bappco Publications & Mysore.

References

1 Sharma. B. K, 2001, "Environmental Chemistry", 11th Edition, Goel Publishing house & Meerut.

2 Seema Yadav, 2002, "Food Chemistry", 1st Edition, Anmol Publications Pvt Ltd & New Delhi.

3 John M. deMan, John W. Finley, Hurst. W.J and Lee. C.Y, 2018, "Principles of Food Chemistry", 4th Edition, Springer International Publishing & Switzerland.

4 Stanley. M, 2017, "Environmental Chemistry", 10th Edition, CRC Press & USA.

192CE1A3GA	GENERIC ELECTIVE: CHEMISTRY IN DAILY LIFE – I	SEMESTER III

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Polymers 5 h

Introduction – classification- difference between thermosetting and thermoplastics – chemistry of some important polymers - properties and uses - nylons - polyester – synthetic rubber - polyurethane rubber – sponge, foam rubber, thermocole - polymerization techniques- bulk, solution, suspension, emulsion polymerization.

Unit II Hair Care & Skin Care Products 5 h

Shampoos – principal constituents – thickeners and foam stabilizers– perfumes – preservatives – conditioning agents – antidandruff shampoos.

Hair cream – composition – hair dyes – types – constituents – dye removals.

Unit III Waxes, Soap and Detergents 5 h

Waxes – Classification –Hydrocarbon in Candles – manufacture of Candles – safety matches - naphthalene balls – shoe polish. Soaps and Detergents - Definition, Ingredients, Classification, Characteristics and Uses – Cleansing Action of Soaps.

Unit IV Food Adulteration and Hygiene 4 h

Definition of Adulteration of Food – Common Adulterants in Different Foods – Toxic Effects of Some Metals and Chemicals – Contamination of Foods with Harmful Microorganisms – Detection of Adulteration in Some Common Food items – Food Additives and Preservatives – Food standards.

Unit V Chemistry in Housing and Household Products 5 h

Portland Cement - Paints And Coatings - Varnishes And Polishes - Glass - Cleaners - Household Pesticides - Stain Removers - Fire Extinguishers- Composition and Uses

Text Books

1. Sharma. B.K, 2001, "Environmental Chemistry", 6th Revised Edition, Krishna Prakasam Medai (P) Ltd & Meerut.
2. Jain. P. C and Monika Jain, 2016, "Engineering Chemistry", 16th Edition, Dhanpat Rai & Sons & New Delhi.

References

1. Swaminathan. M, 2011, "Food & Nutrition", 2nd Edition, Bappco publications & Mysore.
2. Sri Lakshmi. B, 2011, "Food Science", 5th 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.

192CE1ASSA	SELF STUDY: CHEMISTRY IN THE SERVICE OF MANKIND	SEMESTER III

Total Credits: 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 pulp and 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.

3 Williams. R.J.P and Fraústo da Silva J.J.R, 2005, " The Chemistry of Evolution" Elsevier Science & UK.

References

1 George and T. Austin, 1984," Shreve's Chemical Process Industries", McGraw Hill Book Co & NewDelhi.

2 Alexander Findlay , 2007, " Chemistry in the Service of Man", Longmans, Green & London

192CE1ASSB	SELF STUDY: COSMETIC CHEMISTRY	SEMESTER III

Total Credits: 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.
3. Chattopadhyay. P. K. "Herbal Cosmetics & Ayurvedic Medicines". 3rd revised edition, Niir Project Consultancy Services & New Delhi.

References

1. Panda. H, 2015, "Herbal Cosmetics Handbook", 3rd revised edition, Asia Pacific Business Press Inc. & New Delhi.
2. Dar A. M, 2018, "Cosmetic Chemistry", Educreation Publishing & Chhattisgarh.

191TL1A3AA	பகுதி – 4 : அடிப்படைத்தமிழ்தாள் : 1(Basic Tamil)	SEMESTER III

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019–20ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது (10 மற்றும் 12 – ஆம் வகுப்பு வரை தமிழ் மொழிப்பாடம் பயிலாதவர்களுக்கு) (பருவத் தேர்வு உண்டு)

அலகு : 1 தமிழ் மொழியின் அடிப்படைக் கூறுகள் 12 h

அ) எழுத்துகள் அறிமுகம் :

1. உயிர் எழுத்துக்கள் - குறில் , நெடில் எழுத்துகள்
2. மெய் எழுத்துக்கள் - வல்லினம், மெல்லினம், இடையினம்
3. உயிர்மெய் எழுத்துக்கள்

ஆ) சொற்களின் அறிமுகம்: பெயர்ச்சொல், வினைச்சொல் – விளக்கம் (எ.கா.)

அலகு : 2 குறிப்பு எழுதுதல் 12 h

1. பெயர், முகவரி, பாடப்பிரிவு , கல்லூரியின் முகவரி
2. தமிழ் மாதங்கள்(12), வாரநாட்கள்(7),
3. எண்கள் (ஒன்று முதல் பத்து வரை), வடிவங்கள், வண்ணங்கள்
4. ஊர்வன, பறப்பன, விலங்குகள், மனிதர்களின் உறவுப்பெயர்கள்
5. ஊர்களின்பெயர்கள் (எண்ணிக்கை 10)
6. பயிற்சிப் பகுதி (உரையாடும் இடங்கள்) : வகுப்பறை, பேருந்து நிலையம், சந்தை

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 50

பகுதி –அ

சரியான விடையைத் தேர்வு செய்தல் 10x2=20

பகுதி –ஆ

அரைப்பக்க அளவில் விடையளிக்க 03x5=15

பகுதி-இ

இரண்டு பக்க அளவில் விடையளிக்க 01x15=15

குறிப்பு:

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

Text Books

1 அடிப்படைத் தமிழ். 2019. தொகுப்பு : தமிழ்த் துறை, டாக்டர் என். ஜி.பி. கலை மற்றும் அறிவியல் கல்லூரி, நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட். சென்னை

References

1 ஒன்றாம் வகுப்பு பாடநூல் - தமிழ்நாடு அரசு பாடநூல் கழகம்

2 வலைதள முகவரி : http://tamilvu.org

191TL1A3AB	பகுதி – 4 : சிறப்புத் தமிழ் தாள் : 1 **(Advanced Tamil)**	**SEMESTER - III**

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019– 2020 ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது (10 மற்றும் 12 – ஆம் வகுப்புகளில் தமிழ் மொழிப்பாடம் பயின்றவர்களுக்கு உரியது)(பருவத் தேர்வு உண்டு)

அலகு – 1 மரபுக் கவிதைகள் 05 h

அ) பாரதியார் கவிதைகள்

- தமிழ்நாடு
- மனதில் உறுதி வேண்டும்
- வருகின்ற பாரதம் (பா.எண்.5-8)

ஆ) பாரதிதாசன் கவிதைகள்

- இன்பத்தமிழ்
- நீங்களே சொல்லுங்கள்
- வாளினை எடடா!

இ) தாராபாரதி கவிதைகள்

- வேலைகளல்ல வேள்விகள்

அலகு – 2 புதுக்கவிதைகள் 05 h

- கம்பன் கவியரங்கக் கவிதை - மு.மேத்தா
- தமிழா! நீ பேசுவது தமிழா! - காசியானந்தன்
- நட்புக் காலம் (10 கவிதைகள்) - அறிவுமதி கவிதைகள்

அலகு – 3 இலக்கணம் 04 h

- வல்லினம் மிகும் மற்றும் மிகா இடங்கள்
- ர, ற,- ல, ழ, ள - ந, ண, ன - ஒலிப்பு நெறி, பொருள் வேறுபாடு அறிதல்

அலகு – 4 கடிதங்கள் எழுதுதல் 05 h

- பாராட்டுக் கடிதம்
- நன்றிக் கடிதம்
- அழைப்புக் கடிதம்
- அலுவலக விண்ணப்பங்கள்

அலகு – 5 பாடம் தழுவிய வரலாறு 05 h

- பாரதியாரின் இலக்கியப் பணி
- பாரதிதாசனின் இலக்கியப்பணி
- மரபுக்கவிதை, புதுக்கவிதை - விளக்கம்

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 50

பகுதி –அ	
சரியான விடையைத் தேர்வு செய்தல்	10x1=10
பகுதி –ஆ	
அரைப்பக்க அளவில் விடையளிக்க	05x3=15
பகுதி-இ	
இரண்டு பக்க அளவில் விடையளிக்க	05x5=25

குறிப்பு:

- பகுதி –அ அனைத்து அலகுகளில் இருந்தும் இரண்டு வினாக்கள் அமைதல் வேண்டும்
- பகுதி ஆ மற்றும் இ –க்கான வினாக்கள் இது அல்லது அது என்ற அடிப்படையில் அந்தந்த அலகுகளில் அமைதல் வேண்டும்

Text Books

1 சிறப்புத் தமிழ் . 2019. தொகுப்பு : தமிழ்த் துறை, டாக்டர் என். ஜி.பி. கலை மற்றும் அறிவியல் கல்லூரி, நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட். சென்னை

References

1 புலவர் சோம. இளவரசு - 2014. இலக்கிய வரலாறு, மணிவாசகர் பதிப்பகம், சென்னை – 108

2 வலைதள முகவரி : http://tamilvu.org

195CR1A3AA	WOMEN'S RIGHTS	SEMESTER III

Total Credits: 2

Total Instruction Hours: 24h

Syllabus

Unit I **Rights to Infant & Child** 4 h

Issues for women in India- Law relating to Female infanticide-Rights to the survival of a child-Child Labour- Child trafficking –Child Marriage- Protection of Children against Sexual Offences Act 2012 (POCSO)

Unit II **Rights to women** 5 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

Unit III **Laws for Senior Citizen women** 5 h

Constitutional Rights –Personal Laws- The Tamil Nadu Maintenance and Welfare of Parents and Senior Citizens Rules in 2009- The National Council for Older person- Government Provisions for elderly persons

Unit IV **Civil and Political Rights of Women** 5 h

Right of inheritance-Right to live with decency and dignity-The Married women's Property Act 1874-Personl law 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

Unit V **International convention on Womens' Right** 5 h

Convention on the Elimination of All Forms of Discrimination against Women(CEDAW)-United Nations population Fund(UNFPA)-Protocol to the African Charter on the rights of women in Africa-Convention on the Nationality of Married women-Convention on the political rights of women- Inter-American convention on granting of civil and political rights for women-Universal declaration of Human rights

Text Books

1 Women & Law(2009)-Krishna Pal Malik-Allahabad Law University, Delhi

References

1 Women's Human Rights in India(2019)-Christian Foster and Jaya Sagade- Routledge India

2 Justice for Women: Concerns and Expressions (2008)-Anand AS –Universal Law Publishing Co.

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credit s
							CIA	ES E	Total	
Fourth Semester										
Part–I										
191TL1A4TA	Language - I	Tamil-IV	3	1	-	3	25	75	100	3
191TL1A4HA		Hindi-IV								
191TL1A4MA		Malayalam - IV								
191TL1A4FA		French -IV								
Part–II										
191EL1A4EA	Language - II	English-IV	4	-	-	3	25	75	100	3
Part–III										
192CE1A4CA	Core - VI	Inorganic Chemistry - I	4	1	-	3	25	75	100	4
192CE1A4CP	Core Practical - IV	Gravimetric Analysis	-	1	5	3	40	60	100	3
192MT1A4IA	IDC - IV	Mathematics -II	3	1	-	3	25	75	100	3
192CE1A4SA	SEC - II	Analytical Methods in Chemistry	3	-	-	3	25	75	100	3
	GE		2	-	-	2	-	50	50	2
	LoP	Lab onProject	-	-	-	-	-	-	-	-
Part-IV										
191TL1A4AA	AECC - IV	Basic Tamil	2	-	-	3	-	50	50	2
191TL1A4AB		Advanced Tamil								
192PY1A4AA		General Awareness								
		Total	**22**	**3**	**5**				**700**	**23**

Dr.NGPASC
COIMBATORE | INDIA

B.Sc. Chemistry (Students admitted during the AY 2020-21)

Course Code	Course Name	Category	L	T	P	Credit
191TL1A4TA	பகுதி-1: தமிழ் - தாள்- IV	மொழி	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாகத் தமிழரின் பண்பாடு , 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) – மாணவனின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1,K2 & K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2,K4
CO3	பாட இணைச்செயல்பாடுகள் (Co-curricular activities)	K2,K3 & K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு (Tamil knowledge)	K5

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A4TA	பகுதி-1: தமிழ் - தாள்- IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **எட்டுத்தொகை** 10 h

1. இலக்கிய வரலாறு - எட்டுத்தொகை நூல்கள்

2. 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 :9 – பெருங்கடுங்கோ

2. அகநானூறு – மருதத்திணை

I.பா.எண் : 86 – நல்லாவூர்கிழார்

குறிஞ்சித் திணை

I.பா.எண் :198 – பரணர்

2. 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. இலக்கிய வரலாறு - பத்துப்பாட்டு நூல்கள்

2. பட்டினப் பாலை – கடியலூர் உருத்திரங் கண்ணனார்

Unit IV **புதினம்** 10 h

1. புதினத்தின் தோற்றமும் வளர்ச்சியும்
2. புதினம்

1.புத்துமண் –- சுப்ரபாரதிமணியன்

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

I.இலக்கணம்

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

II.பயிற்சிப் பகுதி

புதினத் திறனாய்வு – கொங்கு வட்டாரப் புதினங்கள்

1. நாகம்மாள் – ஆர். சண்முகசுந்தரம்
2. மானாவாரி மனிதர்கள் – சூர்யகாந்தன்
3. ஈரம் கசிந்த நிலம் – சி. ஆர். ரவீந்திரன்
4. ஒண்டிக்காரன் பண்ணையம் – மா. நடராசன்

Note: பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது

Text Books

செய்யுள் திரட்டு - மொழிப் பாடம் - 2020- 21

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

2 சுப்ரபாரதிமணியன், முதற் பதிப்பு -2019, புத்துமண் புதினம் – நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை – 600 098. (Unit-IV)

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 தமிழ் இணையக் கல்விக்கழகம்.http://www.tamilvu.org/

Course Code	Course Name	Category	L	T	P	Credit
191TL1A4HA	Part- I : HINDI - Paper-IV	Language	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To develop the writing ability and develop reading skill.
- To learn various concepts and techniques for criticizing literature, to learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

191TL1A4HA	Part- I : HINDI - Paper-IV	SEMESTER IV

Total Credits: 03

Total Instruction Hours: 48 h

Syllabus

Unit I — 10 h

नाटक – लडाई – सर्वेश्वरदयाल सक्सेना

प्रकाशक: वाणी प्रकाशन

21-A, दरियागंज

नई दिल्ली-110002

Unit II — 10 h

एकांकी: एकांकी पंचामृत – डॉ राम कुमार

(भोर और तारा छोड़कर)

प्रकाशक: जवाहर पुस्तकालय

सदर बाजार, मथुरा

उत्तर प्रदेश-281001

Unit III — 10 h

काव्य मंजरी- (डा मुन्ना तिवारी)

मैथिलीशरण गुप्त- मनुष्यता, जयशंकर प्रसाद- बीती विभावरी जागरी

सूर्यकान्त त्रिपाठी निराला- तोडती पत्थर और भिक्षुक

Unit IV — 10 h

सूचना लेखन

पुस्तक: व्याकरण प्रदिप – रामदेव

प्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024

Unit V — 08 h

अनुवाद अभ्यास-III (केवल अंग्रेजी से हिन्दी में)

(पाठ 10 to 20)

प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17

Course Code	Course Name	Category	L	T	P	Credit
191TL1A4MA	Part- I : MALAYALAM - Paper-IV	Language	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To develop the writing ability and develop reading skill.
- To learn various concepts and techniques for criticizing literature, to learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

191TL1A4MA	Part- I : MALAYALAM - Paper-IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

Drama

Unit II 10 h

Drama

Unit III 10 h

Drama

Unit IV 10 h

Screen Play

Unit V 08 h

Screen Play

Text Books

1. Manju Poloru Penkutty, Screen Play By Kalavoor Ravikumar, Published by DC.Books, Kannur.
2. Lankalakshmi, Drama By C.N.Sreekandan Nair Published by D C.Books Kottayam

Course Code	Course Name	Category	L	T	P	Credit
201TL1A4FA	FRENCH -IV	LANGUAGE- 1	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- 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.
- 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	Learn the adjectives and the classroom environment in France.	K2
CO3	Learn the Plural, Articles and the Hobbies.	K3
CO4	Learn the Cultural Activity in France.	K3
CO5	Learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

201TL1A4FA	FRENCH - IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Trèsdrôle I, Page 10 10 h

* Exprimersa certitude et son incertitude. * Exprimer son approbation et son indifference.	Ecrire un courriel à un journal pour prendre position surl'application d''uneloil.	* Comprendreun reportage radiophonique. * Interviewer un personage public. * Raconterune experience personnel

Unit II Vousavezdit Culture ?, Page 20 8 h

* Exprimer et demander un point de vue. * Exprimer son intention de faire quelque chose (1).	Monte rune animation dans son centre de langue pourpromouvoir la culture française.	* Comprendreune conversation entre plusieurspersonnes. * Donner son point de vue. * Créer dialogues sur des themes donnés.

Unit III Envied'ailleurs, Page 30 10 h

* Justifier unchoix. * Exprimer son intention de faire quelque chose (2). * Exprimer la restriction.	Monter un projetd'échanges avec un centre de langue francophone.	* Comprendreune interview. * Expliquerseschoix. * Expliquerses intentions d'actions face à une situation. * Présenterunprojet.

Unit IV Voilà l'eté !, Page 40 10 h

* Exprimer le fait d' aimer, de préférer. * Comparer.	Préparer un programme de séjourlinguistique.	* Comprendreun bulletin d'informationradiophonique.

Unit V Voilà l'eté !, Page 40 10 h

* Exprimer as joleetsatristesse.	Préparer un programme de séjourlinguistique	* Comprendre des témoignages. * Exprimerses sentiments à partird'une situation illustrée.

Text Book

1	Reference Book : LATITUDES 2, Méthode de français By – Régine Emmanuel laine, Yves Loiseau, Pages : 9 - 55

Course Code	Course Name	Category	L	T	P	Credit
191EL1A4EA	ENGLISH- IV	LANGUAGE	4	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The basics of English grammar and specific usages
- 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	Learn English grammar and its specific usage	K2
CO2	Know the ways of improving English language vocabulary	K3
CO3	Understand the importance of English language in competitive exams	K3
CO4	Acquire the basic needs of communication skills and methods	K3
CO5	Comprehend the composition writing and similar skills	K4

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191EL1A4EA	ENGLISH- IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Grammar 10 h

The use of correlatives - The perfect tense - appended questions - the infinitive - negative verbs - redundant conjunctions - use of make and do - fairly and rather

Unit II Vocabulary 10 h

Words and contextual uses - Synonyms - Antonyms - Add one out - inflectional - infix- telescoping - loanwords - British and American words - Thesaurus

Unit III Language Use 08 h

Spotting Errors - Words often confused - Reconstructing a Passage - Clause - Idioms and colloquialism - Language aptitude - Clipping

Unit IV Communication 11 h

Different Types of Asking - Oral rehearsal - Describing person, Diagram, Data, Table - Vote of thanks - Small talk - Refusal and Apology

Unit V Composition 09 h

General Essay writing - Mind map - Reviews - Title expansion - Creative writing - Content writing - Translation - Abstracting - Flash Fiction

Text Books

1. Wood F.T. 2010. A Remedial Grammar for Foreign Students. Macmillan Publishers, India. [Unit I and II]
2. Bhatnagar R.P. 2013. English for Competitive Examinations. 3rd Edition. Trinity Press, New Delhi. [Unit III, IV and V]

References

1. Radhakrishna Pillai G. 2000. English for Success. Emerald Publishers, Chennai.
2. Krishnaswamy N. 2000. Modern English a Book of Grammar Usage and Composition. Macmillan Publishers, India.
3. Arulselvi Evangelin. 2012. Teaching of Special English. Saratha Pathippagam, Chennai.
4. Rawdon Wyatt. 2008. Check Your Vocabulary for TOFEL. Macmillan Publishers, India.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A4CA	INORGANIC CHEMISTRY - I	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The structure, preparation, properties and uses of d-block elements, and transition elements.
- About the acids and bases concepts and non-aqueous solvent reactions
- The basic knowledge about radioactivity and displacement law.

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 d-Block elements.	K3
CO2	Utilize different approaches of Arrhenius, Bronsted, Lowry concepts and their application & limitations.	K3
CO3	Summarize the classification, neutralization and their behaviour of Non-aqueous solvents	K3
CO4	Illustrate the occurrence, extraction, properties and uses of transition elements	K3
CO5	Analyze the radioactivity and its types.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A4CA	INORGANIC CHEMISTRY - I	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I 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. Anomalous behaviour of mercury. Stability of oxidation states using standard electrode potential.

Unit II Acids and Bases 12 h

Arrhenius, Bronsted, Lowry, Lux flood, Lewis theory. Relative strength of acids and bases - Acidity and basicity of solvolytic reaction. HSAB - Principle - application - limitations. Theories of hardness and softness. Electronegativity and hardness and softness. Bonding contributions.

Unit III Non-aqueous solvents 12 h

Classification , neutralization reaction and solvolysis in liquid ammonia, metal-ammonia solutions and cavity model. Neutralisation, Amphoteric behaviour, solvolysis and redox reactions in liquid sulphur dioxide and liquid hydrogen fluoride.

Unit IV Transition Elements 12 h

Transition Elements – position in the Periodic Table, occurrence, extraction, properties and uses of zirconium, vanadium, molybdenum and tungsten - their important compounds V_2O_5, $ZrOCl_2$, ammonium molybdate, molybdenum blue, WO_2 and tungsten bronzes.

Unit V Nuclear Chemistry – I 12 h

Radioactivity- types of radioactivity- types of radioactive rays -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- transmutation- artificial transmutation- applications of artificial transmutation-radioactive series.

Text Books

1. Soni, P.L. 2000, "Text book of Inorganic Chemistry", 20th Edn., S. Chand & Co. Ltd., New Delhi.
2. Malik W.U. Tuli G.D. and Madan R.D. 2012, "Selected topics in Inorganic Chemistry", S. Chand & Co. Ltd., New Delhi.
3. Lee J.D. 2014, "A New Concise Inorganic Chemistry", 5th Edition. Oxford Publishers, & UK,

References

1. Madhan. R.D, 2016, "Modern Inorganic Chemistry", 10th Edition, Mc Graw Hill Company & USA
2. Cotton F.A. Wilkinson G. Bochmann M. and Murilla C. 2007, "Advanced Inorganic Chemistry", 6th Ed., Wiley India Pvt. Ltd. & India.

192CE1A4CP	CORE PRACTICAL: 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 sulphate as barium sulphate
5	Estimation of copper as CuSCN
6	Estimation of iron as Fe2O3 by precipitating iron as Fe(OH)3
7	Estimation of nickel as Ni-(DMG)
	APPLICATION ORIENTED PRACTICAL
8	Estimation of Hardness of water using EDTA
9	Estimation of dissolved oxygen in water by winkler method
10	Estimation of alkalinity in water
11	Preparation of soap oil
12	Preparation of detergent powder

Note: Out of 12 – 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

Course Code	Course Name	Category	L	T	P	Credit
192MT1A4IA	MATHEMATICS -II	IDC	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- Methods of solving linear differential equations
- The solvability of Cauchy-Euler equations.
- The application of compatible systems and procedure for solving it.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the methods for solving various form of linear differential equations.	K2
CO2	The solvability of Cauchy's and Legendre's equations	K2
CO3	Explain the application of variation of parameters to solve Linear differential equations of second order.	K2
CO4	Interpret the differential equation in the solution of real world problems.	K3
CO5	Solve the non-linear partial differential equations using Charpit's method.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192MT1A4IA	MATHEMATICS - II	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Linear Differential Equations with Constant Coefficients 10 h

Linear differential equations with constant coefficients– useful results-Complementary function(C.F)-working rule- symbolic functions- determination of particular integral(P.I)- general method of getting P.I-working rule and to solve P.I-e^{ax}, sin ax, cos ax, $x^n, e^{ax}V, xV$

Unit II Homogeneous Linear Equations 10 h

Homogeneous linear equations - method of solution -working rule-definition of $\{1/f(D_1)\}X$- equations reducible to homogeneous form- Legendre's linear equations-working rule-method of variation of parameters- working rule for $\frac{dy}{dx} + Py = Q$

Unit III Linear Differential Equations of Second order 10 h

General form -complete solution of y″+Py′+Qy=R -working rule-theorem-removal of first derivative reduction to normal form-working rule-transformation of the equation -working rule -method of variation of parameters-solutions by operators.

Unit IV Applications of Differential equations 8 h

Applications of first order and second order differential equations-mixture problems. Newton's second law and Hook's law-vibrations of a mass on a spring-Free, undamped motion-Free, damped motion-forced motion, resonance phenomena, Electric circuit.

Unit V Non-Linear Partial differential equations of order one 10 h

Complete integral - Particular integral - Singular integral - general integral-geometrical interpretation of integrals of f(x,y,z,p,q)=0 - method of getting singular integral directly from PDE of first order-Compatible system of first order equations-Charpit's method with working rule - special methods of solution applicable to certain standard forms from I to IV.

Note: Theory 20% and problem 80%

Text Books

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

References

1 Shanthi Narayanan, 2002, "Differential & Integral Calculus", 1st Edition, S.Chand& Co, New Delhi.

2 David. G. Schaffer, Cain, 2016, "Ordinary Differential equations", 1st Edition, John Wiley, New York.

3 Nita H. Shah, 2015, "Ordinary and Partial Differential Equations Theory and Applications", 3rd Edition, Prentice Hall of India, New Delhi.

4 Shair Ahamed, 2012, "A textbook on ordinary differential equations", 2nd Edition, Springer, University of Texas, USA.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A4SA	ANALYTICAL METHODS IN CHEMISTRY	SEC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The laboratory practices in performing practicals.
- 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	Demonstrate the laboratory practices	K2
CO2	Identify the various terms used to express concentration and role of indicators in titration.	K3
CO3	Relate concentration, precipitation and solubility products.	K2
CO4	Examine the errors, significant figures and precision of the experimental result.	K4
CO5	Outline the principles of crystal growth.	K2

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A4SA	ANALYTICAL METHODS IN CHEMISTRY	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Laboratory Practices 7 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. Errors, Accuracy, precision, significant figures. Principle of types of titration - acidimetry - alkalimetry - permanganametry - dichrometry - Iodometry - argentometry - Complexometric titrations.

Unit II Qualitative analysis 8 h

Introduction - Dry reactions – heating, flame tests; Wet reactions – test tubes, centrifuge tubes, stirring rods, droppers, reagent bottles, centrifugation, transferring of precipitates, washing the precipitates - through Buckner funnel and 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 7 h

The mole concept – atomic, molecular and molar masses. Equivalent mass – Equivalent mass of an acid, base, oxidizing and reducing agents.

Concentration terms – Normality, molarity, mole fraction, molality, and percentage solution – weight composition, volume composition.

Principles of volumetric analysis – standard solution (primary and secondary standards), titration – types (acid, base, oxidation, reduction), equivalent point, end point, choice of indicators – internal and external indicators, Theory of indiators – precautions to avoid errors in titrimetric analysis.

Unit IV Gravimetric Analysis 7 h

Precipitation methods, supersaturation 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 7 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, cap, cylindrical and orthorhombic – Temkins model – physical modeling of BCF theory, Crystal Growth Techniques - Bridgman technique - Czochralski method - Verneuil technique - zone melting – gel growth – 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, New Delhi, Sultan Chand and Sons.

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

References

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

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

4 Benz. K, Neumann. W and Mogilatenko.A, 2014, "Introduction to Crystal Growth and Characterization", 1st Edition, Wiley international & USA .

192CE1A4GA	GENERIC ELECTIVE: CHEMISTRY IN DAILY LIFE – II	SEMESTER IV

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Water Treatment 5 h

Introduction – Sources and Uses of Water – Water for Industrial Purposes – Quality of Normal water – water in human body – Hardness of water – Types -Softening of Water – Soda – Lime Process, Zeolite, and Ion-exchange Processes (principles only). Demineralization of water – Treatment of Water for Municipal purposes – Desalination of Brackish Water – Electro dialysis – Reverse Osmosis Method (principles only).

Unit II Pesticides 5 h

Definition – Classification – organic and inorganic pesticides– Safe handling of pesticides - impact of pesticides on soil, plants and environment. Fungicides - definition – classification – sulfur, copper and mercury compounds.

Unit III Fuels 5 h

Introduction, Classification of fuels, Calorific value, Characteristics of a good fuel, comparison between solid, liquid and gaseous fuels. Coal, Classification of coal. Petroleum – fraction, composition and uses – knocking – composition and uses of CNG - LPG - water gas – biogas –bio diesel – power alcohol.

Unit IV Corrosion and its control 4 h

Corrosion – consequence and effects of corrosion – galvanic corrosion – differential aeration corrosion - corrosion control – material selection and design aspects – electro chemical protection – electroplating and electroless plating.

Unit V Batteries and Alloys 5 h

Characteristics of battery - primary and secondary batteries - battery components and their role – description and uses of battery- alkaline – lead acid - lithium ion – fuel cell. (principles only)

Alloys – properties – significance – composition and properties - ferrous alloys – nichrome and stainless steel – brass – bronze.

Text Books

1 Sharma B.K, 2001, "Industrial Chemistry", 6th Revised Edn, Krishna Prakasam Medai (P) Ltd., Meerut.

2 Jain P.C. and Monika Jain, 2016, "Engineering Chemistry", 15th Edn, Dhanpat Rai & Sons, Delhi.

References

1 Bagavathi Sundari K , 2006, "Applied Chemistry", MJP Publishers, Chennai.

2 Biswas T.D, and Mukherjee S.K, 1987, "Text book of soil science", Tata McGraw-Hill, New Delhi.

3 Jayashree, 2013, "Applied Chemistry", 3rd ed, S. Chand publications, New Delhi.

191TL1A4AA	பகுதி – 4 : அடிப்படைத்தமிழ் - தாள் : II (Basic Tamil)	SEMESTER IV

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019–20ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது

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

(பருவத் தேர்வு உண்டு)

அலகு : 1 12 h

நீதி நூல்கள்

I.ஆத்திசூடி - "அறம் செய விரும்பு" முதல் "ஔவியம் பேசேல்"வரை -12 பாடல்கள்

II.கொன்றைவேந்தன் - "அன்னையும் பிதாவும் முன்னறி தெய்வம்" முதல்

"எண்ணும் எழுத்தும் கண் எனத் தகும்" வரை -7 பாடல்கள்

III.திருக்குறள் - 6 பாடல்கள்

1. அகர முதல 1
2. மனத்துக் கண்.....34
3. இனிய உளவாக 100
4. தீயவை தீய பயத்தலான்.....202
5. கற்க கசடற 391
6. கண்ணொடு கண்ணினை.....1100

அலகு : 2 12 h

I. எளிய நீதிக்கதைகளும் வாழ்க்கை முறைகளும்

1. நீதிகாத்த மன்னன்
2. சிங்கமும் முயலும்
3. புத்திசாலி உழவனும் போக்கிரிப் பூதமும்
4. தேனீயும் புறாவும்
5. முயல் கூறிய தீர்ப்பு

II. தமிழகப் பண்பாடுகள்

1. தமிழர் விழாக்கள் - பொங்கல், ஆடிப்பெருக்கு
2. தமிழர் கலைகள் - தெருக்கூத்து, ஓவியம், சிற்பம்
3. தமிழர் விளையாட்டுகள்- ஏறுதழுவுதல், சடுகுடு

III . பயிற்சிப் பகுதி

1. படத்திற்கு ஏற்ற சொற்களை எழுதுதல்.
2. சொற்களைத் தொடராக்குதல்.
3. பொருத்துதல்,
4. உரையாடல் பகுதி

Note: பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 100

பகுதி – அ

சரியான விடையைத் தேர்வு செய்தல் 10x2=20

பகுதி – ஆ

சரியா? தவறா? தேர்ந்தெடுத்து எழுதுக . 10x2=20

பகுதி - இ

ஒரு பக்க அளவில் விடையளிக்க 03x20=60

குறிப்பு:

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

Text Books

1 அடிப்படைத்தமிழ் - 20-21. தொகுப்பு : தமிழ்த்துறை , டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட். சென்னை-600 098

References

1 ஒன்றாம் வகுப்பு பாடநூல் - தமிழ்நாடு அரசு பாடநூல் கழகம்

2 வலைதள முகவரி : http://tamilvu.org

191TL1A4AB	பகுதி – 4 : சிறப்புத்தமிழ் - தாள் : II (Advanced Tamil)	SEMESTER - IV

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019– 2020 ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது

(10 மற்றும் 12 – ஆம் வகுப்புகளில் தமிழ் மொழிப்பாடம் பயின்றவர்களுக்கு உரியது

(பருவத் தேர்வு உண்டு)

அலகு – 1 05 h

திருக்குறள்

I அறத்துப்பால்

1. இனியவை கூறல் - அதிகார எண் : 10
2. அடக்கமுடைமை - அதிகார எண் : 13

II பொருட்பால்

1. கல்வி - அதிகார எண் : 40
2. உழவு - அதிகார எண் : 104

III இன்பத்துப்பால்

1. தகையணங்குறுத்தல் - அதிகார எண் :109
2. பிரிவாற்றாமை - அதிகார எண் : 116

அலகு – 2 05 h

கட்டுரைத் தொகுப்பு

I நல்வாழ்வு - டாக்டர் மு.வரதராசன்

1. நம்பிக்கை
2. புலனடக்கம்
3. பண்பாடு

II இளைஞர்களின் ஒளிமயமான எதிர்காலத்திற்கு - கு.வெ. பாலசுப்பிரமணியம்

1. காலக்கணக்கு
2. நற்பழக்கமே செல்வம்

அலகு – 3 05 h

I காப்பியங்கள் - குறிப்பு எழுதுதல்

1. சிலப்பதிகாரம்
2. மணிமேகலை
3. கம்பராமாயணம்
4. பெரியபுராணம்

II ஊடகம் - காட்சி ஊடகங்கள்

1. தொலைக்காட்சி
2. திரைப்படம்
3. இணையம்
4. முகநூல்
5. கீச்சகம்
6. கட்செவி அஞ்சல்

அலகு – 4 05 h

இலக்கணம் - வழக்கறிதல்

1. இயல்பு வழக்கு
2. தகுதி வழக்கு

அலகு – 5 04 h

I படைப்பாற்றல் பகுதி

கவிதை,கட்டுரை எழுதச்செய்தல் - பொதுத் தலைப்பு

II பயிற்சிப் பகுதி

தமிழில் தட்டச்சு செய்தல் - யூனிகோடு எழுத்துருவில்.

Note: பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 100

பகுதி –அ

சரியான விடையைத் தேர்வு செய்தல் 10x2=20

பகுதி –ஆ

கோடிட்ட இடங்களை நிரப்புக 10x2=20

பகுதி –இ

இரண்டு பக்க அளவில் விடையளிக்க 4x15=60

குறிப்பு :

- அனைத்து அலகுகளில் இருந்தும் இரண்டு வினாக்கள் அமைதல் வேண்டும்
- பகுதி இ –க்கான வினாக்கள் இது அல்லது அது என்ற வகையில் அந்தந்த அலகுகளிலிருந்து அமைதல் வேண்டும்.

Text Books

1 சிறப்புத்தமிழ் 20-21. தொகுப்பு : தமிழ்த் துறை , டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, நியூ செஞ்சுரி புக் ஹவுஸ்(பி) லிட். 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 வலைதள முகவரி : http://tamilvu.org

192PY1A4AA	AECC : GENERAL AWARENESS	SEMESTER IV

Total Credits: 2
Total Instructions Hours: 24 h

S.No	Contents
1	Current Events
2	General Science
3	Geography of India
4	Tamil and Other Literature
5	Inventions and Discoveries
6	Numerical and Mental Aptitude
7	Verbal and Non Verbal Reasoning
8	Socio- Culture and Heritage of India
9	Indian Economy and Political System
10	History of India and Freedom Struggle

References

1. Majid Hussain, Arrora N D, 2019, "General Studies -TNPSC Group -I ", G.K.Publications (P) Ltd. New Delhi
2. Aggarwal R S, 2014, "Verbal and Non Verbal Reasoning" S Chand & Company, New Delhi
3. Competition Success Review, Competitive Success Publisher, New Delhi
4. Pratiyogita Darpan, Pratiyogita Darpan Publishers, Agra.

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fifth Semester										
192CE1A5CA	Core - VII	Inorganic Chemistry - II	4	1	-	3	25	75	100	4
192CE1A5CB	Core - VIII	Organic Chemistry - I	4	1	-	3	25	75	100	4
192CE1A5CC	Core - IX	Physical Chemistry - I	4	1	-	3	25	75	100	4
192CE1A5CP	Core Practical - V	Physical Chemistry	-	1	5	3	40	60	100	3
192CE1A5SA	SEC - III	Spectroscopy and Chromatography	3	-	-	3	25	75	100	3
192CE1A5DA	DSE - I	Industrial Chemistry	4	-	-	3	25	75	100	4
192CE1A5DB		Agricultural Chemistry								
192CE1A5DC		Pharmaceutical Chemistry								
192CE1A5TA	IT	Industrial Training	**Grade A to C**							
192CE1A5LA	LoP	Lab on Project	-	-	-	-	50	-	50	1
Part - IV										
192MT1A5AA	AECC - V	Research Methodology	2	-	-	3	-	50	50	2
		Total	**21**	**4**	**5**				**700**	**25**

Course Code	Course Name	Category	L	T	P	Credit
192CE1A5CA	INORGANIC CHEMISTRY - II	CORE	4	1	-	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.
- About the metal carbonyl and 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	Preparation, comparision and properties of halogens	K4
CO3	General methods of preparation, structure and bonding of metal carbonyls	K3
CO4	Synthesis and crystal structures and properties of semiconductors	K3
CO5	Analyze the principle, working and application of nuclear chemistry.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A5CA	INORGANIC CHEMISTRY - II	SEMESTER V

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I f-Block elements 12 h

General characteristics- electronic configuration- oxidation states- colour and magnetic properties. Lanthanide and actinide contraction and their consequences. Separation methods fractional crystallization, ion-exchange method and chromatographic separation. Comparison between d-and f-block elements- uses of lanthanide compounds.

Unit II Compounds of Halogens 12 h

Preparation, properties and uses of hypohalous acid- hypochlorous acid, sodium hypochlorite - process of bleaching, constitution of bleching powder. Preparation, properties and structure of perchloric acid, polyhalides.– pseudohalogens - preparation, properties and used of iodine – analysis of iodine.

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 semiconductors 12 h

Synthesis and crystal structures of TiO2, ZnO, SnO2, Types of Semiconductors - Properties of semiconductors, valence band, conduction band, band gap calculation, photon absorption by semiconductor - applications of semicondutors.

Unit V Nuclear Chemistry – II 12 h

Nuclear reactions types: fission and fusion reactions-principle and working of nuclear reactors- isobars, isotones and isomers. Isotopes: Separation of isotopes-identification of isotopes- isotope effect- application of isotopes in chemistry and medicine - Detection and measurement of radioactivity – Wilson cloud chamber, Geiger – Muller counter.

Text Books

1. Soni, P.L. 2000, "Text book of Inorganic Chemistry", 20th Edn., S. Chand & Co. Ltd., New Delhi.
2. Madhan. R.D, 2016, "Modern Inorganic Chemistry", 10th Edition, Mc Graw Hill Company & USA
3. Malik W. U. Tuli G. D. and Madan R. D. 2012, "Selected topics in Inorganic Chemistry", S. Chand & Co. Ltd., & New Delhi

References

1. Cotton F. A. Wilkinson G. Bochmann M. and Murilla C. 2007, "Advanced Inorganic Chemistry", 6th Ed., Wiley India Pvt. Ltd. & India.
2. Lee J. D. 2014, "A New Concise Inorganic Chemistry", 5th Ed. Oxford Publishers, & UK

Course Code	Course Name	Category	L	T	P	Credit
192CE1A5CB	ORGANIC CHEMISTRY - I	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The asymmetry and optical activity of organic molecules
- About some novel named reactions, important 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	Understanding the fundamental aspects of stereochemistry	K3
CO2	Study on the various reagents involved in the oxidation and reduction reactions	K4
CO3	Broadening 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. To analyze the structures of proteins and peptides	K3
CO5	Analyse the heterocyclic compounds in terms of physical and chemical properties and to have insight on their preparation	K4

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A5CB	ORGANIC CHEMISTRY - I	SEMESTER V

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Stereochemistry 12 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, Walden inversion. Specifying absolute configuration – R, S system for asymmetric molecule. Optical activity of Biphenyl, Allenes and Spiranes

Unit II Reagents in organic synthesis 12 h

Oxidation: Osmium tetroxide – Chromyl chloride – Ozone – DDQ –Dioxiranes. Lead tetraacetate - selenium dioxide – DMSO either with Ac2O or oxalyl chloride – Dess-Martin reagent. Reduction: Catalytic hydrogenation using Wilkinson Catalyst – Reduction with LAH, NaBH4, tritertiarybutoxy aluminum hydride, NaCNBH3, hydrazines

Unit III Reactions and rearrangements 12 h

Reactions, mechanisms and applications of –Gattermann-Koch aldehyde synthesis, Kolbe – Schmidt reaction, Michal addition, Mannich reaction and Benzoin condensation.

Reaction, mechanism, evidences and applications of reactions - Pinacol-Pinacolone, Beckmann, Hoffmann, Curtius, Benzilic acid and Claisen Rearrangements.

Unit IV Amino acids, Proteins and peptides 12 h

Amino acids – Nomenclature, dipolar nature of amino acids, isoelectric point, methods of preparation – amination of halo acids – Strecker synthesis – Gabrielphthalimide synthesis – Koop synthesis.

Proteins, classification –Structure of proteins – primary – secondary and tertiary structure. Colour test for proteins.

Nomenclature of peptides – determination of structure of peptides – end group analysis.

Unit V Heterocyclic compounds 12 h

Preparation and properties of Furan, Pyrrole, Thiophene, Pyridine, Quinoline and Isoquinoline

Text Books

1. M.G Arora, M. G. 2002, Stereochemistry in Organic Compounds, First editionAnmol Publications Private Ltd, New Delhi
2. I.L.Finar, 2009, I. L, Organic Chemistry, Vol.I and II, sixth edition. Addison-Wesley Longman
3. Jagdamba Singh and Yadav, 2005, Organic Synthesis, Vol. I and II. , First Edition Pragathi and Prakasam Publishers

References

1. Chatwal. G.R, 2015, Reaction Mechanism and Reagents in Organic Chemistry, Himalaya Publisher
2. Carruthers. W. and Coldham I. 2004, Modern methods of Organic Chemistry, Cambridge University Press
3. Gilchrist. 2005, Heterocyclic Chemistry. Third edition, Pearson education.
4. Norman. R.O.C, 2017, Principles of organic Synthesis, Taylor and Francis. Excl. Indian reprint

Course Code	Course Name	Category	L	T	P	Credit
192CE1A5CC	PHYSICAL CHEMISTRY – I	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The Fundamental concepts of electrochemistry
- The adequate knowledge in electro chemical cells, electrodes and their types.
- The application oriented knowledge about polarography and surface chemistry

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	To obtain the basic concepts of electrochemistry and apply it to develop the theory and experimental approaches for the electrochemical problems.	K3
CO2	To acquire basic knowledge of electrode potentials and electrochemical cells.	K4
CO3	To acquire knowledge about the types of electrodes and potentiometric titrations.	K3
CO4	To learn the use of fundamental principles of fuel cells and to know their practical utility and to acquire the basic knowledge of electrochemical processes also their application related to corrosion field.	K3
CO5	To provide the basic concepts of polarography, instrumentation- functions and their applications and to gain a knowledge on the fundamentals of adsorption concepts	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong **M Medium** **L Low**

192CE1A5CC	PHYSICAL CHEMISTRY – I	SEMESTER V

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Fundamentals of Electrochemistry 12 h

Electrolytic conductance-conductivity cell measurement of conductance of solutions - Variation of equivalent conductance and specific conductance with dilutions. Migrations of ions - Hirtorf's theoretical device -Transport number - determination by moving boundary method and Hittorf's method - Kohlrausch's law – statement, application. Applications of conductance measurements - Conductometric titrations and Precipitation titrations - Ostwald's dilution law and limitations - Theory of strong electrolytes: Debye-Huckel - Onsagar theory (elementary treatment only) -Debye- Falkenhagen effect and Wien effect.

Unit II Electro Chemical Cells 12 h

Galvanic cell – Reversible and irreversible cells - Electrode potentials - The standard hydrogen electrode-kinds of electrode and their potentials - Nernst equation - Weston - Cadmium cell - Single electrode potentials. Determination and significance of electrode potentials - Electrochemical series and its applications. Thermodynamic quantities of cell reaction.

Unit III Electrodes and their types 12 h

Reference electrodes – Electrodes for measurement of pH – Hydrogen, quinhydrone, and glass electrodes. Buffer solutions - Buffer action, determination of pH values of Buffer mixture and Henderson's equations. Concentration cells with and without transport - Liquid junction potential - Applications of emf measurements - Redox Potentials - redox indicators - diphenyl amine - Potentiometric titrations – acid-base and redox titrations.

Unit IV Fuel Cells and Corrosion 12 h

Fuel cells - Definition and importance, Hydrogen-Oxygen fuel cell, hydrocarbon - Oxygen cell. Storage cells, Lead storage cell, Nickel- Cadmium cell and Lithium ion cell (basics only). Decomposition Voltage, Over voltage, Discharge Potential.

Corrosion –Definition, types, electrochemical nature, rusting of iron, prevention - cathodic protection and galvanizing.

Unit V Polarography and Adsorption 12 h

Polarography-Instrumentation- advantages and disadvantage of dropping mercury electrode-Limiting current, factors affecting limiting current-Half wave potential-Application of polarography.

Types of adsorption, adsorption of gases by solids. Adsorption isotherms – Freundlich, Langmuir. Adsorption of solutes from solutions. Application of adsorption.

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. , 2013 "Textbook of physical chemistry", 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 Moore, W.J, 1999,"Physical Chemistry", Longmans Publications, 5 th Edn, New Delhi

192CE1A5CP	CORE PRACTICAL : PHYSICAL CHEMISTRY PRACTICAL	SEMESTER V

Total Credits: 3
Total Instructions Hours: 72 h

S.No	Contents
1	Determination of Partition coefficient of Iodine between Carbon tetra chloride and water.
2	Determination of rate constant of acid-catalysed hydrolysis of an ester (Methyl acetate OR Ethyl acetate)
3	Determination of Kf / Molecular weight by Rast method (Naphthalene, Diphenyl and m-dinitrobenzene as solvents).
4	Determination of Critical solution temperature of Phenol-Water system.
5	Phase diagram-Simple Eutectic system
6	Determination of Cell Constant, Specific conductivity and Equivalent conductivity of strong electrolyte
7	Determination of dissociation constant of a weak acid (Acetic acid)
8	Conductometric Titration (Strong acid Vs Strong base)
9	Potentiometric Titration (Acid-Base Titration HCl Vs NaOH)
10	Potentiometric Titration (Redox Titration FAS Vs KMnO4)
11	Estimation of Copper by colorimetric method
12	Estimation of Iron by colorimetric method.

Note: Any ten experiments

References

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

2 Gopalan. R, Subramaniam. P.S. and Rengarajan, K., Elements of Analytical Chemistry, Sultan Chand and Sons, 2004.

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

4 Praveen Kukreja,Chemistry Advanced Practical Manual, Vrinda Publishing (p) Ltd, New Delhi, 2006.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A5SA	SPECTROSCOPY AND CHROMATOGRAPHY	SEC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

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 to utilize their basic aspects to identify various organic compounds.	K2, 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 and apply to predict the organic molecules.	K3
CO4	Know about basic principles and instrumentation of mass spectroscopy technique and predict the fragmentation of simple molecules using rearrangement reactions.	K3
CO5	Exploring the various chromatography techniques and their applications in separation of organic mixtures.	K2, K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A5SA	SPECTROSCOPY AND CHROMATOGRAPHY	SEMESTER V

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I UV-Visible Spectroscopy 7 h

Principle - Instrumentation- selection rules - types of electronic transitions in organic molecules - Woodward Fieser rules for calculation of λmax of conjugated dienes, unsaturated carbonyl compounds. The chromophoric concept - auxochromes - bathochromic, hypsochromic, hyperchromic, hypochromic shifts. Types of absorption bands, solvent effects, Franck - Condon principle.

Unit II IR Spectroscopy 10 h

Principle - Instrumentation - selection rule - vibrational frequencies - factors - vibrational modes of H2O and CO2 - Finger print region. Applications of IR spectra to carbonyl compounds - amino compounds - hydroxyl compounds - inter and intra molecular hydrogen bonding.

Unit III NMR Spectroscopy 9 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- splitting of signals - spin-spin coupling- coupling constant. NMR spectra of simple molecules (Ethyl acetate, Ethylamine, Ethylbromide, Isopropyl ketone, Acetone, Anisole, Benzaldehyde and Toluene).

Unit IV Mass Spectrometry 9 h

Principle - Instrumentation- mass spectrum - molecular 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 chromate plates - Rf values - factors and significance.

Column chromatography - principle - types of adsorbents, preparation of the column, elution, recovery of substances and applications.

Text Books

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

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

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

References

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

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

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

4 Cotton F. A. Wilkinson G. Bochmann M. and Murilla C. 2007, "Advanced Inorganic Chemistry", 6thEd. Wiley India Pvt. Ltd. &India.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A5DA	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
- Various water treatment and cement settling process
- The various 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 water treatment techniques	K4
CO4	Understand the process of cement and ceramics manufacture	K2
CO5	Evaluate the properties of paints and their applications	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	L	L	M
CO2	S	S	M	M	S
CO3	S	S	S	S	S
CO4	M	M	L	M	M
CO5	S	S	S	S	S

S Strong M Medium L Low

192CE1A5DA	INDUSTRIAL CHEMISTRY	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Sugar Industry 10 h

Introduction - 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 10 h

Introduction - conditions favorable for fermentation. Characteristics of enzymes - short account of some fermentation processes. Alcohol beverages - manufacture of beer and wines. Ethyl alcohol from molasses.

Unit III Chemical Explosives 10 h

Preparation and chemistry of lead azide, nitroglycerine, nitrocellulose, TNT, RDX,Dynamite, cordite, picric acid, gunpowder, introduction to rocket propellants

Unit IV Cement and Ceramics 10 h

Cement: Manufacture of cement - Settling of cement (Portland cement). Ceramics: Manufacturing process - Application of colours to the pottery - Earthenware's and Stonewares.

Unit V Pigments and Paints 8 h

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

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

Text Books

1. Sharma. B.K, 2003, "Industrial Chemistry", Reprint, Goel Publishing House & Meerut.
2. Jain &Jain, 2017, "Engineering Chemistry", 16th Edition, Dhanpatrai Publications & NewDelhi.

References

1. Gopalan. R, Venkappayya. D, Nagarajan. S, 2000, "Textbook of Engineering Chemistry", 4th Edition, Vikas Publishing House Pvt. Ltd & New Delhi.
2. Uppal. M.M, 2001, "Textbook of Engineering Chemistry", 6th Edition, Khanna Publishers & New Delhi.
3. White. H.L, 1986, "Introduction to Industrial Chemistry", 1st Edition, A Wiley Interscience Publication & USA.
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.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A5DB	AGRICULTURAL CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- To understand the basic soil chemistry and the physical properties of soils.
- Chemistry aspects of soil – nitrogen fixation.
- To know 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	To understand the basics of soil chemistry, formation of soil and their importance in agriculture.	K2,K3
CO2	To study the physical properties of soil and their importance in the plant growth	K1,K2, K3
CO3	To know the basic chemical aspects of soil and soil testing	K1,K2, K3
CO4	To recognize the role of the plant nutrients in the growth of plant	K2,K3
CO5	To distinguish the properties, classification and mechanism of pesticides and Fungicides.	K2,K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A5DB	AGRICULTURAL CHEMISTRY	SEMESTER V

Total Credits: 4

Total Instruction Hours: 4 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 10 h

Physical properties of soil-soil texture and textural classification-pore space- bulk density, particle density –soil structure and soil colour-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 nutrients-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 8 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

Text Books

1 Biswas, T.D and Mukeherjee, S.K.1987, "Textbook of Soil Science",.

2 Daji, A.J.1970, Textbook of Soil Sciences, Asia Publishing House, Madras.

References

1 HESSE, A Textbook of Soil Chemical Analysis P.R. John Murray, 1971.

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

3 SreeRamula,Chemistry of Insecticides and Fungicides Chemistry of Insecticides and Fungicides, U.S. Oxford and IBH Publishing Co., New Delhi, 1979.

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Course Code	Course Name	Category	L	T	P	Credit
192CE1A5DC	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	K3
CO3	Outline the basic principles of physiological actions of drugs	K3
CO4	Explain the concepts of common body drugs	K4
CO5	Summarize the health promoting drugs and their functions	K5

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A5DC	PHARMACEUTICAL CHEMISTRY	SEMESTER V

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 – SAR of chloramphenicol.

Antiviral drug- remdesivir, galidesivir, favipiravir, baloxavir – structure and mode of action.

Unit III Analgesics, antiseptics and disinfectants 10 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 8 h

Diagnostic agents - Radio Opaques, Preservatives, anti-oxidants, Sweetening agents,Emulsifying agents, Oniment bases, Colouring agents.

Text Books

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

References

1. David William & Thomas Lemke, Principles of Medicinal Chemistry, Foyers, 5th Edition BI publishers, 2005
2. Lakshmi S.,Pharmaceutical Chemistry, S. Chand & Sons,New Delhi, 1995
3. Ashutosh Kar, Medicinal Chemistry, Wiley Eastern Ltd., New Delhi, 1993.
4. Romas Nogrady, Medicinal Chemistry, II Edition, Oxford Univ.Press., 2004.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A5AA	RESEARCH METHODOLOGY	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- the art of using different research methods and techniques
- planning and writing of researchproposals and dissertations, as well as a thesis
- the necessity for research ethics and guidelines to pursue research

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	learn thebasics of the research methods and techniques	K1
CO2	remember the hypothesis, laws related to research problem	K1
CO3	understand the limitations of experimentation in research	K2
CO4	illustrate the concept of interdisciplinary and multidisciplinary research	K3
CO5	analyze the ethics and responsibilities of research	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192MT1A5AA	RESEARCH METHODOLOGY	SEMESTER V

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introductionto Research 4 h

Research: Introduction- Basic, Applied and Evaluation research – multidisciplinary and interdisciplinary Research – value of research skills – formulating a research problem – Research in relation to Teaching and Publishing

Unit II Hypotheses, Theories and Laws 6 h

Hypotheses – Theories – Laws. Scientific statements: their justification and acceptance: verification – Falsification – Acceptance – Peer review

Unit III Experimentationand research 5 h

The roles and limitations of experimentation – Experimentation and research – conducting experiments - validity and reliability in experimentation – Design of experiments

Unit IV Scientific method and Research Design 4 h

Introduction to Scientific method – Research Design - Components - research design and proposal -checklist in the preparation of proposals

Unit V Ethics and Responsibility in Scientific Research 5 h

Ethics – guidelines for Ethical practices in research - unethics to ethics in research - responsibility of Scientists and of Science as an Institution

Text Books

1 PerterPruzan, (2016), Research Methodology: The Aims, Practices and Ethics of Science. Springer, Switzerland

References

1 Thomas, C.G. (2015) Research Methodology and Scientific Writing.Ane Books Pvt. Ltd.: New Delhi.

2 Locharoenrat, K. (2017) Research Methodologies for Beginners.Pan Stanford Publishing: Singapore.

3 Ranjit Kumar, (2014) Research Methodology: A Step-by-Step Guide for Beginners. SAGE Publications Ltd.: Singapore.

4 Kothari, C.R. Garg, G. (2009) Research Methodology Methods and Techniques. New Age International Publishers, New Delhi..

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Sixth Semester										
Part – III										
192CE1A6CA	Core - X	Organic Chemistry - II	4	1	-	3	25	75	100	4
192CE1A6CB	Core - XI	Physical Chemistry - II	4	-	-	3	25	75	100	4
192CE1A6CV	Core-XII	Project	-	-	8	-	40	60	100	4
192CE1A6SA	SEC - IV	Textile Chemistry	3	-	-	3	25	75	100	3
192CE1A6DA	DSE - II	Dye Chemistry	4	-	-	3	25	75	100	4
192CE1A6DB		Nano and Green Chemistry								
192CE1A6DC		Forensic Science and Crime Investigation								
192CE1A6DD	DSE - III	Polymer Chemistry	4	-	-	3	25	75	100	4
192CE1A6DE		Dairy Chemistry								
192CE1A6DF		Leather Chemistry								
Part - IV										
193BC1A6AA	AECC - VI	Innovation, IPR & Entrepreneurship	2	-	-	3	-	50	50	2
Part - V										
192CE1A6XA		Extension Activity	-	-	-	-	50	-	50	1
		Total	**21**	**1**	**8**	-	-	-	**700**	**26**
								Grand Total	**4300**	**140**

Course Code	Course Name	Category	L	T	P	Credit
192CE1A6CA	ORGANIC CHEMISTRY – II	Core	4	1	-	4

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	S	S	S	S	S
CO2	M	S	S	S	S
CO3	S	S	S	S	S
CO4	M	M	S	S	S
CO5	S	S	S	S	S

S Strong **M Medium** **L Low**

192CE1A6CA	ORGANIC CHEMISTRY – II	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Terpenoids 10 h

Classification and general methods of isolation - Isoprene rule - Structural elucidation and synthesis of Geraniol – Citral – Carvone - α-pinene.

Unit II Alkaloids 10 h

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

Unit III Vitamins 10 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 8 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 10 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-Wesley Longman.
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. Ashutosh Kar, 2006, "Medicinal Chemistry", 3rd Edition, Anshan Ltd., New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A6CB	PHYSICAL CHEMISTRY - II	CORE	4	-	-	4

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 equilibrium in the chemical reactions.
- The catalytic reactions and importance of catalysts.

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 rate laws of chemical reactions	K2
CO2	Broadening the concepts of chemical kinetics by theoretical aspects	K3
CO3	Study about various photochemical and photosensitized processes.	K3
CO4	Understand various types of catalysis reactions and to explore their applications in industrial sector	K3
CO5	Learn the concept of chemical equilibrium and colligative properties.	K4

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A6CB	PHYSICAL CHEMISTRY - II	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Chemical Kinetics-I 10 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.

Unit II Chemical Kinetics-II 10 h

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 III Photochemistry 10 h

Characteristics of electromagnetic radiation - Lambert-Beer law - Jablonski diagram - Law of photochemical equivalence - Quantum yield - Photosensitized reactions, steady state approximation - Photochemical reactions - Formation of HCl, HBr- Dimerization of anthracene - Phosphorescence, fluorescence and chemiluminescence.

Unit IV Catalysis 10 h

Theories of catalysis - Types of catalysis – Characteristics of catalytic reactions – Promoters – Catalytic poisoning – Auto catalysis – Negative catalysis – Intermediate Compound Formation Theory - Adsorption Theory – Enzyme catalysis – Mechanism of enzyme catalysis – Industrial applications of Catalysts.

Unit V Chemical Equilibrium and Colligative Properties 8 h

Law of mass action – Equilibrium constant K, Kp and Kc, relation between Kp and Kc -LeChatelior principle and its application to Haber and contact processes - Colligative properties – Lowering of vapour pressure – Elevation of boiling point – Depression of freezing point – Osmotic pressure - Applications in calculating molar masses of normal, dissociated and associated solutes in solution.

Text Books

1. Arun B,Bahl B. S,Tuli G. D, 2018, "Essentials of Physical Chemistry", 28th Edition, S. Chand & Co.
2. Puri B. R, Sharma L. R, and Pathania M. S, 2020, "Principles of Physical Chemistry", 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. Keith J. Laidler and John H. Meiser, 2006, "Physical Chemistry", 3rd Edition, CBS Publishers & Distributors, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A6SA	TEXTILE CHEMISTRY	SEC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- Manufacture and properties of natural fibres, vegetable fibres, and animal fibres.
- Scouring, de-sizing and singeing processes.
- Dyeing- synthesis of dyestuffs and fastness properties.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	The nature of fibers and its applications to materials	K3
CO2	Compare the application of synthetic fibers with natural fibers	K4
CO3	Illustrate the preparatory process prior to dyeing	K3
CO4	Demonstrate for the preparatory process of dyeing	K3
CO5	Analyze ability to solve problems connected with textile technological processes	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A6SA	TEXTILE CHEMISTRY	SEMESTER VI

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Vegetable Fibres and Animal Fibres 7 h

Classification of textile fibres - Essential and desirable properties of textile fibres - Cotton fibre – Physical and Chemical properties, Jute – Purification; Physical and Chemical properties of jute, silk and wool.

Unit II Regenerated and Synthetic Fibres 7 h

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

Unit III Process of Dyeing 7 h

Objective of scouring – Process of caustic scouring on open kier machine with sine diagram, scouring with NaOH and Na_2CO_3 - Desizing using malt extract - Merits and demerits of acid and enzyme desizing - Objects of singeing – Impurities present in grey cotton and cotton fabric – Process of singeing on gas singeing machine – Precautions to be taken during gas singeing.

Unit IV Process of Bleaching 8 h

Principles of wetting and mechanism of detergency – Synthetic detergents – Surface active agents - Bleaching processes – Bleaching agents - H_2O_2, NaOCl, bleaching powder and bio-bleaching and their properties - Bleaching of cotton, rayon, wool and synthetic fibers.

Unit V Printing on Cotton 7 h

Printing object – Methods of printing – Styles of printing – Printing procedures of cotton fabric with various classes of dyes and pigments – Printing machinery.

Text Books

1. Shenai V. A, 1991, "Textile Fibres" (Vol. I), Mahajan Publishers, Ahmedabad, India.
2. Shenai V.A, 1998, "Technology of Bleaching", Mahajan Publishers, Ahmedabad.

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, Newyork.
3. Trotman E.R and Griffin B.I, 1990, "Dyeing and Chemical Technology of Textile Fibres", B.I. Publications, New Delhi.
4. Prayag R.S, 1992, "Bleaching, Mercerising and Dyeing of Cotton Materials", Ms. L.R. Prayag, Dharwad.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A6DA	DYE CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The principles of colours.
- The synthesis of various dyes.
- Utilization of the dyes for various applications.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the principles of colour and its relation with compound's structure	K2
CO2	Analyze and classify dyes based on their chemical structure and applications	K3
CO3	Describe the synthesis of di and triphenyl methane dyes and their applications	K2
CO4	Understand chemistry of nitrogen containing dyes and their applications	K2
CO5	Outline the importance of pigments in various fields	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A6DA	DYE CHEMISTRY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Fundamental Concepts 8 h

Colour and constitution: Colour of substances - Complementary colours - Theories of colour and constitution - Otto - Witt theory - Chromophores, Auxochromes, bathochromic shift, hypsochromic shift - Quinonoid theory - Valence bond theory and molecular orbital theory.

Unit II Classification of Dyes 10 h

Azo Dyes - Principles of azo coupling - Mechanism of diazotization - Coupling with amines and phenols - Monoazo and diazo 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 III Di and Triphenyl methane 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, Rosaniline and Crystal Violet, Xanthhydrol basic xanthene dyes - Rhodamine-B, Rhodamine-G.

Unit IV Supplementary Dyes and Applications 10 h

Synthesis and applications of quinone imine dyes - Indophenols, Indamines - Azine dyes - Safranin-T, Oxazine dyes, Meldola's blue, Gallocyanine - Thiazine dyes - Methylene blue - Thiazo dyes - Pimuline, Thioflavin-T, Cyanine dyes - Quinoline blue - Astrazone pink FG, Astrazone yellow 3G - Phthalocyanine dyes, Acridine dyes - Indigo and Thioindigo.

Unit V 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.

Text Books

1. Chatwal G.R, 2009, "Synthetic Dyes" Himalaya Publishing House, New Delhi.
2. Arora M.G, 2002, "Text Book of Dyes", Anmol Publications Private Ltd., New Delhi.

References

1. Venkataraman K, 2009, "The Chemistry of Synthetic Dyes", Elsevier, India.
2. Mohammadi G Ziarani, Moradi R, Lashgari N, Kruger H.G, 2018, "Metal-Free Synthetic Organic Dyes", 1st Edition, Elsevier, India.
3. Singh R, 2016, "A Handbook of Synthetic Dyes", Mittal Publications, NewDelhi.
4. Yadav M. S, Tyagi O.D, 2002, "A Textbook of Synthetic Dyes", Anmol Publisher, NewDelhi.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A6DB	NANO AND GREEN CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basics of nano chemistry, methods to prepare nano materials.
- 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 in the basics of nano science and their classification. To apply the principles of nano science in carbon nanotubes	K3
CO2	To understand the few methods of preparation of nanomaterials based on chemical and photochemical methods	K3
CO3	To develop the basic knowledge of the various principles involved in green chemistry and their advantages	K3
CO4	To compare the green solvent-mediated reactions with traditional reactions	K3
CO5	Analyze the applications of green solvent in various organic naming reactions	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A6DB	NANO AND GREEN CHEMISTRY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Nanoscience 10 h

Definition of Nanomaterials – Classification (1D, 2D and 3D) with examples - Synthesis top down and Bottom up Approach - Carbon Nanotubes – Types, properties and uses.

Unit II Preparation of Nanomaterials 8 h

Co-precipitation- Sol-gel - Chemical reduction - Photochemical reduction – Hydrothermal and Solvothermal synthesis.

Unit III Applications of Nano Technology 10 h

Quantum dots: Fabrication - Applications - CNT: Synthesis and applications - Application of nano materials in nano medicines and pollution control - Principle of Scanning electron microscope.

Unit IV Introduction to Green Chemistry 10 h

Green chemistry and its significance - Difference between conventional chemistry and green chemistry techniques - Principles of green chemistry - Atom economy - Prevention and recycling of byproducts - Limitations of green chemical techniques.

Unit V Green Synthesis Techniques 10 h

Green solvents - Synthesis involving basic principles of green chemistry - Synthesis of adipic acid, methyl methacrylate, paracetamol – Microwave assisted reactions in water - Hofmann Elimination - Hydrolysis of benzamide - Ultrasound assisted esterification - Cannizaro reaction.

Text Books

1. Shanmugam S, 2010, "Nanotechnology", M.J.P. Publishers, Chennai.
2. Ahluwalia V. K, 2016, "Green Chemistry", 2nd Edition, Ane Books India, New Delhi.

References

1. Cao G, 2004, "Nanostructures & Nano Materials", Imperial College Press, U.K.
2. Rashmi S, Srivastava M. M, 2009. “Green Chemistry” Fourth Reprint, Narosa Publishing House, New Delhi.
3. Mark R, and Daniel R, 2008, "Nanotechnology"1st Edition, Pearson Education, New Delhi.
4. Kumar V, 2010, "An Introduction to Green Chemistry", Vishal Publishing Co, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A6DC	FORENSIC SCIENCE AND CRIME INVESTIGATION	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The significance of forensic science to human society.
- The fundamental principles and functions of forensic science.
- The organizational set up of forensic science.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the progress of forensic Science in India	K1
CO2	Identify the tools and techniques in forensic science	K2
CO3	Acquire fundamental principles of organizational set up of forensic science	K2
CO4	Understand the basics of crime investigation	K3
CO5	Identify the broad components of criminal justice	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A6DC	FORENSIC SCIENCE AND CRIME INVESTIGATION	SEMESTER VI

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 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

Sources of latent finger mark residue-Aqueous components, Lipid components, Chemical processing of latent finger marks-Amino acid sensitive reagents-Ninhydrin, 1,2-indanedione, Alternative reagents, Reagents based on colloidal metals, Lipid - sensitive reagents - Oil red O(ORO), Nile red, other techniques-Powder techniques, Cyanoacrylate fuming, Vacuum metal deposition.

Unit III Chemical analysis of explosives 10 h

Forensic examination of explosives - Chemical composition explosives - inorganic and organic high and low explosives, Chemical analysis 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 8 h

Forensic Identification of natural and synthetic drugs - Chemical Tests - Chen's Test, Mecke's Test, Marquis' Test, Nitric Acid Test, Primary, secondary, tertiary Amine Test, Froehde's 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 Instrumental Applications in Forensic Science 10 h

Role of Spectroscopic techniques in Forensic Science - UV Visible - Fluorescence and Phosphorescence - Atomic - (Absorption and Emission), IR. Electrochemical techniques, Potentiometry, Conductometry - Chromatographic Techniques in Forensic Science.

Text Books

1. Dikshit P. C, 2013, "Textbook of Forensic Medicine and Toxicology", 2nd Edition, Peepee Publishers and Distributors (P) Ltd., New Delhi.
2. Narayan Reddy K. S, 2017, "The Essentials of Forensic Medicine and Toxicology", 4th Edition, Jay Pee Brothers, New Delhi.

References

1. Richard S, 2017, "Criminalistics and introduction to forensic science", Prentice Hall of India, New Delhi.
2. James, S. H, and Nordby J. J, 2003, "Forensic Science: An introduction to scientific and investigative techniques", CRC Press, New Delhi.
3. Siegel J. A, Saukko P. J, 2012, "Encyclopedia of Forensic Sciences Vol. I, II and III", Acad. Press, New Delhi.
4. Nanda B. B, and Tewari R. K, 2001, "Forensic Science in India: A vision for the twenty first century" Select Publisher, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A6DD	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	K4
CO3	Acquire knowledge on concept in stereochemistry of polymers and their physical properties	K3
CO4	Understand the preparation, properties and uses of commercial polymers	K3
CO5	Attain knowledge on the polymerization and polymer processing techniques	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A6DD	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 – Elastomers - Spandex - Natural and synthetic rubber - Smoked rubber - Reclaimed rubber - Foam rubbers - Spongy rubber - Laminate rubber.

Unit II Mechanism of Polymerization 10 h

Chain polymerization - Free radical polymerization - Ionic polymerization - Step polymerization - Addition polymerization - Copolymerization - Conditions of formation of block, alternate and random copolymers - Ring opening polymerization - Electrochemical polymerization.

Unit III Polymer Stereochemistry 10 h

Stereospecific polymers - Factors influencing stereo regulations - Tacticity of polymers - Tactic, atactic and syndiotatic – Zeigler-Natta catalysts - Mono metallic mechanisms of Zeigler - Natta polymerization - Glass transition temperature - Factors influencing Tg - Determination of Tg - Glass transition temperature of copolymer, importance of Tg.

Unit IV Commercial Polymers 8 h

General methods of preparations - Properties and uses of the following polymers: Polyethylene, PVC, Polystyrene, Polyester, Phenol formaldehyde resin, Nylon, polyamide (kevlar) - Polymers for biomedical applications.

Unit V Polymer Technology 10 h

Polymerisation techniques: Bulk, solution, suspension and emulsion polymerization - Polymer processing techniques - Calendaring, Film casting, Die casting, Compression moulding, Injection moulding, Blow moulding and Reinforcing - Hand lay-up technique - Filament-Winding technique.

Text Books

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

References

1. Fred W Billmeyer, 2002, "Text book of polymer science", 3rd Edition, Wiley Eastern Ltd., NewDelhi.
2. Bahadur and Sastry N. V, 2005, "Principles of Polymer Science" 2nd Edition, Narosa Publishers, NewDelhi.
3. Stevens M. P, 2009, "Polymer Chemistry - An Introduction", 3rd Edition, Oxford Publications, NewDelhi.
4. Arora M. G, Singh M, 2002, "Polymer chemistry", Anmol publications Pvt. Ltd., NewDelhi.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A6DE	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 equipments.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	To 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 equipments.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A6DE	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 detection.

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 – gulab jamum, 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. Rangappa K. 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. Lampert L. M, 2017, "Modern Dairy 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.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A6DF	LEATHER CHEMISTRY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- To gain knowledge about the structure and composition of hides.
- To learn the different methods of tanning leather.
- To understand the pollution problems caused by tannery effluents.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	To obtain the knowledge on the structure and composition of the hides, skin and Leather	K3
CO2	To know the different types of tanning and the physico-chemical principles	K4
CO3	To widen a skill on the preparation and chemistry of chrome tanning liquids and their factors involving in it	K3
CO4	To explore the broad idea on the chemical methods of curing and preserving the hides in different medium	K3
CO5	To understand the problems caused by tannery effluents and know about disposal methods	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A6DF	LEATHER CHEMISTRY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Leather Manufacture 10 h

Introduction - Chief process used in leather manufacture - Hides, Skins, Leather – An elementary knowledge of the structure and composition of hides and skins. Proteins and their characteristics - Anatomy and histology of protein constituents of leather (an elementary concept).

Unit II Tanning 10 h

Types of tanning – Vegetable and mineral tanning, different types of vegetable tanning – Materials classification and chemistry of vegetable tanning. Factors and Physico-Chemical principles involved in vegetable tanning - Fixation of vegetable tanning.

Unit III Tanning Liquids 10 h

Preparation of chrome tanning liquids – Olation - Oxolation and hydrolysis of chrome liquids - Effect of adding tanning agents – Role of pH in the reaction of chromium complexes with hide proteins. Factors governing chrome tanning - Chemistry of neutralization process - A brief survey of chemistry of other tanning materials like Al, Zr and Te salts and their relative merit in contrast with chrome tanning.

Unit IV Chemical Methods of Tanning 10 h

Chemical methods of curing and preservation of hides and skins in acid and alkaline solutions - Principles of Analytical methods employed in curing, liming, deliming, bating, pickling - Analysis of vegetable tanning materials and extract

Unit V Tannery Effluents 8 h

Animal by-products – Their collection, handling and preservation methods (such as hair, blood, bones, glands, keratinous materials and their utilization) - Tannery effluents and treatment - Types of water pollution: physical, chemical, physiological and biological - Different types of tannery effluents and waste - Beam-house waste – Liquors – Tanning and finishing yard waste liquors, solid waste – Origin and disposal.

Text Books

1 Sharma B. K, 2008, "Industrial chemistry", Goel Publishing House, Meerut.

2 Jayashree Ghosh, 2008, "Fundamental Concepts of Applied Chemistry", S. Chand, New Delhi.

References

1 Covington A. D, 2015, "Tanning Chemistry: The Science of Leather", 1st Edition, Royal Society of Chemistry, UK.

2 Covington A. D, 2009, "Tanning Chemistry: The science of Leather", RSC Publisher.

3 Procter H. R, 2010, "The Principles of Leather Manufacture", Nabu Press, India.

4 Jain P. C, Jain M, 2007, "Engineering Chemistry", 15th Edition, Dhanpat Raj Publisher, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
193BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	AECC	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	S	M	M	M	M
CO2	S	M	M	M	M
CO3	S	M	M	M	M
CO4	S	M	M	M	M
CO5	S	M	M	M	M

S Strong M Medium L Low

193BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	SEMESTER VI

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Innovation, IPR 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 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 - Infringement of Patent.
Case Study: When Google was used for Patent Infringement.

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: Trademark mismanagement by Cadbury's.

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: Copyright Case of Napster and Grokster.

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: The story of the Tirupati Laddu.

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

Text Book

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

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

References

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

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

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

4 https://knowledgentia.com/knowledgeate.

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

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

Dr.NGPASC
COIMBATORE | INDIA

B.Sc. Chemistry (Students admitted during the AY 2020-21)