

REGULATIONS AND CURRICULUM GOVERNING INTEGRATED M.SC. IN INDUSTRIAL CHEMISTRY PROGRAM

(Academic year from which the curriculum is implemented/ 2025-2026)

Name of the Constituent Unit/Centre:

**The Yenepoya Institute of Arts, Science, Commerce and
Management, Kulur. Mangaluru**



Deralakatte, Mangalore, Karnataka.

NOTIFICATION FROM THE UNIVERSITY

ACM/61/40/2025	Proposal for syllabus approval of I and II semester of five year integrated M.Sc. Program (B.Sc. and M.Sc.) in Industrial Chemistry	Syllabus of I and II semester of five year integrated M.Sc. Program (B.Sc. and M.Sc.) in
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	(2025-2026)	Industrial Chemistry (2025-2026) with the following specialization was approved 1. Industrial Processing 2. Petrochemicals and Refining 3. Pharmaceutical and Analytical Process
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1. Preamble

Chemistry is a fundamental science to understand why an autumn leaf turns red, why a diamond is hard, how soap cleanses or how to design a synthetic fabric or a drug. Chemistry explains starting from keeping clean, important constituent of food, about jewellery, colours, cosmetics, sports materials and everything related to our daily routine life. Hence it is called as mother of all science subjects. It deals with - substances, their structure, properties and reactions that change them into other substances.

An Integrated M.Sc. program is a five- year programme that combines undergraduate and postgraduate studies, with exposure to research allowing students to earn a master's degree without a separate admission process for the postgraduate level. In contrast, a normal M.Sc. is a two-year postgraduate program pursued after completing a bachelor's degree.

As per UGC guidelines, an Integrated M.Sc. offers a flexible and interdisciplinary curriculum, fostering early specialization and research exposure. It provides a seamless transition from foundational to advanced topics, reducing redundancy in course work. This program enhances more skill oriented by integrating industry-oriented skills, internships, and hands – on training, making graduates well-trained for research, academia, and industry roles.

The Integrated M.Sc. Programme in Industrial Chemistry is designed to provide a seamless and comprehensive education in the field of chemistry with a strong industrial orientation. This program aims to bridge the gap between fundamental scientific principles and their practical applications in various industries, including pharmaceuticals, petrochemicals, polymers, materials science, and green chemistry. Structured as a five-year integrated course, the curriculum blends foundational knowledge in chemistry with advanced industrial techniques, research methodologies, and hands-on laboratory experience. The program emphasizes interdisciplinary learning, innovation, and sustainability, equipping students with the necessary skills to address real-world challenges in chemical industries. With a strong focus on chemistry, process optimization, environmental sustainability, and industrial safety, the curriculum is designed to foster critical thinking, problem-solving abilities, and technical expertise. Students will gain exposure to modern instrumentation, computational chemistry, and industrial processes

through coursework, projects, internships, and industry – academia collaborations.

This program aspires to develop highly skilled professionals, researchers, and entrepreneurs who can contribute to industrial advancements, sustainable development, and scientific

innovation. Graduates of this program will be well-prepared for careers in research and development, quality control, production, and regulatory affairs, as well as for pursuing higher studies and specialized research in advanced topics in chemistry.

To enhance industry relevance and provide specialized knowledge, the Integrated M.Sc. Programme in Industrial Chemistry offers three distinct specializations: a) Industrial Processing b) Petrochemicals and Refining c) Pharmaceutical and Analytical Process. The Industrial Processing specialization focuses on process optimization, sustainable manufacturing, and chemistry of advanced materials, preparing students for careers in chemical production and environmental management. The Petrochemicals and Refining specialization delves into crude oil refining, polymer synthesis, and energy-efficient technologies, equipping graduates with expertise in fuel processing and petrochemical industries. The Pharmaceutical and Analytical Process specialization emphasizes drug formulation, quality control, and advanced analytical techniques, fostering skills essential for the pharmaceutical and healthcare sectors. These specializations ensure that graduates acquire domain-specific expertise while retaining a strong foundation in industrial chemistry, research methodologies, and technological advancements, making them highly competent for industry, academia, and innovation-driven careers. Overall, one can find it interesting as it is challenging and he/she can take pride in obtaining the degree of Integrated MSc Chemistry.

2. Definitions

Semester/Credits:

An Integrated M.Sc. programme follows a structured academic schedule aligned with UGC guidelines. A semester consists of 90 working days, and an academic year is divided into two semesters.

A summer term of four weeks is conducted during the vacation period. During this term, students may undertake internships, apprenticeships, research activities, or work-based vocational education and training.

The summer term is particularly beneficial for students who want to strengthen industry skills, complete additional coursework, or engage in research exposure early in the programme. Depending on faculty availability and student demand, selected courses may also be offered in a fast-track mode during the summer term.

Major and Minor disciplines

The Integrated M.Sc. Programme in Industrial Chemistry offers a major discipline with optional specialization tracks, ensuring depth as well as flexibility.

Major discipline:

The major discipline is the primary field of study, and the degree will be awarded in that discipline. Students must earn the prescribed number of credits (approximately 50% of total programme credits) through core courses in the major discipline.

Minor Specialization Streams:

To enhance industrial relevance and domain expertise, the programme offers three specialization pathways:

1. Industrial Processing – Focuses on sustainable manufacturing, advanced materials, process optimization, and industrial safety.
2. Petrochemicals and Refining – Covers crude oil refining, polymer synthesis, sustainable fuel technologies, and petrochemical processing.
3. Pharmaceutical and Analytical Process – Emphasizes drug formulation, analytical techniques, regulatory standards, and pharmaceutical quality control.

A student opting for a specialization acquires deeper knowledge in that domain, similar to obtaining a minor in an interdisciplinary area.

Awarding UG Certificate, UG Diploma, and Degrees (Aligned with UGC Norms)

UG Certificate (Exit after 1st Year):

Students who exit after completing the first year and have earned 40 credits will be

awarded a UG Certificate, provided they also complete one 4-credit vocational course during the first summer term. Such students may re-enter the programme within three years and must complete the degree within a maximum period of seven years.

UG Diploma (Exit after 2nd Year)

Students who exit after the second year with 80 credits will be awarded a UG Diploma, provided they also complete one 4-credit vocational course during the second summer term.

They may re-enter within three years and complete the program within the stipulated seven-year maximum.

3-Year UG Degree (Exit Option)

Students who opt for the 3-year exit and complete 120 credits will be awarded a B.Sc. Degree in Industrial Chemistry, subject to satisfying minimum credit requirements as per UGC guidelines.

4-Year UG Degree (Honours)

Students who complete 160 credits and secure 70% marks or above in the first six semesters will be eligible for the B.Sc. (Honours) in Industrial Chemistry degree.

4-Year UG Degree (Honours with Research)

Students who secure 75% marks or above in the first six semesters and choose a research track in the 4th year must complete a 12-credit research project / dissertation under a recognized faculty guide. Upon earning 160 credits, they will be awarded B.Sc. (Honours with Research) in Industrial Chemistry.

Credit hours for different types of courses

The workload of each course in the Integrated M.Sc. Programme in Industrial Chemistry is expressed in terms of credit hours. A credit represents the number of hours of instruction or academic engagement required per week over a standard semester (minimum of 15 weeks).

- Lecture Courses:

One credit is equivalent to one hour of lecture per week.

A 3-credit lecture course requires 3 hours/week of classroom instruction (45 hours/semester).

- Tutorial Courses:

One credit corresponds to one hour of tutorial engagement per week, amounting to 15 hours/semester.

- Practical / Laboratory Courses:

One credit requires two hours / week of laboratory, project-based, or field-related engagement.

Thus, one practical credit equals 30 hours/semester.

- Seminar / Internship / Studio / Field Practice / Community Engagement:

One credit requires two hours/week of structured engagement, equivalent to 30 hours/semester.

- Experiential Learning:

One credit requires three hours/week of field-based learning, totaling 45 hours/semester.

Courses with Combined Components

A single course may integrate multiple instructional components:

- 1: 4-credit (3L + 1P) course
3 hours of lectures/week → 45 hours/semester
1 practicum credit → 2 hours/week → 30 hours/semester
- 2: 4-credit (3L + 1T) course
3 hours of lectures/week → 45 hours/semester
1 hour of tutorial/week → 15 hours/semester

Types of Academic Engagement

Lecture courses:

Structured classroom instruction delivered by experts to build theoretical understanding of chemical and industrial science concepts.

Tutorial courses:

Problem-solving sessions, discussions, and guided learning that reinforce lecture content.

Laboratory / practical courses:

Hands-on experiments, practical work, field activities, and application of theoretical

concepts under supervision.

seminar courses:

Structured discussions, debates, and presentations based on assigned readings, case studies, or contemporary issues.

Internships

Industry-oriented immersion programs providing real-life exposure to chemical, pharmaceutical, and allied industries.

Field Practice / Projects

Supervised field-based activities enabling students to study industrial setups, environmental systems, or operational processes.

Community Engagement and Service

Projects that expose students to societal issues and allow application of chemical knowledge in real-life community contexts.

Experiential Learning Activities

Day-out learning, industrial surveys, field projects, and other immersive activities enhancing conceptual and practical understanding.

Number of Credits by Type of Course

The curriculum aims to provide flexibility, allowing students to select courses across disciplines while fulfilling programme requirements.

Major and Minor Courses

- Discipline-specific (Major/Minor) courses are generally 4 credits each.
- Additional 1–2 credits may be assigned for accompanying tutorials or practical components.

Other Categories of Courses

- Multidisciplinary, Ability Enhancement (Language), and Skill Enhancement courses are generally 3 credits each.
- Value-Added Courses, Summer Internships/Apprenticeships, and Community Outreach Activities are typically 2 credits each.

Final Year Research Project / Dissertation

- The capstone research project/dissertation carries 12 credits, emphasizing research, innovation, and independent problem-solving.

3. Eligibility for admission

Candidates who have completed P.U.C. / 10+2 with Chemistry as a compulsory subject and a strong background in Mathematics or Biology are eligible.

Selection Process:

Application forms will be available in the official website of Yenepoya (Deemed to be University) (www.yenepoya.edu.in) and the college office. A merit list of the selected candidates will be prepared based on the 12th class marks /PUC marks. Reservation of seats will be followed as per the norms.

4. Duration of the Programme

The Integrated M.Sc. Programme in Industrial Chemistry is a five-year (10-semester) programme that seamlessly integrates undergraduate and postgraduate levels. Students who wish to exit earlier may do so under the Academic Bank of Credits (ABC) framework:

Exit after First Year (2 Semesters): Eligible for a UG Certificate, provided they have earned the minimum prescribed credits (as per Table 3).

Exit after Second Year (4 Semesters): Eligible for a UG Diploma, upon completion of the required credits.

Exit after Third Year (6 Semesters): Eligible for a Bachelor's Degree, subject to earning the required credits.

Students who exit with a UG Certificate or UG Diploma are permitted to re-enter the programme within three years, as per the University and UGC regulations, to complete the remaining requirements and obtain the full degree.

Break of Study:

Students may be permitted to take a break during the course of study. However, the total duration for completing the entire Integrated M.Sc. Programme shall not exceed 8 years, inclusive of any break period.

Total Intake of Students:

The sanctioned intake shall be as per the University regulations and may vary based on institutional capacity, faculty strength, and regulatory norms.

Medium of Instruction:

The medium of instruction and examination shall be English for all courses, practicals, seminars, and project work throughout the programme.

5. Maximum Period for Completion of the Programme

A student admitted to the Integrated M.Sc. Programme in Industrial Chemistry must complete all programme requirements within the maximum permissible duration, as specified below:

- For the Award of the Bachelor's Degree (Exit Option after 3rd Year):
Students must complete the required credits within 6 years from the date of admission.
- For the Award of the Integrated M.Sc. Degree:
The entire programme must be completed within 8 years from the date of admission, including any break of study.

If a student fails to complete the programme within the stipulated maximum period, re-registration shall be mandatory, subject to University rules and availability of courses in the revised curriculum (if applicable)

6. Aim of the Programme

- To provide a strong foundation in industrial chemistry by integrating theoretical concepts with practical applications in chemical processes, materials science, and advanced analytical techniques.
- To offer specialized knowledge in Industrial Processing, Petrochemicals and Refining, Pharmaceutical and Analytical Process, enabling students to align their expertise with industry demands.
- To foster research and innovation by encouraging students to engage in industrial

projects, internships, and hands-on laboratory training, bridging the gap between academia and industry.

- To enhance problem-solving and critical-thinking abilities for addressing real-world challenges in chemical industries, sustainability, and industrial safety.
- To prepare graduates for global career opportunities in chemical manufacturing, pharmaceuticals, petrochemicals, research and development, and academia.
- To instil ethical and sustainable practices in industrial chemistry, ensuring responsible chemical management and adherence to environmental and safety regulations.
- To equip students with entrepreneurship and leadership skills, enabling them to contribute to technological advancements, start their own ventures, or take up consultancy roles in industrial chemistry.

7. Objectives / Outcomes of the Programme

- To provide a strong foundation in industrial chemistry by integrating theoretical concepts with practical applications in chemical processes, materials science, and advanced analytical techniques.
- To offer specialized knowledge in Industrial Processing, Petrochemicals and Refining ,Pharmaceutical and Analytical Process, enabling students to align their expertise with industry demands.
- To foster research and innovation by encouraging students to engage in industrial projects, internships, and hands-on laboratory training, bridging the gap between academia and industry.
- To enhance problem-solving and critical-thinking abilities for addressing real-world challenges in chemical industries, sustainability, and industrial safety.
- To prepare graduates for global career opportunities in chemical manufacturing, pharmaceuticals, petrochemicals, research and development, and academia.
- To instil ethical and sustainable practices in industrial chemistry, ensuring responsible chemical management and adherence to environmental and safety regulations.
- To equip students with entrepreneurship and leadership skills, enabling them to contribute

to technological advancements, start their own ventures, or take up consultancy roles in industrial chemistry.

- **Program Outcomes (POs) for Integrated M.Sc. Programme in Industrial Chemistry**

PO1	Remembering (Knowledge Acquisition) – Demonstrate a strong foundational understanding of fundamental concepts in industrial chemistry, including chemical processes, analytical techniques, and industrial safety regulations.
PO2	Understanding (Comprehension) – Explain the principles of chemistry as applied to industrial processes, pharmaceuticals, and petrochemical industries, and articulate their significance in real- world applications.
PO3	Applying(Practical Implementation) – Utilize laboratory techniques, modern instrumentation, and computational tools to conduct experiments, analyze data, and solve industrial problems effectively.
PO4	Analyzing (Critical Thinking and Problem-Solving) – Critically evaluate chemical processes, interpret experimental results, and optimize industrial reactions for efficiency and sustainability.
PO5	Evaluating (Decision – Making and Ethical Judgment) – Assess industrial practices, environmental impact, and regulatory standards to ensure ethical and sustainable chemical production.
PO6	Creating (Innovation and Research Development) – Design innovative solutions for industrial challenges, contribute to new product development, and engage in research for advancements in industrial chemistry.
PO7	Communication and Teamwork – Demonstrate effective communication skills in presenting scientific ideas, technical reports, and research findings while collaborating in multidisciplinary teams.
PO8	Assess the safety, ethical, and environmental considerations of industrial chemical processes.
PO9	Evaluate the economic feasibility and regulatory compliance of chemical processes in industrial applications.
PO10	Apply chemical knowledge and laboratory techniques to solve practical industrial problems, such as optimizing processes or developing new products.

- Programme Specific Outcomes (PSOs)

Integrated M.Sc. in Industrial Chemistry (Specialization: Industrial Processing) Aligned with Bloom's Taxonomy:

PSO1	Remembering (Knowledge Acquisition) – Recall fundamental principles of industrial chemistry, including chemical processes, materials science, catalysis, and industrial safety regulations.
PSO2	Understanding (Comprehension) – Explain the mechanisms of industrial chemical reactions, process optimization techniques, and sustainability principles in manufacturing industries.
PSO3	Applying (Practical Implementation) – Utilize modern analytical techniques, instrumentation, and computational tools to monitor, control, and improve industrial chemical processes.
PSO4	Evaluating (Decision-Making and Ethical Judgment) – Assess industrial practices for environmental impact, regulatory compliance, safety, and cost-effectiveness, ensuring ethical and sustainable decision-making.

Integrated M.Sc. in Industrial Chemistry (Specialization: Petrochemicals and Refining) Aligned with Bloom's Taxonomy:

PSO1	Remembering (Knowledge Acquisition) – Recall the key principles of petrochemical processes, crude oil refining technologies, and the synthesis of petrochemical products, including fuels, polymers, and specialty chemicals.
PSO2	Applying (Practical Implementation) – Apply modern analytical techniques and industrial tools to monitor and optimize petrochemical production processes, ensuring product quality and energy efficiency.
PSO3	Analyzing (Critical Thinking and Problem-Solving) – Analyze refining

	processes to identify inefficiencies, propose improvements, and integrate innovative solutions for maximizing yield and minimizing environmental impact.
PSO4	Evaluating (Decision-Making and Ethical Judgment) – Evaluate the economic, environmental, and safety aspects of petrochemical and refining operations, ensuring that industry practices adhere to ethical, regulatory, and sustainability standards.

M.Sc. in Industrial Chemistry (Specialization: Pharmaceutical and Analytical Process)
Aligned with Bloom's Taxonomy:

PSO1	Remembering (Knowledge Acquisition) – Recall the core concepts of pharmaceutical chemistry, drug formulation techniques, and various analytical methods used in quality control and pharmaceutical testing.
PSO2	Understanding (Comprehension) – Explain the principles of drug development, pharmacokinetics, and the role of analytical techniques such as chromatography, spectroscopy, and mass spectrometry in pharmaceutical analysis.
PSO3	Applying (Practical Implementation) – Able to apply pharmaceutical synthesis methods and advanced analytical techniques to evaluate drug purity, stability, and efficacy, ensuring compliance with regulatory standards.
PSO4	Analyzing (Critical Thinking and Problem-Solving) – Analyze pharmaceutical formulations, interpret analytical data, and identify quality control issues, providing solutions for optimizing drug development processes.

8. Program structure

Integrated M.Sc. Programme in Industrial Chemistry

Semester 1 / Year 1

Semester 1										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	25ICC11T	CC	Inorganic Chemistry	2	0	0	50	50	100	2
2	25ICC12P	CC	Inorganic Chemistry Practical's	0	4	0	50	50	100	2
3	25ICC13T	CC	Organic Chemistry	2	0	0	50	50	100	2
4	25ICC14P	CC	Organic Chemistry Practical's	0	4	0	50	50	100	2
5	25ICDSC	DSC	DSC group1	2	0	3	50	50	100	3
6	NME 1	ME	MEGroup1	3	0	0	25	25	50	3
7	NVAC 1	VAC	VAC group 1	2	0	0	50	50	100	2
8	NAEC 1	AEC	Language Group1: English/Hind/Kannada	4	0	0	50	50	100	4
Total									750	20

Course Code	Type	Specialization	DSC Group 1
25ICDSCI15	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Industrial Safety, Health & Environmental Management
25ICDSCR15	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
25ICDSCP15	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	

Semester 2 / Year 1

Semester 1										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	25ICC21T	CC	Physical Chemistry	2	0	0	50	50	100	2
2	25ICC22P	CC	Physical Chemistry Practical's	0	4	0	50	50	100	2
3	25ICC23T	CC	Analytical chemistry	2	0	0	50	50	100	2
4	25ICC24P	CC	Analytical chemistry Practical's	0	4	0	50	50	100	2
5	25ICDSC	DSC	DSC group2	2	0	3	50	50	100	3
6	NME 2	ME	MEGroup2	3	0	0	25	25	50	3
7	NVAC 2	VAC	VACGroup2	2	0	0	50	50	100	2
8	NAEC 2	AEC	Language Group2: English/Hind/Kannada	4	0	0	50	50	100	4
Total									750	20

Course Code	Type	Specialization	DSC Group 2
25ICDSCI25	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Chemistry for Industrial Innovations
25ICDSCR25	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
25ICDSCP25	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	

Exit Certificate:
1. UG certificate in Chemistry

Semester 3 / Year 2

Semester 3										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	25ICC31	CC	Advanced Inorganic Chemistry	2	0	0	50	50	100	2
2	25ICC32(P)	CC	Advanced Inorganic Chemistry Practical's	0	4	0	50	50	100	2
3	25ICC33	CC	Advanced Organic Chemistry	2	0	0	50	50	100	2
4	25ICC34(P)	CC	Advanced Organic Chemistry Practical's	0	4	0	50	50	100	2
5	25ICDSC	DSC	DSC group3	2	0	3	50	50	100	3
6	25ICDSE 31	DSE	Basics of Physics	3	0	0	50	50	100	3
			Frontiers in Environmental Science							
7	NME 3	ME	MEGroup3	3	0	0	25	25	50	3
8	NVAC 3	VAC	VACGroup3	2	0	0	100	0	100	2
9	NSEC 1	SEC	SECGroup1	3	0	0	100	0	100	3
Total									850	22

Course Code	Type	Specialization	DSC Group 3
25ICDSCI35	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Pollution Monitoring and Control
25ICDSCR35	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
25ICDSCP35	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process.	

Semester 4 / Year 2

Semester 4										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	25ICC41	CC	Advanced Analytical Chemistry	2	0	0	50	50	100	2
2	25ICC42(P)	CC	Advanced Analytical Chemistry Practical's	0	4	0	50	50	100	2
3	25ICC43	CC	Advanced Physical Chemistry	2	0	0	50	50	100	2
4	25ICC44(P)	CC	Advanced Physical Chemistry Practical's	0	4	0	50	50	100	2
5	25ICDSC	DSC	DSC group4	2	0	3	50	50	100	3
6	25ICDSE41	DSE	Mathematics for Chemists	3	0	0	50	50	100	3
			Computers for Chemists							
7	25ICDSE42	DSE	Calibration and Standardisation Biology for Chemists	3	0	0	50	50	100	3
8	NSEC 2	SEC	SEC Group2	3	0	0	100	0	100	3
Total									800	20

Course Code	Type	Specialization	DSC Group 4
25ICDSCI45	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Industrial process and industrial economics
25ICDSCR46	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Processing and refining of petrochemicals
25ICDSCP45	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Industrial process And industrial economics

Exit Certificate:

2. UG Diploma in Chemistry

Semester 5 / Year 3

Semester 5											
SL No	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credit s	
1	25ICC51	CC	Industrial Inorganic Chemistry	2	0	0	50	50	100	2	
2	25ICC52(P)	CC	Industrial Inorganic Chemistry Practical's	0	4	0	50	50	100	2	
3	25ICC53	CC	Industrial Organic Chemistry	2	0	0	50	50	100	2	
4	25ICC54(P)	CC	Industrial Organic Chemistry Practical's	0	4	0	50	50	100	2	
5	25ICDSC	DSC	DSC group5	2	0	3	50	50	100	3	
6	25ICDSE51	DSE-4	Nanotechnology	3	0	0	50	50	100	3	
			Agrochemicals								
7	25ICDSE52	DSE-5	Nuclear & Photochemistry	3	0	0	50	50	100	3	
			Cosmetic materials								
8	NSEC 3	SEC	SEC Group3	3	0	0	100	0	100	3	
Total									800	20	

Course Code	Type	Specialization	DSC Group 5
25ICDSCI55	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Safety and Process Waste Management
25ICDSCR55	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Alternatives of Petrochemicals and Waste Management
25ICDSCP56	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Safety and Process Waste Management

Course code	COURSE NAME (SEC)
Group 1	
NSEC 1	SEC group 1 Communication skills
Group 2	
NSEC 2	SEC group 2 Leadership and management skills
Group 3	
NSEC 3	SEC group 3 Professional Development

Semester 6 / Year 3

Semester 6											
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits	
1	25ICC61	CC	Industrial Physical Chemistry	2	0	0	50	50	100	2	
2	25ICC62(P)	CC	Industrial Physical Chemistry Practical	0	4	0	50	50	100	2	
3	25ICDSC	DSC	DSC group6	2	0	0	50	50	100	2	
4	25ICDSC	DSC	DSC group7	0	4	0	50	50	100	2	
5	25ICDSE61	DSE	Molecular modeling And drug designs	3	0	0	50	50	100	3	
			Green chemistry								
6	25ICDSE62	DSE-7	Functional Materials	3	0	0	50	50	100	3	
			Electro Organic Synthesis								
7	25ICSEC61	SEC	Internship	0	0	18	100	0	100	6	
Total									700	20	

Course Code	Type	Specialization	DSC Group 6
25ICDSCR64	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Analytical Tools Employed in Industry
25ICDSCI63	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Analytical Tools in the Analysis of Petroleum Products
25ICDSCR63	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Analytical Tools Employed in Industry

Course Code	Type	Specialization	DSC Group 7
25ICDSCR66	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Qualitative Analysis of Industrial Products
25ICDSCI65	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Qualitative Analysis of Petroleum Products
25ICDSCP66	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Qualitative Analysis of Pharmaceutical Products

Semester 6 / Year 3 Honours(Coursework + Internship)

Semester 6										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CI A	SEE	Total	Credits
1	25ICC61	CC	Industrial Physical Chemistry	2	0	0	50	50	100	2
2	25ICC62(P)	CC	Industrial Physical Chemistry Practical	0	4	0	50	50	100	2
3	25ICDSC	DSC	DSC group6	2	0	0	50	50	100	2
4	25ICDSC	DSC	DSC group7	0	4	0	50	50	100	2
5	25ICDSE61	DSE	Molecular Modeling And Drug Designs	3	0	0	50	50	100	3
			Green Chemistry							
6	25ICDSE62	DSE-7	Functional Materials	3	0	0	50	50	100	3
			Electro Organic Synthesis							
	25ICSEC61	SEC	Internship	0	0	18	100	0	100	6
Total									700	20

Course Code	Type	Specialization	DSC Group 6
25ICDSCR64	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Advanced Research Methodology
25ICDSCI63	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
25ICDSCR63	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSC Group 7
ICDSCR66	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Qualitative Analysis of Industrial Products
ICDSCI65	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Qualitative Analysis of Petroleum Products
ICDSCP66	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Qualitative Analysis of Pharmaceutical Products

Exit Certificate:

1. UG Degree in Chemistry

Semester 7 / Year 4 Honours (Coursework + Internship)

Semester 7										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1		ME	ME group 4	3	2	0	50	50	100	4
2		TDE	SWAYAM*	4	0	0	50	50	100	4
3	25ICDSE71	DSE	DSEgroup1	3	2	0	50	50	100	4
4	25ICDSE72	DSE	DSEgroup2	4	0	0	50	50	100	4
5	25ICDSC	DSC	DSC group8	2	4	0	50	50	100	4
Total									500	20

Semester 7 / Year 4 Honours (Coursework + Internship)

Course Code	Type	Specialization	DSE Group 1
ICDSEI71	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Advanced Research Methodology
ICDSER71	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP71	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSE Group 2
ICDSEI72	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Toxicology and Bioinorganic Chemistry
ICDSER72	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Toxicology and Bioinorganic Chemistry
ICDSEP75	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Chemistry of Natural Products
Course Code	Type	Specialization	DSC Group 8
ICDSEI76	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Analytical and Separation Techniques Practicals
ICDSER76	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Analytical and Separation Techniques
ICDSEP77	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Synthesis and Analysis of Complexes

Semester 8 / Year 4 Honours (Coursework + Internship)

Semester 8										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	25ICDSE81	DSE	DSEgroup3	4	0	0	50	50	100	4
2	25ICDSE82	DSE	DSEgroup4	2	4	0	50	50	100	4
3	25ICSEC81	SEC	Internship/ Apprenticeship	0	0	36	100	100	200	12
Total									400	20

Course Code	Type	Specialization	DSE Group 3
ICDSEI81	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Molecular Symmetry and Spectroscopy
ICDSER81	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP81	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSE Group 4
ICDSEI82	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Industrial Analytical Chemistry-II
ICDSER82	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Industrial Analytical Chemistry-II
ICDSEP83	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Synthetic Reagents and purification techniques

Exit Certificate:

1. UG Honours in Chemistry

Semester 9 / Year 5 (Coursework + Internship)

Semester 9										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	25ICDSC	DSC	DSC group9	4	0	0	50	50	100	4
2	25ICDSC	DSC	DSC group10	3	0	3	50	50	100	4
3	25ICDSC	DSC	DSC group11	2	4	0	50	50	100	4
4	25ICDSE91	DSE	DSEgroup5	4	0	0	50	50	100	4
5	25ICDSE92	DSE	DSEgroup6	4	0	0	50	50	100	4
Total									500	20

Course Code	Type	Specialization	DSC Group 9
ICDSCI91	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Medicinal chemistry
ICDSCR91	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP91	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	DSC Group 10	DSC Group 10
ICDSCI92	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Spectroscopy
ICDSCR92	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP92	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSC Group 11
ICDSCI93	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Isolation and separation techniques
ICDSCR92	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP93	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	

Course Code	Type	Specialization	DSE Group 5
25ICDSEI91	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Solid state and Polymer Chemistry
25ICDSER91	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
25ICDSEP91	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSE Group 6
25ICDSEI92	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Chemistry of Biomolecules
25ICDSER92	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
25ICDSEP92	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	

Semester 10 / Year 5 (Course work + Internship)

Semester 10										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	25ICSEC101	SEC	Internship	0	0	60	200	200	400	20
Total									400	20

Students often tenth semester shall be assessed for their work, thesis and viva voce.

Semester 7 / Year 4(Coursework)

Semester 7										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	NME 4	ME	ME group 4	3	2	0	50	50	100	4
2	25ICTDE71	TDE	SWAYAM*	4	0	0	50	50	100	4
3	25ICDSE71	DSE	DSEgroup1	3	2	0	50	50	100	4
4	25ICDSE72	DSE	DSEgroup2	4	0	0	50	50	100	4
5	25ICDSC71	DSC	DSC group8	2	4	0	50	50	100	4
Total									500	20

Course Code	Type	Specialization	DSE Group 1
ICDSEI71	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Advanced Research Methodology
ICDSER71	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP71	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSE Group 2
ICDSEI72	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Toxicology and Bioinorganic Chemistry
ICDSER72	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Toxicology and Bioinorganic Chemistry
ICDSEP75	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Chemistry of Natural Products
Course Code	Type	Specialization	DSC Group 8
ICDSEI76	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Analytical and Separation Techniques Practicals
ICDSER76	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Analytical and Separation Techniques
ICDSEP77	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Synthesis and Analysis of complexes

Semester 8 / Year 4 (Coursework)

Semester 8										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	25ICDSE81	DSE	DSEgroup3	4	0	0	50	50	100	4
2	25ICDSE82	DSE	DSEgroup4	2	4	0	50	50	100	4
3	25ICDSE83	DSE	DSEgroup5	4	0	0	50	50	100	4
4	25ICDSC81	DSC	DSCgroup9	3	0	3	50	50	100	4
5	25ICDSC82	DSC	DSCgroup10	2	4	0	50	50	100	4
Total									500	20

Exit Certificate:

1. UG Honours in Chemistry

Course Code	Type	Specialization	DSE Group 3
ICDSEI81	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Molecular Symmetry and Spectroscopy
ICDSER81	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP81	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSE Group 4
ICDSEI82	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Industrial Analytical Chemistry-II
ICDSER82	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Industrial Analytical Chemistry-II
ICDSEP83	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Synthetic Reagents and Purification Techniques
Course Code	Type	Specialization	DSE Group 5
ICDSEI83	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Polymers and Green Techniques
ICDSER83	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Polymers and Nano Materials
ICDSEP83	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Chemistry of Heterocyclic Compounds

Course Code	Type	Specialization	DSC Group 9
ICDSCI81	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Electro analytical and Thermo-analytical Techniques
ICDSCR81	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP81	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSC Group 10
ICDSCI82	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Gravimetric and Titrimetric Analysis
ICDSCR82	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Gravimetric and Titrimetric Analysis
ICDSCP82	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Organic Estimations

Semester 9 / Year 5 (Course work)

Semester 9										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	ICDSC91	DSC	DSC group11	4	0	0	50	50	100	4
2	ICDSC92	DSC	DSC group12	3	0	3	50	50	100	4
3	ICDSC93	DSC	DSC group13	2	4	0	50	50	100	4
4	ICDSE91	DSE	DSEgroup6	4	0	0	50	50	100	4
5	ICDSE92	DSE	DSEgroup7	4	0	0	50	50	100	4
Total									500	20

Course Code	Type	Specialization	DSE Group 6
ICDSEI91	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Solid state and Polymer Chemistry
ICDSER91	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP91	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSE Group 7
ICDSEI92	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Chemistry of Biomolecules
ICDSER92	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP92	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	

Course Code	Type	Specialization	DSC Group 11
ICDSCI91	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Medicinal Chemistry
ICDSCR91	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP91	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSC Group 12
ICDSCI92	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Spectroscopy
ICDSCR92	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP92	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSC Group 13
ICDSCI93	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Isolation and Separation Techniques
ICDSCR93	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP93	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	

Semester 10 / Year 5 (Coursework)

Semester 10										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	ICDSC101	DSC	DSC group 14	3	0	3	50	50	100	4
2	ICDSC102	DSC	DSC group 15	4	0	0	50	50	100	4
3	ICDSC103	DSC	DSC group 16	2	4	0	50	50	100	4
4	ICDSE101	DSE	DSE group 8	4	0	0	50	50	100	4
5	ICDSE102	DSE	DSE group 9	4	0	0	50	50	100	4
Total									500	20

Course Code	Type	Specialization	DSC Group 14
ICDSCI101	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Synthetic Methods
ICDSCR101	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP101	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSC Group 15
ICDSCI102	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Applied and Industrial Chemistry
ICDSCR102	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP102	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Bioinorganics Designs
Course Code	Type	Specialization	DSC Group 16
ICDSCI103	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Estimations and Spectral Techniques
ICDSCR103	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP103	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	

Course Code	Type	Specialization	DSE Group 8
ICDSEI101	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Carbohydrates and Nucleotides
ICDSER101	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP101	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSE Group 9
ICDSEI102	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Inorganic Materials of Industrial Importance
ICDSER102	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP102	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	

Semester 7/ Year 4 Honours (Coursework + Research)

Semester 7										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	NME 4	ME	ME group 4	3	2	0	50	50	100	4
2	ICTDE71	TDE	SWAYAM*	4	0	0	50	50	100	4
3	ICDSE71	DSE	DSEgroup1	3	2	0	50	50	100	4
4	ICDSE72	DSE	DSEgroup2	4	0	0	50	50	100	4
5	ICDSC71	DSC	DSC group8	2	4	0	50	50	100	4
Total									500	20

Course Code	Type	Specialization	DSE Group 1
ICDSEI71	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Advanced Research Methodology
ICDSER71	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP71	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSE Group 2
ICDSEI72	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Toxicology and Bioinorganic Chemistry
ICDSER72	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Toxicology and Bioinorganic Chemistry
ICDSEP75	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Chemistry of Natural Products
Course Code	Type	Specialization	DSC Group 8
ICDSEI76	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Analytical and Separation Techniques Practical's
ICDSER76	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Analytical and Separation Techniques
ICDSEP77	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Synthesis and Analysis of complexes

Semester 8/ Year 4 Honours (Coursework + Research)

Semester 8										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	ICDSE81	DSE	DSEgroup3	4	0	0	50	50	100	4
2	ICDSE82	DSE	DSEgroup4	2	4	0	50	50	100	4
3	ICSEC81	SEC	Research	0	0	36	100	100	200	12
Total									400	20

Students of eighth semester shall be assessed for their work, thesis and viva voce.

Exit Certificate:

2. UG Honours in Chemistry

Course Code	Type	Specialization	DSE Group 3
ICDSEI81	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Molecular Symmetry and Spectroscopy
ICDSER81	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP81	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSE Group 4
ICDSEI82	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Industrial Analytical Chemistry-II
ICDSER82	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Industrial Analytical Chemistry-II
ICDSEP83	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Synthetic Reagents and Purification Techniques

Semester 9/ Year 5 (Coursework + Research)

Semester 9										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	ICDSC91	DSC	DSC group9	4	0	0	50	50	100	4
2	ICDSC92	DSC	DSC group10	3	0	3	50	50	100	4
3	ICDSC93	DSC	DSC group11	2	4	0	50	50	100	4
4	ICDSE91	DSE	DSEgroup5	4	0	0	50	50	100	4
5	ICDSE92	DSE	DSEgroup6	4	0	0	50	50	100	4
Total									500	20

Course Code	Type	Specialization	DSC Group 9
ICDSCI91	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Medicinal Chemistry
ICDSCR91	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP91	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	DSC Group 10	DSC Group 10
ICDSCI92	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Spectroscopy
ICDSCR92	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP92	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSC Group 11
ICDSCI93	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Isolation and Separation Techniques
ICDSCR93	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSCP93	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	

Course Code	Type	Specialization	DSE Group 5
ICDSEI91	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Solid state and Polymer Chemistry
ICDSER91	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP91	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSE Group 6
ICDSEI92	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Chemistry of Biomolecules
ICDSER92	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP92	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	

Semester 10/ Year 5 (Coursework + Research)

Semester 10										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	ICSEC101	SEC	Research Project /Dissertation(SEC)	0	0	60	200	200	400	20
Total									400	20

Students of tenth semester shall be assessed for their work, thesis and viva voce.

Semester 7/ Year 4 Honours (Research)

Semester 7										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	NME 4	ME	ME group 4	3	2	0	50	50	100	4
2	ICTDE71	TDE	SWAYAM*	4	0	0	50	50	100	4
3	ICDSE71	DSE	Advanced Data Analysis tools	3	2	0	50	50	100	4
3	ICDSE72	DSE	DSEgroup1	3	2	0	50	50	100	4
4	ICDSE73	DSE	DSEgroup2	3	0	0	50	50	100	3
5	ICDSC71	DSC	DSC group8	0	4	0	50	50	100	2
Total									600	21

Course Code	Type	Specialization	DSE Group 1
ICDSEI71	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Advanced Research Methodology
ICDSER71	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
ICDSEP71	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	
Course Code	Type	Specialization	DSE Group 2
ICDSEI72	DSE	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Toxicology and Bioinorganic Chemistry
ICDSER72	DSE	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Toxicology and Bioinorganic Chemistry
ICDSEP75	DSE	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Chemistry of Natural Products
Course Code	Type	Specialization	DSC Group 8
ICDSEI76	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	Analytical and Separation Techniques Practical's
ICDSER76	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	Analytical and Separation Techniques
ICDSEP77	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Synthesis and Analysis of complexes

Semester 8/ Year 4 (Research)

Semester 8										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	ICSEC81	SEC	Research Project /Dissertation(SEC)	0	0	60	200	200	400	20
Total									400	20

Students of eighth semester shall be assessed for their work, thesis and viva voce.

Exit Certificate:
1. UG Honours in Chemistry

Semester 9/ Year 5 (Research)

Semester 9										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	ICSEC91	SEC	Research Project /Dissertation(SEC)	0	0	60	200	200	400	20
Total									400	20

Students of ninth semester shall be assessed for their work, thesis and viva voce.

Semester 10/ Year 5 (Research)

Semester 10										
SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	ICSEC101	SEC	Research Project /Dissertation(SEC)	-	-	60	200	200	400	20
Total									400	20

Students of tenth semester shall be assessed for their work, thesis and viva voce.

8. Attendance

- i A candidate shall be considered to have satisfied the requirement of attendance for a semester if he/she attends not less than 75% of the number of classes held in all courses.
- ii A candidate who does not fulfill the requirement of attendance in more than 50% of the courses in a semester shall not be permitted to appear for the University End Semester Examination. The candidate shall seek readmission to the respective semester in the subsequent year and shall attend a minimum of 75% of the total instruction hours in all courses for that semester.
- iii Student having an attendance shortage in 50% or less than 50% of the courses (irrespective of the credits or type of course e.g. Theory /practical) will not be permitted to write the examination in the concerned courses, during that semester. The student will enroll by paying a casual term fee as fixed by the university and will undertake remedial classes held during the semester break (either summer or winter) and fulfill the attendance requirement and give the examination as and when notified.
- iv A student seeking readmission due to shortage of attendance in more than 50% of the courses in the semester will not be permitted to carry forward the tuition fee. The student shall pay the entire tuition fee of the semester.
- v A student having the required attendance percentage in all courses and fails to pass in the course/s in a semester is permitted to carry over all courses and will be permitted to appear as a resit candidate.
- vi If a candidate represents his/her Institution/University/ Karnataka State/ Nation in Sports/ NSS/ Cultural officially sponsored activities or participates in national level events such as Republic Day Parade etc., he/she may be permitted to claim attendance for actual number of days of participation based on the recommendation of the head of the Institution concerned.

9. SYLLABUS

Semester 1 / Year 1

ICC11:Inorganic Chemistry

Semester 1	25ICC11T	Inorganic Chemistry(Theory)	
2 Credits	TPE:2:0:0	Core Course – CC	30:0:0

Course Goal: To provide students with a strong foundation in atomic structure, periodic properties, and the fundamental principles governing s, p, d, and f block elements, enabling them to understand and predict chemical behaviours based on quantum mechanics and periodic trends.

Course Outcomes: On successful completion of the course the learner will be able to

CO#	Course Outcomes
25ICC11T.1	Recall the fundamental concepts of atomic structure, including Bohr's theory, quantum numbers, and Schrödinger's wave equation.
25ICC11T.2	Describe the shapes and significance of atomic orbital's using wave functions, radial and angular distribution curves.
25ICC11T.3	Explain periodic trends in atomic properties such as atomic and ionic radii, ionization enthalpy, electron gain enthalpy, and electro negativity.

ICC11:Inorganic Chemistry

Course Content:

Unit1: Bohr's Theory

(6 hours)

Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics : de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrödinger's wave equation, significance of ψ and ψ^2 . Quantum numbers and their significance.

Unit2 : Wave Functions (6 hours)

Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbital's. Contour boundary and probability diagrams.

Unit3 : Atomic structure and Periodicity

(6 hours)

Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations- Electronic configurations of the elements ($Z=1-30$), effective nuclear charge, shielding/screening effect, Slater's rules. Variation of effective nuclear charge in Periodic Table.

Unit4 : sand p block Elements

(6 hours)

Sand p block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to s and p-block elements: Atomic radii (vander Waals), Ionic and crystal radii, Covalent radii; Ionization enthalpy, successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy; Electron gain enthalpy, trends of electron gain enthalpy; Electro negativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken - Jaffé's electro negativity scales. Variation of electro negativity with bond order, partial charge, hybridization, group electro negativity.

Unit5 : d and f block Elements

(6 hours)

d and f block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to d and f-block elements: Atomic radii (vander Waals), Ionic and crystal radii; Covalent radii; Ionization enthalpy,

successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy; Electron gain enthalpy, trends of electron gain enthalpy; Electro negativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken - Jaffé's electro negativity scales. Variation of electro negativity with bond order, partial charge, hybridization, group electro negativity. Trends in the chemistry of the compounds of groups 13 to 17 (hydrides, carbides oxides and halides).

References:

1. Lee, J. D. (2021). *Concise inorganic chemistry* (4th ed.). Wiley.
2. Das, A. K. (2013). *Fundamental concepts of inorganic chemistry* (Vols. 1–2, 2nd ed.). CBS Publishers and Distributors.
3. Cotton, F. A., Wilkinson, G., & Gaus, P. L. (n.d.). *Basic inorganic chemistry* (3rd ed.). Wiley India.
4. Housecroft, C. E., & Sharpe, A. G. (2005). *Inorganic chemistry* (2nd ed.). Pearson Prentice Hall

ICC11:Inorganic Chemistry (Practical's)

Semester 1	25ICC12P	Inorganic Chemistry(Practical's)	
2 Credits	TPE:0:4:0	Core Course - CC	0:60:0

Course Goal: To equip students with practical skills in gravimetric analysis, enabling them to accurately determine the composition of metal ions through precipitation and weight-based quantification techniques.

Course Outcomes: On successful completion of the course the learner will be able to

CO#	Course Outcomes
25ICC12P.1	Perform titrimetric analyses to determine the content of carbonate, hydroxide, and other compounds in mixtures.
25ICC12P.2	Standardize solutions and determine the concentration of chemicals like nitrites and chlorine in samples using redox and iodometric methods.
25ICC12P.3	Apply gravimetric analysis techniques to determine the concentration of metal ions such as Ba^{2+} , Cu^{2+} , Fe^{2+} , and Ni^{2+} .

ICC11:Inorganic Chemistry (Practical's)

Course Content:

GRAVIMETRY

1. Determination of Ba^{2+} as BaSO_4
2. Determination of Cu^{2+} as CuSCN
3. Determination of Fe^{2+} as Fe_2O_3
4. Determination of Ni^{2+} as $\text{Ni}(\text{DMG})_2$ complex

References:

1. Soni, P. L. (1998). *A text book of inorganic chemistry*. Sultan Chand and Sons.
2. Puri, B. R., & Sharma, L. R. (2000). *A text book of inorganic chemistry*. Shobanlal Nagin Chand.
3. Raj, G. (n.d.). *A text book of inorganic chemistry*. Krishna's Educational Publishers.
4. Prakash, S. (2001). *A text book of inorganic chemistry*. (Publisher not specified).
5. Vogel, A. I. (n.d.). *A text book of quantitative analysis*. EL

CC13: Organic Chemistry(Theory)

Semester 1	25ICC13T	Organic Chemistry(Theory)	
2 Credits	TPE:2:0:0	Core Course – CC	30:0:0

Course Goal: To provide students with a thorough understanding of the fundamental principles of organic chemistry, including classification, nomenclature, reaction mechanisms, and stereochemistry, enabling them to analyze and predict organic reaction outcomes effectively.

Course Outcomes: On successful completion of the course the learner will be able to

CO#	Course Outcomes
25ICC13T.1	Recall and explain the fundamental concepts of organic reactions, including techniques for representing electron movement, bond breaking, and bond formation.
25ICC13T.2	Analyze and apply the concepts of aromaticity, resonance, and hyper conjugation inorganic molecules.
25ICC13T.3	Prepare and describe the synthesis of alkanes, alkenes, and alkynes, and analyze their reactions and mechanisms.

ICC13: Organic Chemistry (Theory)

Course Content

Unit1: Classification and Nomenclature of Organic Compounds (6 hours)

Organic compounds: Classification and nomenclature of organic compounds, Hybridization, Shapes of organic molecules, Influence of hybridization on bond properties. Nature of bonding in Organic molecules Formation of Covalent bond, Types of chemical bonding, localized and delocalized, conjugation and cross conjugation, concept of resonance, electronic displacements: Inductive effect, Electromeric effect, Resonance and Hyper conjugation, cross conjugation explanation with examples. Concept of resonance, aromaticity, Huckelrule, anti-aromaticity explanation with examples.

Strengths of Organic acid and bases: Comparative study with emphasis on factors effecting pK values. Relative strength of aliphatic and aromatic carboxylic acids-Acetic acid and chloro acetic acid, acetic acid and propionic acid, acetic acid and Benzoic acid. Steric effect- Relative stability of trans and cis-2-butene.

Unit2: Mechanisms and Types of Organic Reactions (6 hours)

Mechanisms of Organic Reactions : Notations used to represent electron movements and directions of reactions- curly arrows, formal charges. Types of bonds breaking- homolytic and heterolytic. Types of reagents - Electrophiles, nucleophiles, nucleophilicity and basicity.

Types of organic reactions- substitution, addition, elimination, rearrangement and pericyclic reactions, explanation with examples. Chemistry of Aliphatic hydrocarbons, Carbon-Carbon Sigma bonds Chemistry of alkanes: Formation of alkanes, Wurtz reaction, Wurtz-Fittig reaction, Free radical substitution, Halogenation- relative reactivity and selectivity Carbon-carbon pi bonds Formation of alkenes and alkynes by elimination reaction.

Unit3: Mechanism of E1, E2, E1cb Reaction (6 hours)

Mechanism of E1, E2, E1cb reaction. Saytzeff and Hofmann eliminations. Addition of HBr to propene, Free radical addition of HBr to propene. Addition of halogens to alkenes - carbocation and halonium ion mechanism. Stereo specificity of halogen addition. Ozonolysis mechanism – ozonolysis of propene. Addition of hydrogen halides to alkenes, mechanism, regioselectivity and relative rates of addition.

Hydrogenation, hydration, hydroxylation and epoxidation of alkenes, explanation with examples, 1,2 and 1,4- addition reactions in conjugated dienes. Diels-Alder reaction, Allylic and benzylic bromination and mechanism in propene, 1-butene, 1-toluene and ethylbenzene. (6 hrs)

Unit 4: Nucleophilic Substitution at Saturated Carbon

(6 hours)

Nucleophilic substitution at saturated carbon : Mechanism of SN1 and SN2 reactions with suitable examples. Energy profile diagrams, Stereo chemistry and factors effecting SN1 and SN2 reactions.

Unit 5: Aromatic Electrophilic Substitution Reactions

(6 hours)

Aromatic Electrophilic substitution reactions : Mechanisms, σ and π complexes, Halogenation, Nitration, Sulphonation, Friedel Crafts alkylation and acylation with their mechanism. Activating and deactivating groups. Orientation influence, Ortho-para ratio. Aromatic nucleophilic substitution reaction: SN Ar and Benzyne mechanism with suitable examples.

References:

1. Mendham, J., Denney, R. C., Barnes, J. D., & Thomas, M. J. K. (2007). *Vogel's textbook of quantitative chemical analysis* (6th ed., 3rd Indian reprint). Pearson Education Pvt. Ltd.
2. Skoog, D. A., West, D. M., Holler, F. J., & Crouch, S. R. (2005). *Fundamentals of analytical chemistry* (8th ed.). Saunders College Publishing.
3. Christian, G. D. (2007). *Analytical chemistry* (6th ed.). Wiley-India.
4. McPherson, P. A. C. (2015). *Practical volumetric analysis*. Royal Society of Chemistry.
5. Morrison, R. N., & Boyd, R. N. (n.d.). *Organic chemistry*. Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
6. Finar, I. L. *Organic chemistry* (Vol. 1). Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

ICC14(P): Organic Chemistry (Practical's)

Semester 1	25ICC14P	Organic Chemistry (Practical's)	
2 Credits	TPE::0:4:0	Core Course - CC	0:60:0

Course Goal: To equip students with practical skills in the systematic qualitative analysis of mono- and bifunctional organic compounds, including determination of melting/boiling points, preparation of solid derivatives, and compound identification using literature references.

Course Outcomes: On successful completion of the course the learner will be able to

CO#	Course Outcomes
25ICC14P.1	Determine the melting or boiling point of derived compounds.
25ICC14P.2	Understand the various strategies involved in chemical synthesis.
25ICC14P.3	Explain the techniques of crystallization.

ICC14(P): Organic Chemistry(Practical's)

Course Content:

Systematic qualitative analysis of mono and bifunctional organic compounds
Determination of melting point/boiling point, preparation of suitable solid derivative and identification compound from literature. Following compounds may be given - Resorcinol, oxalic acid, urea, thiourea, thiophenol, benzoic acid, salicylic acid, phenol, p-cresol, aniline, p-nitroaniline, p-toluidine, benzaldehyde, ethyl-methyl ketone, acetophenone, benzophenone, chlorobenzene, bromobenzene, nitrobenzene and benzamide.

References:

1. Ahluwalia, V. K., & Parashar, R. K. (2010). *Organic reaction mechanisms* (4th ed.). Narosa Publishing House.
2. Mukherji, S. M., Singh, S. P., & Kapoor, R. K. (2017). *Organic chemistry*. New Age Publishers.
- 3.

Vogel, A. I., Tatchell, A. R., Furniss, B. S., Hannaford, A. J., & Smith, P. W. G. (1996). *Vogel's textbook of practical organic chemistry* (5th ed.). Pearson.

Industrial Safety, Health and Environmental Management (Theory)

Semester 1	25ICDSCI15/25ICDSCR15/25ICDSCP15	Industrial Safety, Health and Environmental Management (Theory)	
2 Credits	TPE:2:0:0	DSC	30:0:0

Course Goal: To provide students with a comprehensive understanding of industrial safety, health, and environmental management, including occupational health principles, hazard recognition and control, industrial hygiene, plant commissioning, and regulatory compliance, enabling them to implement effective workplace safety measures.

Course Outcomes: On successful completion of the course the learner will be able to

CO#	Course Outcomes
25ICDSCI15/25ICDSCR15/25ICDSCP15.1	Define key concepts in occupational health and safety.
25ICDSCI15/25ICDSCR15/25ICDSCP15.2	Apply safety and health control measures in industrial settings.
25ICDSCI15/25ICDSCR15/25ICDSCP15.3	Demonstrate knowledge of safety management standards.

(Theory)

Course Content:

Unit1: Introduction and Scope

(6 hours)

Definition of occupational health as per WHO/ ILO; occupational health and environmental safety management – principles practices; common occupational diseases: occupational health management services at the work place. Pre-employment, periodic medical examination of workers, medical surveillance for control of occupational diseases and health records

Unit2 : Monitoring for Safety, Health and environment

(6 hours)

Industrial Hygiene: definition of industrial hygiene, control methods, substitution, changing the process, local exhaust, ventilation, isolation, wet method, personal hygiene, housekeeping and maintenance, waste disposal, special control measures

Unit 3 : Chemical Hazards

(6 hours)

Introduction to chemical hazards, dangerous properties of chemical, dust, gases, fumes, mist, vapours, smoke and aerosols. Route of entry to human system, recognition, evaluation and control of basic hazards, concepts of dose response relationship, biochemical action of toxic substances, concept of threshold , limit values.

Unit4: Plant Commissioning and Inspection

(6 hours)

Commissioning phases and organization, pre-commissioning documents, process commissioning, commissioning problems, post commissioning documentation Plant inspection, pressure vessel, pressure piping system, non destructive testing, pressure testing, leak testing and monitoring-plant monitoring, performance monitoring, condition, vibration, corrosion, acoustic emission-pipe line inspection.

Unit5: Occupational Safety, Health and Environment Management (6 hours)

Bureau of Indian standards on safety and health 14489-1998 and 15001-2000, OSHA, process safety management (PSM) as per OSHA, PSM principles, OHSAS-18001, EPA standards, performance measurement to determine effectiveness of PSM; importance of industrial safety

y,role of safety department, safety committee and function, role and responsibilities of safety officer.

References:

1. Friend, M. A., & Kohn, J. P. (2014). *Fundamentals of occupational safety and health* (7th ed.). Government Institutes.
2. Bittner, R. A. A. K. (2011). *Introduction to occupational health and safety* (1st ed.). Wiley.
3. Klein, D. A. (2017). *Introduction to industrial hygiene* (2nd ed.). Wiley.
4. Gershenfeld, P. M. (2004). *Practical industrial safety, risk assessment, and shutdown systems* (1st ed.). Gulf Professional Publishing.
5. Harriott, P. H. (2006). *Plant design and operations* (1st ed.). Gulf Publishing Company.
6. Bausbacher, E., & Hunt, R. (2004). *Process plant layout and piping design* (1st ed.). Gulf Professional Publishing.
7. Reese, C. D. (2011). *Occupational health and safety management: A practical approach* (2nd ed.). CRC Press.
8. Srinivasan, S. (2017). *The Tamil Nadu Safety Officers Rules 2005* (28th ed.). Madras Book Agency.
9. Sharma, R. R. N. (2019). *Safety management systems: ISO 45001:2018* (1st ed.). New Age International.
10. Thygerson, A. L. (2013). *The safety officer's handbook* (4th ed.). Delmar Cengage Learning.

Semester 2 / Year 1

Semester 1

SL. No.	Course Code	Course Type	Course Title	Hours per Week (T:P:E)			CIA	SEE	Total	Credits
1	25ICC21T	CC	Physical Chemistry	2	0	0	50	50	100	2
2	25ICC22P	CC	Physical Chemistry Practical's	0	4	0	50	50	100	2
3	25ICC23T	CC	Analytical Chemistry	2	0	0	50	50	100	2
4	25ICC24P	CC	Analytical Chemistry Practical's	0	4	0	50	50	100	2
5	25ICDSC	DSC	DSC group2	2	0	3	50	50	100	3
6		ME	MEGroup2	3	0	0	25	25	50	3
7		VAC	VACGroup2	2	0	0	50	50	100	2
8		AEC	LanguageGroup2: English/Hindi/Kannada	4	0	0	50	50	100	4
Total									750	20

Course Code	Type	Specialization	DSC Group 2
25ICDSCI25	DSC	Integrated M.Sc. Industrial Chemistry with specialization in Industrial Processing	Chemistry for Industrial Innovations
25ICDSCR25	DSC	Integrated M.Sc. Industrial chemistry with specialization in Petrochemicals and Refining	
25ICDSCP25	DSC	Integrated M.Sc. Industrial chemistry with specialization in Pharmaceuticals and Analytical Process	

Physical Chemistry (Theory)

Semester 2	25ICC21T	Physical Chemistry(Theory)	
2 Credits	TPE:2:0:0	Core Course - CC	30:0:0

Course Goal: To equip students with a fundamental understanding of physical chemistry concepts, including the behavior of gases, liquids, solids, and liquid crystals, as well as principles of surface tension, viscosity, crystallography, and distribution law, enabling them to apply these concepts to real-world chemical phenomena and problem-solving.

Course Outcomes: On successful completion of the course the learner will be able to

CO#	Course Outcomes
25ICC21T.1	Understand the principles of the gaseous state, including kinetic theory and real gas behavior.
25ICC21T.2	Apply experimental techniques to analyze liquid properties like surface tension, viscosity and refractive index.
25ICC21T.3	Classify liquid crystals and evaluate their applications in technologies such as LCDs and thermal sensors.

Physical Chemistry (Theory)

Course Content:

Unit1: Gaseous State (6 hours)

Elementary aspects of kinetic theory of gases, Ideal and real gases. Boyle temperature (derivation not required), Molecular velocity, collision frequency, collision diameter, Collision cross section, collision number and mean free path and coefficient of viscosity, calculation of σ and η , variation of viscosity with temperature and pressure. Maxwell's Boltzmann distribution law of molecular velocities (Most probable, average and root mean square velocities). Relation between RMS, average and most probable velocity and average kinetic energies. (Mathematical derivation not required), law of equi partition of energy.

Behavior of real gases : Deviation from ideal gas behavior. Compressibility factor(Z) and its variation with pressure for different gases. Causes of deviation from ideal behavior, vander Waals equation of state (No derivation) and application in explaining real gas behavior. Critical phenomena – Andrews isotherms of CO_2 , critical constants and their calculation from vander Waals equation, Continuity of states, Law of corresponding states. Numerical problems.

Unit2: Liquid State (6 hours)

Surface Tension: Definition and its determination using stalagmometer, effect of temperature and solute on surface tension

Viscosity : Definition, Coefficient of viscosity. Determination of viscosity of a liquid using Oswald viscometer. Effect of temperature, size, weight, shape of molecules and intermolecular forces.

Refraction : Specific and molar refraction – definition and advantages. Determination of refractive index by Abbe's Refractometer. Additive and constitutive properties.

Parachor : Definition, Atomic and structure parachor, Elucidation of structure of benzene and benzoquinone. Viscosity and molecular structure. Molar refraction and

chemical constitution. Numerical Problems

Unit 3: Liquid Crystals (6 hours)

Explanation, classification with examples - Smectic, nematic, cholesteric, disc shaped and polymeric. Structures of nematic and cholesteric phases-molecular arrangements in nematic and cholesteric liquid crystals. Applications of liquid crystals in LCDs and thermal sensing.

Unit 4: Solid (6 hours)

Unit cell and space lattice, anisotropy of crystals, size and shape of crystals. Laws of Crystallography: Law of constancy of interfacial angles, Law of rational indices, Law of symmetry (Symmetry elements), Crystal systems, Bravais lattice types and identification of lattice planes. Miller indices and its calculation, X-Ray diffraction by crystals: Bragg's law and derivation of Bragg's equation, Single crystal and powder diffraction methods. Defects in crystals, glasses and liquid crystals. Numerical problems.

Unit 5: Distribution Law (6 hours)

Nernst Distribution Law-Statement and its derivation. Distribution constant, factors affecting distribution constant, validity of Distribution Law, Modification of distribution law when molecules undergo a) Association b) Dissociation. Application of Distribution Law in Solvent extraction. Derivation for simple and multiple extraction. Principles of distribution law in Parkes Process of desilverisation of lead. Numerical Problems.

References:

1. Atkins, P., & De Paula, J. (2006). *Physical Chemistry* (8th ed.). Oxford University Press.
2. Glasstone, S. (1982). *Physical Chemistry*. ELBS.
3. Negi, A. S., & Anand, S. C. (2007). *A Textbook of Physical Chemistry*. New Age International Publishers.

4. Puri, B. R., Sharma, L. R., & Pathania, M. S. (n.d.). *Principles of Physical Chemistry*. Vishal Publishing Co.
- 5.
- 6.
7. Soni, P. L., Dharmarhaand, O. P., & Dash, U. N. (n.d.). *A Textbook of Physical Chemistry*. Sultan Chand and Sons.
8. Raj, G. (2018). *Advanced Physical Chemistry*. Goel Publishing House.

Physical Chemistry(Practical's)

Semester 2	25ICC22P	Physical Chemistry (Practical's)	
2 Credits	TPE::0:4:0	Core Course - CC	0:60:0

Course Goal: To provide students with hands-on experience in physical chemistry laboratory techniques, including the determination of density, viscosity, surface tension, refractive index, and partition coefficients, while emphasizing safety practices and the handling of common laboratory chemicals.

Course Outcomes: On successful completion of the course the learner will be able to

CO#	Course Outcomes
25ICC22P.1	Apply safety practices and laboratory techniques for measuring physical properties like density, viscosity, and surface tension.
25ICC22P.2	Analyze the effects of solute concentration on viscosity and surface tension, and evaluate refractive properties of liquids.
25ICC22P.3	Use partition coefficients and refractometry to determine the composition of liquid mixtures and solve related problems.

Physical Chemistry (Practical's)

Course Content:

1. Safety Practices in the Chemistry Laboratory, Knowledge about common toxic chemicals and safety measures in their handling, cleaning and drying of glassware's
2. Determination of density using specific gravity bottle and viscosity of liquids using Ostwald's viscometer (Ethyl acetate, Toluene, Chloroform, Chlorobenzene or any other non-hazardous liquids)
3. Study of the variation of viscosity of sucrose solution with the concentration of a solute
4. Determination of the density using specific gravity bottle and surface tension of liquids using Stalagmometer (Ethyl acetate, Toluene, Chlorobenzene, any other non-hazardous liquids)
5. Study of variation of surface tension of detergent solution with concentration.
6. Determination of specific and molar refraction by Abbes Refractometer. (Ethyl acetate, Methyl acetate, Ethylene Chloride)
7. Determination of the composition of liquid mixture by refractometry. (Toluene & Alcohol, Water & Sucrose)
8. Determination of partition/distribution coefficient –
 - i) Acetic acid in water and cyclohexane.
 - ii) Acetic acid in Water and Butanol.
 - iii) Benzoic acid in water and toluene.

References:

1. Madan, R. D., & Tuli, G. D. (2001). *Physical Chemistry*. S. Chand.
2. Raj, G. (2001). *A Textbook of Advanced Physical Chemistry*. Goel Publishing House.
3. Khosla, B. D. (2000). *A Textbook of Physical Chemistry*. R. Chand.

Analytical Chemistry (Theory)

Semester 2	25ICC23T	Analytical Chemistry (Theory)	
2 Credits	TPE:2:0:0	Core Course – CC	30:0:0

Course Goal: To equip students with a strong foundation in analytical chemistry principles, including error analysis, titrimetric and gravimetric techniques, data interpretation, and laboratory safety, enabling them to perform accurate and precise chemical analyses.

Course Outcomes: On successful completion of the course the learner will be able to

CO#	Course Outcomes
25ICC23T.1	Evaluate and select analytical techniques based on accuracy, precision, and method validation criteria.
25ICC23T.2	Apply statistical methods to identify, minimize errors, and interpret analytical data accurately.
25ICC23T.3	Evaluate and select analytical techniques based on accuracy, precision, and method validation criteria.

Analytical Chemistry(Theory)

Course Content:

Unit1: Language of Analytical Chemistry (6 hours)

Definitions of analysis, determination, measurement, techniques and methods. Classification of analytical techniques. Choice of an analytical method - accuracy, precision, sensitivity, selectivity, method validation. Figures of merit of analytical methods and limit of detection (LOD), Limit of quantification (LOQ), linear dynamic range (working range).

Unit2: Errors and Treatment of Analytical Data (6 hours)

Limitations of analytical methods — Errors: Determinate and indeterminate errors, absolute error, relative error, minimization of errors. Statistical treatment of finite samples - mean, median, range, standard deviation and variance. External standard calibration- regression equation (least squares method), correlation coefficient (R^2). Numerical problems.

Unit 3: Basic Laboratory Practices (6 hours)

Calibration of glassware (pipette, burette and volumetric flask), Sampling (solids and liquids), weighing, drying, dissolving, Acid treatment, Rules of work in analytical laboratory, General rule for performing quantitative determinations (volumetric and gravimetric), Safety in Chemical laboratory, Rules of fire prevention and accidents, First aid. Precautions to be taken while handling toxic chemicals, concentrated/fuming acids and organic solvents.

Unit4 Titrimetric Analysis (6 hours)

Basic principle of titrimetric analysis. Classification, Preparation and dilution of reagents/solutions. Normality, Molarity and Mole fraction. Use of $N_1V_1 = N_2V_2$ formula, Preparation of ppm level solutions from source materials (salts),

conversion factors.

Acid-base titrimetry: Titration curves for strong acid vs strong base, weak acid vs strong base and weak base vs strong acid titrations. Titration curves, Quantitative applications — selecting and standardizing a titrant, inorganic analysis - alkalinity, acidity.

Complex metric titrimetry : Indicators for EDT Atitrations -theory of metal i on indicators, titration methods employing EDTA - direct, back, displacement and indirect determinations, Application- determination of hardness of water.

Unit5: Redox Titrimetry

(6 hours)

Balancing redox equations, calculation of the equilibrium constant of redox reactions, titration curves,

Theory of redox indicators, calculation of standard potentials using Nernst equation. Applications.

Precipitation titrimetry: Titration curves, titrants and standards, indicators for precipitation titrations involving silver nitrate- Volhard's and Mohr's methods and their differences.

Gravimetric Analysis: Requisites of precipitation, mechanism of precipitation, Factors influencing precipitation, Co-precipitation, post-precipitation, Advantages of organic reagents over inorganic reagents, reagents used in gravimetry (8-hydroxy quinoline (oxine) and dimethyl glyoxime (DMG).

References:

1. Mendham, J., Denney, R. C., Barnes, J. D., & Thomas, M. J. K. (2007). *Vogel's Textbook of Quantitative Chemical Analysis* (6th ed., 3rd Indian Reprint). Pearson Education Pvt. Ltd.
2. Skoog, D. A., West, D. M., Holler, F. J., & Crouch, S. R. (2005). *Fundamentals of Analytical Chemistry* (8th ed.). Saunders College Publishing.
3. Christian, G. D. (2007). *Analytical Chemistry* (6th ed.). Wiley-India.
4. Griggin, R. C. *Technical Methods of Analysis*.
5. Kennedy, J. H. (1990). *Analytical Chemistry Principles* (2nd ed.). Saunders.

6. Skoog, D. A., Holler, F. J., & Nieman, T. A. (1998). *Principles of Instrumental Methods of Analysis* (5th ed.). Saunders.
7. Day, R. A., & Underwood, A. L. (1998). *Quantitative Analysis*. Prentice Hall.
8. Fahim, M. A., Alsahhaf, T. A., & Elkilani, A. (n.d.). *Fundamentals of Petroleum Refining*. Elsevier Science.

Analytical Chemistry (Practical's)

Semester 2	25ICC24P	Analytical Chemistry (Practical's)	
2 Credits	TPE::0:4:0	Core Course - CC	0:60:0

Course Goal: To develop students' proficiency in analytical chemistry laboratory techniques, including calibration, titrimetric and gravimetric analysis, and quantitative determination of substances, ensuring accuracy and precision in chemical analysis.

Course Outcomes: On successful completion of the course the learner will be able to

CO#	Course Outcomes
25ICC24P.1	Apply analytical techniques to determine chemical concentrations using titrimetric and redox methods.
25ICC24P.2	Perform accurate calibration and standardization of laboratory solutions and equipment.
25ICC24P.3	Follow safety protocols and maintain precision in conducting chemical analyses.

Analytical Chemistry (Practical's)

Course Content:

1. Calibration of glassware, pipette, burette and volumetric flask.
2. Determination of sodium carbonate and sodium bicarbonate in a mixture.
3. Determination of alkali present in soaps/detergents.
4. Determination of iron(II) using potassium dichromate.
5. Determination of oxalic acid using potassium permanganate solution.
6. Standardization of EDTA solution and determination of hardness of water.
7. Standardization of silver nitrate and determination of chloride in a waters ample (demonstration).
8. Determination of alkali content in antacids.

References:

1. Vogel, A. I. (n.d.). *A Textbook of Quantitative Inorganic Analysis*.
2. Bassett, J., Denney, R. C., Jeffery, G. H., & Mendham, J. (n.d.). *Vogel's Textbook of Quantitative Inorganic Analysis*.
3. Sandell, E. B. (n.d.). *Colorimetric Determination of Traces of Metals*.

Chemistry for Industrial Innovations

Semester 2	25ICDSCI25/25ICDSCR25/ 25ICDSCP25	Chemistry for Industrial Innovations (Theory)	
2 Credits	TPE:2:0:0	Core Course – CC	30:0:0

Course Goal: To equip students with knowledge of industrial chemistry principles, including raw materials, chemical processes, sustainability, and process optimization, fostering innovation and environmental responsibility in industrial applications.

Course Outcomes: On successful completion of the course the learner will be able to

CO#	Course Outcomes
25ICDSCI25/25ICDSCR25/25ICDSCP25.1	Recall the basic principles and processes in industrial chemistry.
25ICDSCI25/25ICDSCR25/25ICDSCP25.2	Explain the applications of green chemistry in industrial settings
25ICDSCI25/25ICDSCR25/25ICDSCP25.3	Identify various optimization techniques and innovations in industrial processes

Chemistry for Industrial Innovations

Course Content:

Unit1: Fundamentals of Industrial Chemistry

(6 hours)

Introduction to industrial chemistry, including the significance and scope of chemical industries. Overview of raw materials used in industrial processes such as metals, polymers, and fossil fuels. Basic chemical processes like synthesis, polymerization, and fermentation. Industrial reactions and catalysis: types, mechanisms, and industrial applications (e.g., Haber process, Contact process).

Unit2 : Green Chemistry and Sustainability in Industry

(6 hours)

Principles of green chemistry aimed at minimizing waste and energy consumption. Sustainable practices in industries using renewable resources, clean technologies, and waste management strategies. Environmental impact assessments including lifecycle analysis, carbon foot prints, and energy efficiency. Case studies from pharmaceuticals

and automotive industries demonstrating green chemistry applications.

Unit3 : Process Optimization and Innovation (6 hours)

Introduction to process optimization techniques used in industrial settings, focusing on mass balance, energy efficiency, and cost-effectiveness. Innovations in biotechnology, nanotechnology, and automation in the chemical industry. Case studies on process innovations in chemical manufacturing, food processing, and waste-to-energy technologies.

Unit4 : Industrial Applications of Organic Chemistry (6 hours)

Organic chemistry applications in industries such as plastics, textiles, and paints. Role of synthetic polymers and bio-polymers in industrial production.

Unit5 : Industrial Applications of Inorganic Chemistry (6 hours)

Inorganic chemistry in industrial processes including metals, alloys, and catalysts. Industrial synthesis of ceramics and glass. Regulatory standards and safety protocols in chemical industries.

References:

1. Baird, C., & Cann, M. (2018), *Chemistry for Changing Times*, 14th Edition, Pearson.
2. Anastas, P. T., & Warner, J. C. (2020), *Green Chemistry: Theory and Practice*, Oxford University Press.
3. Smith, J.L., & Green, M.R.(2017), *Industrial Chemistry: A Guide to the Practice of Chemical Engineering*, Wiley - Blackwell.
4. Atkins, P., & de Paula, J. (2018), *Physical Chemistry*, 11th Edition, Oxford University Press.
5. Tortora, G.J., & Derrickson, B.(2016), *Principles of Anatomy and Physiology*, 15th Edition, Wiley.
6. Kotz, J. C., & Treichel, P. M. (2020), *Chemistry and Chemical Reactivity*, 10th Edition, Cengage Learning.

7. Alper, J., & Korman, M. (2018), *Biotechnology and Industrial Chemistry*, Springer.
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11. Scheme of Examination

- Internal Assessment
- University Examination

The examination structure shall vary depending the course, however, broadly divided as follows;

Examination/Assessment	All Courses (Except MEC/SEC) Marks	MEC Marks	SEC Marks
Continuous Internal Assessment (CIA)*	50 Marks	25 Marks	100 Marks
Semester End Examination (SEE)	50 Marks	25 Marks	-
Total	100 Marks	50 Marks	100 Marks

*Parameters for CIA

Parameters for the Assessment	All Courses (Except MEC/SEC) Marks	MEC Marks	SEC Marks
Continuous and Comprehensive Assessment (CCA)*	25 Marks	15 Marks	90 Marks
Internal Assessment Test (IAT)*	20 Marks	10 Marks	10 Marks
Total	50 Marks	25 Marks	

Continuous & Comprehensive Assessment (CCA)

The CCA will carry a maximum of 25% weightage (25 marks) of total marks of a course. Before the start of the academic session in each semester, a faculty member should choose for his/her course, minimum of four of the assessment methods.

CCA will be carried out as per the model rubrics enclosed. The rubrics may be changed from time to time based on the new methods of Pedagogy and assessment. The same rubrics will be implemented across all the programs under NEP.

***Internal Assessment Test (IAT)**

Internal Assessment for each course and details for each test are notified well in advance. IAT consists of the following:

	All Courses (Except MEC/SEC) Marks	MEC Marks
I Internal Examination	10 Marks	5 Marks
II Internal Examination	10 Marks	5 Marks
Total	20 Marks	10 Marks

The IAT will carry a maximum of 20% weightage (20 marks) of total marks of a course, under this component, two tests will have to be conducted in a semester and marks of both IAT is to be scaled down to 20 marks. Standard format is enclosed below.

Examination Scheme / Assessment

Question Pattern for the Internal Assessment Test for all the core courses will be as below:

Section A	Objective Questions 5 Questions x 1 mark each	5 Marks
Section B	Analytical Questions/Illustrations/ 2 Questions x 5 marks Case studies/essay type questions Each	10 Marks
Section C	Analytical Questions/Illustrations/ 1 Question x 15 marks Case studies/essay type questions Each	15 Marks
	Total	30 Marks

Question Pattern for the Internal Assessment Test for all the MEC/SEC will be as below

Section A	Objective Questions 5 Questions x 1 mark each	5 Marks
Section B	Analytical Questions/Illustrations/ 3 Questions x 5 marks Case studies/essay type questions Each	15 Marks
	Total	20 Marks

12. Eligibility to appear for University Examination

To be eligible to appear for the University Examination, a candidate must satisfy

the minimum attendance requirements as prescribed in the regulations and secure at least 40% marks in Continuous Internal Assessment.

A candidate shall register for all the courses of a semester when he/she appears for the examination of that semester for the first time.

There shall be examinations at the end of each semester, ordinarily during November/December for odd semesters and during April/May for even semesters, as prescribed in the Scheme of Examinations.

13.Criteria for passing

No candidate shall be declared to have passed the Semester Examination (except in Co- curricular and extracurricular activities) unless he/she obtains not less than 40% marks in the Continuous Internal Assessment and Semester End Examination. If a candidate fails in any course, he/she shall appear for that course in the supplementary examinations conducted within 45 days of regular semester end examination or subsequent regular examinations within the maximum of 7 years from the date of registration for the prescribed course and programs.

14.Grading and Classification

The Semester Grade Point Average (SGPA) is computed from the grades as a measure of the student's performance in a given semester. The SGPA is based on the grades of the current term, while the Cumulative GPA (CGPA) is based on the grades in all courses taken after joining the program of study.

The University may also mention marks obtained in each course and a weighted average of marks based on marks obtained in all the semesters taken together for the benefit of students.

Letter Grade	Grade Poin
O (outstanding)	10
A+ (Excellent)	9
A (Very good)	8

	B+ (Good)	7
B (Above average)	6	
C (Average)	5	
P (Pass)	4	
F (Fail)	0	
Ab (Absent)	0	

When students take audit courses, they may be given pass (P) or fail (F) grade without any credits.

Computation of SGPA and CGPA

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The SGPA is the ratio of the sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$\text{SGPA (Si)} = \sum(C_i \times G_i) / \sum C_i$$

Where C_i is the number of credits of the i th course and G_i is the grade point scored by the student in the i th course.

Example for Computation of SGPA

Semester	Course	Credit	Letter Grade	Grade point	Credit Point (Credit x Grade)
I	Course 1	3	A	8	3 X 8 = 24
I	Course 2	4	B+	7	4 X 7 = 28
I	Course 3	3	B	6	3 X 6 = 18
I	Course 4	3	O	10	3 X 10 = 30
I	Course 5	3	C	5	3 X 5 = 15

I	Course 6	4	B	6	4 X 6 = 24
		20			139
	SGPA				139/20= 6.95

The Cumulative Grade Point Average (CGPA) is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$\text{CGPA} = \sum(C_i \times S_i) / \sum C_i$$

where S_i is the SGPA of the i th semester and C_i is the total number of credits in that semester

Example for Computation of CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credit: 21	Credit: 22	Credit: 25	Credit: 26	Credit: 26	Credit 25
SGPA: 6.9	SGPA: 7.8	SGPA: 5.6	SGPA: 6.0	SGPA: 6.3	SGPA 8.0

$$\text{CGPA} = \mathbf{6.73} \quad (21 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0) / 145$$

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Transcript (Format): Based on the above recommendations on Letter grades, grade points and SGPA and CCPA, the University may issue the transcript for each semester and a consolidated transcript indicating the performance in all semesters.

Note : Students who have already enrolled and are pursuing UG program as per Choice Based Credit System (CBCS) are eligible to pursue 4-year undergraduate program.

15. Declaration of Class : **Refer Point Number 14**

16. Any other information

- Exit Options

Students who opt to exit after completion of the first year and have secured 40 credits will be awarded a UG certificate if, in addition, they complete one vocational course of 4 credits during the summer vacation of the first year. These students are allowed to re-enter the degree program within three years and complete the degree program within the stipulated maximum period of seven years.

Students who opt to exit after completion of the second year and have secured 80 credits will be awarded the UG diploma if, in addition, they complete one vocational course of 4 credits during the summer vacation of the second year. These students are allowed to re-enter within a period of three years and complete the degree program within the maximum period of seven years.

Only students who successfully fulfil these **prerequisite credit and course requirements** are permitted to exit at their chosen level and receive the corresponding certification.

17. Annexures

Blueprint for Theory and Practical Examination

- Question Pattern for the Internal Assessment Test for all the core courses will be as below:

Section A	Objective Questions 5 Questions x 1 mark each	5 Marks
Section B	Analytical Questions/Illustrations/ 2 Questions x 5 marks Case studies/essay type questions Each	10 Marks

Section C	Analytical Questions/Illustrations/ 1 Question x 15 marks Case studies/essay type questions Each	15 Marks
	Total	30 Marks

- Question Pattern for the Internal Assessment Test for all the MEC/SEC will be as below

Section A	Objective Questions 5 Questions x 1 mark each	5 Marks
Section B	Analytical Questions/Illustrations/ 3 Questions x 5 marks Case studies/essay type questions Each	15 Marks
	Total	20 Marks

Semester End Examination (SEE):

- a. Question Pattern for the Semester End Examination **for all Core Courses / DSC/DSE** will be as below

Section A	Objective Questions 15 questions x 1 mark each	15 Marks
Section B	Analytical Questions/Illustrations/ case Studies/essay type questions – Each 3 Questions x 10 marks	30 Marks
Section C	Analytical Questions/Illustrations/ case Studies/essay type questions -Each 2 Questions x 15 marks	30 Marks
	Total*	75 Marks

***Semester End Examination for all Core Courses / DSC/DSE will be conducted out of 75 marks and pro-rated to 50 marks.**

- b. Question Pattern for the Semester End Examination for all MEC will be as below

Section A	Objective Questions 10 questions x 1 mark each	10 Marks
Section B	Analytical Questions/Illustrations/ case Studies/essay type questions – Each 3 Questions x 5 marks	15 Marks
	Total**	25 Marks

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Question paper template for Semester End Examination (SEE) of Core Courses/DSC/DSE

Semester:
Examination, Month/Year:
Paper:
Course Code:

Duration: 3 Hours

Total Marks: 75

Section A

Answer the following Questions (MCQ's)

(15*1=15)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.

Section B

Answer any THREE of the Questions 16.

(3*10=30)

- 17.
- 18.
- 19.
- 20.

Section C

Answer any TWO Questions 21.

(2*15=30)

- 22.
- 23.
- 24.

Question paper template for Semester End Examination (SEE) of MEC Courses

Semester:
Examination, Month/Year:
Paper:
Course Code:

Duration: 1½ Hours
Total Marks: 25

Section A

Answer the following Questions (MCQ's)

(10*1=10) 1.

- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Section B

Answer any three of the Questions

(3*5

=25)

- 11.
- 12.
- 13.
- 14.
- 15.

Logbook template

**THE YENEPOYA INSTITUTE OF
ARTS SCIENCE COMMERCE &
MANAGEMENT**
KULUR MANGAURU-575013
A Constituent unit of Yenepoya (Deemed to be
University)



B.Sc/M.Sc -----

INTERNSHIP LOG BOOK

THE YENEPOYA INSTITUTE OF ARTS SCIENCE COMMERCE & MANAGEMENT

KULUR MANGAURU-575013

A Constituent unit of Yenepoya (Deemed to be
University)



B.Sc/ M.Sc-----

Name :

Registration Number :

Campus ID :

INTERNSHIP LOG BOOK



YENEPLOYA
(DEEMED TO BE UNIVERSITY)

Date:

Check in Time: _____ Checkout time: _____

Name of the Department:

Work Performed/learning Outcomes:

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Signature of Industry Department Head:

Verified by: