VELS

INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM - CHENNAI
ACCREDITED BY NAAC WITH 'A' GRADE
Marching Beyond 25 Years Successfully

B.Sc. Chemistry

Curriculum and Syllabus

Regulations 2021

(Based on Choice Based Credit System (CBCS)

and

Learning Outcomes based Curriculum Framework (LOCF))

Effective from the Academic year

2021-2022

Department of Chemistry

School of Basic Sciences

Vision and Mission of the Department

Vision

The Vision of the Department is to enhance our reputation as a world-class teaching and research institution reputed for its innovation, excellence and discovery, and to attract best students and staff worldwide.

Mission

- To actively promote and preserve higher values and ethics in education and research and will pursue excellence in all these areas.
- To undertake research in emerging areas of Chemical Sciences & Nanotechnology and transform the findings for the benefit of society.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO 1	To provide, knowledge based on value based education and ethical leadership in the professional and social life.
PEO 2	To provide the professional consultancy and research support for the relevant organization in the domain of super specialization.
PEO 3	To provide skills of observations and drawing logical inferences from the scientific experiments.
PEO 4	To gain knowledge of chemistry, physics and mathematics through theory and practicals.

PROGRAM OUTCOMES

PO1	**Problem analyze:** Identify, formulate, review research literature and analyze the chemical problems reaching substantiated conclusions using basics concepts of mathematics, physics and biology.
PO2	**Design and development of solutions:** Design solutions for complex chemical problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO3	**Conduct investigations of complex problems:** Use research based knowledge and including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO4	Gain Knowledge from basic concepts upto the level of application in to releavent industries
PO5	Elementry teaching entrepreneur in a small scale projects

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO1	Global level research opportunities to pursue Ph.D programme targeted approach of CSIR –NET examination
PSO2	Enormous job opportunities at all level of chemical , instrumentatons , food products industries ,life oriented material industries
PSO3	Specific placements in R & D & Allied Division

BOARD OF STUDIES

S. No	NAME	AFFILIATION	ROLE
1.	**Dr . G.Nithya**	Associate Professor & HoD, Department of Chemistry, Vels Institute of Science, Technology and Advanced Studies, Pallavaram, Chennai - 600 117.	Chair Person
2.	**Dr. Narasimhan Srinivasan**	Chairman and Managing Director, Asthagiri Herbal Research Foundation, Perungudi.	External Expert
3.	**Mr.V. Neelakantan**	Managing Director, Kousikh Therapeutics Private Limited, Gerugambakkam	External Expert
4.	**Ms. M. Vidhya lakshmi**	Chemist, Instrumentation department, ABC Techno labs India Private Limited.	Alumini Member
5.	**Dr. R. A. Kalaivani**	Professor & Director, School of Basic Sciences, Vels Institute of Science, Technology and Advanced Studies, Pallavaram,Chennai - 600 117.	Internal member
6.	**Dr.R.Sudha**	Associate Professor, Department of Chemistry, School of Basic Sciences, Vels Institute of Science, Technology and Advanced Studies, Pallavaram,Chennai - 600 117.	Internal member
7.	**Dr. T. Somanathan**	Associate Professor, Department of Chemistry, School of Basic Sciences, Vels Institute of Science, Technology and Advanced Studies, Pallavaram,Chennai - 600 117.	Internal member
8.	**Dr.M. Revathy**	Associate Professor, Department of Chemistry, School of Basic Sciences, Vels Institute of Science, Technology and Advanced Studies, Pallavaram,Chennai - 600 117.	Internal member
9.	**Mr.V.Sriraman**	Assistant Professor, Department of Chemistry, School of Basic Sciences, Vels Institute of Science, Technology and Advanced Studies, Pallavaram,Chennai - 600 117.	Internal member

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES (VISTAS)

CHENNAI - 600 117

REGULATIONS 2021

CHOICE BASED CREDIT SYSTEM AND LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK

COMMON TO BSC CHEMISTRY FULL-TIME PROGRAMMES

DEGREE OF BACHELOR OF SCIENCE IN CHEMISTRY

1. DURATION OF THE PROGRAMME

1.1. Three years (six semesters)

1.2. Each academic year shall be divided into two semesters. The odd semesters shall consist of the period from July to November of each year and the even semesters from January to May of each year.

1.3 There shall be not less than 90 working days for each semester.

2. ELIGIBILITY FOR ADMISSION

2.1. A pass in +2, HSC or equivalent as approved by Government of India/ Goverment of Tamilnadu/Any other State Government of India with chemistry as one of the subject.

3. CREDIT REQUIRMENTS AND ELIGIBILITY FOR AWARD OF DEGREE

3.1. A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in a College affiliated to the University for a period of not less than three academic years and passed the examinations of all the Six Semesters prescribed earning a minimum of 140 credits as per the distribution given in for Part I, II, III, IV & V and also fulfilled such other conditions as have been prescribed thereof.

4. COURSE OF STUDY, CREDITS AND SCHEME OF EXAMINATION

4.1. The Course Components and Credit Distribution shall consist Part I, II & III:

(Minimum number of Credits to be obtained)

Credit Assignment Each course is assigned certain number of credits based on the following: Contact period per week CREDITS

1 Lecture Period - 1 Credit

1 Tutorial Period - 1 Credit

2 Practical Periods - 1 Credit

(Laboratory / Seminar / Project Work / etc.)

5.REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

5.1. **Eligibility:** Students shall be eligible to go to subsequent semester only if they earn sufficient attendance as prescribed therefor by the Board of Management from time to time.

5.2. **Attendance:** All Students must earn 75% and above of attendance for appearing for the University Examination. (Theory/Practical)

5.3. **Condonation of shortage of attendance:** If a Student fails to earn the minimum attendance (Percentage stipulated), the HODs shall condone the shortage of attendance up to a maximum limit of 10% (i.e. between 65% and above and less than 75%) after collecting the prescribed fee towards the condonation of shortage of attendance. Such fees collected and should be remitted to the University.

5.4. **Non-eligibility for condonation of shortage of attendance:** Students who have secured less than 65 % but more than 50 %of attendance are NOT ELIGIBLE for condonation of shortage of attendance and such Students will not be permitted to appear for the regular examination, but will be allowed to proceed to the next year/next semester of the program

5.5. **Detained students for want of attendance:** Students who have earned less than 50% of attendanceshall be permitted to proceed to the next semester and to complete the Program of study. Such Students shall have to repeat the semester, which they have missed by rejoining after completion of final semester of the course, by paying the fee for the break of study as prescribed by the University from time to time.

5.6. **Condonation of shortage of attendance for married women students:**In respect of married women students undergoing UG programs, the minimum attendance for condonation (Theory/Practical) shall be relaxed and prescribed as 55% instead of 65% if they conceive during their academic career. Medical certificate from the Doctor together with the attendance details shall be forwarded to the university to consider the condonation of attendance mentioning the category.

5.7. **Zero Percent (0%) Attendance:** The Students, who have earned 0% of attendance, have to repeat the program (by rejoining) without proceeding to succeeding semester and they have to obtain prior permission from the University immediately to rejoin the program.

5.8. **Transfer of Studentsand Credits:** The strength of the credits system is that it permits inter Institutional transfer of students. By providing mobility, it enables individual students to develop their capabilities fully by permitting them to move from one Institution to another in accordance with their aptitude and abilities.

5.8.1. Transfer of Students is permitted from one Institution to another Institution for the same program with same nomenclature. Provided, there is a vacancy in the respective program of Study in the Institution where the transfer is requested. Provided the Student should have passed all the courses in the Institution from where the transfer is requested.

5.8.2.The marks obtained in the courses will be converted and grades will be assigned as per the University norms.

5.8.3. The transfer students are not eligible for classification.

5.8.4.The transfer students are not eligible for Ranking, Prizes and Medals.

5.8.5. Students who want to go to foreign Universities upto two semesters or Project Work with the prior approval of the Departmental/College Committee are allowed to get transfer of credits and marks which will be converted into Grades as per the University norms and are eligible to get CGPA and Classification; they are not eligible for Ranking, Prizes and Medals.

6. EXAMINATION AND EVALUATION

6.1.Register for all subjects:Students shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination. For this purpose, Students shall register for all the arrear subjects of earlier semesters along with the current (subsequent) Semester Subjects.

6.2.Marks for Internal and End Semester Examinations for PART I, II, III

6.2.1 There shall be no passing minimum for Internal.

6.2.2 For external examination, passing minimum shall be 40% [Forty Percentage] of the maximum marks prescribed for the paper for each Paper/Practical/Project and Viva-Voce.

6.2.3 In the aggregate [External/Internal] the passing minimum shall be of 40%.

6.2.4. He/She shall be declared to have passed the whole examination, if he/she passes in all the papers and practical wherever prescribed as per the scheme of the examinations by earning 140 CREDITS in PartI, II, III.

7. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAMS TO QUALIFY FOR A DEGREE

7.1.A Student who for whatever reasons is not able to complete the programs within the normal period (N) or the Minimum duration prescribed for the programme, may be allowed two years period beyond the normal period to clear the backlog to be qualified for the degree. (Time Span = N + 2 years for the completion of programme)

8. REVISION OF REGULATIONS, CURRICULUM AND SYLLABI

The University may from time to time revise, amend or change the Regulations, Curriculum, Syllabus and Scheme of examinations through the Academic Council with the approval of the Board of Management.

Learning Outcome based Curriculum Framework

Preamble

Over the past decades the higher education system of our country has undergone substantial structural and functional changes resulting in both quantitative and qualitative development of the beneficiaries. Such changes have gained momentum with the introduction of Choice Based Credit System (CBCS) which further expects learning outcome based curriculum in order to maximize the benefits of the newly designed curriculum. The learning outcome based curriculum in general and in Chemistry in particular will definitely help the teachers of the discipline to visualize the curriculum more specifically in terms of the learning outcomes expected from the students at the end of the instructional process. It is pertinent to mention here that the purpose of education is to develop an integrated personality of the individual and the educational system provides all knowledge and skills to the learner for this. The Learning outcome-based curriculum framework (LOCF) has been prepared to support designing uniform, advanced and effective Chemistry curriculum for undergraduate studies in Chemistry. The recommendations related to curriculum development is applicable for college/university education system which includes heads of schools/departments, practicing teachers, parents, employers, academics from tertiary institutions, professionals from related fields or related bodies and representatives from university/college examinations authorities. The LOCF guides are based on the consultation documents on curriculum framework of University Grants Commission and MOOCs. The concerns, needs and interests of students, teachers as well as societal expectations has been taken into consideration while developing these framework structure. Each subject content aims to present a curriculum framework, specifying the curriculum aims, learning targets and objectives, and thus providing suggestions regarding curriculum planning, learning and teaching strategies, assessment and

resources. In addition, the curriculum framework also provides examples of effective learning, teaching and assessment practices. A coherent understanding of the whole-undergraduate chemistry (major and pass) curriculum planning and the planning of student learning ability at subject levels can be established. Curriculum development is a collaborative and an on-going enhancement process, therefore, the same shall be updated and improved from time to time to meet new needs of students, teachers and society at large.

1. Introduction:

Academics and research in India is a priority which depends upon the quality of education.

Quality higher education include innovations that can be useful for efficient governance of higher education institutions, systems and society at large. Thus, fundamental approach to learning outcome-based curriculum framework emphasizes upon demonstration of understanding, knowledge, skills, attitudes and values in particular programme of study. The LOCF based programme intended to follow flexibility and innovation in design of the programme, its assessment, and expect graduate attributes demonstrating the level of learning outcome. It is further expected to provide effective teaching – learning strategies including periodic review of the programme and its academic standard. The learning outcome-based curriculum framework for B.Sc. degree in Chemistry is intended to provide a broad framework and hence designed to address the needs of the students with chemistry as the core subject of study. The framework is expected to assist in the maintenance of the standard of chemistry degrees/programmes across the country and periodic programme review within a broad framework of agreed/expected graduate attributes, qualification descriptors, programme learning outcomes and course-level learning outcomes. The framework is intended to allow flexibility and innovation in programme design, syllabi development, teaching-learning process and quality assessment of students learning levels.

This curriculum framework for the bachelor-level program in Chemistry is developedkeeping in view of the student centric learning pedagogy, which is entirely outcome-oriented and curiosity-driven. To avoid rote-learning approach and foster imagination, the curriculum is more leaned towards self-discovery of concepts. The curriculum framework focuses on pragmatist approach whereby practical application of theoretical concepts is taught with substantial coverage of practical and field works. The platform aims at equipping the graduates with necessary skills for Chemistry-related careers, careers with general graduate- level aptitude and for higher education in Chemistry and allied subjects. Augmented in this framework are graduate attributes including critical thinking, basic psychology, scientific reasoning, moral ethical reasoning and so on, qualification descriptors that are specific outcomes pertinent to the discipline of chemistry, learning outcomes for the two programmes

these frameworks have been developed, learning outcomes for individual courses, pedagogical methods and assessment methods. While designing these frameworks, emphasis is given on the objectively measurable teaching-learning outcomes to ensure employability of the graduates. In line with recent trends in education section, these frameworks foster implementation of modern pedagogical tools and concepts such as flip-class, hybrid learning, MOOCs and other e-learning platforms. In addition, the framework pragmatic to the core; it is designed such a way to enable the learners implementing the concepts to address the real world problems. A major emphasis of these frameworks is that the curriculum focuses on issues pertinent to India and also of the west; for example, green chemistry and biomaterials etc. Above all, these frameworks are holistic and aim to mould responsible Indian citizen to have reflective thinking, scientific temper, and digital literacy in order to acquire requisite skill to be self-employed entrepreneurial.

2. Learning Outcomes based approach to Curriculum Planning: (LOCF)

Curriculum is the heart of any educational system. It can be focused either to achieve the objectives of each course of the programme or on the expected learning outcomes from each course. The objective based curriculum refers to the overall targets to be achieved through curriculum which may be long term or immediate. On the other hand, the learning outcome based curriculum is very specific in nature in terms of changes in the cognitive, affective and psychomotor behavior of the students as a result of their exposure to the curriculum. The outcome based curriculum provides the teacher very specific targets which he can achieve through the selected instructional process as compared to the objective based curriculum which provides general outcomes. The learning outcome based curriculum has very close relationship with the learning of the students whereas objective based curriculum focusses on only providing knowledge to the students. In other words, higher cognitive skills are developed through learning outcome based curriculum. Hence, it is preferred to develop learning outcome based curriculum which will provide specific directions to the teacher with respect to the transaction process and expected changes in the behavior of the students as well.

Curriculum is the heart of any educational system. It can be focused either to achieve the objectives of each course of the programme or on the expected learning outcomes from each course. The objective based curriculum refers to the overall targets to be achieved through curriculum which may be long term or immediate. On the other hand, the learning outcome based curriculum is very specific in nature in terms of changes in the cognitive, affective and psychomotor behavior of the students as a result of their exposure to the

curriculum. The outcome based curriculum provides the teacher very specific targets which he can achieve through the selected instructional process as compared to the objective based curriculum which provides general outcomes. The learning outcome based curriculum has very close relationship with the learning of the students whereas objective based curriculum focusses on only providing knowledge to the students. In other words, higher cognitive skills are developed through learning outcome based curriculum. Hence, it is preferred to develop learning outcome based curriculum which will provide specific directions to the teacher with respect to the transaction process and expected changes in the behavior of the students as well.

2.1 Nature and extent of the B.Sc degree programme

Chemistry is normally referred to as the science that studies systematically the composition, properties, and reactivity of matter at the atomic and molecular level. The scope of chemistry as a subject is very broad. The key areas of study within the disciplinary/subject area of chemistry comprise: organic chemistry, inorganic chemistry, physical chemistry and analytical chemistry.Organic chemistry deals with the study of (most) substances containing the element carbon; Inorganic chemistry involves the study of all other substances; and physical chemistry deals with the application of concepts and laws to chemical phenomena. Analytical chemistry is concerned with the identification andquantification of materials and the determination of composition.

Degree programmesin Chemistry covers topics that overlap with the areas outlined above and that address the interfaces of chemistry with other subjects (such as chemical biology and chemical physics) and with applied fields (such as environmental chemistry, pharmaceutical chemistry, materials chemistry etc.). The depth and breadth of study of individual topics dealt with would vary with the nature of specific chemistry programmes. As a part of the efforts to enhance the employability of graduates of chemistryprogrammes, the curricula for these programmes are expected to include learning experiences that offeropportunities for a period of study in industry. These may involve both a major work-related chemistry project and some guided study.

2.2. Aims of the bachelor's degree programme in chemistry

The overall aims of bachelor's degree programme in chemistry are to:

- providestudents with learning experiences that helpinstill deep interests in learning chemistry; develop broad and balanced knowledge and understanding of key chemical concepts, principles, and theories related to chemistry;and equip students with appropriate tools of analysis to tackle issues and problems in the field of chemistry.

- develop in students the ability to apply the knowledge and skills they have acquired to the solution of specific theoretical and applied problems in chemistry,

- provide students with the knowledge and skill base that would enable them to undertake further studies in chemistry and related areas or in multidisciplinary areas that involve chemistry and help develop a range of generic skills that are relevant to wage employment, self-employment and entrepreneurship.

3. Undergraduate attributes in Basic Science:

Attributes of chemistry graduate under the outcome-based teaching-learning framework may encompass the following:

- **Core competency:** The chemistry graduates are expected to know the fundamental concepts of chemistry and applied chemistry. These fundamental concepts would reflect the latest understanding of the field, and therefore, are dynamic in nature and require frequent and time-bound revisions.
- **Communication skills:** Chemistry graduates are expected to possess minimum standards of communication skills expected of a science graduate in the country. They are expected to read and understand documents with in-depth analyses and logical arguments. Graduates are expected to be well-versed in speaking and communicating their idea/finding/concepts to wider audience.
- **Criticalthinking:** Chemistry graduates are expected to know basics of cognitive biases, mental models, logical fallacies, scientific methodology and constructing cogent scientific arguments.
- **Problem-solving:** Graduates are expected to be equipped with problem-solving philosophical approaches that are pertinent across the disciplines.
- **Analytical reasoning:** Graduates are expected to acquire formulate cogent arguments and spot logical flaws, inconsistencies, circular reasoning etc.

- **Research-skills:** Graduates are expected to be keenly observant about what is going on in the natural surroundings to awake their curiosity. Graduates are expected to design a scientific experiment through statistical hypothesis testing and other a priori reasoning including logical deduction.
- **Moral and ethical awareness:** Graduates are expected to be responsible citizen of India and be aware of moral and ethical baseline of the country and the world. They are expected to define their core ethical virtues good enough to distinguish what construes as illegal and crime in Indian constitution. Emphasis be given on academic and research ethics, including fair Benefit Sharing, Plagiarism, Scientific Misconduct and so on.
- **Leadership readiness:** Graduates are expected to be familiar with decision making process and basic managerial skills to become a better leader. Skills may include defining objective vision and mission, how to become charismatic inspiring leader and so on.

4. Qualification Descriptors:

The following may serve as the important qualification descriptors for a UG degree in Chemistry:

i. To demonstrate a systematic, extensive and coherent knowledge and understanding of academic fields of study as a whole and its applications and links to disciplinary areas of the study; including critical understanding of the established theories, principles and concepts of a number of advanced and emerging issues in the field of chemistry;

ii. To demonstrate procedural knowledge that creates different types of professionals in the field of chemistry. Further application of knowledge can enhance productivity of several economically important product. Knowledge of Chemistry is also necessary for the development and management of industry, manufacturing of fine chemicals, etc.

iii. Developing skills and ability to use knowledge efficiently in areas related to specializations and current updates in the subject.

iv. Demonstrate comprehensive knowledge about chemistry, current research, scholarly and professional literature of advanced learning areas of Chemistry.

v. Use knowledge understanding and skills for critical assessment of wide range of ideas and problems in the field of Chemistry.

vi. Communicate the results of studies in the academic field of Chemistry using main concepts, constructs and techniques.

vii. Apply one's knowledge and understanding of Chemistry to new/unfamiliar contexts and to identify problems and solutions in daily life.

viii. To think any apply understanding of the subject of Chemistry, Chemical Sciences sciences in identifying the problems which can be solved through the use of chemistry knowledge.

ix. To think of the adopting expertise in chemical sciences and solve the problems of environment, green chemistry, ecology, sustainable development, hunger, etc.

5. Objectives of the course:

The aim and objectives of the B.Sc. Chemistry course program essentially focus to develop skills of student for a successful career.

- The course structure emphasizes to put enough efforts in theory as well as laboratory work so as to gain thorough knowledge of the subject.

- The course includes project work that would develop and nourish the scientific approach and research attitude of the students.
- It is compulsory & essential for the students to read research papers, publications and deliver seminars that would better help them to know the recent advances in the subject andalso develop the communication skills.
- The program is designed in such a way that it is essential for the students to read original publications, put enough efforts in laboratory work for practical and project, be acquainted with all the recent advances in the field like drug synthesis and extracts all the skills for a successful career

6. Programme Learning Outcome

The student graduating with the Degree B.Sc. Chemistry should be able to acquire

i. Systematic and coherent understanding of the fundamental concepts in Physical chemistry, Organic Chemistry, Inorganic Chemistry, Analytical Chemistry and all other related allied chemistry subjects.

ii. Students will be able to use the evidence based comparative chemistry approach to explain the chemical synthesis and analysis.

iii. The students will be able to understand the characterization of materials.

iv. Students will be able to understand the basic principle of equipment's, instruments used in the chemistry laboratory.

v. Students will be able to demonstrate the experimental techniques and methods of their area of specialization in Chemistry.

vi. **Disciplinary knowledge and skill:** A graduate student is expected to be capable of demonstrating comprehensive knowledge and understanding of both theoretical and experimental/applied chemistry knowledge in various fields of interest like Analytical Chemistry, Physical Chemistry, Inorganic Chemistry, Organic Chemistry, Material Chemistry, etc. Further, the student will be capable of using of advanced instruments and related soft-wares for in-depth characterization of materials/chemical analysis and separation technology.

vii. **Skilled communicator:** The course curriculum incorporates basics andadvanced training in order to make a graduate student capable of expressing the subject through technical writing as well as through oral presentation.

viii. **Critical thinker and problem solver:** The course curriculum also includes components that can be helpful to graduate students to develop critical thinking ability by way of solving problems/numerical using basic chemistry knowledge and concepts.

ix. **Sense of inquiry:** It is expected that the course curriculum will develop an inquisitive characteristics among the students through appropriate questions, planning and reporting experimental investigation.

x. **Team player:** The course curriculum has been designed to provide opportunity to act as team player by contributing in laboratory, field based situation and industry.

xi. **Lifelong learner:** The course curriculum is designed to inculcate a habit of learning continuously through use of advanced ICT technique and other available techniques/books/journals for personal academic growth as well as for increasing employability opportunity.

7. Teaching learning Process

The learning outcomes based course curriculum framework of Chemistry is designed to persuade the subject specific knowledge as well as relevant understanding of the course. The academic and professional skills required for Chemistry-based professions and jobs are also offered by same course in an extraordinary way. In addition, the learning experiences gained from this course should be designed and implemented for cognitive development in every student. The practical associated with this course helps to develop an important aspect of the teaching-learning process. Various types of teaching and learning processes will need to be adopted to achieve the same. The important relevant teaching and learning processes involved in this course are;

- Class lectures
- Seminars
- Tutorials
- Group discussions and Workshops
- Peer teaching and learning
- Question preparation
- Subjective type
- Long answer
- Short answer
- Objective type
    i. Multiple choice questions
    ii. One answer/two answer type questions
    iii. Assertion and reasoning
- Practicum, and project-based learning

- Field-based learning
- Substantial laboratory-based practical component and experiments
- Open-ended project work,
- Games
- Technology-enabled learning
- Internship in industry, and research establishments.

8. **Assesment methods:** In order to meet the present competitive world in placements the evaluation and assessment is carried out in terms of continuous assessment test seminar assignment viva voce and MCQ incorporated end semester exams. All the test methods are carried with the follow up of blooms taxonomy and rubrics. This assessment method is executed to suit all categories of students namely below average, average and outstanding students which will obviously results in real attainment of CO and PO.

Vels Institute of Science and Technology and Advanced studies (VISTAS)

B.Sc Degree Course

Courses of Study and Scheme of Assessment

(Minimum Credits to be earned: 140)

B.Sc Course Components

Component	**I Sem**	**II Sem**	**III Sem**	**IV Sem**	**V Sem**	**VI Sem**	**Total Credits**
Core Courses & Languages	16 +6	16+6	14+6	15+6	4	-	89
Ability Enhancement t Courses (AEC)	2	-	2	-	-	-	4
Discipline Specific Elective(DSE)&Generic Elective(GEC)	-	-	-	-	16	12	28
Skill enhancement Course(SEC)	-	2	2	3	2	3	12
GE	-	-	-	-	-	2	2
DE	-	-	-	-	-	5	5
Total Credits	**24**	**24**	**24**	**24**	**22**	**22**	**140**

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES (VISTAS)

B.Sc. DEGREE COURSE

COURSES OF STUDY AND SCHEME OF ASSESSMENT(MINIMUM CREDITS TO BE EARNED: 140)

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES (VISTAS)

B.Sc., CHEMISTRY

COURSES OF STUDY AND SCHEME OF ASSESSMENT CREDITS: 140

SEMESTER 1		Hours/Week				Maximum Marks		
Code No.	Course	Lecture	Tutorial	Practical	Credits	CA	SEE	Total
LANG	Tamil I/Hindi / French I	3	0	0	3	40	60	100
ENG	English I	3	0	0	3	40	60	100
CORE	Basic Chemistry	3	1	0	4	40	60	100
CORE	Chemistry of Hydrocarbon	3	1	0	4	40	60	100
CORE	Mathematics I	4	0	0	4	40	60	100
CORE	Inorganic Quantitative Analysis And Inorganic Preparations Practical-PracticaI I	0	0	4	2	40	60	100
CORE	Organic Preparations Practical-Practical-II	0	0	4	2	40	60	100
AECC	Communication Skills	1	0	2	2	40	60	100
SEC	Orientation/Induction Programme/Life skills	-	-	-	-	-	-	-
		17	2	10	24			

SEMESTER 2

		Hours/Week				Maximum Marks		
Code No.	Course	Lecture	Tutorial	Practical	Credits	CA	SEE	Total
LANG	Tamil II /Hindi/ FrenchII	3	0	0	3	40	60	100
ENG	English II	3	0	0	3	40	60	100
CORE	Electro Chemistry and Surface Chemistry	3	1	0	4	40	60	100
CORE	Analytical Methods	3	1	0	4	40	60	100
CORE	Mathematics II	4	0	0	4	40	60	100
CORE	Gravimetric Analysis Practical- Practical III	0	0	4	2	40	60	100
CORE	Inorganic Qualitative Analysis Practical-Practical IV	0	0	4	2	40	60	100
SEC	Soft Skills - I / Sector Skill Council Course	2	0	0	2	40	60	100
SEC	NSS / NCC / Swachh Bharat / Inplant Training	-	-	-	-	-	-	-
		18	2	8	24			

CA - Continuous Assessment SEE - Semester End Examination

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES
Programme: B.Sc. DEGREE COURSE - CHEMISTRY

SEMESTER 3

		Hours/Week				Maximum Marks		
Code No.	Course	Lecture	Tutorial	Practical	Credits	CA	SEE	Total
LANG	Tamil III /Hindi / FrenchIII	3	0	0	3	40	60	100
ENG	English – III	3	0	0	3	40	60	100
CORE	Co-ordination Chemistry	4	0	0	4	40	60	100
CORE	Quantum Mechanics and Thermodynamics	4	0	0	4	40	60	100
CORE	Fundamentals of Physics- I	4	0	0	4	40	60	100
CORE	Physical Chemistry Practical- Practical V	0	0	4	2	40	60	100
AECC	Environmental Studies	2	0	0	2	40	60	100
SEC	Soft Skills - II / Sector Skill Council Course	2	0	0	2	40	60	100
SEC	Swayam / NPTEL / Value Added Course	-	-	-	-	-	-	-
		22	0	4	24			

SEMESTER 4		Hours/Week				Maximum Marks		
Code No.	Course	Lecture	Tutorial	Practical	Credits	CA	SEE	Total
LANG	Tamil IV /Hindi /FrenchIV	3	0	0	3	40	60	100
ENG	English IV	3	0	0	3	40	60	100
CORE	Atomic Theory	3	1	0	4	40	60	100
CORE	Heterocyclic Compounds	3	1	0	4	40	60	100
CORE	Fundamentals of Physics II	3	0	0	3	40	60	100
CORE	Organic Qualitative Analysis Practical- Practical VI	0	0	4	2	40	60	100
CORE	Physics Practical– Practical VII	0	0	4	2	40	60	100
SEC	Soft Skills III / Sector Skill Council Course	2	0	0	2	40	60	100
SEC	Internship / Capability Enhancement Programme	0	0	2	1	40	60	100
		17	2	10	24			

CA - Continuous Assessment SEE - Semester End Examination

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES
Programme: B.Sc. DEGREE COURSE - CHEMISTRY

SEMESTER 5

		Hours/Week				Maximum Marks		
Code No.	Course	Lecture	Tutorial	Practical	Credits	CA	SEE	Total
CORE	Stereochemistry and reaction mechanism	4	0	0	4	40	60	100
DSE	Discipline Specific Elective – I	3	0	0	3	40	60	100
DSE	Discipline Specific Elective – II	3	0	0	3	40	60	100
DSE	Discipline Specific Elective – III	3	0	0	3	40	60	100
DSE	Discipline Specific Elective – IV	3	0	0	3	40	60	100
DSE	Inorganic Chemistry Practical –Practical VIII	0	0	4	2	40	60	100
DSE	Analytical Chemistry Practical- Practical IX	0	0	4	2	40	60	100
SEC	Internship / Mini Project / Sector Skill Council Course	0	0	4	2	40	60	100
SEC	Skill enhancement training /Student Club Activites	-	-	-	-	-	-	-
		16	0	12	22			

SEMESTER 6		Hours/Week				Maximum Marks		
Code No.	Course	Lecture	Tutorial	Practical	Credits	CA	SEE	Total
DSE	Discipline Specific Elective – V	3	1	0	4	40	60	100
DSE	Discipline Specific Elective – VI	3	1	0	4	40	60	100
DSE	Discipline Specific Elective - VII	3	1	0	4	40	60	100
GE	Generic Elective	2	0	0	2	40	60	100
SEC	Entrepreneurship Development	2	0	0	2	40	60	100
DE	Project Work	0	0	10	5	40	60	100
SEC	Technical Seminar / Innovation Council / Start up Initiative	0	0	2	1	40	60	100
		13	3	12	22			

CA - Continuous Assessment SEE - Semester End Examination

LIST OF DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE)

S. No.	Courses
1.	Chemistry of metals and non metals
2.	Bio Inorganic chemistry
3.	Nuclear and solid state chemistry
5.	Phase Equilibria and kinetics
6.	Chemistry of natural products
7.	Introduction to nanoscience and nanotechnology
8.	Agro industrial chemistry
9.	Chemistry of materials
10.	Pharmaceutical chemistry
11.	Chemistry in everyday life
12.	Forensic chemistry
13.	Dye chemistry
14.	Green methods in chemistry
15.	Polymer Chemistry
16.	Medicinal chemistry
17	Organic Spectroscopy
18	Inorganic Chemistry practical
19	Analytical Chemistry Practical

LIST OF GENERIC ELECTIVE COURSES (GEC)

S. No.	Subject Title
1.	Green Chemistry
2.	Chem informatics
3.	Food Chemistry and Adulteration

LIST OF ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

S. No.	Subject Title
1	Communication Skills
2	Environmental studies

LIST OF SKILL ENHANCEMENT ELECTIVE COURSES (SEC)

S. No.	Subject Title
1	Soft skills – I
2	Soft skills – II
3	Personality Development – I
4	Personality Development – II
5	Personality Development – III
6	National Service Scheme – I
7	National Service Scheme – II
8	National Service Scheme – III
9	National Service Scheme – IV
10	National Service Scheme – V
11	Technical Seminar

LIST OF LANGUAGES

S. No.	code	Courses	
1.	21LTAM11	Tamil-I	Language -I
	21LHIN11	Hindi-I	
	21LFRE11	French-I	
2.	21LENG11	English – I	
3.	21LTAM21	Tamil-II	Language -II
	21LHIN21	Hindi-II	
	21LFRE21	French-II	
4.	21LENG21	English – II	
5.	21LTAM31	Tamil-III	Language -III
	21LHIN31	Hindi-III	
	21LFRE31	French-III	
6.	21LENG11	English – III	
7.	21LTAM41	Tamil-IV	Language -IV
	21LHIN41	Hindi-IV	
	21LFRE41	French-IV	
8.	21LENG41	English – IV	

பாடக் குறியீட்டு எண்: 21LTA001

பருவம்-1, தமிழ்மொழிப்பாடம்-1, பகுதி-1, தகுதிப்புள்ளி: 3, வாரப் பாட நேரம்: 3.

தாள்-1

இக்காலக் கவிதைகள் – உரைநடை – பண்பாடு – மொழித்திறன்

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், தற்கால தமிழ் இலக்கிய வகைமைகளான மரபுக்கவிதை, புதுக்கவிதை, உரைநடை ஆகியவற்றை அறிமுகப்படுத்துதல், தமிழர்தம் வாழ்வியல் நெறிகளையும் பண்பாட்டுச் செழுமைகளையும் இன்றைய தலைமுறையினர் அறியச் செய்தல், மாணவர்களுக்குத் தமிழைத் தவறின்றி எழுதுவதற்குத் தேவையான பயிற்சி அளித்து அவர்களின் மொழித்திறனை மேம்படுத்துதல், செய்யுளின் நலத்தைப் பாராட்டும் முறைமையை அறியச் செய்து அதன்வழி சிந்தனை வளத்தைப் பெருகச் செய்தல் என்பனவும் மேற்கண்டவழி மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்து அவர்களுக்கு வேலைவாய்ப்பை உருவாக்குவதும் இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1: மரபுக்கவிதை 9 மணி நேரம்

1. பாரதியார் - பாரத தேசம் என்னும் தலைப்பில் ஆறு பாடல்கள்.
   (பாடல் எண்கள் 1, 6, 7, 9, 12, 13)
2. பாரதிதாசன் – தமிழுக்கும் அமுதென்று பேர் என்னும் தலைப்பிலான கவிதை.
3. தேசிக விநாயகம் பிள்ளை - உடல் நலம் பேணல் என்னும் தலைப்பிலான கவிதை
4. முடியரசன் - காவியப் பாவை – "புண்படுமா" என்னும் கவிதை.

அலகு 2: புதுக்கவிதை 9 மணி நேரம்

1. நா. காமராசன் - ***கறுப்பு மலர்கள்*** தொகுப்பில் ***காகிதப்பூக்கள்*** என்னும் தலைப்பிலான கவிதை.
2. அப்துல் ரகுமான் - ***ஆலாபனை*** தொகுப்பில் ***போட்டி*** என்னும் தலைப்பிலான கவிதை
3. ஈரோடு தமிழன்பன் - ***ஒரு வண்டி சென்ரியு*** தொகுப்பில் தேர்ந்தெடுக்கப்பட்ட சென்ரியு கவிதைகள்
4. ஆண்டாள் பிரியதர்ஷினி – ***முத்தங்கள் தீர்ந்துவிட்டன*** தொகுப்பில் ***'இங்கே வரும் போது'*** என்னும் தலைப்பிலான கவிதை

அலகு 3: உரைநடை 9 மணி நேரம்

1. **மாணாக்கரும் தாய்மொழியும்** - திரு.வி.க.,
2. **மன வலிமை வேண்டும் - மு.வரதராசனார்**
3. **செம்மொழித் தமிழின் சிறப்புகள்**

4. பண்டைத் தமிழரின் சாதனைச் சுவடுகள்

அலகு 4: தமிழர் வாழ்வும் பண்பாடும் 9 மணி நேரம்

பண்பாடு – வாழ்வியல் முறை – அகம், புறம் - உணவு முறை - விருந்தோம்பல் - நம்பிக்கைகள் – விழாவும் வழிபாடும் - கலைகள் - கட்டடம் - சிற்பம் - ஓவியம் - இசை – கூத்து – தொழிலும் வணிகமும் – அறிவியல் நோக்கு.

அலகு 5: மொழித்திறன், இலக்கிய வரலாறு, இலக்கணம் 9 மணி நேரம்

1. எழுத்துப் பிழை, தொடர்ப் பிழைகள்
2. வேற்றுமை இலக்கணம்
3. செய்யுள் நலம் பாராட்டல்
4. பாடம் தழுவிய இலக்கிய வரலாறு (மரபுக் கவிதை, புதுக்கவிதை, உரைநடை)

மொத்தம்: 45 மணி நேரம்

பார்வை நூல்கள்

1. **தமிழர் நாகரிகமும் பண்பாடும்,** டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், 2001.
2. **தவறின்றித் தமிழ் எழுதுவோம்**, மா. நன்னன், ஏகம் பதிப்பகம், 1999.
3. **தவறின்றித் தமிழ் எழுத** - மருதூர் அரங்கராசன், ஐந்திணைப் பதிப்பகம், 2003.
4. **தமிழ் இலக்கிய வரலாறு**, வரதராசன், மு., புது தில்லி : சாகித்திய அக்காதெமி, 2002.
5. **புதிய தமிழ் இலக்கிய வரலாறு**, நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாடெமி, 2007.
6. **செம்மொழி தமிழின் சிறப்பியல்புகள்** - முனைவர் மறைமலை இலக்குவனார்; https://www.youtube.com/watch?v=HHZnmJb4jSY
7. **பாடநூல் தேடலுக்கான இணையம் -** https://archive.org/

HINDI SYLLABUS **3 0 0 3**

I year-I Sem (Prose,Letter writing& Technical words)

Course Objective:

- To enable the students to develop communication skills
- To train students in official language
- To enrich their knowledge in Hindi literature
- To teach them human values & create awareness towards exploitation

Unit I - ' Ek atuut kadi' by shri Rajkishore **9**
letter writing (application),
Technical words (prashasanik vakyansh:1-50).

Unit II 'Devi singh' by agyeya , **9**
letter writing (bank A/C opening&closing),
Technical words (prashasanik vakyansh:51-100).

Unit III ' kabiraa ki kaashi 'by Kumar Ravindra **9**

Unit IV ' bharathiya vigyan ki kahaani - 'hamne diyaa ,hamneliyaa' **9**
'by Gunakar mule, letter writing (shikayath pathra, gyapan)
Technical words: takniki shabd-25**.**

Unit V letter writing (sarkari pathra, ardha sarkaari **9**
pathra, kaaryalaya aadesh),
Technical words: takniki shabd-25**.**

Total hours:45

Course Outcome

- Students will be familiar with official letter writing
- will understand their responsibility in the society
- students will be moulded with good character understand human values
- students will gain knowledge about ancient &,rich culture of India
- will know the equivalent Hindi words for scientific terms

Text /Reference Books :

1. Agyeya ki sampoorna kahaniyaa - Rajpal &sons, year 2017,
2. Yatraye our bhi ,Kumar Ravindra Rashmi prakashan ,Lucknow
3. Bharathiya vigyan ki kahani, Hindi book centre ,NewDelhi
Gadya Khosh

Weblinks:

http://www.hindisamay.com/content/1321/1/%E0%A4%B0%E0%A4%BE%E0%A4

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0

21LFRE11 FRENCH - I 3 0 0 3

Course objective: To introduce French Language and enable the students to understand and to acquire the basic knowledge of French language with the elementary grammar.

UNIT I INTRODUCTION 09

Introduction - Alphabet – Comment prononcer, écrire et lire les mots- Base : Les prénoms personnel de 1er, 2ème et 3ème personnes – Conjugaisons les verbes être et avoir en forme affirmative, négative et interrogative

UNIT II Leçons 1- 3 09

Leçons 1.Premiers mots en français,- 2. Les hommes sont difficiles,- 3 Vive la liberté- Réponses aux questions tirés de la leçon - Grammaire : Les adjectives masculines ou féminines – Les articles définis et indéfinis – Singuliers et pluriels

UNIT III Leçons 4- 6 09

Leçons 4. L'heure, C'est l ; heure,- 5. Elle va revoir sa Normandie,- 6 .Mettez –vous d'accord groupe de nom - Réponses aux questions tirés de la leçon - Grammaire : A placer et accorder l'adjectif en groupe de nom- Préposition de lieu –A écrire les nombres et l'heure en français

UNIT VI Leçons 7- 9 09

Leçons7. Trois visage de l'aventure,- 8. A moi, Auvergne,- 9. Recit de voyage – Réponses aux questions tirés de la leçon - Grammaire : Adjectif possessif – Les Phrases au Présent de l'indicatif - Les phrases avec les verbes pronominaux au présent

UNIT V Composition 09

A écrire une lettre à un ami l'invitant à une célébration différente ex : mariage – A faire le dialogue - A lire le passage et répondre aux questions

TOTAL : 45 Hrs

Course outcome

- To construct simple sentences in French using accurate rudiments of syntax and grammar
- To write short paragraphs on simple topics, e.g., (food, past memories, vacations, daily routines, shopping, health, love and hopes, etc.)
- To demonstrate an elementary knowledge of French sentence structure through speaking and writing
- To pronounce French reasonably well
- To read French at an elementary level

Text Book

1. Jacky GIRARDER & Jean Marie GRIDLIG, Méthode de Français PANORAMA, Clé Intérnational Goyal Publication, New Delhi., Edition 2004

Reference Books

1. DONDO Mathurin , " Modern French Course", Oxford University Press., New Delhi., Edition 1997
2. Nitya Vijayakumar, "Get Ready French Grammar-Elementary", Goyal Publications, New Delhi., Edition 2010

ENGLISH I - PROSE **3 0 0 3**

Course Objective:

- To enable students to develop their communication skills effectively. To make students familiar with usage skills in English Language.
- To enrich their vocabulary in English
- To develop communicative competency.

UNIT I **09**

1. Dangers of Drug Abuse - Hardin B Jones
2. Tight Corners - E. V. Lucas

UNIT II **09**

3. Futurology - Aldous Huxley
4. If You are Wrong, Admit it - Dale Breckenridge Carnegie

UNIT III **09**

5. Industry - Dr.M.Narayana Rao & Dr.B.G.Barki
6. Turning Point of My Life - A.J Cronin

UNIT IV **09**

7. Excitement - Mack R. Douglas
8. The Kanda Man Eater - Jim Corbett

UNIT V **09**

9. Vocabulary and Exercises under the Lessons

Total :45 Hours

Note: Lessons prescribed are from various anthologies and respective exercises therein will be taught.

Course Outcome

At the end of this course students will be able to,

CO1 Examine the language of prose.

CO2 Utilize instructions on fundamentals of grammar

CO3 Develop their own style of writing after studying diverse prose essays.

CO4 Classify different essays on the basis of their types.

CO5 Critically comment on the textual content of prose.

Books Prescribed:

- English for Communication Enrichment: by Jeya Santhi June 2015.
- Dr. M. Narayana Rao and Dr. B. G. Barki – Anu's Current English for Communication (AnuChitra). June 2012.
- Dr. Ananthan , R. Effective Communication. Ed. Chennai : Anu Chithra Pub.2010.

Web Sources:

- https://www.gradesaver.com/
- https://www.enotes.com/
- https://www.jstor.org/
- https://www.sparknotes.com/
- https://www.cliffsnotes.com/

21CBHC11 BASIC CHEMISTRY 3 1 0 4

Course objective

To revive the fundamentals and basics of chemistry learned at school level with detailed explanation.

Unit I Inductive and Field effect 12

Electron displacement effects: Inductive, mesomeric, resonance, hyperconjugation and steric effects. Tautomerism: Keto-enoltautomerism-Amido-imidol and nitro acinitro forms. Stability of reaction intermediates, carbocation, carbanion, and free radicals.

Aromaticity and resonance: Huckel's rule, Benzene, Naphthalene, Heterocyclic compounds

Unit II Nomenclature, Classification and Basic Properties 12

Nomenclature of simple organic compounds. Isomerism- optical, geometric-basic concepts Mechanism: addition, elimination, substitution with specific examples. Hybridization and Geometry of simple molecules like CH_4, C_2H_4, C_2H_2, C_6H_6

Unit III Gaseous state 12

Gaseous state – Gas laws – postulates of kinetic theory – collisions – gas pressure – average kinetic energy of translational- Boltzmann constant. Calculation of most probable, average, and root mean square speeds of molecules. Real gases, compressibility factor, deviation from ideality – van der Waals' equation – Boyle temperature – critical phenomena – critical constants – law of corresponding states and reduced equation of state – intermolecular forces and liquefaction of gases.

Unit IV Liquids and Solutions 12

Liquid state – Qualitative treatment of the structure of the liquid state – liquid crystals (elementary discussion on classification, structure and properties).

Solutions: Solutions of gases in liquids – Henry's law, Solution of liquids in liquids. Raoult's law, Binary liquid mixtures – Ideal solutions – vapour pressure – Clapeyron – Clausius equation-uses – elevation of boiling point and depression of freezing point, calculation of molecular weights.

Unit V Weights, Mole Concepts and Chemical Bonding 12

Atomic weight – equivalent weight- molecular weight mole concept. Pauli's exclusion principle.Hunds rule. Aufbau principle –classification of elements viz., s.p,d and f –block elements.

Ionic bond-Lattice energy-Born, Haber cycle –covalent bond power and polarisability – Fajan's rules, VB theory and VSPER theory –shapes of simple inorganic molecules and ions containing lone pairs and bond pairs. MO theory – bonding and antibonding orbitals-non bonding orbitals-MO configuration of simple diatomic molecules (H_2, He_2, N_2, O_2, B_2, F_2, CO,NO and their ions,-comparison of V band MO theories.

Total: 60 hrs

Course Outcome

- To understand the nature and function of reaction intermediates
- To learn the stability and aromaticity of organic molecules
- To understand the geometry of simple organic compounds
- To know the basic mechanism of different reactions (addition, elimination & substitution)
- To understand the laws of gaseous behaviour

Text Books

1. P. L. Soni, "Text Book of Organic Chemistry" Sultan Chand & sons. 32nd edition. **2013**
2. B. R. Puri, L. R. Sharma, Pathania, "principle of Physical Chemistry" Vishal Publishing & Co., 46th edition **2013**
3. P. L. Soni, "Text Book of Inorganic Chemistry" Sultan Chand & sons. 32nd edition. **2013**

Reference Books

1. James E. Huheey, Ellen, A. Keiter, Richard, L. Keiter, "Inorganic Chemistry" Pearson education (Singapore Pvt Limited) 9th edition, **2013**
2. J. D.Lee, Concise Inorganic chemistry" Blackwell Science Limited (France) 9th edition **2013**
3. Robert Thornton Morrison, Robert Neilson Boyd, "Organic Chemistry" Ashok K. Ghosh 10th edition, **2013**
4. Dr. Jagadambasingh, Dr. L. D. S. Yadav, "Advanced Organic Chemistry" PragatiPrakashan, 7th Edition, **2011**
5. Kundu and Jain, "Physical Chemistry" S. Chand, 6th edition, **2011**

Websource / web link

1. **https://www.toppr.com/guides/general-knowledge/basic-science/basic-chemistry/**
2. **https://ncert.nic.in/ncerts/l/kech101.pdf**
3. **https://www.coursera.org/learn/basic-chemistry**

21CBHC12 CHEMISTRY OF HYDROCARBONS 3 1 0 4

Course objective

To know about what are hydrocarbons and their classification, conformations, preparations, properties and about aromaticity.

Unit I Classifications of hydrocarbons 12

Chemistry of alkanes and cycloalkanes petroleum source of alkanes-Methods of preparing alkanes and cycloalkanes – chemical properties –mechanism of free radical substitutions in alkanes –uses.

Unit II Conformational Analysis 12

Conformational study of ethane and n-butane – Relative stability of cyclo alkanes from cyclopropaneuptocyclooctane – Bayer's straintheory – Limitations – cyclohexane and mono- and disubstitutedcyclohexanes.

Unit III Preparation methods of hydrocarbons 12

General methods of preparation and properties of Alkenes and alkynes-electrophilic and radical addition mechanisms- addition reactions with H_2,X_2, HX, HOX, H_2SO_4, H_2O , hydroboration Ozonolysis and peroxide effect. Hydroxylation of alkenes with $KmnO_4$- allylic substitution of alkenes by NBS –acidity of alkynes and formation of acetylides-test for alkenes and alkynes.

Unit IV Types of Dienes and reactions 12

Dienes-types-stability-preparation of 1, 3 butadiene, isoprene and chloroprene-reactivity –1, 2 and 1, 4 additions in conjugated dienes,-Diels-Alder reaction. Types of polymerization-mechanisms of ionic and free radical addition polymerization.

Unit V Aromaticity and preparation of aromatic compounds 12

Aromaticity-Huckel's rule-resonance in benzene –electrophilic substitution in aromatic compounds-general nitration, sulphonation, Friedelcraft's alkylation and acylation-Orientation and reactivity in monosubstituted benzenes polynuclear hydrocarbons –naphthalene, anthracene and phenanthrene – preparation, properties and uses.

Total: 60 hrs

Course Outcome

- To be well versed in Classifications of hydrocarbons
- To understand the chemical properties and mechanism of free radical substitutions in
- alkanes
- To understand the Conformational Analysis of saturated and unsaturated organic compounds
- To clearly understand electrophilic substitution in aromatic compounds-general nitration,
  sulphonation, Friedelcraft's alkylation

Text Book

1. P. L. Soni, "Text Book of Organic Chemistry" Sultan Chand & sons. 32nd edition. **2013**

Reference Books

1. Robert Thornton Morrison, Robert Neilson Boyd, "Organic Chemistry" Ashok K. Ghosh 10th edition, **2013**
2. Dr. Jagadambasingh, Dr. L. D. S. Yadav, "Advanced Organic Chemistry" PragatiPrakashan, 7th Edition, **2011**

Websource / Weblink

1. https://ncert.nic.in/textbook/pdf/kech206.pdf
2. https://courses.lumenlearning.com/introchem/chapter/introduction-to-hydrocarbons/

21CBHC13 Mathematics-I 4 0 0 4

Course objective: To develop the skills of the students in the areas of Algebra, Numerical methods Trigonometry and Calculus.The course will also serve as a prerequisite for post graduate and specialized studies and research**.**

UNIT – I ALGEBRA AND NUMERICAL METHODS

Algebra: Summation of series simple problems. Numerical Methods: Operators EΔ∇, difference tables -Newton's forward and backward interpolation formulae for equal intervals, Lagrange's interpolation formula. **12**

UNIT- II MATRICES

Introduction-Basic operations-Symmetric-skew symmetric-Hermitian- Skew Hermitian – Unitary-orthogonal-Inverse of a matrix -Solution of linear system(Cramer's rule)- Finding the Eigen roots and Eigen vectors of a matrix-Cayley Hamilton theorem(without proof). **12**

UNIT- III THEORY OF EQUATIONS

Polynomial equations with real coefficients, irrational roots, complex roots, symmetric functions of roots, transformation of equation by increasing or decreasing roots by a constant, reciprocal equation.Newton's method to find a root approximately - simple problems. **12**

UNIT- IV TRIGONOMETRY

Introduction- Expansions of sinnθ and cosnθ in a series of powers of sinθ and cosθ - Expansions of sinnθ, cosnθ, tannθ in a series of sines, cosines and tangents of multiples of "θ" -Expansions of sinθ, cosθ and tanθ in a series of powers of "θ" – Hyperbolic and inverse hyperbolic functions - Logarithms of complex numbers.

12

UNIT- V DIFFERENTIAL CALCULUS

Differentiation-Successive differentiation, n^{th} derivatives, Leibnitz theorem (without proof) and applications, Jacobians, Curvature and radius of curvature in Cartesian co-ordinates, maxima and minima of functions of two variables. **12**

Total 60 Hours

Course Outcome:

- Evaluate the underlying assumptions of analysis tools and relations of Set Theory
- Understand and discuss the applications of matrices and utilizes.
- Discuss the uses and limitations of Theory of equations
- Understand the key terminology, concept tools and techniques used in trigonometry.
- Apply the maxima and minima in detailed ways and the applications of partial differential equations.

TEXT BOOKS

1. P. Kandaswamy and K.Thilagavathy, Allied Mathematics paper I, 1st Semester, S.Chand Publishing Pvt. Ltd. 1st Edition,2003.
2. S. Narayanan and T.K. ManickavasagamPillai – Ancillary Mathematics, S. Viswanathan Printers, 1986, Chennai.

REFERENCE BOOKS

1. P.R. Vittal, Allied Mathematics, Margham Publications, 4th Edition 2009.
2. A. Singaravelu, Allied Mathematics, Meenakshi Agency, 2007.
3. P. Duraipandian and S.UdayaBaskaran, Allied Mathematics, Vol. I & II Muhil Publications, Chennai.

Web sources

1. https://books.google.co.in/books?id=4C4rDAAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
2. https://ncert.nic.in/ncerts/l/keep203.pdf
3. http://www.universityofcalicut.info/SDE/VI%20Sem.%20B.Sc%20Maths%20-%20Additional%20Course%20in%20lie%20of%20Project%20-Theory%20of%20equations%20&%20fuzzy%20set.pdf
4. https://www.math.ust.hk/~machas/numerical-methods.pdf
5. https://www.researchgate.net/publication/321825504_Differential_Calculus

21PBHC11 INORGANIC QUANTITATIVE ANALYSIS AND PREPARATIONS PRACTICAL-PRACTICAL I **0 0 4 2**

Course objective

To know about different types to titrations namely acid base, redox, and complexometric.

Acid – Base Titrations

1. Estimation of Hydrochloric acid using oxalic acid
2. Estimation of sodium Hydroxide using sodium carbonate
3. Estimation of Borax

Redox Titrations

4. Estimation of oxalic acid using Mohr's salt
5. Estimation of Ferrous Sulphate using oxalic acid
6. Estimation of Ferric Iron using Potassium Dichromate

Complexometric titrations

7. Estimation of Magnesium
8. Estimation of Calcium

Inorganic preparations

1. Preparation of Cuprous Chloride, Cu_2Cl_2
2. Preparation of Aluminium potassium sulphate (Potash alum).
3. Preparation of Chrome alum

Total: 30 hrs

Course Outcome

- To learn the common experimental titration methods.
- To know the estimation of various inorganic elements.
- To learn the precipitation titration involving oxidation, reduction.
- To learn the common experimental techniques of synthesis of organic molecules.
- To know the preparation involving molecular rearrangement.

Text Books

1. Vogel's – "Textbook of quantitative Inorganic Analysis", Longmann, 12th edition, **2011.**
2. Gnanaprakasam, Ramamurthy, "Organic Chemistry Lab Manual" S. Viswanathan Pvt. Ltd. 3rd edition **2011**

Reference Books

1. S. Sundaram and K. Raghavan "Practical Chemistry", S. Viswanathan. Co. 3rd edition **2011**.
2. J. N. Gurtu and R. Kapoor "Advanced experimental Chemistry", S. Chand and Co. 6th edition, **2010.**
3. Vogel's – "Textbook of qualitative organic Analysis", Longmann, 12th edition, **2011**
4. J. N. Gurtu and R. Kapoor "Advanced experimental Chemistry", S. Chand and Co. 6th edition, **2010**

Websources / weblink

1. https://www.nature.com/articles/085466a0
2. https://pubs.acs.org/doi/10.1021/ed011p62.2

21PBHC12 ORGANIC PREPARATIONS PRACTICAL –PRACTICAL II 0 0 4 2

1. Acetylation of one of the following compounds: amines (aniline, *o*-, *m*-, *p*-toluidines and *o*-, *m*-,*p*-anisidine) and phenols (β-naphthol, vanillin, salicylic acid) by any one method: (Usingconventional method.and Using green chemistry approach)

2. Benzolyation of one of the amines (aniline, *o*-, *m*-, *p*- toluidines and *o*-, *m*-, *p*-anisidine) and one of the phenols (*β*-naphthol, resorcinol, *p*-cresol) by Schotten-Baumann reaction.

3. Oxidation of ethanol/ isopropanol (Iodoform reaction).

4. Bromination (any one)

   a. Acetanilide by conventional methods

   b. Acetanilide using green approach (Bromate-bromide method)

5. Nitration: (any one)

   a. Acetanilide/nitrobenzene by conventional method

   b. Salicylic acid by green approach (using ceric ammonium nitrate).

6. Selective reduction of *meta*dinitrobenzene to *m*-nitroaniline.

7. Reduction of *p*-nitrobenzaldehyde by sodium borohydride.

8. Hydrolysis of amides and esters.

9. Semicarbazone of any one of the following compounds: acetone, ethyl methyl ketone,cyclohexanone, benzaldehyde.

10. *S*-Benzylisothiouronium salt of one each of water soluble/ insoluble acids (benzoicacid,oxalic acid, phenyl acetic acid and phthalic acid).

Total: 30 hrs

Course Outcome

- To learn the common organic compound preparation methods.
- To know the Recrystalization process.
- To learn the reaction and mechanism involved in organic preparation.
- To learn the common experimental techniques of synthesis of organic molecules.
- To know the preparation involving molecular rearrangement.

Text Books/Reference Books:

1. F.G. Mann, & B.C. Saunders, *Practical Organic Chemistry*, Pearson Education (2009)
2. B.S. Furniss, A.J.Hannaford, P.W.G. Smith & A.R. Tatchell, *Practical Organic Chemistry, 5th Ed.* Pearson (2012)
3. V.K. Ahluwalia, & R. Aggarwal, *Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis*, University Press (2000)
4. V.K. Ahluwalia, & S. Dhingra, *Comprehensive Practical Organic Chemistry: Qualitative Analysis*, University Press (2000).

Websource / Weblink

1. https://www.youtube.com/watch?v=oROSQnzSdZE
2. https://rushim.ru/books/praktikum/Mann.pdf

பாடக் குறியீட்டு எண்: 21LTA002

பருவம்-2, தமிழ்மொழிப்பாடம்-2, பகுதி-1, தகுதிப்புள்ளி: 3, வாரப் பாட நேரம்: 3.

தாள்-2

அற இலக்கியம் – சிற்றிலக்கியம் – சிறுகதை – பயன்பாட்டுத் தமிழ்

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், அற இலக்கியங்கள், சிற்றிலக்கியம், சிறுகதை ஆகியவற்றை அறிமுகப்படுத்துதல், தற்காலப் பேச்சுத் தமிழ் எழுத்துத்தமிழ் ஆகியவற்றின் வளர்நிலைகளை மாணவர்களை அறியச் செய்தல், அதன்வழி சிந்தனை வளத்தைப் பெருகச் செய்தல் என்பனவும் மேற்கண்டவழி மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்து அவர்களின் மொழித் திறனை மேம்படுத்த அவர்களுக்குக் கடிதம் எழுதும் கலையைக் கற்றுக்கொடுத்தல், அணி இலக்கணத்தை அறியச் செய்தல் என்பன இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1: அற இலக்கியங்கள் 10 மணி நேரம்

1. திருக்குறள் - வான் சிறப்பு(அறம்), ஊக்கமுடைமை(பொருள்), குறிப்பறிதல்(இன்பம்) – மூன்று அதிகாரங்கள் முழுமையும்.
2. நாலடியார் – மூன்று பாடல்கள். (2, 3, 5)
3. பழமொழி நானூறு – மூன்று பாடல்கள் (74, 75, 78)
4. திரிகடுகம் – மூன்று பாடல்கள் (10, 12, 22)
5. இனியவை நாற்பது – மூன்று பாடல்கள் (1, 12, 16)

அலகு 2: சிற்றிலக்கியம் 10 மணி நேரம்

1. முத்தொள்ளாயிரம்

   சேரன் – வீரம் 14, 15 பாடல்கள்

   சோழன் – காதல் 23, 24 பாடல்கள்

   பாண்டியன் – நாடு 87, 88 பாடல்கள்
2. தமிழ்விடு தூது – முதல் 20 கண்ணிகள்
3. திருக்குற்றாலக் குறவஞ்சி – மலைவளம் கூறுதல் – முதல் 5 பாடல்கள்
4. முக்கூடற்பள்ளு – மூத்த பள்ளி நாட்டு வளம் கூறுதல் 3 பாடல்கள், இளைய பள்ளி நாட்டு வளம் கூறுதல் 3 பாடல்கள்.
5. கலிங்கத்துப் பரணி – பாலை பாடியது – முதல் 5 பாடல்கள்

அலகு 3: சிறுகதை 9 மணிநேரம்

1. அறிஞர் அண்ணா - செவ்வாழை
2. புதுமைப்பித்தன் - கடவுளும் கந்தசாமிப் பிள்ளையும்
3. ஜெயகாந்தன் - யுகசந்தி
4. கு.அழகிரிசாமி - காற்று
5. அம்பை - காட்டில் ஒரு மான்

அலகு 4: **பேச்சுத் தமிழ்** 8 மணி நேரம்

பேச்சுத் திறன் – விளக்கம் – பேச்சுத்திறனின் அடிப்படைகள் – வகைகள் – மேடைப்பேச்சு – உடையாடல் - பயிற்சிகள்

அலகு 5: எழுத்துத் தமிழ், இலக்கிய வரலாறு, இலக்கணம் 8 மணி நேரம்

1. கலைச் சொல்லாக்கம் – தேவைகள் – கலைச்சொற்களின் பண்புகள் – அறிவியல் கலைச் சொற்கள் – கடிதம் – வகைகள் – அலுவலகக் கடிதங்கள் – உறவுமுறைக் கடிதங்கள்.
2. பாடம் தழுவிய இலக்கிய வரலாறு (அற இலக்கியம், சிற்றிலக்கியம், சிறுகதை)
3. அணி இலக்கணம்
4. விண்ணப்பக் கடிதம் எழுதுதல்

மொத்தம்: 45 மணி நேரம்

பார்வை நூல்கள்

1. **பேசும் கலை,** முனைவர் கு.ஞானசம்பந்தன் விஜயா பதிப்பகம், 2000.
2. **தமிழ் இலக்கிய வரலாறு**, வரதராசன், மு., சாகித்திய அக்காதெமி , புது தில்லி, 2002.
3. **தமிழ் நடைக் கையேடு,** மொழி அறக்கட்டளை, 2008.
4. **பயன்பாட்டுத் தமிழ்**, முனைவர் அரங்க இராமலிங்கம், முனைவர் ஒப்பிலா மதிவாணன், சென்னை பல்கலைக்கழகம், 2007
5. **மொழிபெயர்ப்பியல் அடிப்படைகள்,** கா. பட்டாபிராமன், யமுனைப் பதிப்பகம், திருவண்ணாமலை, 1999.

6 பாடநூல் தேடலுக்கான இணையம்

- http://www.tamilvu.org/library
- https://archive.org/

HINDI SYLLABUS **3 0 0 3**

I year-II Sem (kahani , Natak &Translation)

Course Objective:

- To train students in translation
- To develop reading & writing skills
- To create interest towards reading different types of literature

Unit I - ‘ idgah’ by Premchand’ (kahani), Translation- Definition,Types **9**

Unit II ‘pitha ‘ by gyanranjan (kahani), Translation - Anuvadak ke gun **9**

Unit III - jamun ka ped by Krishna chander ‘ (kahani) , Translation Practice **9**

Unit IV - adhi rath ke baad by Shankar shesh (naatak), Translation Practice **9**

Unit V - adhi rath ke baad by Shankar shesh (naatak), Translation Practice **9**

Total Hours :45

Course Outcome

At the end of this course

CO 1 Students will know the importance & process of translation
CO 2 understand the values of elders in a family & extend their support
CO 3 will know the different writing skills of authors
CO 4 gain knowledge in Hindi literature
CO 5 will acquire knowledge in Hindi Sahithya

Text/Reference book :

Adhi rath ke baad ,by Shankar shah ,kitabhghar prakashan ,2000
Idgah by Premchand,Bharathiya gyan peeth ,NewDelhi ,
Jamun ka ped by Krishna Chandra, Deepak publishers, Nov. 2019
Pitha by gyan ranjan,Rajkamal publication,Jan 2018
Glossary of Administrative terms ,Commission for scientific terms & Technical Terminology,2007
Patralekhan kala by Dr.Shivshankar Pandey,2018, Gadya khosh

Weblinks:

1. https://premchandstories.in/eidgaah-story-munshi-premchand-pdf/

21LFRE21 **FRENCH II** **3 0 0 3**

Course objective: To fortify the grammar and vocabulary skills of the students. Enable the students have an idea of the French Culture and Civilization.

UNIT I Leçons 10 – 11 **09**

Leçons : 10. Les affaires marchent,- 11. Un après midi à problemes- Réponses aux questions tirés de la leçon - Grammaire : Présent progressif, passé récent ou future proche – Complément d'objet directe – Complément d'objet indirecte.

UNIT II Leçons 12 – 13 **09**

Leçons : 12. Tout est bien qui fini bien,- 13. Aux armes citoyens – Réponses aux questions tirés de la leçon - Grammaire : Les pronoms « en ou y » rapporter des paroles - Les pronoms relatifs que, qui, ou où,

UNIT III Leçons 14 – 15 **09**

Leçons 14. Qui ne risqué rien n'a rien,- 15. La fortune sourit aux audacieux –Réponses aux questions tirés de la leçon – Grammaire : Comparaison – Les phrases au passé composé

UNIT IV Leçons 16 – 18 **09**

Leçons16 La publicite et nos reves 17 La france le monde 18 Campagne publicitaire Réponses aux questions tirés de la leçon - Grammaire :- Les phrases à l' Imparfait – Les phrases au Future

UNIT V Composition **09**

A écrire une lettre de regret// refus à un ami concernant l'invitation d'une célébration reçue- A écrire un essaie sur un sujet générale - A lire le passage et répondre aux questions

TOTAL : 45 Hrs

Course outcome

- Differentiate between formal and informal registers of speech in French
- Examine and appraise cognates.
- Evaluate and critique each other's oral and written performance for learning purposes.
- Listen to basic spoken French and demonstrate understanding by writing and/or responding appropriately
- Read French at an elementary level

Text Book

1. Jacky GIRARDER & Jean Marie GRIDLIG, « Méthode de Français PANORAMA », Clé Intérnationale , Goyal Publication, New Delhi., Edition 2004.

Reference Books

1. DONDO Mathurin, " Modern French Course", Oxford University Press, New Delhi., Edition 1997.
2. Paul Chinnappane " Grammaire Française Facile" , Saraswathi House Pvt.Ltd, New Delhi, Edition 2010.

ENGLISH II – POETRY - 3 0 0 3

Course Objective:

- To enable students to develop their communication skills effectively.
- To enrich their vocabulary in English
- To develop communicative competency.

UNIT I **09**

1. Growing Old - Winston Farewell
2. Ecology - A. K. Ramanujan

UNIT II **09**

3. Stopping by Woods on a Snowy Evening - Robert Frost
4. Our Casuarina Tree - Toru Dutt

UNIT III **09**

5. Goodbye Party for Miss Pushpa T.S. - Nissim Ezekiel
6. The Bull - Ralph Hodgson

UNIT IV **09**

7. If - Rudyard Kipling
8. The Drowned Children - Louise Glück

UNIT V **09**

9. Australia - A.D.Hope
10. A Far Cry from Africa - Derek Walcott

Total: 45 Hours

Course Outcome

- Learn to employ Poetic expressions in the course of daily speech.
- Prove their better communicative ability.
- Prove their skill in writing sentences with poetic impact.
- Develop different sensibilities in approaching life.
- Solve life's problems as highlighted in the selections.

Books Prescribed:

- Selections from Caribbean Literature. Mahaam Publishers, Chennai.
- Our Casuarina Tree - Vasan Publication By Dr.A Shanmugakani

Web Sources:

- https://www.gradesaver.com/
- https://www.enotes.com/
- https://www.jstor.org/
- https://www.sparknotes.com/

21CBHC21 ELECTROCHEMISTRY AND SURFACE CHEMISTRY 3 1 0 4

Course objective: To have detailed knowledge about electrochemistry, theories of electrochemistry and surface chemistry.

Unit I Electrochemistry-I 12

Conductance – cell constant specific conductance and equivalent conductance measurement. Variations of equivalent conductance with concentration weak and strong electrolytes motilities of ions – transport number Kohlraush's law. Applications of Ostwald dilution law – conductance –titrations (acid-base, precipitation) solubility product dissociation constant.

Unit II Electrochemistry-II 12

Potentiometry – cells electromotive force – electrode potential – their thermodynamic significance. Nernst equation standard electrode potentials and its determination. Reference electrodes hydrogen electrode calomel, quinhydrone and glass electrodes. Types of cells – chemical and concentration cell – liquid junction potential salt bridges. Redox systems.

Unit IIIElectrochemistry-III 12

Theory of indicators- pH Henderson equation – determination of pH by Potentiometry. Electrolytes – strong and weak-ionic equilibria constant hydrolysis of salts-hydrolysis constant and its determination by potentiometry. Potentiometric titrations – acid-base, redox, precipitation.

Unit IV Surface Chemistry-I 12

Laws of photochemistry GrotthusDrapper law, Einstein's law of photochemical equivalence-quantum yield. Kinetics of photochemical reactions of CH_3CHO and $H_2 – Cl_2$. Photophysical processes fluorescence and phosphorescence chemiluminescence.

Unit V Surface Chemistry-II 12

Physisorption and adsorption isotherms – Freundlich and its use in surface area determination. Colloids-types, stability and electrical double layer, and electro-osmosis –association colloids (micelles) and critical micelle concentration.

Total: 60 hrs

Course Outcome

- To know the concept of specific conductance and equivalent conductance measurement
- To clearly explain the concept of applications of ostwald dilution law
- To understand the Nernst equation standard electrode potentials and its determinations
- To clearly explain the concept of various types of chemical and concentration cells photochemical equivalence
- To clearly explain the concept of photophysical processes, fluorescence and

Text Books

1. P.W. Atkins, "Physical Chemistry" Oxford publishers, 11th edition, **2009**
2. B. R. Puri, L. R. Sharma, Pathania, "principle of Physical Chemistry" Vishal Publishing & Co., 46th edition **2013**

Reference Books

1. P.L. Soni, “Text Book of Physical Chemistry” Sultan Chand & sons. 12th edition, **2011**
2. Kundu and Jain, “Physical Chemistry” S. Chand, 6th edition, **2011**
1. S. Glasstone, “Text Book of Physical Chemistry” –Macmillan. 7th edition **2012**

Websource / Weblink

1. https://www.askiitians.com/iit-jee-chemistry/physical-chemistry/electrochemistry/
2. https://www.sakshieducation.com/Inter/InterPDFStory.aspx?nid=58073&cid=22&sid=174&chid=168&tid=100

21CBHC22 ANALYTICAL METHODS 3 1 0 4

Course objective

To understand the basic concepts about errors and their minimization. Various practical's in chemistry with their concepts, instruments and their utility.

Unit-I Safety in the Chemistry Lab and Error in chemical analysis 12

Storage and handling of chemicals, Handling of acids, ethers, toxic and poisonous chemicals. Antidotes, threshold vapour concentration and first aid procedure. MSDS, COSHH. Accuracy and precision, Absolute and relative errors. Methods of eliminating or minimizing errors. Precision: mean, median, average deviation and coefficient of variation. Significant figure and its relevance. Normal error curve and its importance.

Unit-II Titrimetric Methods of Analysis 12

Methods of expressing concentration of solutions. Types of titrations. Requirements for analysis. Primary and secondary standards. Limitation of volumetric analysis. pH of strong and weak acid solutions. Buffer solutions. Henderson equations. Preparation of acidic and basic buffers. Relative strength of acids and bases from Ka and Kb values. Neutralisation- titration curve, theory and choice of indicators. Stability of complexes.Titration involving EDTA. Metal ion indicators and their characteristics.

Unit-III Precipitation titrations and Gravimetric methods of analysis 12

Concept of sparingly soluble salts. Relation between solubility and solubility products. Argentometric titrations, indicators for precipitation titrations involving silver nitrate. Determination of chloride by Volhard's method. Adsorption indicators. Separation by precipitation. Factors affecting solubility, gravimetric factor. Purity of precipitates, von Weiman ratio. Co-precipitation and post precipitation. Precipitation from homogeneous solution.

Unit-IV Chromatographic techniques and applications 12

Principles of adsorption and partition chromatography: Column and Paper. TLC, ion-exchange chromatography – technique and applications. Gas chromatography, principle, detector and applications. Purification of solid organic compounds: recrystallisation, sublimation. Use of miscible solvents. Use of drying agents and their properties. Purification of liquids. Experimental techniques of distillation – fractional distillation – vacuum distillation – steam distillation.

Unit-V Polarography and Thermal methods 12

Polarography – theory, apparatus, DME, Diffusion, Kinetic and catalytic currents, Current – voltage curves for reversible and irreversible system, qualitative and quantitative applications to inorganic systems. Amperometric titrations-theory, apparatus, types of titration curves, successive titrations and indicator electrodes – Applications. Principle of thermogravimetric analysis (TGA). Differential thermal analysis (DTA): Instrumentation and applications. Factors affecting TGA and DTA curves. TGA of $AgNO_3$, $CaC_2O_4.H_2O$ and DTA of sulphur.

Total: 60hrs

Course Outcome

- To explain the theoretical principles and important applications of classical analytical methods within titration (acid/base titration, complexometric titration, redox titration), and various techniques within gravimetric and coulometric methods.
- To explain the theoretical principles of various separation techniques in chromatography, and typical applications of chromatographic techniques.
- To know the different types of chromatography and its application.
- To get idea about the basics and Merits of electro analytical techniques.
- To learn the theory and working of polarography and its application in inorganic elements can be clearly known.

Text Book

1. B. K. Sharma. "Instrumental method of chemical analysis" Goel publishing house, 27th edition, **2011.**

Reference Book

Grudeep R. Chatwal, Sham K. Anand. "Instrumental Methods of Chemical Analysis" Himalaya Publishing House, 5th edition, **2013.**

Websource / Weblink

1. **https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Book%3A_Analytical_Chemistry_2.1_(Harvey)/09%3A_Titrimetric_Methods**
2. **http://studymaterial.unipune.ac.in:8080/jspui/bitstream/123456789/8353/1/Polarography.pdf**
3. **https://www.slideshare.net/drdev1/application-of-chromatographic-technique**

21CBHC23 **Mathematics-II** **4 0 0 4**

Course Objective: To impart the knowledge of Integral calculus, Differential Equations,Fourier Series and Laplace transform. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT-I INTEGRAL CALCULUS

Integral calculus: Integration – Definite integrals – Bernoulli's formula -Reduction formula for $\int sin^n xdx, \int cos^n xdx, \int tan^n xdx, \int x^n e^{ax} dx$. **12**

UNIT-II DIFFERENTIAL EQUATIONS

Ordinary Differential Equations: First order of higher degree equations – Second order and non-homogenous linear differential equations with constant coefficient.

Partial Differential Equations: Formation of partial differential equations by eliminating arbitrary constants and arbitrary function- Solutions of four standard types of first order equation- Lagrange method of solving linear partial differential equation Pp +Qq = R.

12

UNIT-III FOURIER SERIES

Fourier series of periodic functions on the interval [c,c+2π] –Even and Odd functions- Half range sine and cosine series. **12**

UNIT-IV LAPLACE TRANSFORM

Laplace transformation: Definition, Laplace transform of basic trigonometric,exponential and algebraic functions - Inverse Laplace transform- Solving differential equation of second order with constant coefficients using Laplace transform.

12

UNIT – V VECTOR DIFFERENTIATION

Introduction-Scalar point functions-Vector point functions-Vector differential operator∇, Gradient-Divergence-Curl-Solenoidal-irrotational-identities- Simple problems. **12**

Total 60 Hours

Course Outcomes:

- Understand the key terminology, concept tools and techniques used in Integral calculu
- Discuss the applications of differential equations.
- Analyze the uses, limitations and applications of Fourier series
- Evaluate Laplace transform and its applications
- Understand the key terminology, concept tools and techniques used in Vector Differentiation.

TEXT BOOKS

1. P. Kandaswamy and K.Thilagavathy, Allied Mathematics paper II, 2nd Semester, S.Chand Publishing Pvt. Ltd. 1st Edition, 2004
2. S. Narayanan and T.K. ManickavasagamPillai – Ancillary Mathematics, S. Viswanathan Printers, 1986, Chennai.

REFERENCE BOOKS:

4. P.R. Vittal, Allied Mathematics, Margham Publications, 4th Edition 2009.
5. A. Singaravelu, Allied Mathematics, Meenakshi Agency, 2007.
6. P. Duraipandian and S.UdayaBaskaran, Allied Mathematics, Vol. I & II Muhil Publications, Chennai

Web sources

a. http://mdudde.net/pdf/study_material_DDE/M.Sc.MAthematics/DIFFERENTIAL%20EQUATIONS.pdf

b. https://ncert.nic.in/ncerts/l/lemh201.pdf

c. shttp://www.universityofcalicut.info/SDE/Vector_calculus_BSc_Maths.pdf

21PBHC21 GRAVIMETRIC ANALYSIS PRACTICAL –PRACTICAL III 0 0 4 2

Course objective

To learn and practice the various quantitative estimations; Ba, Pb, Ca, Mg, Zn, Al, Cr and SO_4^{2-} by gravimetry

List of Experiments

1. Estimation of Barium as Barium Sulphate
2. Estimation of Sulphate as Barium Sulphate
3. Estimation of lead as lead chromate
4. Estimation of Calcium as Calcium oxalate monohydrate
5. Estimation of Chloride as Silver Chloride
6. Estimation of nickel as Ni –DMG Complex
7. Estimation of Magnesium as magnesium Oxinate
8. Estimation of Zinc as Zinc Oxinate
9. Estimation of Aluminium as AluminiumOxinate
10. Estimation of Chromium as lead Chromate
11. Estimation of Magnesium as Magnesium pyrophosphate
12. Estimation of Lead as Lead sulphate

Total: 30 h

Course Outcome

- To estimate the amount of substance present in a given sample by determining the weight of the precipitate obtained from the solutions of different metal ions
- To interpret the weight of the precipitate obtained for the calculation of amount of metal present
- To develop the concept of gravimetric analysis
- To compare theoretical concepts with practical experiments
- Compare theoretical concepts with practical experiments.

Text Book

1. Vogel's "Textbook of quantitative Inorganic Analysis" Longmann, 4th edition, **2009**

Reference Book

1. Dr. S. K. Agarwal and Dr. KeemtiLal "Advanced Inorganic Analysis, PragatiPrakashan, 7th edition, **2009**

Websource / Weblink

1. **https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_11_Experiments/07%3A_Gravimetric_Analysis_(Experiment)**

21PBHC22 INORGANIC QUALITATIVE ANALYSIS PRACTICAL-PRACTICAL IV

0 0 4 2

Course objective:

To learn the technique to identify acid radicals and basic radicals of each two with to interfering radicals as well as to prepare simple coordination compounds.

Inorganic Qualitative Analysis

Reactions of mercury, lead, copper, bismuth, cadmium, antimony, tin, ferrous and ferric iron, aluminium, zinc, manganese, cobalt, nickel, calcium, strontium, barium, magnesium, and ammonium; sulphide, carbonate, nitrate, sulphate, chloride, bromide, iodide, fluoride, oxalate, arsenite, phosphate, chromate and borate radicals. Semimicro analysis of a mixture containing two cations and two anions of which one is an interfering ion.

List of Experiments

1. Reactions of simple radicals
2. Reactions of Interfering acid radicals
3. Reactions of groups I, II and III cations
4. Reactions of groups IV, V and VI cations
5. Elimination of interfering acid radicals
6. Analysis of salt mixture – I
7. Analysis of salt mixture – II
8. Analysis of salt mixture – III
9. Analysis of salt mixture – IV
10. Analysis of salt mixture – V

Course Outcome

- To familarise with the reactions of basic radicals
- To understand the analysis of various inorganic mixtures
- To learn the elimination of interfering radicals
- To know the identification of various metals of group
- To know the reaction of simple radicals

Total: 30 h

Text Book

1. Vogel's – "Textbook of qualitative Inorganic Analysis", Longmann, 12th edition, **2011**

Reference Books

1. S. Sundaram and K. Raghavan "Practical Chemistry", S. Viswanathan.Co. 3rd edition **2011**

2. J. N. Gurtu and R. Kapoor "Advanced experimental Chemistry", S. Chand and Co. 6th edition, **2010**

Websource / Weblink

1. **http://www.iscnagpur.ac.in/study_material/dept_chemistry/4.1_MIS_and_NJS_Manual_for_Inorganic_semi-micro_qualitative_analysis.pdf**
2. **http://www.federica.unina.it/agraria/analytical-chemistry/inorganic-qualitative-analysis/**

பாடக் குறியீட்டு எண்: 21LTA003

பருவம்-3, தமிழ்மொழிப்பாடம்-3, பகுதி-1, தகுதிப்புள்ளி: 3, வாரப் பாட நேரம்: 3.

தாள்-3

பக்தி இலக்கியம் – காப்பியம் – புதினம் – மொழிபெயர்ப்பு

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், பக்தி இலக்கியத்தை மாணவர்களுக்கு அறிமுகப்படுத்தி, அதன்வழி தமிழர்தம் பக்தி உணர்வையும் அதன் மேன்மையையும், கலைத்திறனையும் வெளிப்படுத்துதல், காப்பியம், புதினம் என்ற இலக்கிய வகைமைகளை அறிமுகப்படுத்துதல், மாணவர்களின் மொழித்திறனை மேம்படுத்தும் வகையில் மொழிபெயர்ப்பு, இலக்கணக் குறிப்பு என்பனவற்றை அறியச் செய்தல், மேற்கண்டவழி மாணவர்களைப் போட்டித்தேர்வுகளுக்குத் தயார் செய்தல் இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1: பக்தி இலக்கியம் 10 மணி நேரம்

1. **மாணிக்கவாசகர்** - திருவாசகம் – மூன்று பாடல்கள்
   - ✓ புல்லாகி பூடாகி (சிவபுராணம்)
   - ✓ எல்லாப் பிறப்பும் (சிவபுராணம்)
   - ✓ உற்றாரை யான் வேண்டேன் (திருப்புலம்பல்)
2. **ஆண்டாள்** - திருப்பாவை – மூன்று பாடல்கள் (1, 3, 4)
   - ✓ மார்கழித் திங்கள் ... (பாசுரம் 1)
   - ✓ ஓங்கி உலகளந்த... (பாசுரம் 3)
   - ✓ ஆழிமழைக் கண்ணா... (பாசுரம் 4)
3. **வீரமாமுனிவர்** - தேம்பாவணி – மூன்று பாடல்கள்
   - ✓ நீ ஒரு தாய்; ஒரு தாதையும் நீ (698 - சூசை இறைவனின்தாயைப்போற்றுதல்)
   - ✓ அணிக் கலத்து அழகு அழுந்திய (1089 - வானவர் இயேசு நாமத்தைப் போற்றி வணங்கிய செய்தி)
   - ✓ வான் புறத்து இலகும் செஞ் சுடர் காண (3510 - இறைவன் சூசை முனிவர்க்கு ஏழு மணிகள் புறத்தில் ஒளிவிடும் முடியைச் சூட்டுதல்)
4. **குணங்குடி மஸ்தான் சாகிபு** - பராபரக் கண்ணி 1-10 கண்ணிகள்
5. **திருமூலர்** - திருமந்திரம் – மூன்று பாடல்கள்
   - ✓ உடம்பார் அழியின் உயிரார் அழிவர் (திருமந்திரம்: 724)
   - ✓ படமாடக் கோயில் பகவற்கு ஒன்று ஈயில் (திருமந்திரம்: 1857)
   - ✓ மரத்தை மறைத்தது மாமத யானை (திருமந்திரம்: 2290)
6. **இராமலிங்க அடிகள்** - திருவருட்பா – மூன்று பாடல்கள்
   - ✓ எத்துணையும் பேதமுறா... (5297)
   - ✓ ஒருமையுடன் நினது திருமலரடி நினைக்கின்ற (2938)

- ✓ கோடையிலே… (4091)

அலகு 2: காப்பியம்-1 9 மணி நேரம்

1. சிலப்பதிகாரம் – அடைக்கலக் காதை
   (தெரிவுசெய்யப்பட்ட பாடல் அடிகள் 120-199)
2. சீவக சிந்தாமணி – விமலையார் இலம்பகம்
   (தெரிவுசெய்யப்பட்ட பாடல்கள்)

அலகு 3: காப்பியம்-2 9 மணி நேரம்

1. கம்பராமாயணம் – மந்தரை சூழ்ச்சிப் படலம்
   (தெரிவு செய்யப்பட்ட பாடல்கள்)
2. பெரியபுராணம் – பூசலார் நாயனார் புராணம்
   (தெரிவு செய்யப்பட்ட பாடல்கள்)

அலகு 4: புதினம் 8 மணி நேரம்

1. கல்மரம் - கோ. திலகவதி

அலகு 5: மொழிபெயர்ப்பு, இலக்கணம், இலக்கிய வரலாறு 9 மணி நேரம்

1. அலுவல்சார் மொழிபெயர்ப்பு
2. இலக்கணக் குறிப்பு
3. பாடம் தழுவிய இலக்கிய வரலாறு (பக்தி இலக்கியம், காப்பியம், புதினம்)

மொத்தம்: 45 மணி நேரம்

பார்வை நூல்கள்

1. **தமிழ் இலக்கிய வரலாறு**, வரதராசன், மு., சாகித்திய அக்காதெமி , புது தில்லி, 2002.
2. **தமிழ் நடைக் கையேடு,** மொழி அறக்கட்டளை, 2008.
3. **பயன்பாட்டுத் தமிழ்**, முனைவர் அரங்க இராமலிங்கம் முனைவர் ஒப்பிலா மதிவாணன், சென்னை பல்கலைக்கழகம், 2007
4. **மொழிபெயர்ப்பியல் அடிப்படைகள்,** கா. பட்டாபிராமன், யமுனைப் பதிப்பகம், திருவண்ணாமலை, 1999.

5 பாடநூல் தேடலுக்கான இணையம்

- http://www.tamilvu.org/library
- https://www.tamildigitallibrary.in/book

HINDI SYLLABUS **3 0 0 3**

II year-III SEM (Ancient poetry,Hindi sahitya ka Ithihas)

Course Objective:

- To enrich the knowledge of students through Tamil literature
- Enable them to learn ancient poems
- To develop interest in learning history of hindi literature

Unit I	- 'Thirukkural', Hindi Sahitya ka ithihas (aadikal)	**9**
Unit II	-'Kabir ke pad', Hindi Sahitya ka ithihas (aadikal)	**9**
Unit III	- 'Sur ke pad', Hindi Sahitya ka ithihas (bhakthi kal)	**9**
Unit IV	- Thulsi ke pad, Hindi Sahitya ka ithihas (bhakthi kal)	**9**
Unit V	- Rahim ke dohe , Hindi Sahitya ka ithihas (Rithikal)	**9**

Total Hours : 45

Course Outcome

- Students will know the valuable messages in Thirukkural
- Will be interested in knowing ancient poems
- Gain knowledge in Hindi literature
- Will know the difference between Hindi & the languages used byancient poets
- Will be familiar with different styles of poetry writing

Text / Reference books:

Thirukkural translation by Venkata Krishnan

Ramcharitha manas,Githa press ,Gorakhpur by Sri Hanuman Prasad

Sur Sanchayitha by Rajkamal prakashan ,New Delhi

Padya khosh

Hindi Sahitya ka Ithihas by Dr.Nagendra,Dr.Hardayal , Noida

Weblinks:

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF

21LFRE31 **FRENCH III** **3 0 0 3**

OBJECTIVE:

To strengthen the Grammar and Composition in French language.
To train the students to enhance his skills in French language forcommunication

UNIT:I LECON 11 09

AIM :Is to impart the basics of french culture and civilisation.
CONTENT :Leçon 16-La famille Vincent. Page 44-Grammaire :Passe compose. Leçon 29-Vers l'hôtel.Page80- Grammaire :Impératif, a mettre phrases Singulier, Pluriel.

UNIT II- LECON 12-13 09

AIM :Is to impart the french poetry and intermediate grammer.
CONTENT : Leçon 40-L'Epicerie les Légumes et les Fruits. Page 112-Grammaire;Présent del'indicatif. Leçon 44 La poste. Page-124 l'Grammaire :A mettre les phrases a l'impératif

UNIT III-LECON 14-15 09

AIM :Is to impart the french habitat and daily norms and activity.
CONTENT :Leçon 51-Le café et tabac page142- Grammaire :A changer les phrases en interrogatif. Leçon 58-La chasse et la pèche.Page160-Grammaire :Le plus que parfait.

UNIT :IV-LECON 16-18 09

AIM :Is to impart the importance of francophonie
CONTENT :Leçons 61-Un mariage a la campagne. Pagé-170 -grammaire :a changer au participe présent.

UNIT :V- COMPOSITION : 09

AIM :Is to impart the production ecrit and lire
CONTENT : A écrire une lettre a un ami l'invitation d'une célébration différente ex:Mariage-a faire un essaie sur un sujet générale-a lire le passage et répondre aux questions.

Total 45 Hours

Course Outcomes:

- The content of the unit 1 aids the students to explore the basics of the new french culture and civilsation.
- The content of the unit 2 aids the students to know about the french poetry and grammar.
- The content of the unit 3 aids the students to adapt to the french society.
- The content of the unit 4 aids the students to know about francophonie.
- The content of the unit 5 aids the students to acquire the language proficiency.

TEXTBOOK :

Les leçons ont été choisi et tire de i & ii degré de gauger<<Cours de Langue et de Civilisation Française>> The Millenium, Publication Hachette, édition 2002

REFERENCE BOOKS:

DONDO Mathurin, “Modern French Course”, Oxford University Press, New Delhi Edition 2014

WEB SITE RESOURCES LINK;

https://www.thoughtco.com/french-reading-tips-1369373
https://www.bnf.fr/fr
https://www.laits.utexas.edu/tex/

ENGLISH III - DRAMA AND COMPOSITION 3 0 0 3

Course Objective:

- To train students in the use of English language in varied literary and non-literary contexts.
- To teach them soft skills and strengthen their foundation in grammar and composition.
- To evaluate their comprehension skills.

Credit Hours

UNIT I **09**

- Introduction to Drama .

UNIT II **09**

- Shakespeare: Funeral Oration (Act III Scene II Julius Caesar) &
- Monkey's Paw - W.W.Jacobs

UNIT III **09**

- Comprehension

UNIT IV **09**

- Precis -Writing and Note Taking

UNIT V **09**

- General Essay on Current Topics

Total 45 Hours

Course Outcome

- Estimate the dramatic scenes in the light of appeal of values.
- Prioritize pragmatic day- to - day communication through comprehension.
- Develop dramatic skill after reading the scenes of plays.
- Improve their own style of writing after an expose to the prescribed dramatic pieces.
- Adapt themselves to life - context wherein soft skill demonstration is a must.

Books Prescribed:

- An Introduction to Drama. IInd Edition by George Whitfield
- Reading Comprehension for College Students Paperback – Import, 1984 by Reinhart G. Kussat (Author)
- The Monkey's Paw By W. W. Jacobs Publisher: Perfection Learning

Web Sources:

- https://www.gradesaver.com/
- https://www.enotes.com/
- https://www.jstor.org/
- https://www.sparknotes.com/
- https://www.cliffsnotes.com/

21CBHC31 COORDINATION CHEMISTRY 4 0 0 4

Course objective

To learn about what is coordination chemistry, nomenclature and various theories: Werner theory, valence bond theory, crystal field theory and John-Teller theory.

Unit – I Introduction 12

Nomenclature- Werner Theory- EAN Rule – Chelation- Stability of complexes **–** factors affecting the stability – Stepwise and overall formation constant Isomerism: structural isomerism- stereoisomerism – geometrical and optical isomerism in 4 and 6 coordinated Complexes

Unit – II Theories of Coordination – I 12

Valence bond theory – shortcomings of VB theory – Crystal field theory –CFSE – Spectrochemical series- colour and magnetic properties of complexes– high spin and low spin complexes Defects of CFT, Comparison of VBT and CFT

Unit –III Theories of Coordination – II 12

Evidences of covalent bonding in metal – ligand and bonding Molecular Orbital theory of 6 bonded complexes only Jahn Teller effect and electronic spectra of complexes comparison of CFT and MOT

Unit – IV Metal Carbonyls 12

Metallic carbonyls – Preparation – Reaction – Classifications Structure and Bonding in Carbonyls – Back bonding – Evidences for π– bonding – Applications of carbonyls, Ferrocene– preparation – properties and its uses.

Unit – V Coordination complexes reaction and mechanisms 12

Liability and inertness of complexes – mechanism of acid hydrolysis and base hydrolysis of octahedral complexes – SN^1, $SN^2$and SN^1CB mechanisms – evidence for SN^1CB mechanism *trans*- effect – trans effect series – Theories of trans effect – applications of trans effect.

Total: 60 hrs

Course Outcome

- To appreciate the postulates of werners theory of coordination compounds
- To Know the meaning of the terms: coordination entity, central metal atom/ion, ligand, coordination number, coordination sphere
- To learn the rules of nomenclature of coordination compounds
- To define different types of isomerism in coordination compounds
- To understand the nature of bonding in coordination compounds in terms of the valence Bond and crystal Field theories

Text Book

1. Puri B. R, Sharma L. R. Kalia K. K "Principles of inorganic Chemistry" Milestone publishers, 31st edition, **2013.**

Reference Books

1. R. D. Madhan, "Modern Inorgnaic Chemistry" S. Chand & Co., 6th edition **2012**
2. James E. Huheey, Ellen, A. Keiter, Richard, L. Keiter, "Inorganic Chemistry" Pearson education (Singapore Pvt Limited) 9th edition, **2013.**
3. J. D.Lee, Concise Inorganic chemistry" Blackwell Science Limited (France) 9th edition **2013**
4. F. A cotton G. Wilkinson and P. L. Gvas "Basic Inorganic Chemistry" John Wiley, 11th edition, **2009.**

Websource / Weblink

1. https://www.tutorialsduniya.com/notes/coordination-chemistry-lecture-notes-pdf/
2. https://www.alchemyst.co.uk/pdf/Inorganic/coordination_chem.pdf

21CBHC32 QUANTUM MECHANICS AND THERMODYNAMICS 4 0 0 4

Course objective: To know and understand what is quantum mechanics, various fundamental concepts as well as about thermodynamics, different laws in thermodynamics, enthalpy, entropy, free energy various processes.

Unit – I Quantum Mechanics - I 12

Electron and old quantum Theory, Rutherford scattering experiments Rutherford atomic models Quantum Theory of radiation, Photoelectric effect, Bohrs Theory of hydrogen atom alternative explanation for the emission of fine spectrum

Unit – II Quantum Mechanics - II 12

Dual character of electron debrogile's equation, the Davison Germens experiment Heisenberg uncertainty principle Compton effect, Quantum Mechanics, Schrodinger wave equation (No Derivation) Zeeman effect, Pauli's exclusion principle

Unit –III Thermodynamics –I 12

Definitions of thermodynamic terms – intensive and extensive variables, isolated, closed and open systems. Thermodynamic processes, cyclic processes, reversible and irreversible processes, thermodynamic functions and their differentials, Zeroth law of thermodynamics. Concepts of heat and work.

Unit – IV Thermodynamics –II 12

First law of thermodynamics and internal energy (U), enthalpy (H), relation between Cp and Cv Calculations of w, q, d, U and dH for expansion of ideal gas under isothermal and adiabatic conditions, for reversible and irreversible processes including free expansion, Joule's law, Joule Thomson coefficient

Unit – V Thermodynamics –III 12

Application of first law of thermodynamics – Hess's law of constant heat summation, Enthalpy of solution, enthalpy of dilution, enthalpy of neutralization, enthalpy of ionization and enthalpy of formation of ions. Bond dissociations energy, Born-Haber cycle for calculation of lattice energy, Kirchoff's equation, relation between ΔH and ΔU of a reaction. Spontaneous processes, heat engine, Carnot cycle and its efficiency, statements of second law, Nernst heat theorem, third law of thermodynamic.

Total: 60 hrs

Course Outcome:

- To explain the Basic principle of quantum chemistry
- Toexplain the concept of wavefunction
- To state about the postulates of quantum chemistry
- Forsolving the problems in quantum chemistry
- Toexplain operators and mathematical entities

Text Books:

1. P.W. Atkins, "Physical Chemistry" Oxford publishers, 11th edition, **2009**
2. D. A. McQuarrie, "Quantum Chemistry" University Science Books, Mil Valley, California, 7th edition **1983.**
3. S. Glasstone, "Thermodynamics for Chemist" EastWest Press, 6th edition, **1999**

Reference Books:

1. P.L. Soni, "Text Book of Physical Chemistry" Sultan Chand & sons. 2th edition, **2011**
2. . Kundu and Jain, "Physical Chemistry" S. Chand, 6th edition, **2011**
3. S. Glasstone, "Text Book of Physical Chemistry" –Macmillan. 7th edition **2012**

Websource / Weblink

1. **http://www.phys.ens.fr/~ebrunet/Thermo-en.pdf**
2. **https://courses.physics.ucsd.edu/2010/Spring/physics210a/LECTURES/210_COURSE.pdf**

21CBHC33 FUNDAMENDALS OF PHYSICS – I 4 0 0 4

Course Objective

To make the students to understand, the elasticity of a material and different kinds of moduli; surface tension and viscosity of fluids; transmission of heat via Conduction, Radiation process involved in thermal physics; properties of sound using experimental methods and principles of electricity and its conversion into ammeter and voltmeter.

UNIT I Elasticity and Bending Moment 12

Hooke's law - Elastic modulli - Work done in stretching and work done in twisting a wire - Twisting couple on a wire - Determination of rigidity modulus of a wire using torsion pendulum - Expression for bending moment - Uniform bending - Experiment to determine young's modulus using pin and microscope method.

UNIT II Fluids 12

Surface Tension: Definitions-Expression for surface tension of a liquid by capillary rise method - Viscosity: Poiseuille's formula for rate of flow of liquid in a capillary tube by dimensions - Analogy between current flow and liquid flow - streamlined motion – Stoke's formula.

UNIT III Thermal Physics 12

Conduction in solids: Thermal conductivity - Lee's disc method - Wiedmann-Franz law - Convection: Newton's law of cooling – Radiation: Distribution of energy in the spectrum of a black body – Planck's law of radiation (no derivation) and its deduction.

UNIT IV Sound 12

Simple harmonic motion: free, damped, forced vibrations and resonance - Intensity and loudness of sound - Decibels – Melde's string experiment – Determination of frequency of tuning fork - Acoustics of buildings: Reverberation time - Sabine's formula.

UNIT V Electricity 12

Current and Current density – Ohm's law - Resistors - I-V characteristics - colour coding-conversion of galvanometer into an ammeter and voltmeter – Kirchhoff's laws – Balance condition of Wheatstone's bridge - Potentiometer – Measurement of potential difference and current.

Total: 60 hrs

Course Outcomes:

- Understand the bending of beams under different loading conditions.
- Identify the stress developed in beams due to bending.
- Develop an understanding of the general energy equation and its application to the flow of fluids.
- Apply the concepts and principles of black-body radiation to analyze radiation phenomena in thermodynamic systems.
- Analyze acoustic properties of typically used materials for design consideration.

Text Books

1. Properties of Matter: R. Murugeshan, S Chand & Co. Pvt. Ltd., New Delhi
2. Heat and thermodynamics: D S Mathur, S Chand & Co., New Delhi
3. Text book of Sound by M N Srinivasan – Himalaya Publications, 1991
4. Electricity & Magnetism by K KTewari, S Chand & Co., 3rd Edition, 2001.

Website/Websource;

1. https://www.google.com/search?q=OPTICS%3AInterference+&ei=FIXvYMLjMprVz7sPsaq72AQ&oq=OPTICS%3AInterference+&gs_lcp=Cgdnd3Mtd2l6EAM6BwgAEEcQsANKBAhBGABQx8UCWM7IAmDR0QJoAXACeACAAeYBiAGCBZIBBTAuMy4xmAEAoAEBqgEHZ3dzLXdpesgBCMABAQ&sclient=gws-wiz&ved=0ahUKEwjCvaTD7OPxAhWa6nMBHTHVDksQ4dUDCA4&uact=5

21PBHC31 PHYSICAL CHEMISTRY PRACTICAL –PRACTICAL V 0 0 4 2

Course objective

To know and practice the important experiments, in chemical kinetics, phase rule and electrochemistry.

Determination of the order of the following reactions

1. Iodination of acetone
2. Soapanification of an ester (ethyl acetate)
3. Acid catalyzed hydrolysis of an ester (ethyl acetate)

Distribution Law

4. Iodination of acetone
5. Soapanification of an ester (ethyl acetate)
6. Acid catalyzed hydrolysis of an ester (ethyl acetate)

Heterogeneous equilibria

7. Phenol-water system – CST
8. Effect of Impurity- 2% NaCl or succinic acid solutions on phenol-determination of the concentration of the given solution.
9. Determination of transition temperature of the given salt hydrate. $Na_2S_2O_3$. $5H_2O$, CH_3COONa. $3H_2O$, $SrCl_2$ $6H_2O$, $MnCl_2$ $4H_2O$.
10. Molecular weight of a solute-Rast's method using naphthalene, m-dinitrobenzene and diphenyl as solvents.
11. Determination of strength of a strong acid by conduct metric titration (HCl*vs*NaOH).
12. Determination of the strength of Fe (II) by potentiometric redox titration.

Total: 30 hrs

Course Outcome:

- To develop expertise relevant to the professional practice of chemistry
- To developed an understanding of the breadth and concepts of physical chemistry
- To Know the role of physical chemistry in the chemical sciences and Engineering
- To develop an understanding to the role of the chemist and chemical engineer in tasks employing physical chemistry
- To understand the methods employed for problem solving in physical chemistry

Text Books

1. B. Viswanaathan, P.S. Raghavan "Practical Physical Chemistry", Viva Books private Ltd. ,**2005**
2. Slowiski, Wolsey-Indian, "General Chemistry A Lab Manual" Congage learning India Private Ltd.**2010**

Reference Books

1. Williamson, Peck-Indian "Lab Manual Fox General Chemistry", Congage learning India Private Ltd.**2009**
2. R.K.P Singh, Jagadamba Singh, Jaya Singh " Advanced Practical Chemistry", PragatiPrakashan, **2011**
3. V.K Abluwalia, SunitaDhingra, Adarsh Gulati, "College Practical Chemistry",University Press(India) Private Ltd **2005**

Websource / Weblink

1. **https://web.williams.edu/wp-tc/chemistry/epeacock/LECTURE_NOTES/Book.PChem.pdf**

பாடக் குறியீட்டு எண்: 21LTA004

பருவம்-4, தமிழ்மொழிப்பாடம்-4, பகுதி-1, தகுதிப்புள்ளி: 3, வாரப் பாட நேரம்: 3.

தாள்-4

சங்க இலக்கியம் – நாடகம் – வளர் தமிழ் – பொதுக்கட்டுரை

பாடத்திட்ட நோக்கம்:

தமிழர்தம் தொன்மைச் சிறப்பையும், பண்பாட்டுச் செழுமையையும் உலகிற்குப் பறைசாற்றும் சங்க இலக்கியங்களான எட்டுத்தொகை, பத்துப்பாட்டு நூல்களை அறியச் செய்தல், அதன்வழி பண்டைத் தமிழரின் விழுமியங்களை எடுத்துரைத்தல், இலக்கால இலக்கிய வகைமையான நாடக இலக்கியத்தை அறியச் செய்தல், ஊடகங்களில் தமிழின் பயன்பாடு, கணினியில் தமிழ்ப்பயன்பாடு என்பனவற்றை மாணவர்களுக்கு கற்றுக்கொடுத்தல், மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்தல் என்பன இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1: சங்க இலக்கியம் - 1 10 மணி நேரம்

1. புறநானூறு (மூன்று பாடல்கள் - 183, 184, 192)
2. பதிற்றுப்பத்து (இரண்டு பாடல்கள் – 14, 69)
3. பட்டினப்பாலை (காவிரியின் சிறப்பு பாடல் அடிகள் 01-07, சோழநாட்டு வளம் பாடல் அடிகள் 20-28, பல்பொருள் வளம் பாடல் அடிகள் 183-193)
4. மதுரைக் காஞ்சி (பாண்டியர் பரம்பரை பாடல் அடிகள் 01-23, மன்னர்க்கு மன்னன் பாடல் அடிகள் 64-74, பாண்டியன் புகழ் பாடல் அடிகள் 197-209).

அலகு 2: சங்க இலக்கியம் - 2 9 மணி நேரம்

1. நற்றிணை (இரண்டு பாடல்கள் - 1, 172)
2. குறுந்தொகை (மூன்று பாடல்கள் – 3, 40, 135)
3. ஐங்குறுநூறு (மூன்று பாடல்கள் – 281, 283, 286)
4. அகநானூறு (இரண்டு பாடல்கள் – 4, 86)
5. கலித்தொகை (இரண்டு பாடல்கள் – 9, 133)

அலகு 3: நாடகம் 8 மணி நேரம்

1. ஆட்டனத்தி ஆதிமந்தி – கவிஞர் கண்ணதாசன்

அலகு 4: வளர்தமிழ் 9 மணி நேரம்

1. **ஊடகத் தமிழ் – கணினித் தமிழ் அறிமுகம்**

ஊடகத் தமிழ்: அச்சுக்கலை – இதழியல் - ஊடக வகைகள் - அச்சு ஊடகங்கள் - மின்னணு ஊடகம் - இதழியல் முன்னோடிகள் - அச்சு ஊடகங்களில் தமிழ் - கருத்துப் பரிமாற்றம் - மொழி நடையின் தன்மை

- நாளிதழ்கள் - வார, மாத இதழ்கள் - மின்னணு ஊடகங்களில் தமிழ் - வானொலி- தொலைக்காட்சி- திரைப்படம்.

கணினித் தமிழ்: கணினித் தமிழின் அடிப்படையும் பயன்பாடும் -கணிப்பொறியின் வரலாறும் வளர்ச்சியும், கணினியும் தமிழும், விசைப்பலகை (Keyboard) - எழுத்துருக்கள் (Fonts) - தமிழைத் தட்டச்சு செய்ய உதவும் மென்பொருள்கள், தமிழைத் தட்டச்சு செய்யும் முறைகள் - தமிழ்த் தட்டச்சுப் பயிற்சி - இணையமும் தமிழ்ப் பயன்பாடும் - தேடுபொறி (Search) - வலைப்பூ (Blog), மின்னூலகம் (Online e-Library), - மின்னகராதி (e-Dictionary), - மின் செய்தித்தாள் - e-Paper, - இணையவழித் தமிழ்க் கற்றலும்-கற்பித்தலும் - மின்வழிக் கற்றல் - e Learning.

அலகு 5: பொதுக்கட்டுரை, இலக்கிய வரலாறு, இலக்கணம் 9 மணி நேரம்

1. பொதுக்கட்டுரை வரைதல்
2. பாடம் தழுவிய இலக்கிய வரலாறு (சங்க இலக்கியம், நாடகம், வளர்தமிழ்)
3. இலக்கணம் (பொருளிலக்கணம்) திணை, துறை விளக்கம்.

மொத்தம்: 45 மணி நேரம்

பார்வை நூல்கள்

1. **கணினித்தமிழ்**, முனைவர் இல.சுந்தரம், விகடன் பிரசுரம், 2008.
2. **கணிப்பொறியில் தமிழ்**, த.பிரகாஷ், பெரிகாம், 2011.
3. **தமிழ்க் கணினி இணையப் பயன்பாடுகள்**, முனைவர் துரை. மணிகண்டன், மணிவானதி பதிப்பகம், 2013.
4. **இதழியல் கலை**, டாக்டர் மா. பா. குருசாமி, குரு - தேமொழி பதிப்பகம், திண்டுக்கல், 1998.
5. **அச்சுக் கலை வழிகாட்டி**, பாலசுப்பிரமணியன், ஆ., சென்னை : தனசு பதிப்பகம், 1966
6. **தொலைக்காட்சிக் கலை,** முனைவர் வெ. நல்லதம்பி, மங்கைப் பதிப்பகம், சென்னை 42, 2000.

8 பாடநூல் தேடலுக்கான இணையம்

- http://www.tamilvu.org/courses/nielit/Chapters/Chapter1/11.pdf
- https://www.tamildigitallibrary.in/

HINDI SYLLABUS 3 0 0 3

II year-IV SEM (Modern Poetry,Hindi sahithya ka ithihas –Adhunik kal,,Journalism,Advertisement writing)

Course Objective:

- To develop interest in modern poetry
- To teach them the development of Modern Hindi poetry
- To train them in advertisement writings

Unit I - Sansar by Mahadevi varma,
Hindi Sahitya ka ithihas (adhunik kal) **9**

Unit II - ' Mouun nimanthran' by Sumithranandan panth,
Hindi Sahitya ka ithihas (adhunik kal) **9**

Unit III - 'rah rahkar Tuutthaa rab kaa kahar' by
Dharmendra kumar nivathiya
Hindi Sahitya ka ithihas (adhunik kal) **9**

Unit IV 'samarpan' by Subhadra kumara chouhan ,
Advertisment writing **9**

Unit V - 'panthrah agasth kii pukaar 'by atal bihari vajpayee,
Advertisement writing **9**

Total Hours : 45

Course Outcome

- Students will be familiar with modern poetry
- Students will understand the importance of protecting atmosphere
- will know the real meaning of patriotism & the value of freedom.
- will get the ability to write various types of advertisement
- will understand the different methods adopted in writing them

Text / Reference books:

Hindi swachandata kavya by Prem Shankar,Vani prakashan
Meri ikyavan kavithaye ,Kithab gharprakashan ,20106
Sanchayan :Mahadevi Verma by Nirmala jain ,Vani prakashan ,2016
Padya khosh
Hindi Advertisement writing - ek parichaya .Bokcrot.com

Weblinks:

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF

15LFR004 FRENCH - IV 3 0 0 3

OBJECTIVE:
To strengthen the Grammar and Composition in French language.
To train the students to enhance his skills in French language for communication.

UNIT:I **09**

AIM :To teach about the advanced grammar and slam poetry.
CONTENT :Leçon 20 : Une grande Nouvelle-Grammaire Le future.
Leçon 46 :Le mètre ;l'autobus-Grammaire-A former ou a changer L'adjectif masculin ou féminine a l'adverbe-Trouvez les noms qui correspondent aux verbes suivants.

UNIT :II **09**

AIM :To teach about the advanced grammar and the civic responsibility.
CONTENT :Leçon 48 : A la préfecture de police-Grammaire Les pronoms relatifs.
Leçon 63 :les sports-Grammaire le conditionnel présent.

UNIT :III **09**

AIM : To teach about the advanced grammar and the french monuments.
CONTENT :Leçon :56 A Biarritz la page-Grammaire le future antérieure.
Leçon :57 Dans les Pyrénées-Grammaire le future antérieure suite.

UNIT :IV **09**

AIM : To teach about the advanced grammar and french topographies.
CONTENT :Leçons 65-a fin des vacances Grammaire-a changer les phrases du pluriel au singulier, le présent du subjonctif.

UNIT :V **09**

AIM : To teach about the advanced grammar and formal letter drafting.
CONTENT :Grammaire et composition :Transduction - réponses aux questions sur les passage-essaie sur un sujet générale, :lettre :Ecrire une lettre a une amie.

Total Hours: 45hrs

CO1: This unit enables the student to know about the french poet and poetry.
CO2:This unit enables the student to know about the french poet and poetry.
CO3:This unit enables the student to know about the french poet and poetry.
CO4: This unit enables the student to know about the french topographies.
CO5: This unit enables the student to know about the formal letter drafting.

TEXTBOOK :

Les leçons ont été choisi et tire de i & ii degré de gauger<<Cours de Langue et de Civilisation Française>> The Millenium, Publication Hachette, édition 2002

REFERENCE BOOKS:

DONDO Mathurin, "Modern French Course", Oxford University Press, New Delhi Edition 2014

WEB SITE RESOURCES LINK;
https://www.thoughtco.com/french-reading-tips-1369373
https://www.bnf.fr/fr
https://www.laits.utexas.edu/tex/

ENGLISH IV - PRACTICAL ENGLISH (CONVERSATION PRACTICE)- 3 0 0 3

Course Objective:

- To train students in the use of English language in varied literary and non-literary contexts.
- To teach them soft skills and strengthen their foundation in grammar.
- To evaluate students to sensitivity in conversational competency.

UNIT I **09**

i. At the Airport
ii. In a Bank
iii. On a Bus

UNIT II **09**

iv. In Flight
v. In a Hotel
vi. In a Library

UNIT III **09**

vii. Tea Time
viii. On a Train
ix. In a Restaurant

UNIT IV **09**

x. On a Picnic
xi. In a Police station
xii. In a Post office

UNIT V **09**

xiii. In a travel agency
xiv. Asking the way
xv. At the theatre

Total:45 Hours

Course Outcome

At the end of this course students will be able to,

- Feel confident to speak in different situations.
- Learn befitting vocabulary words.
- Have the ability to visualize speaking situations.
- Be conversant with other conversational situations.
- Categorize the nature of questions asked usually in interviews.

Books Recommended:

- English Conversation Practice, D.H.Spencer, Oxford.
- Communicative English by Department of English, National College(Autonomous), Trichy.

Web Sources:

- https://self-publishingschool.com/how-to-write-dialogue/
- https://www.masterclass.com/articles/how-to-write-dialogue

21CBHC41 Atomic Theory 3 1 0 4

Course Objective

To make the students to understand and study, Electronic configuration of various elements in periodic table, Predicting structure of molecules and how hydrogen bonding, metallic bonding is important in common materials' scientific applications to material fabrication

Unit I : Atomic Structure 12

Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de'Broglie equation, Heisenberg's Uncertainty Principle and its significance. Shapes of *s, p, d* and *f* orbitals. Contourboundary and probability diagrams. Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations, Variation of orbital energy with atomic number.

Unit II : Periodicity of Elements 12

s, p, d, f block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to *s* and *p*-block -Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective - nuclear charge in periodic table - Atomic radii (van'der Waals) - Ionic and crystal radii - Covalent radii (octahedral and tetrahedral) - Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy - Applications of ionization enthalpy - Electron gain enthalpy, trends of electron gain enthalpy.

Unit III : Ionic Bond and Covalent Bond 12

Ionic bond:General characteristics, types of ions, size effects, radius ratio rule and its limitations. Packing of ions in crystals. Born-Landé equation with derivation, expression for lattice energy. Madelung constant, Born-Haber cycle and its application, Solvation energy.

Covalent bond:Lewis structure, Valence Shell Electron Pair Repulsion Theory (VSEPR), Shapes of simple molecules and ions containing lone-and bond-pairs of electrons multiple bonding, sigma and pi-bond approach, Valence Bond theory, (Heitler-London approach).

Unit IV : Molecular orbital theory 12

Postulates of Molecular orbital theory - Molecular orbital diagrams of simple homonuclear and heteronuclear diatomic molecules, MO diagrams of simple tri and tetra-atomic molecules, e.g., N2, O2, C2, B2, F2, CO, NO, and their ions; Covalent character in ionic compounds, polarizing power and polarizability. Fajan rules, polarization. Ionic character in covalent

compounds: Bond moment and dipole moment. ionic character from dipole moment and electronegativities

Unit V : Metallic bonding and Weak chemical forces **12**

Metallic Bond:Qualitative idea of free electron model, Semiconductors, Insulators.

Weak Chemical Forces:van'der Waals, ion-dipole, dipole-dipole, induced dipole dipoleinduced dipole interactions, Lenard-Jones 6-12 formula, hydrogen bond, effects of hydrogen bonding on melting and boiling points, solubility, dissolution.

TOTAL HOURS : 60 HRS

Course Outcome

- Understand the basics of hydrogen bonding, metallic bonding.
- Identify some geometry ofmolecules..
- Demonstrate an understanding of the hybridization and shapes of atomic, molecular orbitals, bond parameters, bond- distances and energies..
- Understand and examine the Atomic theory and its evolution
- Learning scientific theory of atoms, concept of wave function.

Text Books/Reference Books:

1. Lee, J. D. *Concise Inorganic Chemistry*, Wiley, 5th Edn.
2. Douglas, B.E., McDaniel, D.H., Alexander J.J., *Concepts & Models of Inorganic Chemistry, (Third Edition)* John Wiley & Sons,1999.
3. Atkins, P. W. and DePaula, J. *Physical Chemistry*, Tenth Edition, Oxford University Press, 2014.
4. Rodger, G. E. *Inorganic and Solid State Chemistry*, Cengage Learning, 2002.

Websources / Weblinks

1. **https://www.shakopee.k12.mn.us/cms/lib07/MN01909221/Centricity/Domain/293/Atomic%20Structure%20Notes.pdf**
2. **http://www.appstate.edu/~brian/tec-1023/misc/basatom.pdf**
3. **https://ocw.mit.edu/courses/materials-science-and-engineering/3-091sc-introduction-to-solid-state-chemistry-fall-2010/syllabus/MIT3_091SCF09_aln01.pdf**

21CBHC42 Heterocyclic Compounds 3 1 0 4

Course Objective

To make the students to understand and study, Use of benzene diazonium salt in organic synthesis. Applications of heterocyclic compounds in pharmaceutics/drugs and the mechanism of actions Pharmaceutics/Biomedical applications of alkaloids and terpenes, Nitrogencontaining organic compounds/heterocyclic compounds in synthetic chemistry

Unit I: Synthesis of Three-membered ring Heterocyclic Compounds 12

Chemistry of oxiranes, aziridines and episulphides - synthetic approaches and reactivities.

Unit II:Three-membered heterocyclic with two heteroatoms 12

oxaziranes, diaziridines and diazirines - synthetic approaches and reactivities.

Unit III:Heterocyclic Compounds 12

Classification and nomenclature, Structure, aromaticity in 5-numbered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis), Pyrimidine, Structure elucidation of indole, Fischer indole synthesis and Madelung synthesis), Structure elucidation of quinoline and isoquinoline, Skraup synthesis, Friedlander's synthesis, Knorr quinoline synthesis, Doebner-Miller synthesis, Bischler-Napieralski reaction, Pictet-Spengler reaction, Pomeranz-Fritsch reaction Derivatives of furan: Furfural and furoic acid

Unit IV:Alkaloids 12

Natural occurrence, General structural features, Isolation and their physiological action Hoffmann's exhaustive methylation, Emde's modification, Structure elucidation and synthesis of Hygrine and Nicotine. Medicinal importance of Nicotine, Hygrine, Quinine, Morphine, Cocaine, and Reserpine.

Unit V:Four-membered heterocycles: 12

oxitanes, azatidanes and thietanes - synthetic approaches and reactivities. natural products:synthesis of Peniciline and cephalosporine

Total: 60 hrs

Course Outcome

- Understand the basics of Heterocyclic compounds and their reactions..
- Identify Nitrogen containing functional groups and their reactions
- Demonstrate an understanding of the Alkaloids and Terpenes.
- Understanding the reactions and mechanisms of diazonium compounds.
- Understanding the structure and their mechanism of reactions of selected polynuclearhydrocarbons.

Text Books/Reference Books:

1.Morrison, R. T., Boyd, R. N., Bhatterjee, S.K., Organic Chemistry, 7th Edn., Pearson.
2 Acheson, R.M. *Introduction to the Chemistry of Heterocyclic compounds,* John Welly & Sons (1976).
3 Solomons, T.W., Fryhle Craig, *Organic Chemistry*, John Wiley & Sons, Inc (2009).
4 McMurry, J.E. *Fundamentals of Organic Chemistry*, 7th Ed. Cengage Learning India Edition, 2013.
5 Kalsi, P. S. *Organic reacations and their mechanisms*, New Age Science (2010).
6 Clayden, J.; Greeves, N.; Warren, S.; Wothers, P.; *Organic Chemistry,* Oxford University Press Inc., New York (2001).

Websource / Weblink

1. **http://www.chem.gla.ac.uk/staff/stephenc/teaching/HeterocycleLectures2011_2C12.pdf**
2. **https://www.britannica.com/science/heterocyclic-compound**
3. **https://www.cliffsnotes.com/study-guides/chemistry/organic-chemistry-ii/aromatic-compounds/heterocyclic-aromatic-compounds**

21CBHC43 FUNDAMENDALS OF PHYSICS – II 3 0 0 3

Course Objective

To make the students to understand and study, the interference and diffraction properties of light; principles of magnetism; dual nature of matter wave and significance of wave function and Schrodinger equation; principles of nuclear physics and radiation physics; the working of electronic components in the digital circuits.

UNIT I Optics 09

Air wedge - determination of diameter of a thin wire by air wedge – Diffraction: Fresnel diffraction &Fraunhofer diffraction - plane diffraction grating - theory and experiment to determine wavelength (normal incidence) - Polarization: Double refraction.

UNIT II Magnetism and Electromagnetism 09

Magnetism: Susceptibility - permeability - intensity of magnetization - properties of dia, para and ferro magnetic materials – Electromagnetism: Faraday's laws of electromagnetic induction, Lenz's law – self-inductance – mutual inductance.

UNIT III Nuclear and Radiation Physics 09

Nuclear Physics: Nuclear constituents, size, mass, spin and charge - binding energy - binding energy curve - nuclear fission - chain reaction – nuclear reactor - Radiation Physics: radioactive disintegration – half-life period.

UNIT IV Relativity and Quantum Mechanics 09

Relativity: Frames of references - postulates of special theory of relativity - Lorentz transformation equations - Wave mechanics: matter waves - de Broglie wavelength - properties of wave functions - Quantum mechanics: postulates of quantum mechanics -Schrödinger equation - Time dependent and time independent wave equations.

UNIT V Electronics 09

Diodes, transistors and ICs: - Zener diode – characteristics - transistor configuration CE mode - IC – Pin diagram of 741 – Digital electronics: binary numbers – conversion of decimal number to binary number - binary number to decimal number – binary addition, subtraction and basic logic gates (OR, AND, NOT. NOR & NAND) – EXOR gate – De Morgan's theorem.

Total hours:45h

Course Outcome

- Understand the basics of interference, diffraction and polarization.
- Identify some typical magnetic materials and their properties.
- Demonstrate an understanding of the basic principles of the special theory of relativity.
- Understand and examine the structure of various number systems and its application in digital design.
- Design and analyze the combinational logic circuits.

Text Books

1. Optics: BrijLal&Subramaniam, S Chand & Co., New Delhi
2. Electricity and magnetism: R Murugeshan, 8th Edn, 2006, S Chand & Co., New Delhi
3. Principles of Electronics: V K Mehta, 5th edition 2001, S Chand & Co., New Delhi,
4. Atomic and Nuclear Physics: BrijLal&Subramaniam, S Chand & Co., 2000
5. Quantum Mechanics: V. Devanathan, Narosa, Chennai, 2005.
6. Modern Physics: R Murugeshan, Kiruthiga, Sivaprasath S Chand & Co. 2007
7. Physics of Radiation Therapy: FM Khan - Williamd and Wilkins, Third edition, 2003

Reference Books

1. Fundamentals of Physics, 6th Edition by D Halliday, R Resnick and J Walker, Wiley NY 2001.
2. Physics, 4th Edition vols. I, II & II Extended by D Halliday, R Resnick and K S Krane, Wiley NY 1994.
3. Nuclear Medicine Physics: Chandra, Lippincot Williams and Wilkins, 1998.

Website link/Web source:

1. https://www.google.com/search?q=Nuclear+and+Radiation+Physics+&ei=QYXvYPjFEs3tz7sPgeWwIA&oq=Nuclear+and+Radiation+Physics+&gs_lcp=Cgdnd3Mtd2l6EAMyAggAMgYIABAWEB4yBggAEBYQHjIGCAAQFhAeMgYIABAWEB4yBggAEBYQHjIGCAAQFhAeMgYIABAWEB4yBggAEBYQHjIGCAAQFhAeOgcIABBHELADSgQIQRgAUP6W8gFY_pbyAWD8n_IBaAFwAngAgAHZAYgB1gKSAQUwLjEuMZgBAKABAqABAaoBB2d3cy13aXrIAQjAAQE&sclient=gws-wiz&ved=0ahUKEwi46r7Y7OPxAhXN9nMBHYEyDAQQ4dUDCA4&uact=5

21PBHC41 ORGANIC QUALITATIVE ANALYSIS PRACTICAL-PRACTICAL VI

0 0 4 2

Course objective

To know the identification of various functional groups in a unknown compound and to know how to prepare various organic compound by a single stage preparation.

Organic analysis

Reaction of the following functional groups:

1. Aldehyde
2. Ketone
3. Carboxylic acid (mono and di)
4. Ester
5. Carbohydrate (reducing and non-reducing)
6. Phenol
7. Aromatic primary amine
8. Amide
9. Nitro compound
10. Diamide
11. Aniline

The given organic compound containing one functional group should be analyzed and to be reported with a characteristic derivative.

Determination of boiling point and melting point (Demonstration only**)**

Total: 30 hrs

Course Outcome

- To understand how to identify the given organic substance is aliphatic or aromatic
- To learn how to find the given organic substance is saturated or unsaturated
- To learn the reaction mechanism of identification for special elements through lassigne's test
- To learn the preliminary test of identification for various functional groups like carbohydrate, carboxylic acid, aldehyde, phenolic compound, amines, ketones, nitro compounds
- To practice the various confirmatory tests for different functional groups

Text Book

1. Gnanaprakasam, Ramamurthy, "Organic Chemistry Lab Manual" S. Viswanathan Pvt. Ltd. 3rd edition **2011**

Reference Book

1. Vogel's – "Textbook of qualitative organic Analysis", Longmann, 12th edition, **2011**

Websource / Weblink

1. **https://rushim.ru/books/praktikum/Mann.pdf**
2. **http://www.iscnagpur.ac.in/study_material/dept_chemistry/3.1_MIS_and_NJS_Manual_for_Organic_Qualitative_Analysis.pdf**

21PBHC42 PHYSICS PRACTICAL –PRACTICAL VII 0 0 4 2

Course Objective:

To impart the knowledge for the bending of beams under different loading conditions, to know the comparative study of viscosity, spectrometerand conductance.

Any 10 Experiments

1. Young's modulus by uniform bending - Pin and Microscope.
2. Young's modulus by non-uniform bending - Pin and Microscope.
3. Rigidity modulus - torsion pendulum
4. Coefficient of viscosity of a liquid - Poiseuilles method
5. Thermal conductivity of a bad conductor - Lee's disc method.
6. Spectrometer - grating - normal incidence method.
7. Spectrometer – Dispersive Power of a prism.
8. Coefficient of viscosity of a liquid – Stoke's method
9. Ultrasonic Interferometer
10. Sonometer-Frequency of Tuning Fork
11. Compound Pendulum.
12. Air wedge - thickness of a wire

Total: 30 hrs

Course outcome

- Calculate the Young's modulus of the material.
- Estimate the parameters associated with torsional oscillation.
- Analyze the coefficient of viscosity at different pressure head.
- Calculate the wavelengths of different spectral line using spectrometer grating.
- Examine the thermal conductivity of bad conductor using Lee's disc method.

Text Books

1. Properties of Matter: R. Murugeshan, S Chand & Co. Pvt. Ltd., New Delhi
2. Heat and thermodynamics: D S Mathur, S Chand & Co., New Delhi

21CBHC51 STEREOCHEMISTRY AND MOLECULAR REARRANGEMENT 4 0 0 4

Course objective

To understand about what is isomers their classification conformational analysis and the mechanism of important rearrangement.

UNIT-I Stereoisomerism 09

Definition – classification into optical and geometrical isomerism. Optical isomerism: optical activity – conditions for optical activity – asymmetric center – chirality – methods of racemisation and resolution – asymmetric synthesis – (partial and absolute) – Walden inversion.

UNIT-II Absolute Configuration 09

Cahn – Ingold – Prelog rules, R-S notations (Biphenyl, Allene, Spirane and Hexahelicine) for optical isomers with one and two asymmetric carbon atoms (configuration of Glyceraldehyde, Isoserin, Lactic acid and Tartaric acid).

UNIT-III Geometrical Isomerism 09

Cis, *trans* and E, Z notations – geometrical isomerism in maleic, fumaric acid, disubstitutedcyclopropane, disubstituted 1, 2-cyclobutane, 1,3-disubstituted cyclobutane, disubstitutedcyclopentane and cyclohexane) physical and chemical methods of distinguishing geometrical isomers.

UNIT-IV Conformational Analysis 09

Conformers-dihedral angle – conformational analysis of ethane and n-butane – energy diagram – conformers of cyclohexane – boat, twisted boat and chair forms. Conformation and stability of 1,2-,1,3-, 1,4-dimethycyclohexane and conformation of decalin.

UNIT-V Molecular Rearrangements 09

Mechanism, examples for Pinacol-Pinacolone, Wagner Meerwein, Wolff, Beckmann, Hofmann, Benzilic acid, Cope and Claisen rearrangements. Migration aptitude, Nighboring group participation and their role in rearrangements.

Total: 45 hrs

Course Outcome

- To recognize and comment on different synthetic strategies and methods for stereocontrol when faced with a synthetic scheme
- To predict the conformational preferences of common organic structures based on steric and electronic interactions and describe stereochemical and conformational structure on the chemical reactivity and on the mechanisms of organic reactions
- To discuss the significance of chirality of allenes, spiranes and biphenyls
- To draw mechanisms for reactions involving heterocycles as starting materials, intermediates and products, and to propose syntheses of heterocycles from the major classes
- To describe about aromaticity, nonaromaticity and antiaromaticity in carbocyclic and heterocyclic compounds

Text books

1. I. L. Finar. "Organic chemistry: Stereochemisty and the Chemistry of Natural Products. Vols. II, Pearson education, London 5th edition, **1975**.
2. P. S. Kalsi, "Stereochemistry: Conformation and Mechanism" New age international Pvtltd. 6th edition **2005**

Reference Books

1. Robert Thornton Morrison, Robert Neilson Boyd, "Organic Chemistry" Ashok K. Ghosh 10th edition, **2013**
2. Dr. Jagadambasingh, Dr. L. D. S. Yadav, "Advanced Organic Chemistry" PragatiPrakashan, 7th Edition, **2011**

Websource / Weblink

1. **https://nptel.ac.in/content/storage2/courses/104101005/downloads/LectureNotes/chapter%2011.pdf**
2. **https://www.uou.ac.in/lecturenotes/science/MSCCH-17/CHEMISTRY%20LN%201%20STERIOCHEMISTRY.pdf**
3. **http://assets.vmou.ac.in/MSCCH02.pdf**

21IMSG21 INTERNSHIP 0 0 2 1

Course Objective:

- To gain practical experience by working in a professional chemistry -related environment.
- To demonstrate an ability to work independently and utilize principles of chemistry to solve real-world problems.

Course Requirements:

- Students wishing to receive credit for internship are required to find, apply for, and be selected for a chemistry or materials related internship position with an organization of their choice. They will then need to seek permission by the Department Chair to register for the appropriate internship course.

- The student must complete at least 90 hr of work during the semester for each hour of academic credit awarded, and these work hours must be completed during the term (odd or even semester vacation) in which the student is registered for the internship course.

- After the student has completed the internship, the student must submit the final evaluation report of the internship experience and 20 minute presentation to department at conclusion of semester. The Department Chair and class instructor will allot the marks for the internship evaluation report.

Course Outcomes:

- To know the various types of industries.
- To learn the procedure of identifying, approaching, applying and getting approval of internship from a leading industry.
- To witness the entire work area of the industry.
- To understand the nature of job involved in the various sector of the industry.
- To adapt with the working people.

PROJECT WORK **0 0 10 5**

Course Objective: To learn about the concept of project work. To know about designing new experiments and carry out the experiments. To know about the various characterization techniques used to characterize the synthesized compounds. To know about the necessities of literature survey and to learn about writing dissertation of project work.

NOTE

1. Review of Chemical literature and documentation.
2. During the Sixth semester the project work may be carried out either in industries/ National laboratories/R & D centers/in the university lab.

DISCIPLINE SPECIFIC ELECTIVE

(DSE)

CHEMISTRY OF METALS AND NON METALS 3 0 0 3

Course objective

To learn about the periodic table classification, properties and comparative studies of elements in different series.

Unit-I Chemistry of `d' block elements 09

Characteristics of `d' block elements. Comparative study of Ti, V, Cr, Mn and Iron group metals- occurrence, oxidation states, magnetic properties, catalytic properties and color.

Unit II Metallurgy 09

General principles of metallurgy –occurrence- concentration of the ores- extraction of the metals Extraction of following metals: Al, Ca, Ti, Cr, Mn, Ni, V, Sn and Pb.

Unit-III Chemistry of P block elements 09

Carbon family – Comparison of properties of carbon and silicon valencies, oxides, halides, hydrides and oxyacids classification, properties and uses of carbides. Classification of silicates.

Unit-IV Nitrogen and Oxygen family 09

Comparative study of N, P, As, Sb, and Bi – elements, oxides, oxyacids, halides and anhydrides, valency states – preparation, properties, structure and uses of hydrazine, hydroxylamine and hydrazoic acids, preparation and uses of $NaBiO_3$.

Comparative study of O, S, Se, and Te – elements, hydrides, oxides and oxyacids of sulphur including peroxy acids.

Unit-V Halogens and Nobel Gases 09

Comparative study of F, Cl, Br, I and At – elements reactivities, hydrogen halides, oxides and oxyacids. Interhalogen compounds and pseudo halogens. Exceptional properties of Fluorine. Electronic onfiguration and position in the periodic table. Applications, clathrates and compounds of xenon, hybridization and geometries of XeF_2, XeF_4, $XeOF_4$.

Total: 45 hrs

Course Outcome

- To clearly explain the Characteristics of `d' block elements
- To understand the comparative study of Ti, V, Cr, Mn and Iron group metals
- To clearly explain the general principles of metallurgy, occurrence and concentration of
- the ores
- To clearly explain the extraction of the selected metals

Text Books

1. P. L. Soni, "Text Book of Inorganic Chemistry" Sultan Chand & sons. 32nd edition. **2013**
2. R. D. Madhan, "Modern Inorgnaic Chemistry" S. Chand & Co., 6th edition **2012**

Reference Books

1. James E. Huheey, Ellen, A. Keiter, Richard, L. Keiter, "Inorganic Chemistry" Pearson education (Singapore Pvt Limited) 9th edition, **2013**
2. J. D. Lee, Concise Inorganic chemistry" Blackwell Science Limited (France) 9th edition **2013**

Websource/Weblink

1. https://nios.ac.in/media/documents/secscicour/English/Chapter-27.pdf
2. https://ncert.nic.in/ncerts/l/jesc103.pdf
3. https://www.csun.edu/~jk323784/subjects/chemistry/notes/metal_prop.pdf

BIO – INORGANIC CHEMISTRY 3 0 0 3

Course objective

To understand about human biochemistry, proteins, enzymes, vitamins. Chemistry involved in agriculture, nitrogen fixing and photosynthesis.

Unit – I Introduction 09

Essential and trace metal lions – membrane- structure, function, transport properties active transport – phosphate hydrolysis – Role of alkali and alkaline earth metal lions in biological systems- sodium pump

Unit – II Oxygen Carriers 09

Hemeproteins – Hemoglobin and myoglobin – structure – oxygenation mechanism Bohr effect co-operativity effect in hemoglobin

Unit –III Metalloenzymes 09

Enzymes- Definition, Nomenclature, Sources, Classification and Specificity – Factors affecting enzyme activity- substrate pH, temperature –Coenzyme- vitamin B_{12} coenzymes- peroxidase and catalyses

Unit – IV Nitrogen Fixation and Iron – Sulphur proteins 09

Nitrogen fixing microorganisms (In VIVO nitrogen Fixation)-Nitrogenous) Reactivity of nitrogenous-postulated mechanisms for biological nitrogen fixation Rurbredoxin, Ferredoxins structure, and functions

Unit – V Photosynthesis and Toxicity 09

Chloroplast- light reactions – structure of chlorophyll- Photosynthesis – Reactions – Type I and Type II photosynthetic reactions – Role of Manganese complex in evolution of oxygen Toxicity – Hg, Cd, Zn, Pb, and As

Total: 45 hrs

Course Outcome

- To know the essentials of metal ions in human body
- To learn the importance of ATP cycle and sodium potassium pump
- To understand the structure and functions of hemoglobin and myoglobin
- To understand the process and basis of nitrogen fixation in organisms
- To realize the mechanism of biological nitrogen fixation

Text Book

1. Lippard and Berg, "Principle of Bioinorganic Chemistry" –University- Science Book 7th edition, **1994**

References Books

1. Bertini, Gray, Hippard and Valentire – "Bioinorganic Chemistry" –Viva Books Pvt Ltd. 3rd edition, **2011**
2. David E. Fertion , "Bio-coordination Chemistry" Oxford chemistry Primer, 7th edition1995.

Websource / Weblink

1. https://www.chemie-biologie.uni-siegen.de/ac/hjd/lehre/master/bioinorganic_handout.pdf
2. http://homes.nano.aau.dk/fp/uke/pdf/Bio%20Inorganic%20Chemistry.pdf
3. https://www.internetchemistry.com/chemistry/bioinorganic-chemistry.php

NUCLEAR AND SOLID STATE CHEMISTRY 3 1 0 4

Course objective: To learn about nuclear components, nuclear energy, forces, nuclear reactors, nuclear power projects in India and various countries and to understand solid structure, crystals types, X-ray diffraction, semi conductors and solid defects

Unit – I Introduction 12

The nucleus – subatomic particles- nuclear force- mass defect- packing fraction – Binding energy – n/p ratios in stable and metastable nuclei –Nuclear shell model the liquid drop model –nuclear isomerism- isotopes, isobars, isotones – mirror nuclelli magic numbers

Unit – II Fragmentation and Assay 12

Nuclear fission – fission fragments and their mass distribution – fission energy – Theory of fission Nuclear reactors – Fast Breeder reactors – atomic power projects in India Nuclear fusion – Nuclear fusion in Sun's atmosphere Detection and determination of activity by G.M counter and Scintillation counter.

Unit –III Tracer techniques 12

Radioactive Tracers: - Principles of separation of isotopes- uses in analytical chemistry, reaction mechanism and agriculture – radio carbon dating

Artificial radioactivity- Transmutation of elements – cyclotron – induced radioactivity- Qvalues of nuclear reactions

Unit – IV Solid state I 12

Crystalline and amorphous solids- Elements of symmetry of a crystal – unit cell – Bravais lattices – miller indices – Bragg's law – X- ray diffraction of crystals – structure of NaCl, CsCl diamond, Graphite zinc and Futile – radius ratio rule

Unit – V Solid state II 12

Defects in solids-Band Theory – Semiconductors – p-type and n- type semiconductors – applications – Solid state electrolytes- Types of magnetic, Dia, Para, Ferro, Antiferro and ferrimagnetism**.**

Total: 60 hrs

Course Outcome

- To define Atomic nucleus, Isotopes, Types of isotopes and Nuclear isomers
- To explain different types of Nuclear reactions, stability of Nucleus, Nuclear forces and Emission of alpha, beta and gamma rays
- To know aboutradioactivity, Nuclear fission, Nuclear fusion , Nuclear reactors and breedor reactors
- To learn about rate of radioactive decay, half life period and activity of Radioactive substance
- To describe general characteristics of solid state

Text Books

1. Antony R. West, "Solid State Chemistry" Wiley edition, 7th edition, **2011**
2. H. J Arnikar: "Essentials of nuclear Chemistry" New Age International Pvt. Limited. 5th edition, **2014**

Reference Books

1. R. Gopalan, "Elements of nuclear Chemistry" S. Viswanathan & Co., 7th edition, **2009.**
2. A. F. Wells "Structural Inorganic Chemistry" Oxford University Press, 11th edition, **2009.**
3. Phillips F. C. "An introduction to crystallography" Longmans Green, New York., 7th edition, **2012**

Websource / Weblink

1. **http://www.uobabylon.edu.iq/eprints/publication_10_10256_250.pdf**
2. **https://www.internetchemistry.com/chemistry/solid-state-chemistry.php**

PHASE EQUILIBRIA AND KINETICS 3 1 0 4

Course objective

To know about chemical kinetics, catalysis rate determination, phases and its concepts: components, degrees of freedom, phase diagram.

Unit-I Phase Equilibria 12

Phase Rule: Concepts of phase, component and degrees of freedom, with examples. Gibb's phase rule phase diagram and application of phase rule: *One-component system*- Water and sulphur systems. Solid-liquid equilibria –Binary systems *Two component system*- Simple eutectic: Lead-silver system - Distribution law statement and limitations applications to simple systems involving association, dissociation and complex formation

Unit-II Free Energy and Chemical Equilibria 12

Spontaneous reaction-Free energy-Chemical Equilibrium – Thermodynamic treatment of the law of mass action-Von't Hoff Reaction Isotherm-Relation between K_p K_c and K_x Homogeneous equilibria-Dissociation Of N_2O_4 and PCl_5.Integrated Form of the van't Hoff Equation.Heterogenous Equilibria-Equilibrium constants for reaction involving real gases-Le Chatelier's Principle

Unit-III Chemical Kinetics-I 12

Rate of a reaction – Rate equation- Rate constant, Order and Molecularity – Methods of rate measurement. Derivation of kinetic equation for rate constants of I, II order reactions – Third and zero order reactions and examples (No derivation of rate constant). Rate determining step and mechanism of elemental process – Arrhenius law- activation energy.

Unit IV Chemical Kinetics-II 12

Collision theory of reaction rates, collision cross section, collision number. Effect of solvent and ionic strength on reaction rates. Unimolecular reactions steady state treatment Lindemann hypothesis Chain reaction.

Unit V Chemical Kinetics-III 12

Homogeneous and Heterogenous Catalysis – definition – examples and differences. Reactions in gases and in solutions (Acid, base and Wilkinson's catalysts). Enzyme catalysis elementary of the principle of the activated complex using steady state treatment Michaelis – Menten kinetics.

Total: 60 hrs

Course Outcome

- To identify and understand the principles of chemical equilibrium thermodynamics to solve
  multiphase equilibria and chemical reaction equilibria
- To write down the basic equations for vapor-liquid equilibrium using the gamma and phi
- Methods and find vapor-liquid equilibrium phase compositions
- Ability to construct phase diagrams for single and multi-component systems
- Able to derive Nernst Equation and distribution coefficient

Text Books

1. P.L. Soni, " Text Book of Physical Chemistry" Sultan Chand & sons, 12th edition, **2010**
2. B. R. Puri, L. R. Sharma, Pathania, "principle of Physical Chemistry" Vishal Publishing & Co., 46th edition **2013**

Reference Books

1. Kundu and Jain, "Physical Chemistry" S. Chand, 6th edition, **2011**
2. S. Glasstone, "Text Book of Physical Chemistry" –Macmillan. 7th edition **2012**

Websource / Weblink

1. **https://ocw.mit.edu/courses/chemistry/5-60-thermodynamics-kinetics-spring-2008/video-lectures/lecture-18-phase-equilibria-2014-one-component/**
2. **https://users.encs.concordia.ca/~tmg/images/9/94/Mats_Hiiert_Phase_quilibria_and_thermodynamics.pdf**
3. **http://www.colby.edu/chemistry/PChem/Lecture1.html**
4. **https://chem.libretexts.org/Bookshelves/General_Chemistry/Book%3A_Concept_Development_Studies_in_Chemistry_(Hutchinson)/14%3A_Reaction_Equilibrium_in_the_Gas_Phase**

CHEMISTRY OF NATURAL PRODUCTS 3 0 0 4

Course objective

To understand what are carbohydrates proteins amino acid, alkaloids, terpenoide their classification structure, elucidation and to know about dyes

UNIT-I Carbohydrates 12

Classification – Constitution of glucose and fructose. Reactions of glucose and fructose- osazone formation. Mutarotation and its mechanism. Cyclic structure. Pyranose and furanose forms. Determination of ring size. Haworth projection formula. D and L configuration of monosaccharides – chain lengthening and chain shortening of aldoses. Inter conversion of aldoses and ketoses.

UNIT-II Amino Acids and Proteins 12

Aminoacids and proteins – Classification of amino acids. Essential and nonessential amino acids, preparation of alpha aminoacids, properties and reactions. Zwitter ions, isoelectric points – Peptide synthesis – structure determination of polypeptides – end group analysis.

UNIT-III Vitamins and Alkaloids 12

Vitamins:- classification, biological importance of vitamins A, B_1, B_2, B_6, B_{12} and C. General methods of isolation and general methods of structure determination of Conine,

Piperine and Nicotine.

UNIT-IV Terpenoids 12

Isoprene rule, special isoprene rule, Structural elucidations of – Geraniol, menthol and alpha terpineol.

UNIT-V Dyes and Pigments 12

Theory of colour and constitution. Classification – according to structure and method of application. Preparation and uses of 1) Azo dye-methyl orange and Bismark brown 2) Triphenyl methane dye Malachite green. 3) Phthalein dye – phenolphthalein and fluroescein 4) Vat dye – indigo 5) Anthraquinone dye – alizarin.

Total: 60 hrs

Course Outcome

- To be well versed in Basic Structure and Reactions of Glucose and Fructose
- To clearly explain the Haworth projection formula and D & L configuration of carbohydrates
- To understand the classification, function and reactions of amino acids and proteins
- To demonstrate the concept of synthesis and structural determination of polypeptides
- To classify fat soluble and water soluble vitamins with suitable examples and the biological importance

Text Book

1. Ashutosh Kaur. "Chemistry of Natural Products" Vol. I & II. B. S. publishers. 2nd edition, **2012.**

Reference Books

1. Jagadamba Singh. "Natural Products Chemistry" Pragati Prakashan, 2nd edition **2012.**

2. O. P. Aggarwal. “Chemistry of Natural Products” Vol. I & II. Goel publishers. 41st edition. **2009.**

Websource / Weblink

1. https://nios.ac.in/media/documents/dmlt/Biochemistry/Lesson-02.pdf
2. **http://chemistry.creighton.edu/~jksoukup/lec5-aminoacidsstud.pdf**
3. https://www.intechopen.com/books/alkaloids-their-importance-in-nature-and-human-life/introductory-chapter-alkaloids-their-importance-in-nature-and-for-human-life

INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY 3 0 0 3

Course Objective

Impart the basic knowledge on 100Nanoscience and technology. Understand the various process techniques available for the processing of nanostructured materials. Impart knowledge on the exotic properties of nanostructured materials at their nanoscale lengths. Acquire the knowledge above the various nanoparticles process methods and their skills. Study the reactive merits of various process techniques.

Unit-I Introduction 09

Definition of a nano system – Basic concepts of and technology – Scientific revolutions of nanotechnology – atomic & molecular size – Time and length at nanoscale – Scope of nanoscience and technology – Commercial Applications of Nanotechnology.

Unit-II Nanostructures and Dimensions 09

Definition of Nanostructure materials – Classification of nanostructures – zero, one, two and three dimensional nanostructures. Size Dependency in Nanostructures –quantum size effects in nanostructures.

Unit-III Nanomaterial Synthesis 09

Synthesis of nanomaterials – top down and bottom up approach –Method of nanomaterials preparation – Physical methods – Inert gas condensation and evaporation, chemical synthesis – sol-gel and chemical reduction – Biological methods – nanoparticles using plant extracts, bacteria, fungi etc.

Unit-IV Nanomaterial Properties 09

Surface properties of nanoparticles – Surface to volume ratio- mechanical – optical,-electronic – magnetic – thermal and chemical properties of nanomaterials. Size dependent properties-size dependent absorption spectra – self-assembly in nanotechnology – Types of SAMs, Methods of self-assembly, Applications of self assembled monolayers

Unit-V Applications of Nanomaterials 09

Applications of metal nanoparticles in technologically imperative fields like sensors, Nanomaterials for energy storage – Batteries and fuel cells - photovoltaic devices –solar cells – optical memory devices – Quantum nanoelectronic devices –quantum computing.

Total: 45 hrs

Course Outcome

- To learn about the definition of a nano system and the basic concepts of nanoscience and technology
- To understand the Scientific revolutions of nanotechnology.
- To know about the Scope of nanoscience and technology and commercial applications of Nanotechnology
- To familiarize theClassification of nanostructures, Size Dependency in Nanostructures and quantum size effects in nanostructures
- To learn about the Synthesis of nanomaterials

Text Books

1. C. P. Poole and J.F. Owens, “Introduction to Nanotechnology”, Wiley Interscience, 2003.

2. M. A. Ratner. And D. Ratner, “Nanotechnology: A Gentle Introduction to the Next Big Idea”, Prentice Hall PTR, First Edition, 2002.

3. T. Pradeep, “Nano: The Essential Nanoscience and Nanotechnology”, Tata McGraw hill, 2007.

Reference Books

1. G. Cao, “Nanostructures & Nanomaterials: Synthesis, Properties &Applications”, Imperial College Press, 2004.

2. C. N. R. Rao, A. Muller and A. K. Cheetham, “The Chemistry of nanomaterials: Synthesis, Properties and Applications”, Wiley-VCH verlag GmBH & Co.KGA, 2004.

Websource / Weblink

1. **https://nanoyou.eu/attachments/188_Module-1-chapter-1.pdf**
2. **http://trl.lab.uic.edu/1.OnlineMaterials/nano.publications/17.An%20Introduction%20to%20%20Nanoscience%20&%20Nanotechnology.pdf**
3. **https://lkouniv.ac.in/site/writereaddata/siteContent/20200412080803947 4anupam_tripathi_engg_Nanotechnology.pdf**

AGRO INDUSTRIAL CHEMISTRY 3 1 0 4

Course objective

To know the various water sources, treatment analysis and its importance in agriculture, types of solid fertilizers, pesticides, sugar, oils, fats and waxes.

UNIT I Water source for agriculture- Water Treatment & Water Analysis 12

Sources of water supply for agriculture. Hard and soft water. Water softening methods: lime soda process, phosphate conditioning, permutit and ion-exchange processes. Water analysis; determination of hardness of water, acidity, alkalinity, pH value, amount of free CO2, fluoride content, chloride content and their estimation. Biological oxygen demand (BOD), chemical oxygen demand (COD), chlorine demand and their determinations. Recycling of water.

UNIT II Chemistry of soil-soil classification and soil analysis 12

Definition of soils. Classification of soils. Properties of soils-physical properties and mechanical analysis. Structure and Texture. Soil water, soils air and soil temperature. Chemicalproperties-soil mineral matter-soil colloids, ion-exchange reactions. Soil fertility and its evaluation. Soil organic matter and their influence on soil properties –N ratio effects. Soil reactions. Soil pH, acidity, alkalinity, buffering of soils and its effects on the availability of N, P, K, Ca, Mg, I, AI, Mn & sulphuric acid. Soils salinity, acid & alkaline soils- their formation and reclamation.

UNIT III Fertilizers & Pesticides 12

Importance of nitrogenous fertilizers. Principle and manufacture of ammonium nitrate, ammonium sulphate, and urea Phosphate fertilizers. Preparation and uses of mono and diammonium phosphates, super phosphate and triple super phosphate.

Potassium fertilizers-potassium nitrate, potassium chloride, potassium sulphate. Mixedfertilizers. Methods of compost in green manuring, concentrated organic manures and their chemical composition. Oil cakes, horn and hoof metal.

Pesticides Classification-Insecticides, fungicides and herbicides. General methods ofpreparation. Insect attractants and repellants-fluorine compounds,boron compounds, arsenic compounds, organomercuric compound.

UNIT IV Chemistry of sugar and fermentation 12

Details of manufacture of sucrose from cane sugar-extraction of juice, purification,concentration, crystallization, separation and refining of crystals, recovery of sucrose from

molasses. Manufacture of sucrose from beetroot. Estimation of sucrose and inversion sugar by polarimetry. Manufacture of alcohol from molasses and starch by fermentation process.

UNIT V Oils, fats and Waxes 12

Classification of oils fats and waxes: distinction between oil, fats and waxes hydrogenation of oils-principle and manufacturing details. Definition and determination of soapanification value, acid value, iodine value RM value and Hehner value and their signification. Elaidin test for oils. Some common waxes like spermaceti, Bees wax, baybeery wax and their uses. Soap and its manufacture; toilet and transparent soaps. Cleansing action of soap. Detergent.

Total: 60 hrs

Course Outcome

- To explain about the basic concept of water source for agriculture and its classification and purification process
- To identify the appropriate water analysis method and learn about the recycling of water
- To extend skills about the classification of soils and it properties (physical and chemical)
- To gain appreciation knowledge about the soil analysis and understand the salinity, acid & alkaline soils- their formation and reclamation
- To understand the effect of nitrogenous fertilizers and their preparation and uses in agriculture

Text Books

1. Applied Chemistry- Theory and Practise- O.P.Vermani & A.K.Narula
2. Industrial Chemistry-B. N. Chakrabarty

Reference books

1. Nature and properties of soils-Harry, O Buckman N Yle C. Brandy
2. Soils Sceince-A.Sankara
3. Insecticides, Pesticides and Agro based Industries – R. C. Palful, K. Goel, R. K. Gupta
4. Industrial Chemistry-B. K. Sharma.

Websource / Weblink

1. http://kamarajcollege.ac.in/Department/Chemistry/II%20Year/007%20Skill%20Based%20I%20Core%20-%20Agro%20Chemistry%20-%20III%20Sem.pdf
2. https://inis.iaea.org/collection/NCLCollectionStore/_Public/03/016/3016137.pdf
3. http://www.fao.org/3/j7714e/j7714e.pdf

CHEMISTRY OF MATERIALS 3 0 0 3

Course objective

To know multiphase materials, liquid crystals, polymeric materials, organic solids and high Tc materials

UNIT- I Multiphase Materials 09

Ferrous alloys: Fe-C phase transformation in ferrous alloys: stainless steels, non-ferrous alloys, properties of ferrous and non-ferrous alloys and their applications.

Thin films and Langmuir-Blodgett Films

Preparation techniques; evaporation/sputtering. Chemical processes, MOCVD, sol-get etc. Langmuir-Blodgett (LB) film, growth techniques, photolithography, properties and applications of thin and LB lilms.

UNIT- II Glasses and Ceramics Composites 09

Glasses, Ceramics, Composites and nanomaterials, Glassy state, glass formers and glass modifiers, applications. Ceramic structures, mechanical properties, clay products. Refractories, characterizations, properties and application. Microscoipc composites; dispersion-strengthened and particle- reinforces, fibre-reinforced composites, nanocrystalling phase, preparation procedures, special properties.

UNIT- III Liquid Crystals 09

Mesmorphic, liquid crystals, positional order, bond orientational order, nematic and smectic mesophases; smectic-nematic and clearing ternperature-horneotropic, planar and schlieren textures, twisted nematics, chiral nemations, molecular arrangement in smectic A and smectic C phases, optical properties of liquid crystals. Dielectric susceptidility and dielectric comstants. Lyotropic phases and their description of ordering in liquid crystais.

Polymeric Materials: Molecular shape, structure and configuration, crystallinity, and their applications. Conducting and ferroelectric polymers.

UNIT- IV Ionic Conductors 09

Types of ionic conductors. Mechanism of ionic conduction, interstitial jumps (Frenkel).vacancy mechanism. Diffusion superiohic conductors. Phase teransitions andmechanism of conduction in superionic conductors examples and applications of ionic conductors.

B- High Tc Materials: Defect perovskites, high Tc superconductivity in cuprates, preparation and characterization of 1-2-3 and 2-1-4 materials, normal state properties; anisotropy; anisotropy; temperature dependence of electrical resistance; optical phonon modes, supenerconducting state; heat capacity; coherence length, elastic constants, position lifetimes, microwave absorption-pairing and multi gap structure· in high Tc materials applications of high Tc materials.

UNIT- V Materials for solid State Devices 09

Rectifiers, transistors, capacitors-IV, V compounds, low- dimensional quantum structures; optical properties.

Organic Solids. Fullerenes. Molecular Devices: Conducting organics, organic superconductors, magnetism in organic materials. Fullerenes-doped, fullerenes as superconductors. Molecular rectifiers and artificial photosynthetic devices. Optical storagememory and sensors. Nonlinear optical materials: nonlinear optical effects. Second and third order-molecular hyperpolarisability and second order electric susceptibility-materials for second and third harmonic generation.

Total: 45 hrs

Course Outcome

- To clearly explain the phase transformation in ferrous alloys
- To known the concept of thin films and Langmuir-Blodgett Films
- To understand the concept of glasses, ceramics and composites
- To clearly explain the characterizations, properties and application nanomaterials
- To known the concept of polymeric materials and their applications

Text Books

1. Solid State Physics, N.W. Ashcroft and N.D. Mermin Saunders College.
2. Material Science and Engineering. An Introduction. ·W.D. Callister. Wiley.

Reference Books

1. Principles of the Solid State, H.v. Keer. Wiley Eastern.
2. Materials Science, J.e. Anderson, K.D. Leaver, J.M. Alexander and R.D. Rawlings, ELBS
3. Thermotropic Liquid Crystals Ed. G.W. Gray. John Wiley.
4. Handbook of Liquid Crystals. Kelker and Hafz. Chemie Verlag.

Websource / Weblink

1. http://chemistry.du.ac.in/course_material.html
2. https://docbrown.info/page03/materials.htm
3. https://matmatch.com/learn/material/glass-ceramics

PHARMACEUTICAL CHEMISTRY 3 0 0 3

Course objective

To know the terminology in pharmaceutical chemistry, and about antibiotics anasthetics antibacterials as well as various harmones and their functions in human systems.

UNIT- I Pharmaceutical Chemistry –I 09

Definition of the following terms: Drug, pharmocophore, pharmacology, pharmacopeia, pharmacodynamics, bacteria, virus, and vaccine. Cause, systems, and drugs for anaemia, Jaundice, cholera, malaria and filoria. Indian medicinal plants and uses- Neem, tulasi, kizhanelli, mango, semparathi, adathodai and thoothuvalai. Blood: Grouping, composition, Rh- Factor, blood-pressure hypertension and hypotension.

UNIT –II Pharmaceutical Chemistry – II 09

Antibiotics: Definition and uses with examples (Structure not required). Antiseptics anddisinfectants: Definition and uses with examples. Analgesics: Definition and uses of narcotics, non-narcoatics, disadvantages.

UNIT – III Pharmaceutical Chemistry-III 09

Anaesthetics: Classification and uses. CNS Drugs: Definition, Classitication and uses with examples. Drugs and treatments of (a) AIDS (anti-HIV) (b) Diabetes (c) Cancer

UNIT –IV Pharmaceutical Chemistry – IV 09

Antibacterials: Definition, Classification –Sulphadrups, examples. Anti- Pyretic and anti-inflammatory agents. Cardiovascular drugs, anti-arithemitic drugs antihypertensive antianginal agents, vasodialators: Definition, examples with uses

UNIT –V Pharmaceutical Chemistry- V 09

Physiological functions of hormones: Adrenalin, thyroxin, insulin, oxytocin, progesterone, estrone and testosterone. Micronutrients and their biological role in human systems.

Total: 45 hrs

Course Outcome

- To demonstrate the importance of chemistry in the development and application of therapeutic drugs
- To develop an understanding of the physico-chemical properties of drugs
- To Understand how current drugs were developed and how new scientific techniques will provide future drugs
- To clearly explain the classification, function and uses of antibiotics and antiseptic and disinfectants
- To describe the function and uses of narcotic and non narcotics analgesics

Text Books

1. Surendra N. Pandeya "Textbook of medicinal chemistry (Synthetic Bio chemical approach)" vol. I &II S. G. Publishers, 5th edition, **2011.**
2. Gurdeep R Chatwal. "Synthetic drugs" Himalaya publishing house, 2nd edition, **2013.**

Reference book

1. K.D. Tripathi. "Essentials medical pharmacology" J. P. Brothers. 7th Edition, **2009.**

Websource / Weblink

1. **https://www.tutorialsduniya.com/notes/pharmaceutical-chemistry-notes/**
2. **http://www.pharmacy180.com/group/medicinal-chemistry-6/**

CHEMISTRY IN EVERYDAY LIFE 3 0 0 3

Course objective

To know about various compounds in nature, building materials, Food and nutrition, agriculture chemistry, color chemicals.

Unit-I General survey of chemicals **09**

General survey of chemicals used in everyday life. Air- Components and their importance, Photosynthetic reaction, Green house effect and their impact on our life style. Water-sources of water, qualities of potable water, soft and hard water, methods of removal of hardness.

Unit – II Building materials **09**

Building materials: - Cement, Ceramics, Glass and Refractories. Definition, composition and application only. Plastics: - Definition, Types with examples, uses, merits and demerits, environmental impact and awareness. Biodegradable polymers.

Unit –III Food and Nutrition **09**

Food and Nutrition: Carbohydrates, proteins, Fats Definition source and their importance as food constituents balanced diet- Calorie, minerals and vitamins. Cosmetics: General formulation and possible hazards.

Unit – IV Agricultural chemistry **09**

Agricultural chemistry: Fertilizers, Pesticides Classification and used Energy sources: Fuels classification –Solid, liquid and gaseous, nuclear fuel, propellants – utility and awareness.

Unit – V Color chemical **09**

Color chemical: Pigments and Dyes: Example, uses. Explosives: Classification and examples. Chemistry in Technology: Uses, examples.

Total Hours : 45hrs

Course Outcome

- To be well versed in general survey of chemicals
- To understand the concept of greenhouse effect and their impact on our life style
- To understand the composition and application of building materials
- To clearly explain the concept offood and nutrition
- To understand the importance of minerals and vitamins

Text Book

1. A. K. De, Environmental Chemistry, Himalaya publishing house, 7th edition **2011**

Reference Books

1. R. Norris Shreve “Chemical Process Industries” (4th Edition)
2. Perfumes, Cosmetics and Soaps –W.A. Poucher (Vol 3)

Websource / Weblink

1. **https://www.askiitians.com/revision-notes/chemistry/chemistry-in-everyday-life/**
2. **https://ncert.nic.in/ncerts/l/lech207.pdf**
3. **https://www.thinkiit.in/board-notes/english/class-12/chemistry/all/chemistry-in-everyday-life/**

FORENSIC CHEMISTRY 3003

Course objective

To know about history and development of forensic chemistry crime detection, forgery, counterfeit, misuse of drugs, cybercrime

Unit I Introduction 09

Definition, History, Development and Scope of Forensic Science. Divisions of Forensic Science and Laboratory Set up. Forensic Chemistry: Introduction, Conventional methods of chemical analysis, presumptive tests (colour & spot); Drugs of Abuse: Introduction and classification; Forensic Toxicology: Introduction and General Methods of chemical analysis for alcohol, Classification of Poisons.

UNIT II Crime detection 09

Accidental explosions during manufacture of matches and fire-works (as in Sivakasi). Human bombs, possible explosives (gelatin sticks, RDX). Metal detector devices and other security measures for VVIP. Composition of bullets and detection of powder burns. **Scene of crime**: finger prints and their matching using records. Smell tracks and police dogs. Analysis of blood and other body fluids in rape cases. Typing of blood. DNA finger printing for tissue identification in 109bodies. Blood stains on clothing. Cranial analysis (head and teeth).

UNIT III Forgery and Counterfeiting 09

Detecting forgery in bank cheques / drafts and educational records (mark lists, certificates), using UV-light. Alloy analysis using AAS to detect counterfeit coins. Checking silver line water mark in currency notes. Jewellery: detection of gold purity in 22 carat ornaments, detecting gold plated jewels, authenticity of diamonds (natural, synthetic, glassy).

UNIT IV Medical Aspects: AIDS 09

Cause and prevention. Misuse of scheduled drugs. Burns and their treatment by plastic surgery. Metabolite analysis, using mass spectrum – gas. Detecting steroid consumption among athletes and race horses.

UNIT V Identification and Detection 09

Identification and detection of biological fluids (Blood, Semen, Saliva and Urine) and their Medico-logical importance. Personal Identification through somatometry and Somatoscopy; Study and hair and fibers. Examination of skeletal remains-identification of bones, differentiation between human and non human, determination of age, sex and height from skeletal remains. Modern Developments and their concepts (Nacre analysis, Brain fingerprinting, DNA Profiling, voice identification, Cyber crime, Forensic Odontology and Bitemarks).

Total: 45 hrs

Course Outcome

- To be well versed in development and scope of forensic science
- To clearly explain thegeneral methods of chemical analysis for alcohol and classification
- of poisons
- To understand the concept of crime detection
- To known the concept of DNA finger printing for tissue identification in bodies

Text Books

1. B.R. Sharma: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad (2003).
2. S. Nath: An Introduction to Forensic Anthropology, Gian Publishing House, N. Delhi (1989).

Reference Books

1. K. S. Narayan Reddy, *The Essentials of Forensic Medicine and Toxicology*, 12th ed., Sri Lakshmi Art Printers, Hyderabad, 1990.
2. R. Saferstein, Criminalistics, Prentice Hall (1998).
3. W.G. Eckert, Introduction of Forensic Science, CRE Press, Bock Raton (1997).
4. I.P. Singh and M.K. Bhasin, A Laboratory Manual of Biological Anthropology, K.R. Enterprises, N. Delhi (2005).
5. S. Nath: Personal Identification through Fingerprints, Shree Publisher & Distributors, New Delhi (2006).

Websource / Weblink

1. https://www.chemistryabc.com/introduction-to-forensic-chemistry-science-pdf/
2. https://www.sakshyaforensic.com/study-materials
3. https://www.ojp.gov/pdffiles1/nij/187736.pdf

DYE CHEMISTRY 3 0 0 3

Course objective: To understand what are dyes and pigments their classification, synthesis, reactions, applications in the field of textile, medicine, cosmetics, foods and beverage.

UNIT I Chromophores and Auxochromes 09

Colour and constitution-Relationship of colour observed-to wave length of light absorbed- Terms used in colour chemistry-Chromophores, Auxochromes, Bathochromic shift, Hypsochromic shift. Colour of a substance-Quinonoid theory and molecular orbital approach.

UNIT II Classification of Dyes 09

Classification of Dyes-chemical classification-classification according to their applications- Acid dyes-Basic dyes. Azoic dyes, mordant dyes, vat dyes, Sulphur dyes, Disperse dyes, Nitro dyes-and Nitroso dyes process of dyeing (simple treatment). Azo dyes-Principles governingazo coupling-mechanism of diazotization-Coupling with amines, coupling with phenols Classification according to the number of azo group & application-Tautomerism in azo dyes.

UNIT III Di and Triphenyl methane dyes and Phthalocyanines-Cyanine dyes 09

Synthesis, reactions and applications of Di and Triphenyl methane dyes-phthalein dyes- Xanthen dyes-acridine dyes-sulphur dyes. Phthalocyanines-Cyanine dyes. Malachite green, Para-rosaniline, crystal violet.

UNIT IV Azine, Oxazine and Triazine Dyes 09

Azine, Oxazine and Triazine Dyes. Synthesis and applications of quinonoid dyes including vat dyes based on anthraquinone.

UNIT V Pigments 09

Pigments-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.

Total: 45 hrs

Course Outcome

- To clearly explain about the basic concept of colour and constitution and relationship of colour observed-to wave length of light absorbed
- Understanding about Quinonoid theory and molecular orbital approach of a colour substance
- To extend skills about the classification of dyes such as Acid dyes, Basic dyes. Azoic dyes, Nitro dyes-and Nitroso dyes process of dyeing (simple treatment)
- Identify the classification according to the number of azo group & application
- Gain appreciation knowledge about the synthesis, reactions and applications of Di and Triphenyl methane dyes

Text books

1. S. K. Jain & S. K. Mailk "Modern paint pigment and Varnish" Industries Small business Publication, New Delhi. **2001.**
2. I. L. Finar "Organic chemistry Vol. I & II, ELBS, 11th edition,**2009.**

Reference books

1. Dyes and their intermediates-E. N. Abraha, Bergamon Press, **1969**.
2. The chemistry of synthetic dyes and pigments-H.A.Lubs, ACS Publication, Halner, **1970**.

3. The chemistry of synthetic dyes Vol, I, II, III & IV-K.Venkataraman, Academic Press N.Y., **1949**.
4. Physical and Chemistry applications of dyestuffs-F.P.Schafer, Springer-Veriag N.Y.**1976**.

Websource / Weblink

1. **https://www.brainkart.com/article/Dye-Chemistry_39968/**
2. **https://www.ncbi.nlm.nih.gov/books/NBK385442/**
3. **https://monographs.iarc.who.int/wp-content/uploads/2018/06/mono99-7.pdf**

GREEN METHODS IN CHEMISTRY 3 0 0 3

Course objective

To learn what is green chemistry twelve principles energy sources of a country and cases study

Unit-I Introduction 09

Definitions of Green Chemistry. Brief introduction of twelve principles of Green Chemistry, with examples, special emphasis on atom economy, reducing toxicity, green solvents.

Unit –II Alternative Sources of Energy 09

Green Chemistry and catalysis and alternative sources of energy, Green energy and sustainability.

Unit –III Surfactants 09

Surfactants for Carbon Dioxide – replacing smog producing and ozone depleting solvents with CO_2 for precision cleaning and dry cleaning of garments.

Unit –IV Toxicity Replacement 09

Designing of Environmentally safe marine antifoulant. Right fit pigment: synthetic azo-pigments to replace toxic organic and inorganic pigments.

Unit –V Green Synthesis 09

An efficient, green synthesis of a compostable and widely applicable plastic (poly lactic acid) made from corn.

Total: 45 hrs

Course Outcome

- To understand the importance of Green methods and its need for future of the mankind
- To solve the problems of pollutions, degradation of environment
- To address the issues like degradation, global warming, the deplection of ozone layer and loss of biodiversity
- To get an idea about the nature and purity of the crystal
- To get knowledge about the synthesis of different complexes and their analytical study by spectroscopy.

Text Books

1. Anastas, P.T. and Warner, J.K. *Oxford Green Chemistry- Theory and Practical*, University Press, 1998

2. Matlack, A.S. *Introduction to Green Chemistry*, Marcel Dekker, 2001

Reference Books

1. Cann, M.C. and Connely, M.E., *Real-World Cases in Green Chemistry*, American Chemical Society, Washington, 2000

2. Ryan, M.A. and Tinnesand, M., *Introduction to Green Chemistry*, American Chemical Society, Washington, 2002

Websource / Weblink

1. https://www.tutorialsduniya.com/notes/green-methods-in-chemistry-notes/
2. https://www.intechopen.com/books/green-chemistry/introductory-chapter-principles-of-green-chemistry#:~:text=2.11.&text=Consequently%2C%20green%20chemistry%20aims%20at,time%20monitoring%20of%20running%20processes.
3. https://www.asdlib.org/onlineArticles/ecourseware/Manahan/GreenChem-2.pdf

POLYMER CHEMISTRY 3 0 0 3

Course Objective:

To study the types of polymerization, polymerization techniques, glass transition temperature, polymer degradation and additives for polymers.

UNIT –I Basic Concepts of Polymers. 09

Polymer, Monomer, Repeating unit, degree of polymerization. Classification of polymers, Stereochemistry of polymer, nomenclature of stereo regular polymers. Chain polymerization, free radical polymerization; ionic polymerization; Coordination polymerization

UNIT –II Plastics and Composites 09

Plastics, classification – preparation, properties and uses of PVC, Teflon, polycarbonate, polyurethane, nylon-6,6, PET – Rubber – vulcanization of rubber. Synthetic rubbers. Composites – definition, types, polymer matrix composites – FRP only

Conducting polymers, semiconducting polymers, molecular switches—examples, mechanism and applications.

UNIT- III Molecular Weight of polymers 09

Measurement of molecular weight and size; number average and weight average molecular weights. Random, block and graft co polymers- preparation.

Polymerisation techniques; bulk, solution, suspension and emulsion polymerization.

UNIT- IV Glass transition temperature and glassy Solids 09

Glass transition temperature, concepts of glass transition temperature and associated properties. Glassy solids and glass transition, factors influencing glass transition temperature (Tg).

UNIT –V Types of Polymers and Polymer Degradation 09

Synthetic resins and plastics; Manufacture and applications of polyethylene, PVC,Teflon, poly styrene, poly methyl methacrylate, poly urethane, phenol – formaldehyde resins, urea-formaldehyde resins and epoxy polymers.

Polymer degradation: Types of degradation- thermal, mechanical, photo, hydrolytic and oxidative degradations.

TOTAL: 45h

Course Outcomes:

- To know about basic ideas of polymers like monomer, repeat unit and degree of polymerization.
- To learn about the stereochemistry and nomenclature of polymers.
- To understand the various types of polymerization.
- To know the preparation and polymerization techniques.
- To understand the number average and weight average molecular weights.
- To learn about the concepts of glass transition temperature.
- To know the various factors influencing glass transition temperature.
- To understand the principle of crystallinity.

TEXT BOOKS:

1. Fred. W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, Third Edition, 2007.
2. R. V. Gowariker, Polymer Science, New Age International Publication, 2006.

REFERENCE BOOKS:

1. A. Ravve, Principles of Polymer Chemistry, Springer New York, Third Edition, 2012.
2. R. J. Young and P. A. Powell, Introduction to Polymers, CRC Press, Third Edition,1991.

Weblink / Websource

1. http://web.mit.edu/5.33/www/lec/poly.pdf
2. https://www.freebookcentre.net/chemistry-books-download/General-Polymer-Chemistry-Lecture-notes.html

Medicinal chemistry 3 1 0 4

Course Objective

To make the students to understand and study, The basics of medicinal chemistry, biophysical properties, Biological activity parameters, Drug metabolism, Biophysical and chemical properties of enzymes, hormones, vitamins and Concept of rational drug design

Unit I :Bio-physicochemical properties 12

Acidity/Basicity, Solubility, Ionization, Hydrophobic properties, Hydrophilic properties, Lipinski Rule, Drug-like properties, Understanding of the biological activity parameters such as Ki, Kd, LD50, EC50, IC50, CC50, ADMET properties

Unit II :Structural properties 12

Isosterism, Bioisosterism, Nonclassical isosteres, Understanding of the 3D-structure along with bond length, bond angle and dihydral angle, Concept of Configuration and Conformation withexamples, Concept of stereochemistry in terms of biological response with examples, Stereoselective receptors or enzymes such as muscarinic receptor, Stereochemically pure drug and recemates, Examples such as catecholamines, etc.

Unit III :Steroids, Prostaglandins, Enzyme, Hormone and Vitamins 12

Biophysico-chemical properties, Steroid Hormone Receptors, Chemical Contraceptive agents, COX-2 inhibitors, Prostaglandins for Ophthalmic use, pharmaceutically important enzyme products such as Pancreatin, Trypsin, Insulin. Classification of vitamins with examples.

Unit IV :Medicinal Chemistry of Therapeutic Agent 12

Structure, Chemistry, Mode of action and adverse effect of the representative therapeutic agents such as Anti-infective agent, Antimalarials, Antibacterial, Antiviral, Anticancer, CNS acting drugs, Adrenergic Agents, Cholinergic Drugs, Diuretics, Cardivascular, local anesthetic agent, Analgesic Agents, Histamine and Antihistamine agents.

Unit V :Concept of rational drug design 12

Structure activity relationship, Drug-receptor understanding, Molecular modeling, Structure based drug design. QSAR.

Total Hours: 60hrs

Course Outcome

- Understand the basics of medicinal chemistry, biophysical properties.
- Identify Biological activity parameters.
- Demonstrate an understanding of Drug metabolism.
- Understanding the Biophysical and chemical properties of enzymes, hormones, Vitamins.
- Understanding the Concept of rational drug design.

Text Books/Reference Books:

1. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical ...by Charles Owens Wilson, John H. Block, Ole Gisvold, John Marlowe Beale
2. Foye's Principles of Medicinal Chemistry by David A. Williams, Thomas L. Lemke, William O. Foye (2008), Kluwer publication.
3. Remington: The Science and Practice of Pharmacy Vol 1, Ed. 19 by Joseph Price Remington, Alfonso R. Gennaro. (1995), MACK Publishing.
4. Burgers Medicinal Chemistry by Manfred E. Wolff, Alfred Burger
5. Burgers Medicinal Chemistry and Drug Discovery by Abraham D. J., Lewis F. L., Burger A., vol.5, 6th Edn., 2003, Hoboken N.J.Wiley,
6. The Organic Chemistry of Drug Design and Drug Action by Silverman R. B., 2nd Edn., Academic Press. 2012

Weblink/Websource

1. https://www.mypharmaguide.com/medicinal-chemistry-pdf-notes-free-download/
2. https://remixeducation.in/introduction-to-medicinal-chemistry/

Organic Spectroscopy 3 0 0 3

Course Objective

To make the students to understand and study, organic spectroscopy, Identify of functional groups using IR Spectrocopy and UV spectroscopy, Understanding the working principle of IR, NMR spectroscopy and Mass spectroscopy.

Unit I :Basic Principles of UV Spectroscopy 09

Application of Woodward-Fiser rule in interpretation of Organic compounds: Application of visible, ultraviolet and infrared spectroscopy in organic molecules. Electromagnetic radiation, electronic transitions, λmax &εmax, chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating λmax of conjugated dienes and α,β– unsaturated compounds.

Unit II :Basic principles of IR Spectroscopy 09

Identification of Functional groups of various classes of organic compounds: Infrared radiation and types of molecular vibrations, functional group and fingerprint region.

Unit III :Application of IR Spectroscopy 09

IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

Unit IV :NMR (1H and 13C NMR) 09

Application of Chemical Shifts, Splitting of signals, Spin coupling and Over Houser effect in interpretation of NMR spectra, Isotopic exchange

Unit V :Basic principles Mass Spectrometry 09

Application of fragmentation rule in characterization of organic compounds. Problems on structure elucidation of organic compounds based on spectral data.

Total Hours : 45hrs

Course Outcome

- Understand the basics of organic spectroscopy.
- Identify of functional groups using IR Spectrocopy.
- Demonstrate an understanding of UV spectroscopy.
- Understanding theworking principle of IR and NMR spectroscopy
- Understanding the Concept of Mass spectroscopy.

Recommended Books/References:

1. R.M. Silverstein, G.C. Bassler & T.C. Morrill*: Spectroscopic Identification of Organic Compounds*, John Wiley & Sons.
2.John R. Dyer, Applications of absorption spectroscopy of organic compounds, Prentice Hall India (2012).

Weblink / Websource

1. https://www.saurashtrauniversity.edu/docs/eBooks/organic-spectroscopy.pdf
2. https://www.chemistryabc.com/organic-spectroscopy-handwritten-notes-pdf/

Inorganic Chemistry practical-Practical VIII 0 0 4 2

Course objective

To learn the technique to identify acid radicals and basic radicals of each two with to interfering radicals as well as to prepare simple coordination compounds.

(A) Iodo / Iodimetric Titrations

(i) Estimation of Cu(II) and K2Cr2O7 using sodium thiosulphate solution (Iodimetrically).
(ii) Estimation of (i) arsenite and (ii) antimony iodimetrically
(iii) Estimation of available chlorine in bleaching powder iodometrically.

(B) Inorganic preparations

(i) Preparation of Ferric Alum
(ii) Preparation of Soda Alum.

Total hours : 30hrs

Recommended books/references:

Mendham, J., *A. I. Vogel's Quantitative Chemical Analysis* Sixth Edition Pearson, 2009.

Weblink / Websource

1. https://freebookcentre.net/chemistry-books-download/Laboratory-Manual-of-Practical-Inorganic-II-Chemistry-(PDF-69P).html

Analytical Chemistry Practical-Practical IX 0 0 4 2

Course objective

To learn the technique to identify acid radicals and basic radicals of each two with to interfering radicals as well as to prepare simple coordination compounds.

I. Chromatography:

(i) Paper chromatographic separation of Fe3+, Al3+, and Cr3+.
(ii) Separation and identification of the monosaccharides present in the given mixture (glucose & fructose) by paper chromatography. Reporting the Rfvalues.
(iii) Chromatographic separation of the active ingredients of plants, flowers and juices by TLC

II. Spectrophotometry

(i). Determination of pKa values of indicator using spectrophotometry.
(ii) Structural characterization of compounds by infrared spectroscopy.
(iii) Determination of dissolved oxygen in water.
(iv) Determination of chemical oxygen demand (COD).
(v) Determination of Biological oxygen demand (BOD).

III. Solvent Extractions:

(i) To separate a mixture of Ni2+ & Fe2+ by complexation with DMG and extracting the Ni2+-DMG complex in chloroform, and determine its concentration by spectrophotometry.
ii. Determine the pH of the given aerated drinks fruit juices, shampoos and soaps.

Total hours : 30hrs

Recommended text books/references:

1. Mendham, J., *A. I. Vogel's Quantitative Chemical Analysis 6th Ed.*, Pearson, 2009.
2. Willard, H.H. *et al*.: *Instrumental Methods of Analysis*, 7th Ed. Wardsworth Publishing Company, Belmont, California, USA, 1988.
3. Christian, G.D. *Analytical Chemistry*, 6th Ed. John Wiley & Sons, New York, 2004.
4. Harris, D.C. *Exploring Chemical Analysis*, 9th Ed. New York, W.H. Freeman, 2016.
5. Khopkar, S.M. *Basic Concepts of Analytical Chemistry*. New Age International Publisher, 2009.

Weblink / Websource1.

1. http://www.esparama.lt/es_parama_pletra/failai/ESFproduktai/2012_Analytical_chemistry_laboratory_manual_(_aprasas_uzsienio_studentams_).pdf

SYLLABUS GENERIC ELECTIVE COURSES

GREEN CHEMISTRY 4 0 0 2

Course Objective

To train the students to use eco-friendly approaches in synthesizing agro-based chemicals viz. insecticides, fungicides, herbicides, bactericides acaricides, weedicides**.** To emphasize green chemistry approach in crop protection which help to reduce global warming

Unit I Introduction 06

Current status of chemistry and the Environment-Evolution of the Environmental movement: Public awareness – Dilution is the solution to pollution-Pollution prevention

Unit II Green Chemistry 06

Definition – Principles of Green Chemistry – Why is this new area of Chemistry getting to much attention – Why should chemist pursue the Goals of Green Chemistry – The roots of innovation – Limitations

Unit III Green Chemistry using Bio Catalytic Reactions 06

Introduction – Fermentation and Bio transformations – Production of Bulk and fine chemicals by microbial fermentation- Antibiotics – Vitamins – Bio catalyses synthesis of industrial chemicals by bacterial constructs – Future Tends.

Unit IV Green House Effect and Global Warming 06

Introduction – How the green house effect is produced – Major sources of green house gases – Emissions of CO_2 – Impact of green house effect on global climate – Control and remedial measures of green house effect – Global warming a serious threat – Important points

Unit V Future Trends in Green Chemistry 06

Green analytical methods, Redox reagents, Green catalysts; Green nano-synthesis, Green polymer chemistry, Exploring nature, Biomimetic, Proliferation of solvent-less reactions; Non-covalent derivatization, Biomass conversion, emission control.

Total: 30 hrs

Course Outcome

- To understand the connection between common atoms and complex molecules
- To explain and analysing simple chemical reactions
- To distinguishing between recyclable and non-recyclable materials
- To assessing the potential impact of chemical reactions to environment and human health
- To understand the connection at the chemical level between all matter and will develop your inquiry based activities to explore best practices related to organic farming and resource management.

Text Books

1. M. Lancaster, “Green Chemistry: an Introductory Text”, RSC, 2002
2. Sheldon, Arends, Hanefeld, “Green Chemistry and Catalysis”, Wiley, New York, 2007

Reference Books

1. Anastas & Warner, Green Chemistry : Theory & Practice ,Oxford Univ. Press,New York, 1998
2. S. E. Park, J. S. Chang, S. H. Jhung, "The Role of Catalyst for Green Chemistry", Chemworld, Vol. 44 (8), 38, 2004

Weblink/Websource

1. **HTTP://WWW.RSC.ORG/SUPPDATA/CS/C1/C1CS15219J/C1CS15219J.PDF**
2. **HTTPS://WWW.ASDLIB.ORG/ONLINEARTICLES/ECOURSEWARE/MANAHAN/GREENCHEM-2.PDF**

CHEMINFORMATICS 4 0 0 2

Course Objective

Students completing this paper should be able to understand concepts of molecular chemistry that are basic to cheminformatics.This course will train the students to use QSAR, docking etc.

Unit I Mathematics Process 06

Graph theory and molecular numerology; Logic, sets and functions; Algorithms, integers and matrices; Mathematical reasoning, induction and recursion; Counting; graphs, trees and sets, basic probability and statistics; Markov processes

Unit II Basics of Stereochemistry 06

Basic Stereochemistry, Amino acids and Proteins and Properties; pKa, pH and ionization of acids and bases; Protein structure – Primary structure, Secondary structure – helix & sheet; Tertiary structure; Quaternary structure; covalent and non-covalent forces that maintain structures.

Unit III Cheminformation 06

History of scientific information communication-chemical literature-chemical information-chemical information search-chemical information sources-chemical name and formula searching-analytical chemistry-chemical history-biography-directories and industry sources

Unit IV Biological Databases 06

Introduction; Experimental sources of biological data; Publicly available databases; Gene expression monitoring; Genomics and Proteomics; Metabolomics; Visualisation of sequence data; Visualization of structures using Rasmol or SPDB Viewer or CHIME; Genetic basis of disease; Personalized medicine and gene-based diagnostics.

Unit V Drug Design 06

Introduction to drugs, structure-based drug design. QSAR and 3D-QSAR Methods. Pharmacophore Design, Ligand-Based Design and *De Novo* Drug Design Virtual screening/docking of ligands. Protein structure, Drug action & enzymes. Drug action & receptors. Prediction of Binding Modes, Protein–Ligand binding free energies, Fragment-Based Drug Design, ADMET prediction.

Total: 30 hrs

Course Outcome

- To understand basis of group theory and its applications
- To know Logics, sets and functions can be studied
- To study the principles and theories of algorithms, induction Basics and process of photosynthesis
- To learn the Basics of stereochemistry and structure of proteins
- To study the history of science and chemical information could be well studied

Text Books

1. P. Shanmughavel, “Principles of Bioinformatics”, Pointer publishers, 2005.
2. Arfken, “Mathematical Methods for Physicists” Academic Press, 1985.

Reference Books

1. P. Shanmughavel, “Trends in Bioinformatics”, Pointer publishers, 2006.
2. Francis A. Carey and Richard J. Sundberg, “Advanced Organic Chemistry-Part A & B” Third Edition, 1990.

Weblink / Websource

1. **HTTP://WWW.ACAD.BG/EBOOK/CHEMINFORMATICS/LEACH_AN%20INTRODUCTION%20TO%20CHEMOINFORMATICS%20REV%20ED.PDF**

FOOD CHEMISTRY AND ADULTERATION 4 0 0 2

Course Objective

To understand the basic information of food chemistry and adulteration. To appreciate the importance of food additives and pesticide control. To provide an information about food preservatives

Unit-I Introduction **06**

Food: source, functions of food – food groups – food guide – basic five food groups, usage of the food guide – food in relation to health – objectives of cooking.

Water: Purification processes – Ion exchangers, reverse osmosis, activated charcoal treatment – Use of chlorination, ozone, and UV light disinfection. Specification of drinking water.

Unit-II Constituents of Foods **06**

Carbohydrates: Classification, Principles involved in the analysis of carbohydrates –estimation of carbohydrates.

Proteins: amino acids – peptides – Analysis of proteins – Separation of amino acids by paper chromatography.

Minerals and vitamins: Sources, functions, deficiency of the following minerals (calcium, iron, iodine, fluorine, sodium and potassium (elementary treatment). Vitamins – classification, sources, Vitamins – A, D, E and K, C, B Complex, - B6 & B12.

Unit-III Food Additives **06**

Artificial sweeteners – saccharin, 128asparatame – food flavours – esters, aldehydes and heterocyclic compounds. Antioxidants. Food colours – changes in cooking. Restricted use. Spurious colours. Emulsifying agents, preservatives – leavening agents. Baking powder –Yeast. Taste enhancers – MSG-vinegar

Unit-IV Pesticides Control **06**

Spoilage of foods by insects and pests, loss in food quantity and quality Various pesticides used in agriculture and post-harvest storage, uses of pesticides for food grain application.

Unit-V Food Adulteration **06**

Common adulterants in different foods – milk and milk products, vegetable oils, and fats, spices and condiments, cereals, pulses, sweetening agents and beverages. Contamination with toxic chemicals – pesticides and insecticides. .

Total: 30 hrs

Course Outcome

- To clearly explain about the basic food groups, sources, function, usage and objective of cooking
- To Understand about water purification processes such as Ion exchangers, reverse osmosis, activated charcoal treatment and also about water borne diseases
- Describe the sources, classification, function and uses of proteins, minerals and vitamins in food industry
- To understand about food additives, artificial sweeteners, food colours and modern foods such as snack foods, fast foods, Instant foods, dehydrated foods
- To be well versed in various pesticides used for food grain application

Text Books

1. Owen R Fennema, “Food Chemistry”, Marcel Decker Inc., New York. 1996.
2. M. Swaminathan “Text Book on Food chemistry”, Printing and Publishing CO., Ltd. 1993.

Reference Books

1. B. Siva Sankar, “Food Processing and Preservatio”, Prentice – Hall of India Pvt. Ltd., New Delhi. 2002.
2. S. Ramakrishnan, K. G. Prasannam, R. Rajan, ”Principles – Text book of medical biochemistry”, Orient Longman Ltd. Third Edition, 2001.

Weblink / Websource

1. **https://gcwgandhinagar.com/econtent/document/1589361321Unit%20V%20Food%20adulteration.pdf**
2. **http://lib.rudn.ru/file/Food_Science_Nutrition_Catalogue_ebook.pdf**

SYLLABUS

ABILITY ENHANCEMENT COMPULSORY COURSES

AECC

COMMUNICATION SKILLS **1 0 2 2**

Course Objective:

- This course is to subject the students to practise the components in various units.
- To make students ready for placement interviews within campus.
- To infuse confidence to face job situations.

UNIT I **06**

- Resume and CV Writing
- Complaint Letter
- Social Correspondence
- Letter of Enquiry

UNIT II **06**

- Short Essay Writing

UNIT III **06**

- Explaining Proverbs

UNIT IV **06**

- Use of Prepositions

UNIT V **06**

- Synonymous Words

Total :30 Hours

Course Outcome:

CO1	To enhance learners' confidence level.
CO2	To make learners' feel the assimilation of skills.
CO3	To engage in a conversation with others to exchange ideas.
CO4	To impart leadership qualities among the participants.
CO5	To express opinions to enhance their social skills.

Books Prescribed

- For Unit I – V Effective Communication For You – V. Syamala Emerald Publishers, Chennai.
- Cameron, David. Mastering Modern English, Hyderabad: Orient Blackswan, 1978 (rpt. 1989, 1993, 1995,1998).
- Freeman, Sarah. Written Communication in English, Hyderabad: Orient Blackswan, 1977 (21st Impression,2007).
- Singh, Vandana R. The Written Word. New Delhi: Oxford university Press, 2003 (3rd Impression, 2007)
- Seely, John. Oxford Guide to Effective Writing and Speaking. New Delhi: Oxford University Press, 2000 (4thImpression,2008)

Web Sources:

- https://www.myperfectresume.com/career-center/resumes/how-to/write
- https://www.englishgrammar.org/
  https://www.thesaurus.com/browse/

ENVIRONMENTAL STUDIES 2 0 0 2

Course Objective

To inculcate the importance of environmental pollution, preservation of nature and environmental management for human welfare.

Unit-IMultidisciplinary nature of environmental studies, Natural Resources 06

Definition, scope and importance, need for public awareness.

Renewable and non-renewable resources - Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects ofmodern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification - Role of an individual in conservation of natural resources- Equitable use of resoureces for sustainable lifestyles.

Unit-II Ecosystems, Biodiversity and its conservation 06

Concept of an ecosystem. - Structure and function of an ecosystem Producers, consumers and decomposers. -Energy flow in the ecosystem. Ecological succession. - Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Introduction–Definition,genetic, species and ecosystem diversity. Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels. Inida as a mega-diversity nation. Hot-sportsof biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit-III Environmental Pollution 06

Definition, Cause, effects and control measures of a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards. Solid waste Management. Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Diaster management- floods, earthquake, cyclone and landslides.

Unit-IVSocial Issues and the Environment 06

From Unsustainable to Sustainable development, Urban problems related to energy - Water conservation, rain water harvesting, watershed management- Resettlement and rahabilitation of people; its problems and concerns. Case Studies - Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife

Protection Act, Forest Conservation Act - Issues involved in enforcement of environmental legislation. Public awareness.

Unit-V Human Population and the Environment 06

Population growth, variation among nations. Population explosion – Family Welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health. Case Studies.

Field work - Visit to a local area to document environmental assetsriver/forest/grassland/hill/mountain, Visit to a local polluted site-Urban/Rural/Industrial/Agricultural, Study of common plants, insects, birds, Study of simple ecosystems-pond, river, hill slopes, etc.

Total: 30 hrs

Course Outcome

- To understand the nature and facts about environment.
- To find and implement scientific, technological, economic solutions to environmental problems.
- To know about the interrelationship between living organisms and environment.
- To understand the integrated themes and biodiversity, natural resources, pollution control and waste management.
- To appreciate the importance of environment by assessing its impact on the human world.

Text Books

1. De AK, Environmental Chemistry, Wiley Eastern Ltd.

2. Bharucha Erach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, India.

3. Brunner RC, 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480pgs.

4. Clark RS, Marine Pollution, Clanderson Press, Oxofrd (TB).

Reference Books

2. Agarwal KC, 2001. Environmental Biology, Nidi Publishers Ltd. Bikaner.

3. Gleick HP, 1993. Water in Crisis, Pacific Institute for Studies in Development, Environment and Security. Stockholm Environmental Institute, Oxford University Press, 473pgs.

4. Heywood VH, and Watson RT, 1995. global Biodiversity Assessment. Cambridge University Press 1140pgs.

5. Jadhav H and Bhosale VM, 1995. Environmental Protection and Laws. Himalaya Publishing House, Delhi 284pgs.

6. Miller TG, Jr. Environmental Science, Wadsworth Publishing CO. (TB)

Web link and we source

https://easyengineering.net/ge6351-environmental-science-and/

https://learnengineering.in/ge8291-environmental-science-and-engineering/

SKILL ENHANCEMENT ELECTIVE COURSES (SEC) SYLLABUS

SOFT SKILLS I **2 0 0 2**

Course Objective:

- To enable participants Business Communication Skills
- To enhance participants E-mail writing skills
- To impart Leadership and Team Bonding skills

Credit Hours

UNIT I: EFFECTIVE COMMUNICATION SKILLS **06**

Talking about your company – Making Polite requests – Introducing yourself and others– Socialising with others – Talking about work activities – Talking about your job – Communication practice – Role plays

UNIT II: WRITTEN BUSINESS COMMUNICATION **06**

Essential Email writing skills – Formal and Informal E-mails – Usage of formal language – Report Writing – Writing project reports – Extended writing practice – Email Etiquette – Understanding Business E-mails

UNIT III: TELEPHONE ETIQUETTE **06**

The basics of Telephone Etiquette – Customer Service – Being courteous – Making arrangements – Giving clear and concise information – Tone and Rate of speech – Pronunciations – Summarisation – Mock Telephonic Conversations

UNIT IV: LEADERSHIP SKILLS **06**

Essential Leadership Skills – Interpersonal Skills – Team Building – Team work – Do's and Don'ts of Leadership skills – Importance of communication in Leadership – Delegating and Handling of Projects

UNIT V: LISTENING AND ANSWERING QUESTION **06**

Listening for the main ideas – Listening for details – Listening for specific information – Predicting and listening for opinions – Recognising context – Listening for sequence – Understanding Pronunciation – Listening practice

Total :30 Hours

Course Outcome:

CO1 To enhance participant's Business Communication Skills
CO2 To enhance the participant's Reading, Speaking, Listening and Writing capabilities
CO3 To engage in a conversation with others to exchange ideas
CO4 To impart leadership qualities among the participants
CO5 To express opinions to enhance their social skills

Books Prescribed

- Raman, M. & Sangeeta Sharma. Technical Communication.OUP.2008
- Taylor, Grant.English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd. 2005
- Tiko, Champa & Jaya Sasikumar. Writing with a Purpose.OUP. New Delhi. 1979

Web Sources:

- https://www.skillsyouneed.com/ips/communication-skills.html
- https://blog.smarp.com/top-5-communication-skills-and-how-to-improve-them
- https://blog.hubspot.com/service/phone-etiquette

SOFT SKILLS II **2 0 0 2**

Course Objective:

- To enable students to develop their communication skills effectively
- To enhance students Reading, Writing, Listening and Speaking skills
- To develop their self-confidence through communication

Credit Hours

UNIT I: READING COMPREHENSION AND VOCABULARY **06**

Reading Techniques – Types of Reading – Skimming – Scanning – Reading for detail – Identifying key words – Underlining unfamiliar key words – Vocabulary Building – Reading Comprehension practice

UNIT II: PRESENTATION SKILLS **06**

Presentation Methods – Preparation and Practice – Organising content – Do's and Don'ts of a Presentation – Presentation Techniques – Mock Presentation

UNIT III: GROUP DISCUSSION **06**

Introduction to Group Discussion – Preparation for GD – Structure of GD's – Do's and Don'ts – Tips and Strategies – Etiquette and Practice – Body Language and Posture – Sharing Ideas with respect – Understanding Opinions – Mock GD Practice

UNIT IV: CONVERSATIONAL SKILLS **06**

Introduction to Small talk – How to start and end a conversation – Exchanging ideas – Expressing Interests – Giving Opinions – Social skills and Etiquette – Informal Conversations – Formal Meetings – Group Practice

UNIT V: SELF – INTRODUCTION AND ROLE PLAY **06**

Introducing oneself – Exchange of Greetings – Appropriate Greetings – Usage of Vocabulary – Rapport Building – Handshakes and First Impressions – Basic Etiquette

Total :30 Hours

Course Outcome:

CO1	To get students to understand the importance of communicating in English
CO2	To understand effective communication techniques
CO3	To increase self-confidence through regular practice
CO4	To encourage active participation in their regular class
CO5	To enable participants to face large group of audience with confidence

Books Prescribed

- English for Competitive Examinations by R.P.Bhatnagar&Rajul BhargavaMacmillan India ltd. Delhi.
- Carnegie, Dale. The Quick and Easy Way to Effective Speaking. New York: Pocket Books, 1977.
- Kalish, Karen.How to Give a Terrific Presentation. New York: AMACOM, 1996

Web Sources:

- https://www.skillsyouneed.com/ips/communication-skills.html
- https://venngage.com/blog/presentation-skills/
- https://gdpi.hitbullseye.com/Group-Discussion.php

SOFT SKILLS III **2 0 0 2**

Course Objective:

- To enable students to develop their soft skills
- To enhance students Reading, Writing, Listening and Speaking skills
- To develop their self-confidence to excel at Interviews

Credit Hours

UNIT I: SKILL ENHANCEMENT **06**

Time Management – Planning and Organisation – Scheduling – Prioritization – Delegation – Task Management – Stress Management – Overcoming anxiety – Confidence Building – Body Language

UNIT II: RESUME / COVER LETTER WRITING **06**

SWOT Analysis – Details and Resume Writing – Resume Examples – Building Resume using SWOT – Writing Resume – Writing Cover Letter – Resume Correction – Resume Feedback

UNIT III: INTERVIEW SKILLS **06**

Interview Do's and Don'ts – First Impression – Grooming – Body Language – Frequently asked questions – Useful Language – Mock Interview

UNIT IV: QUANTITATIVE ABILITY **06**

Permutation & Combinations – Probability – Profit & Loss – Ratio Proportions & Variations – Cubes – Venn Diagrams – Logical Reasoning – Critical Reasoning

UNIT V: REVISIONARY MODULES **06**

Group Discussions – HR Process – Interview Process – Mock Group Discussions

Total :30 Hours

Course Outcome:

CO1	To develop participants social and professional skills
CO2	To help participants manage time effectively
CO3	To build a strong resume to suit corporate requirements
CO4	To face interviews confidently
CO5	To enhance their aptitude abilities

Books Prescribed

- Meena. K and V.Ayothi (2013) A Book on Development of Soft Skills (Soft Skills: A Road Map to Success) P.R. Publishers & Distributors.
- Soft Skills – Know Yourself & Know the World, S.Chand & Company LTD, Ram Nagar, NewDelhi
- Prasad, H. M. How to Prepare for Group Discussion and Interview. NewDelhi: Tata McGraw-Hill Publishing Company Limited, 2001.
- Pease, Allan. Body Language. Delhi: Sudha Publications, 1998.

Web Sources:

- https://www.skillsyouneed.com/ips/communication-skills.html
- https://www.businessnewsdaily.com/5836-top-interviewing-skills.html
- https://gdpi.hitbullseye.com/Group-Discussion.php

PERSONALITY DEVELOPMENT – I 2 0 0 2

Course Objective:

- This course is to subject the students to practise the components in various units.
- To make Determinants of Personality for placement interviews within campus.
- To infuse confidence to face job situations.

UNIT I SOFT SKILLS I 06

Introduction to Personality Development – Meaning-Features of personality=Dimensions of Personality-Determinants of Personality-Features and Traits- Components of self concept-Barriers-Self analysis.

UNIT II SOFT SKILLS II 06

Importance of Soft Skills – First impression-Work Place requirements-Discipline-Cleanliness-Hygiene-general Appearance--Building Confidence—Concept of Thinking and Usage-Value of Time-Focus & Commitment.

UNIT III SOFT SKILLS IN ACTION 06

Grooming – Attire – Understanding others- – Stability & Maturity Development – Strength s – Weakness – Opportunities-threats -Merits of SWOT Analysis-Components-how to convert weakness into strengths-Goal settings.

UNIT IV SELF AWARENESS AND SELF ESTEEM 06

Definitions-Components of self awareness-Developing Self awareness-Self esteem-meaning-Steps to improve self esteem

UNIT V SELF MOTIVATION 06

Motivation –Meaning-Techniques of self motivation-Motivation & goal setting – Motivation and emotion – Motivation at work.

Total: 30 hrs

Course outcome

- To apply knowledge of mathematics, science, and engineering fundamentals.
- To identify, formulate, and solve engineering problems.
- to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- To design and conduct experiments, as well as to analyze and interpret data.
- To use the techniques, skills, and modern engineering tools necessary for engineering practice

REFERENCES

1. Personality Development And Soft Skills---Barun K Mitra, Oxford Publication
2. Seven habits of Higly Effective people – Stephen R. covey
3. Emotion, motivation and Self regulation - Nathan C. Hall , McGill University, Canada, Thomas Goetz, University of Konstanz, Germany
4. http://www.emeraldgrouppublishing.com/
5. Psychology of Selfesteem – Nathaniel Branden, Nash (1st edition), Jossey-Bass (32nd anniversary edition

Weblink / Websource

1.https://www.bharathuniv.ac.in/colleges1/downloads/courseware_ece/notes/BSS201%20-%20PERSONALITY.pdf

2. https://www.msuniv.ac.in/Download/Pdf/d35b684c8ce542a

PERSONALITY DEVELOPMENT – II **2 0 0 2**

Course Objective:

- This course is to subject the students to practise the components in various units.
- To develop the confidence & skills to interact with the business environment.
- To infuse confidence to face job situations.

UNIT I SOFT SKILLS I **06**

Basic Etiquette – Email etiquette – Business etiquette – Telephone etiquette – Meeting etiquette – Adjustment of Role & Leadership – Team Management & Development

UNIT II QUANTITATIVE APTITUDE I **06**

Percentage – Profit Loss -Discount – Ratio Proportion – Time & Work – Time, Speed &Distancel. Problems relating to ages- Permutation &Combination-Probability

UNIT III ANTITATIVE APTITUDE II **06**

Mensuration Clocks and Calendars- Boats-Simple Interest –Compound Interest- Fractions and Decimals –

Square roots – Functions.

UNIT IV ANALYTICAL PROBLEMS **06**

Introduction – Linear Sequencing – Seating Arrangements – Distribution/Double Line Up – Selection – Ordering

and Sequencing – Binary Logic – Venn Diagrams –Directions.

UNIT V LOGICAL PROBLEMS **06**

Introduction to Logical problems – Cause and Effect – Course of Action – Statement and Assumption – Letter and Symbol series – Analogies.

TOTAL: 30Hrs

Course Outcome

At the end of this course, the Student will be able to

- Develop the confidence & skills to interact with the business environment and at networking events & client functions in a manner that enhances the Company Brand.
- Engage with clients & colleagues in a polished and professional manner, ensuring positive first & last impressions.
- Recognize a variety of leadership theories.
- Communicate effectively in a range of group sizes and across multiple media types.
- To use the techniques, skills, and modern engineering tools necessary for engineering practice

REFERENCE BOOKS

1. Personality Development --Dr V M SelvarajBhavani Publications
2. Quantitative Aptitude – R. S Aggarwal
3. Logical and Analytical Reasoning (English) 30th Edition – A.K Gupta

Weblink / Websource

1. https://www.bharathuniv.ac.in/colleges1/downloads/courseware_ece/notes/BSS201%20-%20PERSONALITY.pdf
2. https://www.msuniv.ac.in/Download/Pdf/d35b684c8ce542a

PERSONALITY DEVELOPMENT – III 2 0 0 2

Course Objective:

- This course is to subject the students to practise the components in various units.
- To develop the confidence & skills to interact with the business environment.
- To infuse confidence to face job situations.

UNIT I VERBAL APPTITUDE I 06

Phonetics/Neutral Accent/Pronunciation – Speech Mechanism/Mouth & Face Exercise – Vowels & Consonants – Sounds – Syllable and Syllable Stress/ Word Stress – Sentence Stress & Intonation – Articulation Exercise – Rate of Speech / Flow of Speech / Idiomatic Phrases.

UNIT II VERBAL APTITUDE II 0**6**

Singular/plural-present tense/past tense—genders - Prepositions-conjunctions-Choice of words—simple sentences—compound sentences-summarisingphrases—Synonyms—Antonyms—Analogies—Similar Words

UNIT III SOFT SKILLS IV 0**6**

Attitude—Meaning-Features of attitude-Formation-Personality Factors-Types of attitude-change in attitude-Developing Positive attitude.

UNIT IV TIME MANAGEMENT 0**6**

Definition –Meaning-Importance, Value of time as an important resource- comparison of Time and Money-Circle of influence and circle of control—Definition of URGENT and IMPORTANT—Time Wasters and how to reduce— Procrastination—meaning and impact- 4 Quadrants.

UNIT V TEAM BUILDING 0**6**

Meaning—Aspects of team building—Process of team building—Types of Teams-Team ethics and Understanding-Team trust and commitment

TOTAL: 30hrs

Course Outcome

At the end of this course, the Student will be able to

- Collect and analyze data for the purpose of resolving an issue(s) directly related to organizational behavior.
- Undertake complete and submit a project using appropriate planning, methodological, evaluative and presentation techniques.
- Create a mission statement to identify their long term goals.
- Identify characteristics of successful people.

Text books / Reference books

1. Managing Soft Skills And Personality--B N GhoshMcgraw Hill Publications
2. Principles and Practices of Management Shejwalkar and Ghanekar McGraw Hill Latest

3. Time management for Busy people – Roberta roesch, TatamcGraw-Hill Edition

Weblink / Websource

1. https://www.bharathuniv.ac.in/colleges1/downloads/courseware_ece/notes/BSS201%20-%20PERSONALITY.pdf
2. https://www.msuniv.ac.in/Download/Pdf/d35b684c8ce542a

NSS PAPER – I **2 0 0 2**

Course Objective:

- This course is to subject the students to practise the components in various units.
- To learn the phscology of the youth, their issues, challenges, social responsibilities and oppurtunities
- To know various activites under NSS.

Unit -I Introduction and Basic Concepts of NSS **0 6**

a) History, philosophy ,aims & objectives of NSS
b) Emblem, flag motto, song, badge etc.,
c) Organizational structure, roles and responsibilities of various NSS Functionaries

Unit-II NSS Programmes and Activities **06**

a) Concept of regular activities, special camping, Day Camps
b) Basis of adoption of village/slums, Methodology of conducting Survey
c) Financial pattern of the scheme
d) Other youth prog./schemes of GOI
e) Coordination with different agencies
f) Maintenance of Diary

Unit-III Understanding Youth **06**

a) Definition, profile of youth, categories of youth
b) Issues, challenges and opportunities for youth
c) Youth as an agent of social change

Unit-IV Community Mobilization **06**

a) Mapping of community stakeholders
b) Designing the message in the context of the problem and culture of the community
c) Identifying methods of mobilization
d) Youth – adult partnership

Unit -V Volunteerism and Shramdan **06**

a) Indian Tradition of volunteerism
b) Needs &Importance of volunteerism
c) Motivation and Constraints of Volunteerism
d) Shramdan as a part of volunteerism

Total: 30 hrs

Project work /Practical

Conducting Surveys on special theme and preparing a report thereof.

Course Outcome:

- To learn the phscology of the youth, their issues, challenges, social responsibilities and oppurtunities
- To learn the basic concepts of NSS, its history, philosophy, aim, growth, emblem, flag moto, batch and form.
- To understand what is volunteerism and selfless service.
- To know various activites under NSS.
- To learn different programs that could be conducted under NSS.

Weblink / Websource

1. **https://www.osmania.ac.in/NSS%20URL/10.%20%20Basic%20Concepts%20and%20Components.pdf**
2. **https://jntuh.ac.in/uploads/about_NSS.pdf**

NSS PAPER – II **2 0 0 2**

Course Objective:

- To enhance the youth leadership, social harmony and nation integration.
- To develop the communication and importance of life compentencies.
- To understand the importance of social harmony and nation integration.

Unit-I Importance and Role of Youth Leadership **06**

a) Meaning and types of leadership

b) Qualities of good leaders; traits of leadership

c) Importance and role of youth leadership

Unit-II Life Competencies **06**

a) Definition and importance of life competencies

b) Communication

c) Inter Personal

d) Problem – solving and decision-making

Unit-III Social Harmony and National Intergration **06**

a) Indian history and culture

b) Role of youth in peace-building and conflict resolution

c) Role of youth in Nation building

Unit-IV Youth Development Programmes in India **06**

a) National Youth Policy

b) Youth development Programmes at the National level, State Level and Voluntary sector

c) Youth-focused and Youth –led organizations

Unit -V Environment Issues **06**

a) Environment conservation, enrichment and Sustainability
b) Climate change
c) Waste management
d) Natural resource management (Rain water harvesting, energy conservation, waste land development, soil conservations and afforestation)

Total: 30 hrs

Project work /Practical

Conducting Surveys on special theme and preparing a report thereof.

Course Outcome:

- To know what is national youth policy.
- To practice the approach of problem solving and decision making in a critical situation for an issue.
- To understand the importance of social harmony and nation integration.
- To practice about youth leadership.
- To learn the importance of life competencies.

Website link / Websource

1. https://txssc.txstate.edu/tools/youth-engagement-toolkit/benefits-of-youth-leadership/
2. https://www.sbh4all.org/training/youth-development/youth-engagement-toolkit/developing-youth-leadership-skills/

NSS PAPER – III **2 0 0 2**

Course Objective:

- To understand the concept of family, community, human values and about gender justice.
- To learn what is yoga and its support for healthy life
- To learn the consumer awareness and the legal rights of the consumer RTI.

Unit – I Citizenship **06**

a) Basic Features of constitution of India
b) Fundamental Rights and Duties
c) Human Rights
d) Consumer awareness and the legal rights of the consumer RTI

Unit – II Family and Society **06**

a) Concept of family, community,(PRIs and other community-based Organizations and society
b) Growing up in the family – dynamics and impact
c) Human Values
d) IV Gender justice

Unit – III Health, Hygiene & sanitation **06**

a) Definition, needs and scope of health education
b) Food and Nutrition
c) Safe drinking water, waterborne diseases and sanitation (swatch Bharat Abhiyan)
d) National Health Programme
e) Reproductive Health

Unit – IV Youth Health **06**

a) Healthy lifestyles
b) HIV AIDS, Drugs and substance abuse
c) Home Nursing
d) First Aid

Unit – V Youth and Yoga **06**

a) History, Philosophy and concept of yoga
b) Myths and misconceptions about yoga
c) Yoga as a preventive, Primitive and curative method
e) Yoga as a tool for healthy; lifestyle

Total: 30 hrs

Project work / practical 40 marks

Preparation of research project report.

Course Outcome:

- To learn the basic definitions of components of health, hygiene and sanitation.
- To know about HIV, AIDS and their cause, treatment.
- To learn the basic rights of citizen and consumer awareness.
- To understand human values and about gender justice.
- To learn what is yoga and its support for healthy life.

Weblink / Websource

1. http://www.astec.gov.in/ncsc/agb_2_heath.pdf
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3980104/

Course Objective:

- To develop the Entrepreneurship and establishment agencies that possess the necessary expertise in the related vocational skills
- To practice condition oriented vocational skill training
- To know the qualities and role of a good entrepreneur.

Unit -I Vocational Skill Development **10**

This unit will aim to enhance the employment potential of the NSS volunteers or, alternately, to help them to set up small business enterprises. For this purpose, a list of 12 to 15 vocational skills will be drawn up, based on the local conditions and opportunities. Each volunteer will have the option to select two skill areas out of this list- one such skill in each Semester. The education institution (or the university) will make a arrangements for developing these skills in collaboration with establishment agencies that possess the necessary expertise in the related vocational skills

Unit-II Entrepreneurship Development **10**

a) Definition & Meaning
b) Qualities of good entrepreneur
c) Steps / ways in opening an enterprise
d) Role of financial and support service Institutions

Unit-III Youth and Crime **10**

a) Sociological and Psychological Factors influencing Youth Crime
b) Peer Mentoring in preventing crimes
c) Awareness about anti -Ragging
d) Cyber Crime and its Prevention
e) Juvenile Justice

Total: 30 hrs

Project work /Practical **40 Marks**

Outcome

- To learn the definition and meaning of entrepreneurship.
- To know the qualities and role of a good entrepreneur.
- To understand the procedure of business service and management.
- To practice condition oriented vocational skill training in atleast 12 to 15 objectives.
- To learn how to establish various vocational skills.

Websource / Weblink

1. **https://niti.gov.in/planningcommission.gov.in/docs/aboutus/committee/wrkgrp11/wg11_rpskill.pdf**
2. https://articles.bplans.com/10-great-websites-for-entrepreneurs/

NSS PAPER – V **2 0 0 2**

Course Objective:

- To understand the concept of Vocational skilldevelopment.
- To practice condition oriented vocational skill training
- To know the qualities and role of a good entrepreneur.

Unit -I Vocational Skill Development **15**

This unit will aim to enhance the employment potential of the NSS volunteers or, alternately, to help them to set up small business enterprises. For this purpose, a list of 12 to 15 vocational skill will be drawn up, based on the local conditions and opportunities. Each volunteer will have the option to select two skill areas out of this list- one such skill in each Semester. The education institution (or the university) will make a arrangements for developing these skills in collaboration with established agencies that possess the necessary expertise in the related vocational skills

Unit-II Civil /Self Defense **05**

a) Civil defense services, aims and Objectives of civil defense
b) Needs for Self defense training

Unit-III Resource Mobilization **03**

a) Writing a Project Proposal
b) Establishment of SFUs

Unit-IV Additional life Skills **07**

a) Positive Thinking
b) Self Confidence and Self Esteem
c) Setting life Goals and working to achieve them
d) Management of Stress including time management

Total: 30 hrs

Project work /Practical **40**
Marks

Outcome

- To learn the definition and meaning of entrepreneurship.
- To know the qualities and role of a good entrepreneur.
- To understand the procedure of business service and management.To practice condition oriented vocational skill training in atleast 12 to 15 objectives.
- To learn how to establish various vocational skills.

Websource / Weblink

1. **https://niti.gov.in/planningcommission.gov.in/docs/aboutus/committee/wrkgrp11/wg11_rpskill.pdf**
2. **https://open.lib.umn.edu/criminallaw/chapter/5-2-self-defense/**

TECHNICAL SEMINAR 0 0 2 1

Course Objective: To gain practical experience by working in a professional organic chemistry -related environment. To demonstrate an ability to work independently and utilize principles of organic chemistry to solve real-world problems.

Course Requirements

A student will be trained to take seminar at least twice in innovative job oriented (or) research perspective topics in association with the interest of the students. Student will be encouraged to inculcate updated technical aspects and skills to prepae a proposed project.

Course Outcomes:

- To know the various types of industries.
- To learn the procedure of identifying, approaching, applying and getting approval of internship from a leading industry.
- To witness the entire work area of the industry.
- To understand the nature of job involved in the various sector of the industry.
- To adapt with the working people.