



V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM REGULATIONS AND SYLLABUS

(with effect from Academic Year 2024 - 2025)

V.V.Vanniaperumal College for Women, Virudhunagar, established in 1962, offers 13 UG Programmes(Aided), 15 UG Programmes(SF), 15 PG Programmes and 6 Ph.D. Programmes. The curricula for all these Programmes, except Ph.D. Programmes, have been framed as per the guidelines given by the University Grants Commission (UGC) & Tamil Nadu State Council for Higher Education (TANSICHE) under Choice Based Credit System (CBCS) and the guidelines for Outcome Based Education (OBE).

The Departments of Commerce, English, History, Mathematics, Biochemistry and Tamil upgraded as Research Centres offer Ph.D. Programmes as per the norms and regulations of Madurai Kamaraj University, Madurai and do not come under the purview of CBCS.

A. CHOICE BASED CREDIT SYSTEM (CBCS)

The CBCS provides an opportunity for the students to choose Courses from the prescribed Courses. The CBCS is followed as per the guidelines formulated by the UGC. The performance of students is evaluated based on the uniform grading system. Computation of the Cumulative Grade Point Average (CGPA) is made to ensure uniformity in evaluation system.

List of Programmes in which CBCS/Elective Course System is implemented

UG PROGRAMMES

Arts & Humanities	:	History (E.M. & T.M.), English, Tamil
Physical & Life Sciences	:	Mathematics, Zoology, Chemistry, Physics, Biochemistry, Home Science - Nutrition and Dietetics, Costume Design and Fashion, Microbiology, Biotechnology, Computer Science, Information Technology, Data Science, Computer Applications and Computer Applications - Graphic Design

Commerce &
Management

Commerce, Commerce (Computer Applications),
Commerce (Professional Accounting),
Business Administration

PG PROGRAMMES

- Arts & Humanities : History, English, Tamil
- Physical & Life Sciences : Mathematics, Physics, Chemistry, Zoology, Biochemistry, Home Science - Nutrition and Dietetics, Biotechnology, Computer Science, Computer Science (Data Science) and Computer Applications (MCA) *
- Commerce & Management : Commerce, Business Administration (MBA) *
- * AICTE approved Programmes

OUTLINE OF CHOICE BASED CREDIT SYSTEM – UG

1. Core Courses
2. Elective Courses
 - Generic Elective Courses
 - Discipline Specific Elective Courses (DSEC)
 - Non Major Elective Courses (NMEC)
3. Skill Enhancement Courses (SEC)
4. Environmental Studies (EVS)
5. Value Education
6. Self Study Courses (Online)
7. Extra Credit Courses (Self Study Courses) (Optional)

**List of Non Major Elective Courses (NME)
(2024-2025 onwards)**

UG PROGRAMMES

Name of the Course	Course Code	Semester	Department
Introduction to Tourism	24UHIN11	I	History (E.M)
Indian Constitution	24UHIN21	II	
சுற்றுலா ஓர் அறிமுகம்	24UHIN11	I	History (T.M)
இந்திய அரசியலமைப்பு	24UHIN21	II	

Popular Literature and Culture	24UENN11	I	English
Philosophy for Literature	24UENN21	II	
அடிப்படைத் தமிழ் இலக்கணம் - I எழுத்தறிதல்/ பேச்சுக்கலைத்திறன்	24UBTN11/ 24UTAN11	I	Tamil
அடிப்படைத்தமிழ் - மொழித் திறனறிதல் / பயன்முறைத் தமிழ்	24UBTN21/ 24UTAN21	II	
Basic Hindi - I	24UBHN11	I	Hindi
Basic Hindi - II	24UBHN21	II	
Practical Banking/ Financial Literacy-I	24UCON11/ 24UCON12	I	Commerce
Basic Accounting Principles/ Financial Literacy-II	24UCON21/ 24UCON22	II	
Practical Banking / Self-Employment and Startup Business	24UCON11/ 24UCCN11	I	Commerce C.A.
Basic Accounting Principles / Fundamentals of Marketing	24UCON21/ 24UCCN21	II	
Women Protection Laws	24UCPN11	I	Commerce Professional Accounting
Basic Labour Laws	24UCPN21	II	
Basics of Event Management	24UBAN11	I	Business Administration
Managerial Skill Development	24UBAN21	II	
Quantitative Aptitude - I	24UMTN11	I	Mathematics
Quantitative Aptitude - II	24UMTN21	II	
Physics for Everyday Life	24UPHN11	I	Physics
Astrophysics	24UPHN21	II	
Food Chemistry	24UCHN11	I	Chemistry
Dairy Chemistry	24UCHN21	II	
Ornamental fish farming and Management	24UZYN11	I	Zoology
Biocomposting for Entrepreneurship	24UZYN21	II	
Foundations of Baking and Confectionery	24UHSN11	I	Home Science – Nutrition and Dietetics
Women's Health and Wellness	24UHSN21	II	
Nutrition and Health	24UBCN11	I	Biochemistry
Life Style Diseases	24UBCN21	II	

Social and Preventive Medicine	24UMBN11	I	Microbiology
Nutrition & Health Hygiene	24UMBN21	II	
Herbal Medicine	24UBON11	I	Biotechnology
Organic Farming and Health Management	24UBON21	II	
Basics of Fashion	24UCFN11	I	Costume Design And Fashion
Interior Designing	24UCFN21	II	
Office Automation	24UCSN11	I	Computer Science
Introduction to HTML	24UCSN21	II	
Office Automation	24UITN11	I	Information Technology
Basics of Internet	24UITN21	II	
Fundamentals of Information Technology	24UDSN11	I	Data Science
Computer Fundamentals	24UDSN21	II	
Office Automation	24UCAN11	I	B.C.A.
Web Designing	24UCAN21	II	
Organic Farming	24UBYN11	I	Botany
Nursery and Landscaping	24UBYN12	I	
Mushroom Cultivation	24UBYN21	II	Botany
Medicinal Botany	24UBYN22	II	
Library and Information Science - I	24ULSN11	I	Library Science
Library and Information Science - II	24ULSN21	II	
Cadet Corps for Career Development I	24UNCN11	I	National Cadet Corps
Cadet Corps for Career Development II	24UNCN21	II	

B. OUTCOME BASED EDUCATION (OBE) FRAMEWORK

The core philosophy of Outcome Based Education rests in employing a student - centric learning approach to measure the performance of students based on a set of pre-determined outcomes. The significant advantage of OBE is that it enables a revamp of the curriculum based on the learning outcomes, upgrade of academic resources, quality enhancement in research and integration of technology in the teaching –learning process. It also helps in bringing clarity among students as to what is expected of them after completion of the Programme in general and the Course in particular. The OBE directs the teachers to channelize their teaching

methodologies and evaluation strategies to attain the PEOs and fulfill the Vision and Mission of the Institution.

Vision of the Institution

The founding vision of the Institution is to impart Quality Education to the rural womenfolk and to empower them with knowledge and leadership quality.

Mission of the Institution

The mission of the Institution is to impart liberal education committed to quality and excellence. Its quest is to mould learners into globally competent individuals instilling in them life-oriented skills, personal integrity, leadership qualities and service mindedness.

B.1 Programme Educational Objectives, Programme Outcomes and Programme Specific Outcomes

It is imperative for the institution to set the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Course Outcomes (COs), consistent with its Vision and Mission statements. The PEOs and the POs should be driven by the mission of the institution and should provide distinctive paths to achieve the stated goals. The PEOs for each Programme have to fulfill the Vision and Mission of the Department offering the Programme.

Vision of the Department of Chemistry

To empower rural young women through quality education in the field of chemical sciences with both theoretical and technical knowledge to pursue higher education to fulfill the regional, national and global demands.

Mission of the Department of Chemistry

- Offering learners deep knowledge in the theoretical and practical chemistry for their profession development.
- Developing research aptitude and personality.
- Facilitating learners to recognize the applications of chemistry in everyday life to progress as entrepreneurs.
- Inculcating social awareness and responsibility.

B.1.1 Programme Educational Objectives (PEOs)

PEOs are broad statements that describe the career and professional achievements that the Programme is preparing the graduates to achieve within the first few years after graduation. PEOs are framed for each Programme and should be consistent with the mission of the Institution.

The Programme Educational Objectives of B.Sc., Chemistry programme

The students will be able to

- To pursue further studies and succeed in academic and research Careers.
- To have opportunities to get employment at local and national level and to work as a teacher, analyst, quality controller, research assistant and in government sector jobs.
- To provide solutions for social issues such as environmental protection, occupational health and safety resource management and appropriate business skills.

Key components of the mission statement	PEO 1	PEO 2	PEO 3
Deep knowledge in theoretical and practical chemistry	✓	✓	✓
Profession development	✓	✓	✓
Research aptitude and personality	✓	✓	-
Applications of chemistry in everyday life to progress as entrepreneurs	-	✓	✓
Social awareness and responsibility	-	✓	✓

B.1.2 Programme Outcomes (POs)

POs shall be based on Graduate Attributes (GAs) of the Programme. The GAs are the attributes expected of a graduate from a Programme in terms of knowledge, skills, attitude and values. The Graduate Attributes include Disciplinary Knowledge, Communication Skills, Critical Thinking, Problem Solving, Analytical Reasoning, Research Related Skills, Co-operation/Team Work, Scientific Reasoning, Reflective Thinking, Information/Digital Literacy, Multicultural Competence, Moral and Ethical Awareness/Reasoning, Leadership Qualities and Lifelong Learning.

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

- 1 apply effectively the acquired knowledge and skill in the field of Arts, Physical Science, Life Science, Computer Science, Commerce and Management for higher studies and employment. (*Disciplinary Knowledge*)

- 2 articulate innovative thoughts and ideas proficiently in both in spoken and written forms. (*Communication Skills*)
- 3 identify, formulate and solve problems in real life situations scientifically / systematically by adapting updated skills in using modern tools and techniques. (*Scientific Reasoning and Problem Solving*)
- 4 critically analyse, synthesize and evaluate data, theories and ideas to provide valid suggestions through assignments, case studies, Internship and projects for the fulfillment of the local, national and global developmental needs. (*Critical Thinking and Analytical Reasoning*)
- 5 use ICT in a variety of self-directed lifelong learning activities to face career challenges in the changing environment. (*Digital Literacy, Self - directed and Lifelong Learning*)
- 6 self-manage and function efficiently as a member or a leader in diverse teams in a multicultural society for nation building. (*Co-operation/Team Work and Multicultural Competence*)
- 7 uphold the imbibed ethical and moral values in personal, professional and social life for sustainable environment. (*Moral and Ethical Awareness*)

B.1.3 Programme Specific Outcomes (PSOs)

Based on the Programme Outcomes, Programme Specific Outcomes are framed for each UG Programme. Programme Specific Outcomes denote what the students would be able to do at the time of graduation. They are Programme specific. It is mandatory that each PO should be mapped to the respective PSO.

On completion of B.Sc. Chemistry Programme, the students will be able to

PO1-Disciplinary Knowledge

PSO 1.a: Apply the gained advanced knowledge in inorganic, organic and physical chemistry and related courses to pursue higher studies and employment.

PSO 1.b: Apply the good laboratory practices in core and related courses by appropriate experimental methods and safety measures and thereby updating their knowledge and skills to become successful entrepreneurs.

PO2-Communication Skills

PSO 2.a: Develop the confidence to articulate the basic concepts in chemistry in a clear and concise manner to fetch employment.

PSO 2b: Develop competence to draw complex chemical structures and to execute and report the results of an experiment in a systematic way.

PO3 -Scientific Reasoning and Problem Solving

PSO 3.a: Identify chemical formulae and analyse food, water and oil samples qualitatively and quantitatively by adapting updated skills in using modern tools and techniques for research activities..

PSO 3.b: Characterize the compounds extracted from natural sources by applying the basic principles of various chemical methods for recent research.

PO4 -Critical thinking and Analytical Reasoning

PSO 4.a: Critically analyze the concepts, theories and equations in various divisions of chemistry and perceive their significance in chemical industries and to conserve the environment in daily life.

PSO 4.b: Apply the integrated knowledge of different sections of chemistry and associated Courses to create startup and thereby developing their research towards the development of new products.

PO5 -Digital Literacy, Self - directed and Lifelong learning

PSO 5.a: Acquire the ability to engage in independent and life-long learning trained at personal/career development concerning to their area of interest using contemporary digital tools to face the alteration of personal and social circumstances.

PSO 5.b: Exhibit excellence in industrial pursuits that contribute towards the holistic development of self and community

PO6 -Cooperation/Team Work and Multi-Cultural Competence

PSO 6: Promote self management in efficient functioning of an individual as an exemplary in representing and solving the current issues in a multicultural society for good nation building through their internship, group practical, co-curricular, extra curricular and extension activities.

PO7- Moral and Ethical awareness

PSO 7: Adapt the universal ethics and morals of chemical acts and practice the imbibed moral principles in their career and humanity to accomplish a green environment.

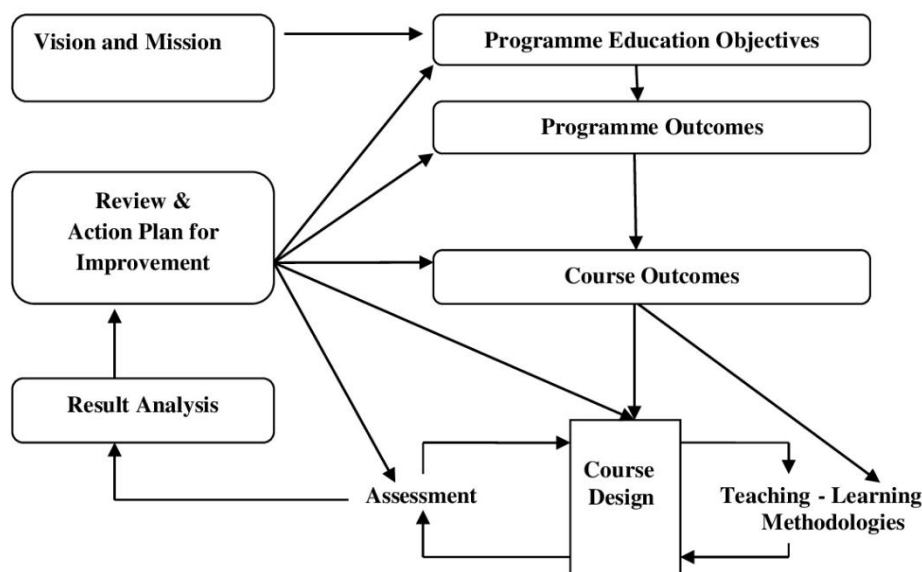
PO-PEO Mapping Matrix

Attainment of PEOs can be measured by a PO-PEO matrix. PEOs should evolve through constant feedback from alumnae, students, industry, management, *etc.* It is mandatory that each PEO should be mapped to at least one of the POs.

PEOs POs/PSOs	PEO1	PEO2	PEO3
PO1/PSO1.a	-	✓	✓
PO1/PSO1.b	✓	✓	✓
PO2/PSO2.a	✓	✓	-
PO2/PSO2.b	✓	✓	-
PO3/PSO3	-	✓	✓
PO4/PSO4.a	-	✓	✓
PO4/PSO4.b	✓	✓	-
PO5/PSO5	✓	✓	-
PO6/PSO6	-	✓	✓
PO7/PSO7	-	-	✓

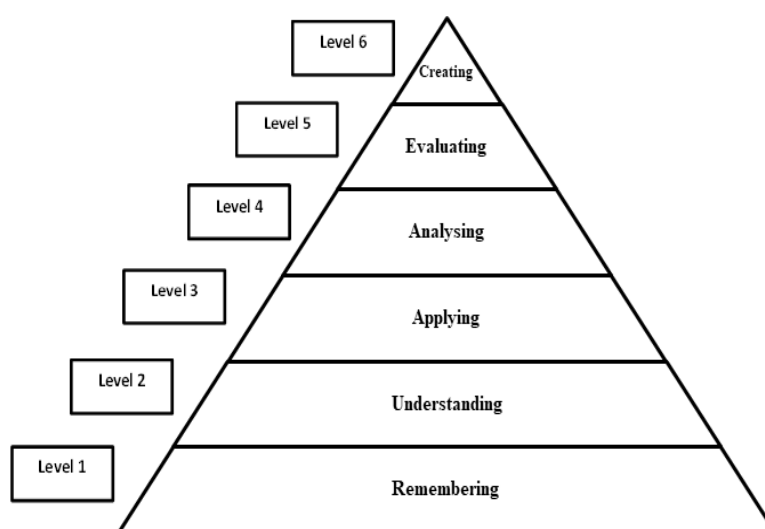
B.1.4 Course Outcomes (COs)

Course Outcomes are narrow statements restricted to the Course contents given in five units. Course Outcomes describe what students would be capable of, after learning the contents of the Course. They reflect the level of knowledge gained, skills acquired and attributes developed by the students after learning of Course contents. COs are measurable, attainable and manageable in number. COs contribute to attain POs in such a way that each CO addresses at least one of the POs and also each PO is reasonably addressed by adequate number of COs.



It is important to determine the methods of assessment. A comprehensive assessment strategy may be outlined using the revised Bloom's Taxonomy levels.

BLOOM'S TAXONOMY



CO – PO Mapping of Courses

After framing the CO statements, the COs framed for each Course is mapped with POs based on the relationship that exists between them. The COs which are not related to any of the POs is indicated with (-), signifying Nil. Measurement Mapping is based on Four Points Scale [High (H), Medium (M), Low (L) and Nil (-)]. For calculating weighted percentage of contribution of each Course in the attainment of the respective POs, the weights assigned for H, M and L are 3, 2 and 1 respectively.

CO-PO/PSO Mapping Table (Course Articulation Matrix)

PO/PSOs	PO1/ PSO1	PO2/ PSO2	PO3/ PSO3	PO4/ PSO4	PO5/ PSO5	PO6/ PSO6	PO7/ PSO7
COs							
CO1							
CO2							
CO3							
CO4							
CO5							

ELIGIBILITY FOR ADMISSION

The candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Tamil Nadu or any other equivalent examination accepted by the Academic Council with Mathematics/Botany as one of the subjects in Higher Secondary Course.

DURATION OF THE PROGRAMME

The candidates shall undergo the prescribed Programme of study for a period of three academic years (six semesters).

MEDIUM OF INSTRUCTION

English

COURSES OFFERED

Part I	:	Tamil/Hindi Course
Part II	:	English
Part III	:	Core Courses
		Elective Courses <ul style="list-style-type: none"> • Generic Elective Courses • Discipline Specific Elective Courses
		Self Study Course - online
Part IV	:	Skill Enhancement Courses (SEC)
		Elective Course (NMEC)
		Environmental Studies Value Education
		Field Project/Internship
		Self Study Course - online
Part V	:	National Service Scheme/ Physical Education/ Youth Red Cross Society/ Red Ribbon Club/ Science Forum/ Eco Club/ Library and Information Science/ Consumer Club/ Health and Fitness Club/ National Cadet Corps/ Rotaract Club

B.2 EVALUATION SCHEME

B.2.1.PART II

Components	Internal Assessment Marks	Summative Examination Marks	Total Marks
Theory	15	60	100
Practical	5	15	
Assignment	5	-	

Three Periodic Tests - Average of the best two will be considered

B.2.2.Part I & PART III - Core Courses, Elective Courses (Generic, DSEC)

Components	Internal Assessment Marks	External Examination Marks	Total Marks
Theory	25	75	100

INTERNAL ASSESSMENT**Distribution of Marks****Theory**

Mode of Evaluation		Marks
Periodic Test	:	15
Assignment	K3 Level	5
Quiz	K1 Level	5
Total		25

Three Periodic Tests - Average of the best two will be considered

Two Assignments - Better of the two will be considered

Three Quiz Tests - Best of the three will be considered

Practical

Mode of Evaluation		Marks
Model Test	:	30
Record & Performance	:	10
Total		40

Two Model Tests - Average of the two will be considered

Question Pattern for Internal Tests**Duration: 2 Hours**

Section	Q. No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 4	Multiple Choice	4	4	1	4
B	5 -6	Internal Choice - Either ... or Type	3	3	7	21
C	8 -9	Internal Choice - Either... or Type	2	2	10	20
					Total	45*

*The total marks obtained in the Periodic Test will be calculated for 15 marks

SUMMATIVE EXAMINATION**Question Pattern****Duration: 3 Hours**

Section	Q. No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 -10	Multiple Choice	10	10	1	10
B	11 - 15	Internal Choice – Either ...or Type	5	5	7	35
C	16 - 18	Internal Choice – Either... or Type	3	3	10	30
					Total	75

PROJECT**Assessment by Internal Examiner Only****Internal Assessment****Distribution of Marks**

Mode of Evaluation	:	Marks
Project work and Report	:	60
Presentation and Viva –Voce	:	40
Total	:	100

B.2.3 PART IV - Skill Enhancement Courses, Non Major Elective Courses and Foundation Course

B.2.3.1 FOUNDATION COURSE

INTERNAL ASSESSMENT

Distribution of Marks

Theory

Mode of Evaluation		Marks	
Periodic Test	:		15
Assignment	K2 Level	:	5
Quiz	K1 Level	:	5
Total		:	25

Three Periodic Tests - Average of the best two will be considered

Two Assignments - Better of the two will be considered

Three Quiz Tests - Best of the three will be considered

Question Pattern for Periodic Tests

Duration: 1 Hour

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 3	Internal Choice - Either ...or Type	3	3	5	15
B	4	Internal Choice – Either ...or Type	1	1	10	10
Total						25*

*The total marks obtained in the Periodic Test will be calculated for 15 marks

SUMMATIVE EXAMINATION

Mode of Evaluation		Marks	
Summative Examination	:		50
Online Quiz (Multiple Choice Questions - K2 Level)	:		25
Total	:		75

Question Pattern**Duration: 2 Hours**

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 5	Internal Choice - Either ... or Type	5	5	6	30
B	6 - 7	Internal Choice – Either... or Type	2	2	10	20
Total						50

B.2.3.2 Skill Enhancement Course - Entrepreneurial skills**INTERNAL ASSESSMENT ONLY****Distribution of Marks**

Mode of Evaluation	Marks
Periodic Test	: 15
Assignment	: 5
Quiz	: 5
Model Examinations	: 60
Online Quiz(Multiple Choice Questions - K2 Level)	: 15
Total	: 100

Question Pattern for Periodic Tests**Duration: 1 Hour**

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q. No.(1- 3)	Internal Choice – Either Or Type	3	3	6	18
B Q. No.(4)	Internal Choice – Either Or Type	1	1	12	12
Total					30

Two Periodic Tests - Better of the two will be considered

Two Assignments - Better of the two will be considered

Question Pattern for Model Examination**Duration: 2 Hours**

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q. No.(1-5)	Internal Choice – Either Or Type	5	5	6	30
B Q. No.(6- 8)	Internal Choice – Either Or Type	3	3	10	30
Total					60

B.2.3.3 Skill Enhancement Courses/ Non Major Elective Courses**INTERNAL ASSESSMENT****Distribution of Marks****Theory**

Mode of Evaluation		Marks
Periodic Test	:	15
Assignment	K3 Level	5
Quiz	K2 Level	5
Total		25

Three Periodic Tests - Average of the best two will be considered

Two Assignments - Better of the two will be considered

Three Quiz Tests - Best of the three will be considered

Question Pattern for Periodic Tests**Duration: 1 Hour**

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 3	Internal Choice - Either ...or Type	3	3	5	15
B	4	Internal Choice – Either ...or Type	1	1	10	10
Total						25*

*The total marks obtained in the Periodic Test will be calculated for 15 marks

SUMMATIVE EXAMINATION

Mode of Evaluation	Marks	
Summative Examination	:	50
Online Quiz (Multiple Choice Questions - K2 Level)	:	25
Total	:	75

Question Pattern**Duration: 2 Hours**

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 5	Internal Choice - Either ... or Type	5	5	6	30
B	6 - 7	Internal Choice – Either... or Type	2	2	10	20
Total						50

B.2.4 PART IV- ENVIRONMENTAL STUDIES / VALUE EDUCATION**INTERNAL ASSESSMENT ONLY****Evaluation Pattern**

Mode of Evaluation	Marks	
Periodic Test	:	15
Assignment (Based on the Listed activities) - K3 Level	:	10
Online Quiz (Multiple Choice Questions - K2 Level)	:	25
Poster Presentation - K3 Level		10
Report on Student's Awareness creation on Environmental Protection / Ethical Values -- K3 Level		10
Model Examination	:	30
Total	:	100

Three Assignment - Best of the three will be considered

Question Pattern for Periodic Tests**Duration: 1 Hour**

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q. No.(1- 3)	Internal Choice – Either Or Type	3	3	6	18
B Q. No.(4)	Internal Choice – Either Or Type	1	1	12	12
Total					30

Two Periodic tests - Better of the two will be considered

*The total marks obtained in the Periodic Test will be calculated for 15 marks

Question Pattern for Model Examination

Duration: 2 ½ Hours

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 5	Internal Choice - Either ... or Type	5	5	6	30
B	6 - 8	Internal Choice – Either... or Type	3	3	10	30
Total						60*

*The total marks obtained in the Model Examination will be calculated for 30 marks

B.2.5 PART IV- Internship/ Field Project

Internship / Field Project is compulsory for II year UG Science Students

- **Internship:** A designated activity that carries one credit involving not less than 15 days of working in an organization under the guidance of an identified mentor
- **Field Project:** Students comprising of maximum 5 members in a team need to undertake project that involve conducting surveys inside/outside the college premises and collection of data from designated communities or natural places.
- Assessment by Internal Examiner only

Mode of Evaluation		Marks
Onsite Learning/Survey	:	50
Report	:	25
Viva-Voce	:	25
Total		100

B.2.6 SELF STUDY COURSE

B.2.6 .1 PART III - Core & Elective Courses Quiz – Online

- Assessment by Internal Examiner only
- Question Bank is prepared by the Faculty Members of the Departments for all the Core and Elective Courses offered in all the Semesters.
- No. of Questions to be taken 700.
- Multiple Choice Question pattern is followed.
- Online Test will be conducted in VI Semester for 100 Marks.
- Model Examination is conducted after two periodic tests.

Distribution of Marks

Mode of Evaluation		Marks
Periodic Test	:	25
Model Examination	:	75
	:	100

Two Periodic Tests - Better of the two will be considered

B.2.6 .2 PART IV - Practice for Competitive Examinations – Online

Assessment by Internal Examiner only

- Question Bank prepared by the Faculty Members of the respective Departments will be followed.
- Multiple Choice Question pattern is followed.
- Online Test will be conducted in V Semester for 100 Marks.
- Model Examination is conducted after two periodic tests.

Subject wise Allotment of Marks

Subject		Marks
Tamil	:	10
English	:	10
History	:	10
Mathematics	:	10
Current affairs	:	10
Commerce, Law & Economics	:	10
Physical Sciences	:	10
Life Sciences	:	15
Computer Science	:	5
Food and Nutrition	:	5
Sports and Games	:	5
Total	:	100

Distribution of Marks

Mode of Evaluation		Marks
Periodic Test	:	25
Model Examination	:	75
Total	:	100

Two Periodic Tests - Better of the two will be considered

B.2.7. Part V – Extension Activities**INTERNAL ASSESSMENT ONLY****Distribution of Marks**

Mode of Evaluation	Marks
Attendance	: 5
Performance	: 10
Report/Assignment/Project/Camp/Practical	: 10
Total	: 25*

*The marks obtained will be calculated for 100 marks

B.2.8 EXTRA CREDIT COURSES (OPTIONAL)**2.8.1 Extra Credit Course offered by the Department.**

Assessment by Internal Examiner Only (To be conducted along with the III Periodic Test)

Distribution of Marks

Mode of Evaluation	Marks
Quiz (Multiple Choice Questions)	: 25
Model Examination	: 75
Total	: 100

Question Pattern for Model Examination

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q.No.(1-5)	Internal Choice- Either or Type	5	5	7	35
B Q.No.(6-9)	Internal Choice- Either or Type	4	4	10	40
				Total	75

2.8.2 Extra credit Course offered by MOOC (Massive Open Online Course)

- The Courses shall be completed within the first V Semesters of the Programme.
- The allotment of credits is as follows (**Maximum of 10 credits**)

4weeks Course	- 1 credit
8 weeks Course	- 2 credits
12 weeks Course	- 3 credits

ELIGIBILITY FOR THE DEGREE

- The candidate will not be eligible for the Degree without completing the prescribed Courses of study, lab work, *etc.*, and a minimum Pass marks in all the Courses.
 - No Pass minimum for Internal Assessment.
 - Pass minimum for External Examination is 27 marks out of 75 marks for Core Courses, Elective Courses (Generic Elective, DSEC Courses)
 - Pass minimum for External Examination is 18 marks out of 50 marks for Skill Enhancement Courses and Non Major Elective Courses (NMEC).
 - The aggregate minimum pass percentage is 40.
 - Pass minimum for External Practical Examination is 21 marks out of 60 marks.
 - Pass minimum for Ability Enhancement Compulsory Courses is 40 marks.
 - Pass minimum for Self Study Courses is 40 marks.
- **ATTENDANCE**
 - For UG, PG Programmes,
 - (a) The students who have attended the classes for 76 days (85%) and above are permitted to appear for the Summative Examinations without any condition.
 - (b) The students who have only 60-75 days (66% - 84%) of attendance are permitted to appear for the Summative Examinations after paying the required fine amount and fulfilling other conditions according to the respective cases.

- (c) The students who have attended the classes for 59 days and less - upto 45 days (50%-65%) can appear for the Summative Examinations only after getting special permission from the Principal.
- (d) The students who have attended the classes for 44 days or less (50%) cannot appear for the Summative Examinations and have to repeat the whole semester.
- These rules are applicable to UG, PG and M.Phil. Programmes and come into effect from 2023-2024 onwards.
 - For Certificate, Diploma, Advanced Diploma and Post Graduate Diploma Programmes, the students require 75% of attendance to appear for the Theory/Practical Examinations.

B.3 ASSESSMENT MANAGEMENT PLAN

An Assessment Management Plan that details the assessment strategy both at the Programme and the Course levels is prepared. The continuous assessment is implemented using an assessment rubric to interpret and grade students.

B.3.1 Assessment Process for CO Attainment

Assessment is one or more processes carried out by the institution that identify, collect and prepare data to evaluate the achievement of Course Outcomes and Programme Outcomes. Course Outcome is evaluated based on the performance of students in the Continuous Internal Assessments and in End Semester Examination of a Course. Target levels of attainment shall be fixed by the Course teacher and Heads of the respective departments.

Direct Assessment (rubric based)-Conventional assessment tools such as Term Test, Assignment, Quiz and End Semester Summative Examination are used.

Indirect Assessment –Done through Course Exit Survey.

CO Assessment Rubrics

For the evaluation and assessment of COs and POs, rubrics are used. Internal assessment contributes 40% and End Semester assessment contributes 60% to the total attainment of a CO for the theory Courses. For the practical Courses, internal assessment contributes 50% and Semester assessment contributes 50% to the total attainment of a CO. Once the Course Outcome is measured, the PO can be measured using a CO-PO matrix.

CO Attainment

Direct CO Attainment

Course outcomes of all Courses are assessed and the CO – wise marks obtained by all the students are recorded for all the assessment tools. The respective CO attainment level is evaluated based on set attainment rubrics.

Target Setting for Assessment Method

For setting up the target of internal assessment tools, 55% of the maximum mark is fixed as target. For setting up the target of End Semester Examination, the average mark of the class shall be set as target.

Formula for Attainment for each CO

Attainment = Percentage of students who have scored more than the target marks

$$\text{Percentage of Attainment} = \frac{\text{Number of Students who Scored more than the Target}}{\text{Total Number of Students}} \times 100$$

Attainment Levels of COs

Assessment Methods	Attainment Levels	
Internal Assessment	Level 1	50% of students scoring more than set target marks in Internal Assessment tools
	Level 2	55% of students scoring more than set target marks in Internal Assessment tools
	Level 3	60% of students scoring more than set target marks in internal Assessment tools
End Semester Summative Examination	Level 1	50% of students scoring more than average marks in End Semester Summative Examination
	Level 2	55% of students scoring more than average marks in End Semester Summative Examination
	Level 3	60% of students scoring more than average marks in End Semester Summative Examination

Indirect CO Attainment

At the end of each Course, an exit survey is conducted to collect the opinion of the students on attainment of Course Outcomes. A questionnaire is designed to reflect the views of the students about the Course outcomes.

Overall CO Attainment=75% of Direct CO Attainment + 25 % of Indirect CO Attainment

In each Course, the level of attainment of each CO is compared with the predefined targets. If the target is not reached, the Course teacher takes necessary steps for the improvement to reach the target.

For continuous improvement, if the target is reached, the Course teacher can set the target as a value greater than the CO attainment of the previous year.

B.3.2 Assessment Process for Overall PO Attainment

With the help of CO-PO mapping, the PO attainment is calculated. PO assessment is done by giving 75% weightage to direct assessment and 25% weightage to indirect assessment. Direct assessment is based on CO attainment, where 75% weightage is given to attainment through End Semester Examination and 25% weightage is given to attainment through Internal assessments. Indirect assessment is done through Graduate Exit Survey and participation of students in Co-curricular/Extra-curricular activities.

PO Assessment Tools

Mode of Assessment	Assessment Tool	Description
Direct Attainment (Weightage -75%)	CO Assessment	This is computed from the calculated CO Attainment value for each Course
Indirect Attainment (Weightage - 25%)	Graduate Exit Survey 10%	At the end of the Programme, Graduate Exit Survey is collected from the graduates and it gives the opinion of the graduates on
	Co-curricular / Extracurricular activities 15%	For participation in Co-curricular / Extracurricular activities during the period of their study.

Programme Articulation Matrix (PAM)

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Average Direct PO Attainment									
Direct PO Attainment in percentage									

Indirect Attainment of POs for all Courses

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Graduate Exit Survey								
Indirect PO Attainment								

Attainments of POs for all Courses

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Direct Attainment (Weightage - 75%)								
Indirect Attainment (Weightage - 25%)								
Overall PO Attainment								

**Overall PO Attainment= 75% of Direct PO Attainment +
25% of Indirect PO Attainment (Graduate Exit Survey
& Participation in Co- curricular and
Extracurricular Activities)**

Expected Level of Attainment for each of the Programme Outcomes

POs	Level of Attainment
Attainment Value $\geq 70\%$	Excellent
$60\% \leq$ Attainment Value $< 70\%$	Very Good
$50\% \leq$ Attainment Value $< 60\%$	Good
$40\% \leq$ Attainment Value $< 50\%$	Satisfactory
Attainment Value $< 40\%$	Not Satisfactory

Level of PO attainment

Graduation Batch	Overall PO Attainment (in percentage)	Whether expected level of PO is achieved? (Yes/No)

B.3.3 Assessment Process for PEOs

The curriculum is designed so that all the courses contribute to the achievement of PEOs. The attainment of PEOs is measured after 5 years of completion of the programme only through Indirect methods.

Target for PEO Attainment

Assessment Criteria	Target (UG)	Target (PG)
Record of Employment	15% of the class strength	30% of the class strength
Progression to Higher Education	50% of the class strength	5% of the class strength
Record of Entrepreneurship	2% of the class strength	5% of the class strength

Attainment of PEOs

Assessment Criteria & Tool	Weightage
Record of Employment	10
Progression to Higher Education	20
Record of Entrepreneurship	10
Feedback from Alumnae	30
Feedback from Parents	10
Feedback from Employers	20
Total Attainment	100

$$\text{Percentage of PEO Attainment from Employment} = \frac{\text{Number of Students who have got Employment}}{\text{Target}} \times 100$$

$$\text{Percentage of PEO Attainment from Higher Education} = \frac{\text{Number of Students who pursue Higher Education}}{\text{Target}} \times 100$$

$$\text{Percentage of PEO Attainment from Entrepreneurship} = \frac{\text{Number of Students who have become Entrepreneurs}}{\text{Target}} \times 100$$

Expected Level of Attainment for each of the Programme Educational Objectives

POs	Level of Attainment
Attainment Value $\geq 70\%$	Excellent
$60\% \leq \text{Attainment Value} < 70\%$	Very Good
$50\% \leq \text{Attainment Value} < 60\%$	Good
$40\% \leq \text{Attainment Value} < 50\%$	Satisfactory
Attainment Value $< 40\%$	Not Satisfactory

Level of PEO Attainment

Graduation Batch	Overall PEO Attainment (in percentage)	Whether expected level of PEO is achieved? (Yes/No)

C. PROCESS OF REDEFINING THE PROGRAMME EDUCATIONAL OBJECTIVES

The college has always been involving the key stakeholders in collecting information and suggestions with regard to curriculum development and curriculum revision. Based on the information collected the objectives of the Programme are defined, refined and are inscribed in the form of PEOs. The level of attainment of PEOs defined earlier will be analyzed and will identify the need for redefining PEOs. Based on identified changes in terms of curriculum, regulations and PEOs, the administrative system like Board of Studies, Academic Council and Governing Body may recommend appropriate actions. As per the Outcome Based Education Framework implemented from the Academic Year 2020 -2021, the following are the Programme Structure, the Programme Contents and the Course Contents of B.Sc. Chemistry Programme.



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VIRUDHUNAGAR

Quality Education with Wisdom and Values

BACHELOR OF SCIENCE CHEMISTRY (2017)

Outcome Based Education with Choice Based Credit System

Programme Structure - Allotment of Hours and Credits

For those who join in the Academic Year 2024-2025

Components	Semester						Total Number of Hours (Credits)
	I	II	III	IV	V	VI	
Part I : Tamil /Hindi	6 (3)	6 (3)	6 (3)	6 (3)	-	-	24 (12)
Part II : English	6 (3)	6(3)	6 (3)	6 (3)	-	-	24 (12)
Part III : Core Courses, Elective Courses & Self Study Course							
Core Course	5 (5)	5 (5)	5 (5)	4 (4)	6 (5)	6 (5)	31 (29)
Core Course	-	-	-	-	6 (5)	6 (5)	12 (10)
Core Course	-	-	-	-	6(5)	5(5)	11(10)
Core Course Practical	3(2)	3 (2)	3 (2)	3 (2)	-	3 (2)	15(10)
Core Course Project	-	-	-	-	1 (3)	-	1 (3)
Elective Course (DSEC)	-	-	-	-	5(4)	5 (5)	10 (9)
Elective Course (DSEC Practical)	-	-	-	-	-	-	7(4)
Elective Course I (Allied)	6 (4)/ 4(4)	3(2) & 3(2)/ 4(3)	-	-	-	-	12(8)
Elective Course I Practical I(Allied)	2(0)	2(1)	-	-	-	-	
Elective Course II(Allied)	-	-	4	4 (3)	-	-	8(6)
Elective Course II Practical II(Allied)	-	-	2 (1)	2 (1)	-	-	4 (2)
Self Study Course	-	-	-	-	-	0 (1)	0 (1)
Part IV : Skill Enhancement Courses, Elective Courses, Environmental Studies, Value Education, Self Study Course & Internship/ Field Project							
SEC	2 (2)	-	1 (1)	2 (2)	-	-	5(5)
SEC	-	2 (2)	2 (2)	2 (2)	-	2 (2)	8 (8)
Elective Course(NME)	2 (2)	2 (2)	-	-	-	-	4 (4)
Value Education	-	-	-	-	2	-	2 (2)
Environmental Studies	-	-	1	1 (2)	-	-	2 (2)
Self Study Course	-	-	-	-	0 (1)	-	0 (1)
Internship/ Field Project	-	-	-	-	0	-	0 (1)
Part V : Extension Activities	-	-	-	-	-	0	0 (1)
Total	30 (21/21)	30 (21/21)	30	30 (22)	30 (28)	30 (28)	180 (140)
Extra Credit Course (Self Study Course)	-	-	-	-	0(2)	-	0(2)

DSEC: Discipline Specific Elective Course; SEC- Skill Enhancement Course.

NMEC: Non Major Elective Course



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B.Sc. Chemistry- 2017

Semester- I

(for those who join 2024-2025)

S. No	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam Hours	Marks			
							Int	Ext.	Total	
1.	Part I	Tamil/Hindi	24UTAG11/ 24UHDG11	6	3	3	25	75	100	
2.	Part II	English	24UENG11	6	3	3	25	75	100	
3.	Part III	Core Course -1	General Chemistry-I	24UCHC11	5	5	3	25	75	100
4.		Core Course -2 Practical -I	Quantitative Inorganic estimation (titrimetry) and Inorganic Preparations Practical	24UCHC11P	3	2	3	40	60	100
5.		Elective Course – I	Mathematical Foundations I/ Allied Botany I	24UMTA11/ 24UBYA11	6 / 4	4 / 4	3	25	75	100
		Allied Botany Practical-I	24UBYA21P	2	-	-	-	-	-	
6.	Part IV	Elective Course NME-1	Food Chemistry	24UCHN11	2	2	2	25	75	100
7.		SEC- 1 Foundation Course	Role of chemistry in daily life	24UCHF11	2	2	2	25	75	100
Total				30	21 / 21				700	

B. Sc. CHEMISTRY(2024-2025 onwards)
Semester- II

Curriculum for B.Sc. Chemistry

S. No	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int.	Ext.	Total	
1.	Part I	Tamil/Hindi	24UTAG21/ 24UHDG21	6	3	3	25	75	100	
2.	Part II	English	24UENG21	6	3	3	25	75	100	
3.	Part III	Core Course -3	General Chemistry–II	24UCHC21	5	5	3	25	75	100
4.		Core Course -4 Practical II	Qualitative Organic Analysis and Preparation of Organic Compounds Practical	24UCHC21P	3	2	3	40	60	100
5.		Elective Course -I	Mathematical Foundations II	24UMTA21	3	2	3	25	75	100
			Statistics and Operations Research /	24UMTA22	3	2	3	25	75	100
6.		Allied Botany II	24UBYA21	4	3	3	25	75	100	
		Allied Botany Practical I	24UBYA21P	2	1	3	40	60	100	
7.	Part IV	Elective Course NME-2	Dairy Chemistry	24UCHN21	2	2	2	25	75	100
8		SEC- 2	Cosmetics and Personal Grooming	24UCHS21	2	2	2	25	75	100
Total				30	21 / 21				800	

Semester- III

S.No	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int.	Ext.	Total	
1.	Part I	Tamil/Hindi	24UTAG31/ 24UH DG31	6	3	3	25	75	100	
2.	Part II	English	24UENG31	6	3	3	25	75	100	
3.	Part III	Core Course -5	General Chemistry–III	24UCHC31	5	5	3	25	75	100
4.		Core Course -6	Qualitative Inorganic Analysis	24UCHC31P	3	2	3	40	60	100
5.		Elective Course -II	General Physics - I	24UPCA31	4	3	3	25	75	100
6.		Elective Course –II Practical –II	General Physics Practical-I	24UPCA31P	2	1	3	40	60	100
7	Part IV	SEC – 2	Entrepreneurial skills in Chemistry	24UCHS31	1	1	2	100	-	100
8		SEC- 3	Pesticide Chemistry	24UCHS32	2	2	2	25	75	100
9			Environmental Studies	24UGES41	1	-	-	-	-	-
Total				30	20		800			

S.No	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int.	Ext.	Total	
1.	Part I	Tamil/Hindi	24UTAG41/ 24UHDG41	6	3	3	25	75	100	
2.	Part II	English	24UENG41	6	3	3	25	75	100	
3.	Part III	Core Course -7	General Chemistry-IV	24UCHC41	4	4	3	25	75	100
4.		Core Course -8	Physical Chemistry Practical- I	24UCHC41P	3	2	5	40	60	100
5.		Elective Course -II	General Physics - II	24UPCA41	4	3	3	25	75	100
6.		Elective Course -II Practical -II	General Physics Practical-II	24UPCA41P	2	1	3	40	60	100
7	Part IV	SEC – 4	Instrumental methods of Chemical Analysis (Theory)	24UCHS41	2	2	2	25	75	100
8		SEC- 5	Forensic Science	24UCHS42	2	2	2	25	75	100
9			Environmental Studies	24UGES41	1	2	2	100	-	100
Total				30	22		900			

Semester- V

S.No	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int.	Ext.	Total	
1.	Part III	Core Course -9	Organic Chemistry-I	24UCHC51	6	5	3	25	75	100
2.		Core Course -10	Inorganic Chemistry-I	24UCHC52	6	5	3	25	75	100
3.		Core Course -11	Physical Chemistry-I	24UCHC53	6	5	3	25	75	100
4.		Elective Course – I (DSEC)	Biochemistry	24UCHE51	5	4	3	25	75	100
5.		Elective Course – II (DSEC)	Industrial Chemistry	24UCHE52	4	2	3	25	75	100
6.		Core Course -12	Project with viva-voce	24UCHC54PR	1	3	-	100	-	100
7.	Part IV		Value Education	24UGVE51	2	2	3	100	-	100
8.		Self study course	Practice for competitive examinations-online	24UGCE51	-	1	-	100	-	100
9.		Internship / Industrial Visit / Field Visit(Carried out in II Year Sum vacation) (30 hours)	Field Project	24UCHI51G	-	1	-	100	-	100
	Total				30	28				900
	Extra Credit Course (Self study course)	Laboratory Practices and Safety Measures	24UCHO51	-	2	3	-	100		100

Semester- VI

S.No	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int.	Ext.	Total	
1.	Part III	Core Course -13	Organic Chemistry-II	24UCHC61	6	5	3	25	75	100
2.		Core Course -14	Inorganic Chemistry-II	24UCHC62	6	5	3	25	75	100
3.		Core Course -15	Physical Chemistry-II	24UCHC63	5	5	3	25	75	100
4.		Core Course -16	Physical Chemistry Practical II	24UCHC61P	3	2	5	25	75	100
5.		Elective Course – III (DSEC)	Fundamentals of Spectroscopy	24UCHE61	5	5	3	25	75	100
6.		Elective Course – IV (DSEC)	Nanoscience/ Pharmaceutical Chemistry (Elective based)	24UCHE62	3	2	3	25	75	100
7.		Self study course	Core courses Quiz-online	24UCHQ61	-	1	-	100	-	100
8.	Part IV	SEC-7	Cosmetics and Personal grooming	24UCHS61	2	2	2	25	75	100
9.		Extension Activity	Extension Activity		-	1	-	100	-	100
Total				30	28					900



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Semester I	GENERAL CHEMISTRY-I	Hours/Week: 5	
Core Course-1		Credits: 5	
CourseCode 24UCHC11		Internal 25	External 75

COURSE OUTCOME

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

- CO1 : explain the atomic structure, wave particle duality of matter, periodic properties bonding, and properties of compounds. [K1]
- CO2 : classify the elements in the periodic table, types of bonds, reaction intermediates electronic effects in organic compounds, types of reagents. [K2]
- CO3 : illustrate the relationship existing between electronic configuration, bonding, geometry of molecules and reactions; structure reactivity and electronic effects. [K2]
- CO4 : apply the theories of atomic structure, bonding, to calculate energy of a spectral transition, Δx , Δp electronegativity, bond order [K3]
- CO5 : construct MO diagrams, predict trends in periodic properties, assess the properties of elements, and explain hybridization in molecules, nature of H – bonding and organic reaction mechanisms. [K3]

UNIT I

Atomic structure and Periodic trends

History of atom (J.J.Thomson, Rutherford); Moseley's Experiment and Atomic number, Atomic Spectra; Black-Body Radiation and Planck's quantum theory - Bohr's model of atom; The Franck-Hertz Experiment; Interpretation of H- spectrum; Photoelectric effect, Compton effect; Dual nature of Matter- De- Broglie wavelength- Davisson and Germer experiment Heisenberg's Uncertainty Principle; Electronic Configuration of Atoms and ions- Hund's rule, Pauli's exclusion principle and Aufbau principle; Numerical problems involving the core concepts.

(15 Hours)

Unit II**Introduction to Quantum mechanics**

Classical mechanics, Wave mechanical model of atom, distinction between a Bohr orbit and orbital; Postulates of quantum mechanics; probability interpretation of wave functions, Formulation of Schrodinger wave equation - Probability and electron density-visualizing the orbitals -Probability density and significance of Ψ and Ψ^2 .

Modern Periodic Table

Cause of periodicity; Features of the periodic table; classification of elements - Periodic trends for atomic size- Atomic radii, Ionic, crystal and Covalent radii; ionization energy, electron affinity, electronegativity- electronegativity scales, applications of electronegativity.

Problems involving the core concepts.

(15 Hours)

UNIT III: Structure and bonding - I**Ionic bond**

Lewis dot structure of ionic compounds; properties of ionic compounds; Energy involved in ionic compounds; Born Haber cycle – lattice energies, Madelung constant; relative effect of lattice energy and solvation energy; Ion polarization – polarising power and polarizability; Fajans' rules - effects of polarisation on properties of compounds; problems involving the core concepts.

Covalent bond

Shapes of orbitals, overlap of orbitals – σ and Π bonds; directed valency - hybridization; VSEPR theory - shapes of molecules of the type AB_2 , AB_3 , AB_4 , AB_5 , AB_6 and AB_7

Partial ionic character of covalent bond-dipole moment, application to molecules of the type A_2 , AB , AB_2 , AB_3 , AB_4 ; percentage ionic character- numerical problems based on calculation of percentage ionic character.

(15 Hours)

UNIT IV: Structure and bonding - II

VB theory – application to hydrogen molecule; concept of resonance - resonance structures of some inorganic species – CO_2 , NO_2 , CO_3^{2-} , NO_3^- ; limitations of VBT; MO theory - bonding, antibonding and nonbonding orbitals, bond order; MO diagrams of H_2 , C_2 , O_2 , O_2^+ , O_2^- , O^{2-} , N_2 , NO , HF , CO ; magnetic characteristics, comparison of VB and MO theories. Coordinate bond: Definition, Formation of BF_3 , NH_3 , NH_4^+ , H_3O^+ properties

Metallic bond-electron sea model, VB model; Band theory-mechanism of conduction in solids; conductors, insulator, semiconductor – types, applications of semiconductors
 Weak Chemical Forces - Vander Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces; Hydrogen bonding – Types, special properties of water, ice, stability of DNA; Effects of chemical force, melting and boiling points. **(15 Hours)**

UNIT-V:

Basic concepts in Organic Chemistry and Electronic effects

Types of bond cleavage – heterolytic and homolytic; arrow pushing in organic reactions; reagents and substrates; types of reagents - electrophiles, nucleophiles, free radicals; reaction intermediates – carbanions, carbocations, carbenes, arynes and nitrenes.

Inductive effect - reactivity of alkyl halides, acidity of halo acids, basicity of amines; inductomeric and electromeric effects.

Resonance – resonance energy, conditions for resonance - acidity of phenols, basicity of aromatic amines, stability of carbonium ions, carbanions and free radicals, reactivity of vinyl chloride, dipole moment of vinyl chloride and nitrobenzene, bond lengths; steric inhibition to resonance.

Hyperconjugation - stability of alkenes, bond length, orienting effect of methyl group, dipole moment of aldehydes and nitromethane.

Types of organic reactions- addition, substitution, elimination and rearrangements. **(15 Hours)**

Text Books

1. Puri, B. R. and Sharma, L. R. *Principles of Physical Chemistry*, 38thed.; Vishal Publishing Company: Jalandhar, 2002.
2. Dash UN, Dharmarha OP, Soni P.L. *Textbook of Physical Chemistry*, Sultan Chand & Sons: New Delhi, 2016
3. Madan, R. D. and Sathya Prakash, *Modern Inorganic Chemistry*, 2nd ed.; S.Chand and Company: New Delhi, 2003
4. Arun Bahl & Bahl, B.S.(2009). *Advanced Organic Chemistry*. 19th edition. New Delhi: S.Chand & Company Ltd.

5. Tewari, K.S. & Vishnoi, N.K.(2006).*A Text book of Organic Chemistry*.2nd edition.
NewDelhi: Vikas Publishing House Pvt. Ltd.

Reference Books

1. Maron, S. H. and Prutton C. P. *Principles of Physical Chemistry*, 4thed.;The Macmillan Company: Newyork,1972.
2. Lee, J. D. *Concise Inorganic Chemistry*, 4th ed.; ELBS William Heinemann:London,1991.
3. Gurdeep Raj, *Advanced Inorganic Chemistry*, 26thed.; Goel Publishing House: Meerut,2001.
4. Atkins, P.W. & Paula, J. *Physical Chemistry*, 10th ed.; Oxford University Press: New York, 2014.
5. Huheey, J. E. *Inorganic Chemistry: Principles of Structure and Reactivity*, 4th ed.; Addison, Wesley Publishing Company: India,1993.
6. Finar, I.L. Volume I.(2003).*Organic Chemistry*. 6thedition.Singapore: PearsonEducation Pvt. Ltd.

Course Code 24UCHC11	PO1		PO2		PO3		PO4		PO5		PO6	PO7
	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO
	1.a	1. b	2.a	.2.b	3a	3.b	4a	4b	5.a	5.b	6	7
CO1	1	1	3	3	1	1	1	2	1	1	-	1
CO2	1	1	3	3	2	2	3	2	2	2	-	1
CO3	2	2	3	2	2	3	3	2	2	3	-	1
CO4	2	2	3	3	1	1	3		2	3	-	1
CO5	2	2	3	3	1	1	2	2	2	2	-	1

Strong – 3

Medium – 2

Low – 1

Dr.M.Dhanalakshmi
Head of the Department

Dr.A.Prasanna
Course Designer



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Semester I	QUANTITATIVE INORGANIC ESTIMATION (TITRIMETRY) AND INORGANIC PREPARATIONS PRACTICAL	Hours/Week: 3	
Core Course-2 Practical I		Credits: 2	
Course Code 24UCHC11P		Internal 40	External 60

COURSE OUTCOME

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

- CO1** : explain the basic principles involved in titrimetric analysis and inorganic preparations. [K2]
- CO2** : compare the methodologies of different titrimetric analysis. [K2]
- CO3** : calculate the concentrations of unknown solutions in different ways and develop the skill to estimate the amount of a substance present in a given solution. [K3]
- CO4** : determine the yield of different inorganic preparations and identify the end point of various titrations. [K3]
- CO5** : apply the principle and procedure involved in titrimetric analysis to estimate the amount of unknown compound in the given solution. [K3]

Unit I

Chemical Laboratory Safety in Academic Institutions: Introduction - importance of safety education for students, common laboratory hazards, assessment and minimization of the risk of the hazards, prepare for emergencies from uncontrolled hazards; concept of MSDS; importance and care of PPE; proper use and operation of chemical hoods and ventilation system; fire extinguishers-types and uses of fire extinguishers, demonstration of operation; chemical waste and safe disposal.

Common Apparatus Used in Quantitative Estimation (Volumetric)

Description and use of burette, pipette, standard flask, measuring cylinder, conical flask, beaker, funnel, dropper, clamp, stand, wash bottle, watch glass, wire gauge and tripod stand.

Principle of Quantitative Estimation (Volumetric)

Equivalent weight of an acid, base, salt, reducing agent, oxidizing agent; concept of mole, molality, molarity, normality; primary and secondary standards, preparation of standard solutions; theories of acid-base, redox, complexometric, iodimetric and iodometric titrations; indicators – types, theory of acid–base, redox, metal ion and adsorption indicators, choice of indicators.

Unit II**Quantitative Estimation (Volumetric)**

Preparation of standard solution, dilution from stock solution

Permanganometry

Estimation of sodium oxalate using standard ferrous ammonium sulphate

Dichrometry

Estimation of ferric alum using standard dichromate (external indicator)

Estimation of ferric alum using standard dichromate (internal indicator)

Iodometry

Estimation of copper in copper sulphate using standard dichromate

Argentimetry

Estimation of chloride in barium chloride using standard sodium chloride/ Estimation of chloride in sodium chloride (Volhard's method)

Unit III**Complexometry**

Estimation of hardness of water using EDTA

Estimations

Estimation of iron in iron tablets

Estimation of ascorbic acid.

Preparation of Inorganic compounds-

Potash alum

Tetraammine copper (II) sulphate

Hexamminecobalt (III) chloride

Mohr's Salt

Text Book

1. Venkateswaran, V.; Veeraswamy, R.; Kulandivelu, A.R. Basic Principles of Practical Chemistry, 2nd ed.; Sultan Chand & Sons: New Delhi, 1997.
2. Nad, A. K.; Mahapatra, B.; Ghoshal, A.; An advanced course in Practical Chemistry, 3rd ed.; New Central Book Agency: Kolkata, 2007.

Reference Books

1. Mendham, J.; Denney, R. C.; Barnes, J. D.; Thomas, M.; Sivasankar, B.; Vogel's Textbook of Quantitative Chemical Analysis, 6th ed.; Pearson Education Ltd: New Delhi, 2000.

Course Code 24UHC11P	PO1		PO2		PO3		PO4		PO5		PO6	PO7
	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO
	1. a	1. b	2.a	2.b	3. a	3. b	4. a	4. b	5.a	5.b	6	7
CO1	1	1	1	2	1	1	1	1	2	1	3	3
CO2	1	2	2	2	2	2	2	2	2	2	3	3
CO3	2	1	3	3	2	2	2	2	1	3	3	3
CO4	3	2	3	3	2	2	3	2	1	3	3	3
CO5	3	3	3	1	3	2	2	2	1	2	3	3

Strong – 3**Medium – 2****Low – 1**

Dr.M.Dhanalakshmi
Head of the Department

Dr.A.Prasanna
Course Designer



V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.Sc. PHYSICS AND CHEMISTRY (for those who join in 2024-2025)

Semester I	MATHEMATICAL FOUNDATIONS - I	Hours/Week:6	
Elective Course-I		Credits:4	
Course Code		Internal	External
24UMTA11		25	75

COURSE OUTCOMES

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

CO1: retrieve the fundamental concepts, techniques in Calculus, Algebra and Numerical Methods. [K1]

CO2: explain curvature of a curve, method of solving algebraic, transcendental and simultaneous equations. [K2]

CO3: find the eigen values and eigen vectors of a given matrix and evaluate double and triple integrals. [K2]

CO4: apply the knowledge gained in Calculus and Algebra to other fields. [K3]

CO5: use appropriate method to solve algebraic, transcendental and simultaneous equations.[K3]

UNIT I

The Solution of Numerical Algebraic and Transcendental Equations

The Bisection method - Iteration method – Regula Falsi method – Newton Raphson method – Horner's method (without proof) (Simple problems only) (18 hours)

UNIT II

Solution of Simultaneous Linear Algebraic Equations

Introduction - Gauss Elimination method – Gauss Jordan method – Gauss Jacobi method - Gauss Seidel method of iteration – (Restricted to three variables only) (Simple problems only) (18 hours)

UNIT III

Matrices

Eigen Values and Eigen Vectors – Diagonalization of Matrices – Cayley – Hamilton Theorem – Inverse of a Matrix (18 hours)

UNIT IV

Differential Calculus

n^{th} derivatives – Leibnitz theorem (without proof) – Jacobian – Curvature and radius of curvature (18 hours)

UNIT V

Ordinary Differential Equations

Linear equations with Constant coefficients

Partial Differential Equations

Formation of Partial Differential Equations – Solution of a Partial Differential Equation – Standard Forms (18 hours)

TEXT BOOKS

1. P.Kandasamy, K.Thilagavathy, K.Gunavathy, Numerical Methods (2016), S.Chand & Company Ltd., New Delhi-55.
2. P.Duraipandian and Dr.S.Udayabaskaran, Allied Mathematics Volume I (2014), S.Chand & Company Ltd., New Delhi-55.
3. P.Duraipandian and Dr.S.Udayabaskaran, Allied Mathematics Volume II (2014), S.Chand & Company Ltd., New Delhi-55.

Course Code 24UMTA11	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	1	2	-
CO2	3	2	3	2	1	2	-
CO3	2	2	3	2	1	2	-
CO4	3	3	3	3	1	2	-
CO5	3	2	3	2	1	3	-

Strong(3) Medium(2) Low(1)

Dr.M.C.Maheswar

Head of the Department

Mrs. G. Nagalakshmi

Course Designer



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VIRUDHUNAGAR

Quality Education with Wisdom and Values

Allied Botany – I (for those who join in 2024-2025)

Semester I	ALLIED BOTANY I	Hours/Week: 4	
Elective Course - I		Credits: 3	
Course Code 24UBYA11		Internal 25	External 75

Course Outcomes:

on successful completion of the course, the learners should be able to

- CO1: Increase the awareness and appreciation of human friendly algae and their economic Importance. K1
- CO2: Develop an understanding of microbes and fungi and appreciate their adaptive strategies K2
- CO3: Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms. K2
- CO4: Identify the importance of cell as a basic unit of life K3
- CO5: Interpret the structure and function of cells and explain the development of cells K3

UNIT I : Algae: General characters of algae - Structure, reproduction and life cycle of the following genera - *Anabaena* and *Sargassum* and economic importance of algae.(10 Hours)

UNIT II: Fungi and Bacteria: General characters of fungi, structure, reproduction and life cycle of *Agaricus* and economic importance of fungi. Bacteria - general characters, structure and reproduction of *Escherichia coli* and economic importance of bacteria.

(14 Hours)

UNIT III : Bryophytes, Pteridophytes and Gymnosperms:

General characters of Bryophytes, Structure and life cycle of *Funaria*. General characters of Pteridophytes, Structure and life cycle of *Lycopodium*. General characters of Gymnosperms, Structure and life cycle of *Cycas*. (12 Hours)

UNIT IV: Cell Biology:

Prokaryotic and Eukaryotic cell- structure /organization. Cell organelles - ultra structure and function of chloroplast, mitochondria and nucleus. Cell division - mitosis and meiosis.

(12 Hours)

UNIT V :Genetics and Plant Biotechnology:

Mendelism - Law of dominance, Law of segregation, Incomplete dominance. Law of independent assortment. Monohybrid and dihybrid cross - Test cross - Back cross. Plant tissue culture - *In vitro* culture methods. Plant tissue culture and its application in biotechnology.

(12 Hours)

TEXT BOOKS

1. Singh, V., Pande, P.C and Jain, D.K. 2021. A Text Book of Botany. Rastogi Publications, Meerut.
2. Bhatnagar, S.P and Alok Moitra. 2020. Gymnosperms, New Age International (P) Ltd., Publishers, Bengaluru.
3. Sharma, O.P. 2017. Bryophyta, MacMillan India Ltd. Delhi.
4. Lee, R.E. 2008. Phycology, IV Edition, Cambridge University Press, New Delhi.
5. Rao, K., Krishnamurthy, K.V and Rao, G.S. 1979. Ancillary Botany, S. Viswanathan Pvt. Ltd., Madras.
6. Verma, P.S. & Agarwal, V.K. (2006). *Cell Biology*, New Delhi: S. Chand & Company Ltd.,

REFERENCE BOOKS

1. Parihar, N.S. 2012. An introduction to Embryophyta –Pteridophytes - Surjeet Publications, Delhi.
2. Alexopoulos, C.J. 2013. Introduction to Mycology. Willey Eastern Pvt. Ltd.
3. Vashishta, P.C. 2014. Botany for Degree Students Gymnosperms. Chand & Company Ltd, Delhi.
4. Coulter, M. Jhon, 2014. Morphology of Gymnosperms. Surjeet Publications, Delhi.
5. Vashishta, P.C. 2014. Botany for Degree Students Algae. 2014. Chand & Company Ltd, Delhi.

6. Parihar, N.S. 2013. An introduction to Embryophyta –Bryophytes -, Surjeet Publications, Delhi.

7. Pandey B.P. 1986, Text Book of Botany (College Botany) Vol I &II, S.Chand and Co. New Delhi.

Course Code 24UBYA11	PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7
CO1	3	3	3	3	2	2	2
CO2	3	3	3	3	2	2	2
CO3	3	3	3	3	2	2	2
CO4	3	3	3	3	2	2	2
CO5	3	3	3	3	2	2	2

Strong (3) Medium (2) Low (1)

Dr. B. Karunai Selvi
Head of the Department

Dr. B. Karunai Selvi
Course Designer



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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.Sc. CHEMISTRY

(for those who join in 2024-2025)

Semester I	FOOD CHEMISTRY	Hours/Week: 2	
Elective Course NME-1		Credits: 2	
Course Code 24UCHN11		Internal 25	External 75

COURSE OUTCOME

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

- CO1** : get an awareness about food adulteration and food poisons [K1].
- CO2** : outline about various food additives, beverages and edible oils [K1]
- CO3** : understand the food adulteration methods and the types of food poisons[K2]
- CO4** : get an exposure on food additives, artificial sweeteners, types of beverages and quality parameters of edible oils.[K2]
- CO5** : apply their knowledge to identify food adulterants, food poisons, analyse the advantage and disadvantage of food additives, prevent liver and social problems due to beverages and to determine iodine value, RM value, saponification values inedible oils. [K3]

UNIT I

Food Adulteration

Sources of food, types, advantages and disadvantages. Food adulteration - contamination of wheat, rice, milk, butter etc. with clay stones, water and toxic chemicals -Common adulterants, Ghee adulterants and their detection. Detection of adulterated foods by simple analytical techniques **(6 Hours)**

UNIT-II

Food Poison

Food poisons - natural poisons (alkaloids - nephrotoxin) - pesticides, (DDT, BHC, Malathion) -Chemical poisons - First aid for poison consumed victims

(6 Hours)

UNIT-III

Food Additives

Food additives -artificial sweeteners – Saccharin - Cyclamate a n d AspartateFood flavours -esters, aldehydes and heterocyclic compounds – Food colours– Emulsifying agents – preservatives -leavening agents. Baking powder – yeast – taste makers – MSG - vinegar.

(6 Hours)

UNIT-IV

Beverages

Beverages-soft drinks-soda-fruit juices-alcoholic beverages-examples. Carbonation-addiction to alcohol– diseases of liver and social problems.

(6 Hours)

UNIT-V

Edible Oils

Fats and oils - Sources of oils - production of refined vegetable oils - preservation. Saturated and unsaturated fats - iodine value - role of MUFA and PUFA in preventing heart diseases-determination of iodine value, RM value, saponification values and their significance.

(6 Hours)

Text Books

1. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house,2010.
2. Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S. ChandCo.
3. Publishers, second edition, 2006.

4. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010.
5. Food Chemistry, Dr. L. Rakesh Sharma, Evincepub publishing, 2022.
6. Food processing and preservation, G. Subbulakshmi, Shobha A Udipi, Padmini S Ghugre, New age international publishers, second edition, 2021.

Reference Books

1. H.-D. Belitz, Werner Grosch, Food Chemistry Springer Science & Business Media, 4th Edition, 2009.
2. M. Swaminathan, Food Science and Experimental Foods, Ganesh and Company, 1979.
3. Hasenhuettl, Gerard. L.; Hartel, Richard. W. Food Emulsifiers and their applications Springer New York 2nd ed. 2008.
4. Food Chemistry, H.-D. Belitz, W. Grosch, P. Schieberle, Springer, fourth revised and extended edition, 2009.
5. Principles of food chemistry, John M. deMan, John W. Finley, W. Jeffrey Hurst, Chang Yong Lee, Springer, Fourth edition, 2018.

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7
24UCHN11							
CO1	2	2	1	2	1	2	2
CO2	2	1	1	2	2	1	2
CO3	1	2	2	1	2	1	1
CO4	1	1	1	-	1	1	1
CO5	1	1	1	1	1	1	1

Strong (3) Medium (2) Low (1)

Dr.M.Dhanalakshmi
Heads of the Department

Dr.M.Amutha
Course Designer



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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.Sc. CHEMISTRY (for those who join in 2024-2025)

Semester I	ROLE OF CHEMISTRY IN DAILY LIFE	Hours/Week: 2	
SEC- 1 Foundation Course		Credits: 2	
Course Code 24UCHF11		Internal 25	External 75

COURSE OUTCOME

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

- CO1** : learn about the chemicals used in everyday life. [K1]
- CO2** : get knowledge on building materials, polymers carbohydrates and fertilizers [K1]
- CO3** : acquire information about Food and Nutrition and pharmaceutical drugs . [K2]
- CO4** : describe about the vitamins, minerals fuels and dyes [K2]
- CO5** : have an idea about pollution, cosmetics, chemicals used in food protection and explosives.[K2]

UNIT I:

General survey of chemicals used in everyday life. Air - components and their importance; photosynthetic reaction, air pollution, green - house effect and the impact on our life style. Water - Sources of water, qualities of potable water, soft and hard water, methods of removal of hardness-water pollution

(6 Hours)

UNIT II :

Building materials - cement, ceramics, glass and refractories - definition, composition and application only. Plastics - polythene, PVC, bakelite, polyesters, melamine-formaldehyde resins -preparation and uses only.

(6 Hours)

UNIT – III

Food and Nutrition - Carbohydrates, Proteins, Fats - definition and their importance as food constituents – balanced diet – Calories minerals and vitamins (sources and their physiological importance).
Cosmetics – tooth paste, face powder, soaps and detergents, shampoos, nail polish, perfumes - general formulation and preparations - possible hazards of cosmetic use.

(6 Hours)

UNIT-IV

Chemicals in food production – fertilizers - need, natural sources; urea,NPK fertilizers and super phosphate. Fuel – classification - solid, liquid and gaseous; nuclear fuel examples and uses.

(6 Hours)

UNIT – V

Pharmaceutical drugs - analgesics and antipyretics - paracetamol and aspirin. Colour chemicals - pigments and dyes - examples and applications. Explosives - classification and examples. (6 Hours)

Text Books

1. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010.
2. A textbook of pharmaceutical chemistry by Jayashree Ghosh, S Chand publishing, 2012.
3. S. Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur, 2006.
4. B. K, Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.
5. Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S. Chand & Co.Publishers, second edition, 2006.

Reference Books

- 1.Randolph. Norris Shreve, Chemical Process Industries, McGraw-Hill,Texas, fourth edition, 1977.
- 2.W.A.Poucher,Joseph A.Brink,Jr.Perfumes,Cosmetics and Soaps,Springer,2000.
3. A.K.De, Environmental Chemistry, NewAge International Public Co.,1990

Course Code 24UCHF11	PO1		PO2		PO3		PO4		PO5		PO6	PO7
	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO
	1.a	1. b	2a	2b	3a	3.b	4a	4b	5a	5b	6	7
CO1	1	1	3	2	1	2	L	M	1	1	-	1
CO2	1	1	3	2	2	2	3	2	2	1	-	1
CO3	2	2	3	2	2	3	3	2	2	1	-	1
CO4	2	2	3	2	1	1	3	3	2	1	-	1
CO5	2	2	3	2	1	1	2	2	2	1	-	1

Strong (3) Medium (2) Low (1)

Dr.M.Dhanalakshmi
Head of the Department

Mrs.R.Nagasathya
Course Designer



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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.Sc. CHEMISTRY (for those who join in 2024-2025)

Semester II	GENERAL CHEMISTRY-II	Hours/Week: 5	
Core Course -3		Credits: 5	
Course Code		Internal	External
24UCHC21		25	75

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

- CO1** : explain the concept of acids, bases and ionic equilibria; periodic properties of s and p-block elements, preparation and properties of aliphatic and aromatic hydrocarbons. [K1]
- CO2** : discuss the periodic properties of s and p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids. [K2]
- CO3** : classify hydrocarbons, types of reactions, acids and bases, examine the properties s and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons. [K2]
- CO4** : illustrate theories of acids, bases and indicators, buffer action and important compounds of s-block elements. [K3]
- CO5** : assess the application of hard and soft acids indicators, buffers, compounds of s and p- block elements and hydrocarbons. [K3]

UNIT-I

Acids, bases and Ionic equilibria

Concepts of Acids and Bases - Arrhenius concept, Bronsted-Lowry concept, Lewis concept; Relative strengths of acids, bases and dissociation constant; dissociation of poly basic acids, ionic product of water, pH scale, pH of solutions; Degree of dissociation, common ion effect, factors affecting degree of dissociation; acid base indicators, theory of acid base indicators – action of

phenolphthalein and methyl orange, titration curves - use of acid base indicators;

Buffer solutions – types, mechanism of buffer action in acid and basic buffer, Henderson-Hasselbalch equation; Salt hydrolysis - salts of weak acids and strong bases, weak bases and strong acids, weak acids and weak bases - hydrolysis constant, degree of hydrolysis and relation between hydrolysis constant and degree of hydrolysis; Solubility product - determination and applications; numerical problems involving the core concepts. **(15 Hours)**

Unit-II

Chemistry of s - block Elements

Hydrogen: Position of hydrogen in the periodic table. Alkali metals: Comparative study of the elements with respect to oxides, hydroxides, halides, carbonates and bicarbonates. Diagonal relationship of Li with Mg. Preparation, properties and uses of NaOH, Na₂CO₃, KBr, KClO₃ alkaline earth metals. Anomalous behaviour of Be.

Chemistry of p- block Elements (Group 13 & 14)

preparation and structure of diborane and borazine. Chemistry of borax. Extraction of Al and its uses. Alloys of Al.

comparison of carbon with silicon. Carbon-di-sulphide – Preparation, properties, structure and uses. Percarbonates, per monocarbonates and per dicarbonates. **(15 Hours)**

UNIT-III

Chemistry of p- block Elements (Group 15-18)

General characteristics of elements of Group 15; chemistry of H₂N-NH₂, NH₂OH, HN₃ and HNO₃. Chemistry of PH₃, PCl₃, PCl₅, POCl₃, P₂O₅ and oxy acids of phosphorous (H₃PO₃ and H₃PO₄). General properties of elements of group 16 - Structure and allotropy of elements - chemistry of ozone - Classification and properties of oxides - oxides of sulphur and selenium – Oxy acids of sulphur (Caro's and Marshall's acids).

Chemistry of Halogens: General characteristics of halogen with reference to electro-negativity, electron affinity, oxidation states and oxidizing power. Peculiarities of fluorine. Halogen acids (HF, HCl, HBr and HI), oxides and oxy acids (HClO₄). Inter-halogen compounds (ICl, ClF₃, BrF₅ and IF₇), pseudo halogens [(CN)₂ and (SCN)₂] and basic nature of Iodine.

Noble gases: Position in the periodic table. Preparation, properties and structure of XeF₂, XeF₄, XeF₆ and XeOF₄; uses of noble gases – clathrate compounds. **(15 Hours)**

UNIT-IV**Hydrocarbon Chemistry-I**

Petroproducts: Fractional distillation of petroleum; cracking, isomerisation, alkylation, reforming and uses

Alkenes-Nomenclature, general methods of preparation – Mechanism of β - elimination reactions – E1 and E2 mechanism - factors influencing – stereochemistry – orientation – Hofmann and Saytzeff rules. Reactions of alkenes – addition reactions – mechanisms – Markownikoff's rule, Kharasch effect, oxidation reactions – hydroxylation, oxidative degradation, epoxidation, ozonolysis; polymerization

Alkadienes

Nomenclature - classification – isolated, conjugated and cumulated dienes; stability of conjugated dienes; mechanism of electrophilic addition to conjugated dienes - 1, 2- and 1, 4-additions; free radical addition to conjugated dienes– Diels–Alder reactions – polymerisation – polybutadiene, polyisoprene (natural rubber), vulcanisation, polychloroprene.

Alkynes

Nomenclature; general methods of preparation, properties and reactions; acidic nature of terminal alkynes and acetylene, polymerisation and isomerisation.

Cycloalkanes: Nomenclature, Relative stability of cycloalkanes, Bayer's strain theory and its limitations. Conformational analysis of cyclohexane, mono and di substituted cyclohexanes. Geometrical isomerism in cyclohexanes. **(15 Hours)**

UNIT-V**Hydrocarbon Chemistry – II**

Benzene: Source, structure of benzene, stability of benzene ring, molecular orbital picture of benzene, aromaticity, Huckel's $(4n+2)$ rule and its applications. Electrophilic substitution reactions - General mechanism of aromatic electrophilic substitution - nitration, sulphonation, halogenation, Friedel-Craft's alkylation and acylation. Mono substituted and disubstituted benzene

- Effect of substituent – orientation and reactivity.

Polynuclear Aromatic hydrocarbons: Naphthalene – nomenclature, Haworth synthesis; physical properties, reactions – electrophilic substitution reaction, nitration, sulphonation, halogenation, Friedel – Crafts acylation & alkylation, preferential substitution at α/β - position – reduction, oxidation – uses.

Anthracene – synthesis by Elbs reaction, Diels – Alder reaction and Haworth synthesis; physical properties; reactions - Diels-Alder reaction, preferential substitution at C-9 and C-10; uses.

(15 Hours)

Recommended Text

1. Madan R D, Sathya Prakash, (2003), Modern Inorganic Chemistry, 2nded, S.Chand and Company, New Delhi.
2. Sathya Prakash, Tuli G D, Basu S K and Madan R D, (2003), Advanced Inorganic Chemistry, 17th ed., S.Chand and Company, New Delhi.
3. Bahl B S, Arul Bhal, (2003), Advanced Organic Chemistry, 3rd ed., S.Chand and Company, New Delhi.
4. Tewari K S, Mehrotra S N and Vishnoi N K, (1998), Text book of Organic Chemistry, 2nd ed., Vikas Publishing House, New Delhi.
5. Puri B R, Sharma L R, (2002), Principles of Physical Chemistry, 38th ed., Vishal Publishing Company, Jalandhar.

Reference Books

1. Maron S H and Prutton C P, (1972), Principles of Physical Chemistry, 4th ed., The Macmillan Company, New York.
2. Barrow G M, (1992), Physical Chemistry, 5th ed., Tata McGraw Hill, New Delhi.
3. Lee J D, (1991), Concise Inorganic Chemistry, 4th ed., ELBS William Heinemann, London.
4. Huheey J E, (1993), Inorganic Chemistry: Principles of Structure and Reactivity, 4th ed., Addison Wesley Publishing Company, India.
5. Gurudeep Raj, (2001), Advanced Inorganic Chemistry Vol – I, 26th ed., Goel Publishing House, Meerut.
6. Agarwal O P, (1995), Reactions and Reagents in Organic Chemistry, 8th ed., Goel Publishing House, Meerut.

Course Code 24UCHC21	PO1		PO2		PO3		PO4		PO5		PO6	PO7
	PSO 1 a	PSO 1 b	PSO 2 a.	PSO 2b.	PSO 3 a	PSO 3 b	PSO 4 a	PSO 4 b	PSO 5.a	PSO 5.b.	PSO6	PSO7
CO 1	3	3	2	2	2	3	3	2	2	2	3	3
CO 2	3	3	2	2	2	3	3	2	2	2	3	3
CO 3	3	3	1	1	1	3	3	3	3	2	3	3
CO 4	3	3	3	3	3	3	3	3	3	2	3	3
CO 5	3	3	1	1	2	2	3	3	3	2	3	3

Strong (3) Medium (2) Low (1)

Dr.M.Dhanalakshmi
Head of the Department

Dr.M.Amutha
Course Designer



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B.Sc. CHEMISTRY (for those who join in 2024-2025)

Semester II	QUALITATIVE ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS PRACTICAL	Hours/Week: 3	
Core Course-4 Practical II		Credits: 2	
Course Code 24UHC21P		Internal 40	External 60

COURSE OUTCOME

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

- CO1** : observe the physical state, odour, colour and solubility of the given organic compound. [K2]
- CO2** : classify the unknown organic compound by functional groups [K2]
- CO3** : identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis. [K3]
- CO4** : exhibit a solid derivative with respect to the identified functional group. [K3]
- CO5** : apply the techniques of the separation and isolation of organic compounds in their project and research work. [K3]

UNIT I

Safety rules, symbols and first-aid in chemistry laboratory

Basic ideas about Bunsen burner, its operation and parts of the flame. Chemistry

laboratory glassware –basis information and uses

UNIT II

Qualitative Organic Analysis: Preliminary examination, detection of special elements - nitrogen, sulphur and halogens. Aromatic and aliphatic nature, Test for saturation and unsaturation, identification of functional groups using solubility tests.

Confirmation of functional groups

- monocarboxylic acid, dicarboxylic acid

- monohydric phenol, polyhydric phenol
- aldehyde, ketone, ester
- carbohydrate (reducing sugars and non-reducing sugars)
- primary, secondary, tertiary amine
- monoamide, diamide, thioamide
- anilide, nitro compound

Preparation of derivatives for functional groups **(20 Hours)**

UNIT III

Preparation of Organic Compound (15 Hours)

- i) Nitration - picric acid from Phenol
- ii) Halogenation - p-bromo acetanilide from acetanilide
- iii) Oxidation - benzoic acid from Benzaldehyde
- iv) Microwave assisted reactions in water:
- v) Methyl benzoate to Benzoic acid
- vi) Salicylic acid from Methyl Salicylate
- vii) Rearrangement - Benzil to Benzilic Acid
- viii) Hydrolysis of benzamide to Benzoic Acid

Separation and Purification Techniques (Not for Examination) (10 Hours)

1 Purification of organic compounds by crystallization (from water /alcohol)and distillation

2. Determination of melting and boiling points of organic compounds.

3. Steam distillation - Extraction of essential oil from citrus fruits/eucalyptus leaves.

1. Chromatography (any one) (Group experiment)

- (i) Separation of amino acids by Paper Chromatography
- (ii) Thin Layer Chromatography - mixture of sugars / plant Pigments /permanganate dichromate

- (iii) Column Chromatography - extraction of carotene, chlorophyll and xanthophyll from leaves / separation of anthracene - anthracene picrate.

2. Electrophoresis – Separation of amino acids and proteins.

(Demonstration)

3. Isolation of casein from milk/Determination of saponification value of oil or fat/Estimation of acetic acid from commercial vinegar. (Any one Group experiment) (4,5& 6–not for ESE)

Recommended Text

1. Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. Basic Principles of Practical Chemistry, 2nd ed.; Sultan Chand: New Delhi, 2012.
2. Manna, A.K. Practical Organic Chemistry, Books and Allied: India, 2018.
3. Gurtu, J. N; Kapoor, R. Advanced Experimental Chemistry (Organic), Sultan Chand:New Delhi, 1987.
4. Furniss, B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. Vogel's Textbook of Practical Organic Chemistry, 5th ed.; Pearson: India, 1989.

Course Code 24UCHC21P	PO1		PO2		PO3		PO4		PO5		PO6	PO7
	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO
	1.a	1. b	2.a	.2.b	3a	3.b	4a	4b	5.a	5.b	6	7
CO1	1	1	3	3	1	2	1	2	1	1	-	3
CO2	1	1	3	3	2	2	3	2	2	2	-	3
CO3	2	1	3	2	2	3	3	2	2	2	-	3
CO4	2	2	3	3	1	1	3	3	2	3	-	3
CO5	2	2	3	3	1	1	2	2	2	3	-	3

Strong (3) Medium (2) Low (1)

Dr.M.Dhanalakshmi
Head of the Department

Dr.A.Prasanna
Course Designer



V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.Sc. CHEMISTRY

(for those who join in 2024-2025)

Semester II	MATHEMATICAL FOUNDATIONS - II	Hours/Week:3	
Elective Course-I		Credits:2	
Course Code 24UMTA21		Internal 25	External 75

COURSE OUTCOMES

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

CO1: retrieve the basic concepts in differentiation, integration, algebraic equations and trigonometric functions. [K1]

CO2: explain the concepts in Vector Calculus, Algebra and Trigonometry. [K2]

CO3: find approximate solutions, establish the relation between roots and coefficients of an equation. [K2]

CO4: apply the concepts in Algebra and trigonometry in various fields. [K3]

CO5: solve problems in Vector calculus, Algebra and Trigonometry. [K3]

UNIT I

Vector Differentiation

Differentiation of Vectors – Gradient – Velocity and Acceleration – Divergence and Curl (Simple Theorems only) - Problems. (9 hours)

UNIT II

Vector Integration

Line integrals – Surface integrals – Theorems of Green, Gauss and Stoke's (Statements only) – Problems. (9 hours)

UNIT III**Algebra**

Formation of Equations – Relation between roots and coefficients. (9 hours)

UNIT IV**Algebra Continued**

Transformation of Equations – Approximate solutions of numerical equations. (9 hours)

UNIT V**Trigonometry**

Expansion of $\sin\theta$, $\cos\theta$, $\tan\theta$ in powers of θ –Hyperbolic Functions. (9 hours)

TEXT BOOKS

1. Arumugam.S. and Thangapandi Isaac.A. (2004). *Ancillary Mathematics Paper II (Revised)*, New Gamma Publishing House.
2. Arumugam.S. and Thangapandi Isaac.A.(2014). *Allied Mathematics Paper I*, New Gamma Publishing House.

Course Code 24UMTA21	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	-	-
CO2	3	1	3	2	2	1	-
CO3	3	2	3	2	2	1	-
CO4	2	2	1	2	2	-	-
CO5	3	1	1	2	2	1	-

Strong (3) Medium (2) Low (1)

Dr. M.C.Maheswari
Head of the Department

Dr. S.Kohila
Course Designer



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B.Sc. CHEMISTRY (for those who join in 2024-2025)

Semester II	STATISTICS AND OPERATIONS RESEARCH	Hours/Week:3	
Elective Course-I		Credits:2	
Course Code 24UMTA22		Internal 25	External 75

COURSE OUTCOMES

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

CO1: retrieve the basic concepts in Statistics and Operations Research. [K1]

CO2: explain the techniques used to solve the problems in Statistics and Operations Research [K2]

CO3: find solutions to solve the problems in the society. [K2]

CO4: calculate some statistical constants to get statistical inference and use O.R techniques to solve real life problems. [K3]

CO5: apply Correlation and Regression to draw conclusion for a given data. [K3]

UNIT I

Statistics Correlation

Correlation-Problems-Rank correlation (9 hours)

UNIT II

Regression

Regression –Properties of Regression coefficients–Problems. (9 hours)

UNIT III

Operations Research

Formulation of Linear Programming Problem – Mathematical formulation of a Linear Programming Problem- Graphical method. (9 hours)

UNIT IV**Operations Research Continued:**

Mathematical formulation of Transportation Problems – Initial Basic Feasible Solutions (Method 1, Method 2, Method 3, Method 4). (9 hours)

UNIT V**Operations Research Continued:**

Introduction- Mathematical formulation of an Assignment Problem – Solution to Assignment Problem – Hungarian Algorithm (balanced minimization problems only). (9 hours)

TEXT BOOKS

1. Arumugam.S and Thangapandi Isaac. A. (2011). *Statistics*, New Gamma Publishing House.
2. Arumugam.S and Thangapandi Isaac. A.(2015). *Topics in Operations Research Linear Programming*, New Gamma Publishing house.

Course Code 24UMTA22	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	3	3	-
CO2	3	2	3	3	3	2	-
CO3	3	3	3	3	3	3	-
CO4	3	2	3	3	3	3	-
CO5	3	2	3	3	3	3	-

Strong(3) Medium(2) Low(1)

Dr.M.C.Maheswari

Head of the Department

Dr.P.Getchial Pon Packiavathi

Course Designer



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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.Sc. CHEMISTRY (for those who join in 2024-2025)

Semester II	ALLIED BOTANY II	Hours/Week: 4	
Elective Course - I		Credits: 3	
Course Code 24UBYA21		Internal 25	External 75

Course Outcomes:

- CO1: Understand the fundamental concepts of plant taxonomy, anatomy, physiology and embryology. [K1]
- CO2: Compare the different organs of plants, parts of flower, secondary growth and Plant metabolism. [K2]
- CO3: Explain the water relation of plants with respect to various physiological processes. [K2]
- CO4: Identify the types of aerobic and anaerobic respiration [K3]
- CO5: Interpret the plant systematics and recognize the importance of herbarium and virtual herbarium. [K3]

UNIT I : MORPHOLOGY OF FLOWERING PLANTS: Plant and its parts. Structure and function of root and stem. Leaf and its parts. Leaf types- simple and compound. Phyllotaxy and types. Inflorescence - Racemose, Cymose and Special types. Terminology with reference to flower description. (12 Hours)

UNIT II: TAXONOMY: Study of the range of characters and plants of economic importance in the following families: Rutaceae, Caesalpiniaceae, Asclepiadaceae, Euphorbiaceae and Poaceae (12 Hours)

UNIT III ANATOMY: Tissue and tissue systems: Simple and complex tissues. Anatomy of monocot and dicot roots - anatomy of monocot and dicot stems - anatomy of dicot and monocot leaves. (12 Hours)

UNIT IV: EMBRYOLOGY: Structure of mature anther and ovule - Types of ovules, structure of embryo sac, pollination -double fertilization, structure of dicotyledonous and monocotyledonous seeds. (12 Hours)

UNIT V: PLANT PHYSIOLOGY: Absorption of water, photosynthesis - light reaction - Calvin cycle; respiration - Glycolysis - Krebs cycle - electron transport system. Growth hormones - auxins and cytokinins and their applications. (12 Hours)

TEXT BOOKS

1. Sharma, O.P. 2017. Plant Taxonomy. (II Edition).The McGraw Hill Companies.
2. Bhojwani, S.S. Bhatnagar, S.P and Dantu, P.K. 2015. The Embryology of Angiosperms (6th revised and enlarged edition). Vikas Publishing House, New Delhi.
3. Maheshwari, P. 1963. Recent Advances in Embryology of Angiosperms. Intl. Soc. Plant Morphologists, New Delhi.
4. Salisbury, F. B.C.W. Ross.1991. Plant Physiology. Wassworth Pub. Co. Belmont.
5. Ting, I.P. 1982. Plant Physiology. Addison Wesley Pb. Philippines.

REFERENCE BOOKS

1. Lawrence.G.H.M. 1985. An Introduction to Plant Taxonomy, Central Book Depot, Allahabad.
2. Bhojwani, S.S and Bhatnagar, S.P. 2000. The Embryology of Angiosperms (4th revised and enlarged edition). Vikas Publishing House, New Delhi.
3. Pandey, B.P. 2012. Plant Anatomy. S Chand Publishing.
4. Jain, VK. 2006. Fundamentals of Plant Physiology, S. Chand and Company Ltd.
5. Rajni Gupta. 2012. Plant Taxonomy: Past, Present and Future. Vedams (P) Ltd. New Delhi.
6. Jain, V.K. 2006. Fundamentals of Plant Physiology, S.Chand and Company Ltd., New Delhi.
7. Verma, S.K. 2006. A Textbook of Plant Physiology, S.K.Chand & Co., New Delhi.

Course code 24UBYA21	PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7
CO1	3	3	3	3	2	2	2
CO2	3	3	3	3	2	2	2
CO3	3	3	3	3	2	2	2
CO4	3	3	3	3	2	2	2
CO5	3	3	3	3	2	2	2

Strong (3) Medium (2) Low (1)

Dr. B. Karunai Selvi
Head of the Department

Dr. B. Karunai Selvi
Course Designer



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B.Sc. CHEMISTRY (for those who join in 2024-2025)

Semester II	Allied Botany Practical I	Hours/Week: 2	
Elective Course – 2 Practical 1		Credits: 1	
Course Code 24UBYA21P		Internal 40	External 60

Course Outcomes:

On completion of this course, students will able to

CO1: Explain the internal organization of algae and fungi. [K2]

CO2: Develop critical understanding on morphology, anatomy and reproduction of
Bryophytes, Pteridophytes and Gymnosperms. [K2]

CO3: Solve the classical taxonomy with reference to different parameters. [K3]

CO4: Sketch the fundamental concepts of plant anatomy and embryology. [K3] CO5:
Demonstrate the effect of various physical factors on photosynthesis. [K3]

EXPERIMENTS

1. Make suitable micro preparation of the types prescribed in Algae – *Sargassum* leaf, Fungi - *Agaricus*, and Gymnosperms – *Cycas* leaf.
2. Spotters – Algae - *Anabaena* and *Sargassum* (Thallus and Conceptacles), Fungi - *Agaricus* (Fruiting Body), Bryophytes – *Funaria* (Gametophyte and Sporophyte), Pteridophytes (Sporophyte and Gametophyte), Gymnosperms - *Cycas* (Habit, Ovule), Biotechnology – Callus and Artificial Seeds.
3. Study of cell organelles - Chloroplast, Mitochondria and Nucleus
4. Cell division – Stages of Mitosis
5. Simple genetic problems – Test Cross, Back cross, Monohybrid and Dihybrid Cross.
6. To describe in technical terms, plants belonging to any of the family prescribes and to identify the family

7. To dissect a flower, construct floral diagram and write floral formula - Caesalpiniaceae, Asclepiadaceae and Euphorbiaceae
8. Demonstration of Plant Physiology Experiments
 - Ganong's Light screen
 - Ganong's respiroscope
9. To make suitable micro preparations of anatomy materials prescribed in the Syllabus – Monocot stem – *Maize*, Monocot leaf – *Onion*, Monocot Root – Grass, Dicot stem – *Tridax*, Dicot leaf – *Nerium*, Leaf and Dicot root – *Tridax*.
10. Spotters – Anatomy - Simple and complex tissues, Embryology - Structure of mature anther, Physiology - Growth hormones - Auxins and Cytokinins

TEXT BOOKS

1. Subramaniam, N.S. 1996. Laboratory Manual of Plant Taxonomy. Vikas Publishing House Pvt. Ltd., New Delhi.
2. Noggle G.R and G.J. Fritz. 2002. Introductory Plant Physiology. Prentice Hall of India, New Delhi.

REFERENCE BOOKS

1. Steward, F.C. 2012. Plant Physiology Academic Press, US
2. Gamble, J.S. 1921. Flora of the Presidency of Madras, Volumes I, II and III. Adlard and Son Ltd. London.
3. Warriar, P.K., V.P. K. Nambiar and C. Ramankutty. 1994. Indian Medicinal Plants – a compendium of 500 species. Vaidyaratnam P.S. Varier's Arya Vaidya Sala, Kottakkal, Orient Longman Publications, Chennai.

Course code 24UBYA21P	PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7
CO1	3	3	3	3	2	3	3
CO2	3	3	3	3	2	3	3
CO3	3	3	3	3	2	3	3
CO4	3	3	3	3	2	3	3
CO5	3	3	3	3	2	3	3

Strong (3) Medium (2) Low (1)

Dr. B. Karunai Selvi
Head of the Department

Dr.R.Sreebha
Course Designer



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VIRUDHUNAGAR

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B.Sc. CHEMISTRY (for those who join in 2024-2025)

Semester II	DAIRY CHEMISTRY	Hours/Week: 2	
Elective Course (NME -2)		Credits: 2	
Course Code 24UCHN21		Internal 25	External 75

COURSE OUTCOMES

On completion of the course, the students shall be able to

CO 1: understand the general composition of milk – constituents and its physical properties.

[K1]

CO 2: acquire knowledge about pasteurization of Milk and various types of pasteurization – Bottle, Batch and HTST Ultra High Temperature Pasteurization. [K1]

CO 3: compare cream and butter, identify their composition and know how to estimate fat in cream and ghee. [K2]

CO 4: explain about homogenized milk, flavoured milk, vitaminised milk and toned milk. [K2]

CO 5: demonstrate how to make milk powder and to estimate the fat, acidity and total solids in milk. [K3]

UNIT I

Composition of Milk

Milk-definition-general composition of milk- constituents of milk - lipids, proteins, carbohydrates, vitamins and minerals - physical properties of milk - colour, odour, acidity, specific gravity, viscosity and conductivity -Factors affecting the composition of milk - adulterants, preservatives with neutralizer- examples and their detection- estimation of fat, acidity and total solids in milk.

(6 Hours)

Unit II

Processing of Milk

Microbiology of milk - destruction of micro - organisms in milk, physico – chemical changes taking place in milk due to processing - boiling, pasteurization – types of pasteurization -Bottle, Batch and HTST (High Temperature Short Time) – Vacuum pasteurization – Ultra High Temperature Pasteurization.

(6 Hours)

UNIT III

Major Milk Products

Cream - definition - composition - chemistry of creaming process - gravitational and centrifugal methods of separation of cream - estimation of fat in cream. Butter - definition -composition - theory of churning – desi butter - salted butter, estimation of acidity and moisture content in butter. Ghee - major constituents - common adulterants added to ghee and their detection - rancidity- definition - prevention - antioxidants and synergists - natural and synthetic.

(6 Hours)

UNIT IV

Special Milk

Standardised milk - definition - merits - reconstituted milk - definition - flow diagram of manufacture - Homogenised milk - flavoured milk – vitaminized milk - toned milk -Incitation milk - Vegetable toned milk - humanized milk –condensed milk - definition, composition and nutritive value.

(6 Hours)

UNIT V

Fermented and other Milk Products

Fermented milk products – fermentation of milk - definition, conditions, cultured milk - definition of culture - example, conditions - cultured cream, butter milk - Bulgarian milk -acidophilous milk – Yoheer Indigeneous products- khoa and chhena definition - Ice cream -definition-percentage composition-types-ingredients-manufacture of ice-cream, stabilizers - emulsifiers and their role-milk powder-definition-need for making milk powder- drying process- types of drying.

(6 Hours)

TEXT BOOKS

1. Jayashree Ghosh, (2012). *A Text Book of Pharmaceutical Chemistry*, 1st Edition.
New Delhi: S.Chand & Company Ltd.
2. K. Bagavathi Sundari, *Applied Chemistry*, MJP Publishers, 1st edition, 2006.
3. K. S. Rangappa and K.T. Acharya, *Indian Dairy Products*, Asia Publishing House New Delhi, 1st edition, 1974.

REFERENCE BOOKS

1. Text book of dairy chemistry, M.P. Mathur, D. Datta Roy, P. Dinakar, Indian Council of Agricultural Research, 1st edition, 2008.
2. A Text book of dairy chemistry, Saurav Singh, Daya Publishing house, 1st edition, 2013.
3. Text book of dairy chemistry, P. L. Choudhary, Bio-Green book publishers, 1st edition, 2021.

Course Code	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
24UCHN21							
CO 1	2	2	1	1	2	2	1
CO 2	1	1	2	2	1	1	2
CO 3	2	2	1	1	1	2	1
CO 4	2	1	1	1	-	1	1
CO 5	1	1	1	-	1	1	2

Strong (3) Medium (2) Low (1)

Dr.M.Dhanalakshmi
Head of the Department

Dr. C. Vidya Rani
Course Designer



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B.Sc. CHEMISTRY (2024-2025 onwards)

Semester II	COSMETICS AND PERSONAL GROOMING	Hours/Week: 2	
SEC-2		Credits: 2	
Course Code 24UCHS21		Internal 25	External 75

COURSE OUTCOMES

On successful completion of the course, the

learners shall be able to

CO1: know the composition of various cosmetic products. [K1]

CO2: understand the chemical aspects and applications of hair care, dental care and skincare products. [K1]

CO3: recognize the chemical aspects and applications of perfumes. [K2]

CO4: comprehend the methods of beauty treatments, their advantages and disadvantages. [K2]

CO5: realize the hazards of cosmetic products. [K3]

Unit I

Skin care

Nutrition of the skin, skin care and cleansing of the skin; face powder – ingredients; creams and lotions – cleansing, moisturizing all purpose, shaving and sunscreen (formulation only); Gels – formulation and advantages; astringent and skin tonics – key ingredients, skin lightness, depilatories. (6 Hours)

Unit II

Hair care

Shampoos – types – powder, cream, liquid, gel – ingredients; conditioner – types – ingredients

Dental care -Tooth pastes – ingredients – mouth wash (6 Hours)

Unit III**Make up**

Base – foundation – types – ingredients; lipstick, eyeliner, mascara, eye shadow, concealers, rouge (6 Hours)

Unit IV**Perfumes**

Classification - Natural – plant origin – parts of the plant used, chief constituents; animal origin – amber gries from whale, civetone from civet cat, musk from musk deer; synthetic – classification emphasizing characteristics –esters – alcohols – aldehydes – ketones (6 Hours)

Unit V**Beauty treatments**

Facials - types – advantages – disadvantages; face masks – types; bleach - types – advantages– disadvantages; shaping the brows; eyelash tinting; perming– types; hair colouring and dyeing; permanent waving – hair straightening; wax –types – waxing; pedicure, manicure - advantages – disadvantages. (6 Hours)

TEXT BOOKS

1. Thankamma Jacob, *Foods, drugs and cosmetics – A consumer guide*, Macmillan publication, London. 1st edition, 1997
- 2.

REFERENCE BOOKS

1. Wilkinson J B E and Moore R J, (1997) *Harry's cosmeticology*, 7th ed., Chemical Publishers, London.
2. George Howard, (1987) *Principles and practice of perfumes and cosmetics*, Stanley Therones, Chettenham

Course Code	PO1		PO2		PO3		PO4		PO5		PO6	PO7
	PSO 1 a	PSO 1 b	PSO 2a	PSO 2a	PSO 3 a	PSO 3 b	PSO 4 a	PSO 4 b	PSO 5a	PSO 5.b	PSO 6	PSO 7
24UCHS21												
CO 1	3	2	3	1	3	1	1	2	2	2	1	2
CO 2	3	3	3	1	3	2	2	2	2	2	1	2
CO 3	3	3	3	1	3	3	3	3	3	3	2	3
CO 4	3	3	2	1	2	3	1	2	2	2	2	3
CO 5	3	3	3	1	2	2	2	2	2	2	2	3

Dr.M.Dhanalakshmi
Head of the Department

Mrs.R.Nagasathya
Course Designer