Annexure – IV

VIGNAN'S

DEPARTMENT OF CHEMICAL ENGINEERING

CIRCULAR

Date: 07.03.2025

Department of Chemical Engineering is going to conduct Board of Studies (BoS) meeting for the B.Tech programme in Chemical Engineering on 15.03.2025 from 2.00 PM in blended mode. The BoS meeting was held at the office of the Head of the Department, Chemical Engineering Department, First Floor, H-Block, VFSTR. All the members joined through Zoom link: https://us05web.zoom.us/j/86990085532?pwd=hvWmO208IQSygeCPYrvpcuxHdimKv2.1

The members are

1. Dr. Dr. M. Ramesh Naidu, Professor and Head, Chemical Engineering, VFSTR - Chairperson
2. Dr. Nageswara Rao Peela - External Member (Academic)
3. Dr.Dr. Sunil Dhole - External Member (Industry)
4. Dr. T. Subbaiah - Internal Member
5. Dr. P. Ashok Kumar - Nominee (Dean R& D)
6. Dr. P. Bangaraiah - Nominee (Dean-School)
7. Prof. Dr. Venkata Satyanarayana Suggala - Invitee (Academia)
8. Dr. B. Sumalatha Associate Professor, Chemical Engineering - Member Secretary

Agenda of the BoS Meeting:

1. To Discuss and finalize the curriculum structure and credits distribution of B.Tech., Chemical Engineering Programme for the regulation 2025 (R25-C25).
2. To Discuss and finalize the Department elective courses list and stream of B.Tech., Chemical Engineering Programme for the regulation R25-C25.
3. To Discuss about the SDG and IKS components in the syllabus.
4. To approve the R25-C25 assessment schemes of B.Tech, Chemical Engineering Programme and recommend to the Academic Council.
5. NPTEL Courses for even and odd semesters.
6. Any other points with the permission of the Chairperson.

B. Sumalatha

Member Secretary

Ramesh

Chairperson

HEAD
Department of Chemical Engineering
VIGNAN'S FOUNDATION
FOR SCIENCE, TECHNOLOGY & RESEARCH
(Declared to be Deemed University U/S 3 of UGC Act 1956)
VADLAMUDI-522 213, A.P. INDIA

Annexure – V

VIGNAN'S

DEPARTMENT OF CHEMICAL ENGINEERING

Date: 15.03.2025

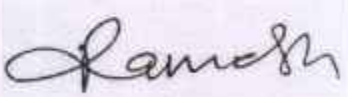
Minutes of Board of Studies Meeting

Department of Chemical Engineering is going to conduct Board of Studies (BoS) meeting for the B.Tech programme in Chemical Engineering on 15.03.2025 from 2.00 PM in blended mode. The BoS meeting was held at the office of the Head of the Department, Chemical Engineering Department, First Floor, H-Block, VFSTR. All the members joined through Zoom link: https://us05web.zoom.us/j/86990085532?pwd=hvWmO208IQSygeCPYrvpcuxHdimKv2.1

Agenda of the BoS Meeting:

1. To Discuss and finalize the curriculum structure and credits distribution of B.Tech., Chemical Engineering Programme for the regulation 2025 (R25-C25).
2. To Discuss and finalize the Department elective courses list and stream of B.Tech., Chemical Engineering Programme for the regulation R25-C25.
3. To Discuss about the SDG and IKS components in the syllabus.
4. To approve the R25-C25 curriculum, syllabus and assessment schemes of B.Tech., Chemical Engineering Programme and recommend to the Academic Council.
5. NPTEL Courses for even and odd semesters.
6. Any other points with the permission of the Chairperson.

The following members were present either thorough offline or online.

S.No.	Name and Designation of the Member	Position	Signature
1.	Dr. M. Ramesh Naidu, Professor and Head, Chemical Engineering Department, VFSTR	Chairperson	
2.	Dr. Nageswara Rao Peela, Professor, Dept. of Chemical Engineering, IIT-Guwahati	External Member (Academic)	Online
3.	Dr. Sunil Dhole, Director, Technorbital Advanced Material Pvt. Ltd., Kanpur	External Member (Industry)	-

4.	Dr. T. Subbaiah	Internal Member	
5.	Dr. P. Ashok Kumar	Nominee (Dean-R&D)	
6.	Dr. P. Bangaraiah	Nominee (Dean-School)	
7.	Prof. Dr. Venkata Satyanarayana Suggala, Professor, Dept. of Chemical Engineering, JNTU-Ananthapur	Invitee	Online
8.	Dr. B. Sumalatha	Member Secretary	B. Sumalatha

The following member have taken leave of absence:

1. Dr.Sunil Dhole, Director, Technorbital Advanced Material Pvt. Ltd., Kanpur

Chairperson Dr. M. Ramesh Naidu, Professor and Head, department of Chemical Engineering, VFSTR initiated the meeting by welcoming and introducing the external members and invitees to the internal members. Chairperson presented about the *NEP 2020 Compliant Regulation - R25-C25* which emphasis on creating *learning centric* (continuous learning and continuous assessment model), offering B.Tech., B.Tech. with Honours / Research Honours / Minor / Add-on Diploma, providing lateral entry and honourable exit.

The following points were discussed in the BoS meeting:

1. Regulation R25-C25.
2. Curriculum structure with credits, credits distribution (L-T-P-SL).
3. Significance of self-learning (SL)
4. 2 Modules, Module-1 is fundamental with 2 units and Module-2 is fundamental with 2 units.
5. Assessment methods (Formative & Summative).
6. Grading Schemes.
7. Department Elective and Honour courses (streams/pools).
8. Open Elective and Minor courses (streams/pools).
9. Information related to NPTEL courses for the Academic Year 2025-26.
10. Creative work-in-Liu-Course work
11. SDG Mapping and incorporation of IKS components
12. Consideration of new program outcomes (POs) as prescribed by the NBA

The following are the observations:

1. Major restructuring has taken place in the curriculum which is oriented towards continuous learning and assessment based on Module structure.
2. Major reformation has taken place in the curriculum by offering Honours/Specialization degree or Minor degree thorough 16 more credits with additional courses.
3. R25-C25 curriculum structure including list of professional core, department elective, open elective, Minor, Honour, NPTEL courses of B.Tech., Chemical Engineering programme. **(Appendix - I)**
4. The curriculum is encompassing the courses that enable employability or entrepreneurship or skill development, provided in **Appendix - II**.
5. Total average percentage of syllabus revised was **23%** compared to previous curriculum provided in **Appendix - III**.
6. The significant changes are made in the content of all courses and hence the courses are considered as new courses provided in **Appendix - IV**.
7. NPTEL Courses for even and odd semesters
8. Feedback from various stakeholders are incorporated appropriately in the R25-C25 curriculum.

The following improvements are suggested: (Action Points)

1. External members suggested creating more awareness about IKS among faculty members by conducting either department workshops or institute-level workshops
2. **Indian Knowledge System (IKS)** components to be incorporated in the relevant courses.
3. The courses in the curriculum to be mapped with the **Sustainable Development Goals (SDG)**
4. Prof. Satyanarayana suggested the inclusion of Chemical Process Flow sheeting as a subject.
5. Dr. Nageswara Rao recommended incorporating Zero Liquid Discharge (ZLD), Common Effluent Treatment Plants (CETPs), and Cleaner Production Technology (CPT) along with Best Available Techniques (BAT) into the Industrial Effluent Methods subject.
6. Prof. Satyanarayana also suggested the inclusion of Environmental, Social, and Governance (ESG) concepts in the Health, Environment, and Safety Management course.
7. Prof. Satyanarayana suggested that, if feasible, an Honors course in Process Engineering / Process Safety may be included in the C-24 / R-25 curriculum.

The following recommendations and approvals are made after the discussion:

1. BoS Members approved the revised regulations, curriculum structure, syllabus, and assessment schemes of the B.Tech., Chemical Engineering programme, and it follows the NEP 2020.
2. The details of the Department elective courses of B.Tech. Chemical Engineering Programme for the regulation R25-C25 is approved.
3. NPTEL courses are approved for the Academic Year 2025-26.
4. The Process Engineering Honors program has been designed and implemented starting from the C-24 and R-25 curricula.

There being no further points for discussion, the Chairperson thanked all the external, internal, invited members and announced that the meeting was concluded.

B. Gowralatha

Member Secretary

Chairperson

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DEPARTMENT OF CHEMICAL ENGINEERING

APPENDIX I

B. Tech in Chemical Engineering Course Structure

I Year I Semester (MPC Stream)

Course Code	Course Title	L	T	P	SL	C	Course category
25MT103	Linear Algebra	3	2	0	3	4	Basic Sciences
25MT105	Calculus and Ordinary Differential Equations						
25PY101	Engineering Physics	3	0	2	3	4	Basic Sciences
25CT102	Engineering Chemistry						
25EE101	Basic of Electrical & Electronics Engineering	2	0	2	2	3	Basic Engineering
25ME101	Engineering Drawing						
25CS101	Programming in C	2	0	4	2	4	Basic Engineering
25EN103	English Proficiency and Communication Skills (PET)	0	0	2	0	1	Humanities
25CT101	Environmental Studies	2	2	0	2	3	Basic Sciences
25MS101	Management Studies						Humanities
						1	Binary graded
						1	Binary graded
						1	Binary graded
Total						22	

I Year II Semester (MPC Stream)

Course Code	Course Title	L	T	P	SL	C	Course category
25MT103	Linear Algebra	3	2	0	3	4	Basic Sciences
25MT105	Calculus and Ordinary Differential Equations						
25PY101	Engineering Physics	3	0	2	3	4	Basic Sciences
25CT102	Engineering Chemistry						
25EE101	Basic of Electrical & Electronics Engineering	2	0	2	2	3	Basic Engineering
25ME101	Engineering Drawing						
25CS102	Problem Solving through Python	2	0	2	2	3	Basic Engineering
25EN104	Technical English Communication	1	0	2	1	2	Humanities

25CT101	Environmental Studies	2	2	0	2	3	Basic Sciences
25MS101	Management Studies						Humanities
25CY101	Cyber security	0	1	1	0	1	Basic Engineering
						1	Binary graded
						1	Binary graded
						1	Binary graded
						1	Binary graded
Total						**22**	

II Year I Semester

Course Code	Course Title	L	T	P	SL	C	Course category
25MT202	Engineering Statistics and Probability Applications	3	2	0	3	4	Basic Sciences
25CH201	Analytical Chemistry	2	2	0	2	3	Basic Sciences
25CS201	Data Structures	2	2	2	2	4	Basic Engineering
25CH202	Design Thinking and Engineering Orientation	0	0	2	0	1	Basic Engineering
25CH203	Momentum Transfer	2	2	2	2	4	Professional Core-1
25CH204	Chemical Engineering Thermodynamics - 1	2	2	0	2	3	Professional Core-2
25CH205	Chemical Process Calculations	2	4	0	2	4	Professional Core-3
	Sub-Total					23	
	Total					**23**	

II Year II Semester

Course Code	Course Title	L	T	P	SL	C	Course category
25CH206	Transforms and Numerical Techniques	2	2	0	2	3	Basic Sciences
25CH801	Industry – Interface (I^2) Course					1	Dept. Elective-1
	Open Elective-1					3	Open Elective-1
25CH207	Process Heat Transfer	2	2	2	2	4	Professional Core-4
25CH208	Chemical Reaction Engineering – I	2	2	2	2	4	Professional Core-5
25CH209	Chemical Engineering Thermodynamics - II	2	2	0	2	3	Professional Core-6

25CH210	Mechanical Unit Operations	2	2	2	2	4	Professional Core-7
25CH211	Field Project	0	0	2	0	1	Project
	Total					**23**	

III Year I Semester

Course Code	Course Title	L	T	P	SL	C	Course category
25EN301	Soft Skills Laboratory	0	0	2	0	1	Humanities
25TP301	Quantitative Aptitude and Logical Reasoning	0	2	0	0	1	Humanities
	Dept. Elective-2					3	Dept. Elective-2
25CH301	Mass Transfer Operations - I	2	2	2	2	4	Professional Core-8
25CH302	Chemical Reaction Engineering – II	2	4	0	2	4	Professional Core-9
25CH303	Chemical Engineering Process Design and Economics	2	4	0	2	4	Professional Core-10
25CH304	Process Dynamics and Control	2	2	2	2	4	Professional Core-11
	Sub-Total					21	
	Honours/Minors (Add-on)					4	Honours/Minors
	Total					**25**	

III Year II Semester

Course Code	Course Title	L	T	P	SL	C	Course category
25EN302	Professional Communication Skills	0	0	2	0	1	Humanities
	Dept. Elective-3					4	Dept. Elective-3
	Dept. Elective-4					4	Dept. Elective-4
	Open Elective-2					3	Open Elective-2
25CH305	Chemical Technology	2	2	2	2	4	Professional Core-12
25CH306	Mass Transfer Operations – II	2	2	2	2	4	Professional Core-13
25CH307	Inter-departmental Project	0	0	2	2	1	Project

	Sub-Total					21	
	Honours/Minors (Add-on)					4	Honours/Minors
	Total					**25**	

IV Year I Semester

Course Code	Course Title	L	T	P	SL	C	Course category
25CH401	Professional Ethics for chemical Engineers	1	0	2	1	2	Humanities
	Dept. Elective-5					4	Dept. Elective-5
	Dept. Elective-6					4	Dept. Elective-6
25CH802	Work-in-Lieu of Course					4*	Dept. Elective-7
	Open Elective-3					3	Open Elective-3
	Sub-Total					17	
	Honours/Minors (Add-on)					4	Honours/Minors
	Total					**21**	

IV Year II Semester

Course Code	Course Title	L	T	P	SL	C	Course category
25CH402	Internship	0	2	22	0	12	Project
25CH403	Project						
	Sub-Total	0	2	22	0	12	
	Honours/Minors (Add-on)					4	Honours/Minors
	Total					**16**	

LIST OF BINARY GRADED COURSES

Course Code	Course Title	L	T	P	SL	C
25SS101	Constitution of India	0	2	0	0	1
22SA103	Physical Fitness	0	0	2	0	1
22SA104	Life Skills	0	0	2	0	1
22SA102	Self-Understanding and Gender Sensitization	0	2	0	0	1
22EN102	Universal Human Values	0	2	0	0	1
22SS102	Indian Knowledge Systems	0	2	0	0	1
22SS103	Indian Culture and Heritage	0	2	0	0	1
22SS104	Stories of Indian Independence	0	2	0	0	1
22SS105	Gerentology	0	2	0	0	1
22ME102	Do it yourself	0	0	2	0	1

I. LIST OF DEPARTMENT ELECTIVE COURSES

Course Code	Course Title	L	T	P	SL	C
25CH803	Environmental Engineering	2	2	0	2	3
25CH804	Health, Environment and Safety Management	2	2	0	2	3
25CH805	Industrial Instrumentation	2	2	0	2	3
25CH806	Environmental Regulations and Impact Analysis	2	4	0	2	4
25CH807	Industrial Effluent Treatment Methods	2	4	0	2	4
25CH808	Solid Waste Management and Treatment	2	4	0	2	4
25CH809	Conventional and Non-Conventional Energy Resources	2	4	0	2	4
25CH810	Energy Management and Auditing	2	4	0	2	4
25CH811	Green Fuels	2	4	0	2	4
25CH812	Waste Heat Recovery	2	4	0	2	4
25CH813	Waste to Energy Conversion	2	4	0	2	4
25CH814	Industrial Safety Engineering	2	4	0	2	4
25CH815	Natural Gas Engineering and Energy Resources Management	2	4	0	2	4

25CH816	Petrochemicals	2	4	0	2	4
25CH817	Petroleum Refinery Engineering	2	4	0	2	4
25CH818	Surface Production Operation	2	4	0	2	4
25CH819	Aspen Plus: Chemical Engineering Application	2	4	0	2	4
25CH820	Computational Fluid Dynamics	2	4	0	2	4
25CH821	Fundamentals of Nanotechnology	2	4	0	2	4
25CH822	MATLAB Programming for Chemical Engineers	2	4	0	2	4
25CH823	Novel Separation Processes	2	4	0	2	4
25CH824	Process Modelling, Simulation and Optimization Techniques	2	4	0	2	4
25CH285	Transport Phenomena	2	4	0	2	4
25CH826	Analysis of Techno-Economic Feasibility of the Chemical Process Plant	0	6	0	0	3
25CH827	Chemical Process Flow sheeting	2	2	2	2	4

L=Lecture; T= Tutorial; P= Practical; SL= Self Learning; C=Credits

V. List of SWAYAM – NPTEL Courses

S. No	Course name with NPTEL Code	NPTEL Course offered by	Credits
1.	noc25-ch06 Aspen Plus Simulation Software - A Basic Course for Beginners	**IIT, Guwahati**	**3**
2.	noc25-ch09 Biomass Conversion and Biorefinery	**IIT, Roorkee**	**3**
3.	noc25-ch14 Chemical Process Instrumentation	**IIT, Guwahati**	**3**
4.	noc25-ch16 Chemical Process Utilities	**IIT, Roorkee**	**3**
5.	noc25-ch24 Environmental Quality Monitoring & Analysis	**IIT, Madras**	**3**
6.	noc25-ch37 Physico-chemical processes for wastewater treatment	**IIT, Roorkee**	**3**
7.	noc25-ch39 Process Equipment Design	**IIT, Roorkee**	**3**
8.	noc25-ch40 Renewable Energy Engineering: Solar, Wind And Biomass Energy System	**IIT, Guwahati**	**3**
9.	noc25-ch46 Waste to Energy Conversion	**IIT, Roorkee**	**3**

10.	noc25-ce63 Water and Waste Water Treatment	**IIT, Roorkee**	3
11.	noc25-ce04 Air Pollution and Control	**IIT, Roorkee**	3
12.	noc25-ch29 Matlab Programming for Numerical Computation	**IIT, Madras**	3
13.	noc24-ch52 Matlab-Based Programming Lab in Chemical Engineering	**IIT, Kharagpur**	3
14.	noc24-ch74 Chemical Process Safety	**IIT, Roorkee**	3
15.	noc24-ch58 Chemical Process Intensification	**IIT, Guwahati**	3
16.	noc24-ch71 Aspen Plus® Simulation Software - A Basic Course For Beginners	**IIT, Guwahati**	3
17.	noc24-ch73 Hydrogen Energy: Production, Storage, Transportation and Safety	**IIT, Bombay**	3
18.	noc24-ce105 Wastewater Treatment and Recycling	**IIT, Kharagpur**	3
19.	noc24-ch53 Basic Environmental Engineering and Pollution Abatement	**IIT, Roorkee**	3
20.	noc24-ce102 Indoor Air Pollution: Sources, Effects, Monitoring, Control and Modeling	**IIT, Hyderabad**	3

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DEPARTMENT OF CHEMICAL ENGINEERING

APPENDIX II

List of Courses that Enables Employability or Entrepreneurship or Skill Development

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill Development
1	25MT103	Linear Algebra	2025	Skill Development: Develop analytical and problem-solving skills for engineering and scientific applications using matrices, vectors, and linear transformations.
2	25MT105	Calculus and Ordinary Differential Equations	2025	Skill Development: Apply calculus and differential equations for solving engineering and process-related mathematical problems.
3	25PY101	Engineering Physics	2025	Employability: Gain knowledge of physical principles and modern engineering applications relevant to industrial technologies.
4	25CT102	Engineering Chemistry	2025	Skill Development: Understand chemical principles, material properties, corrosion control, and water treatment techniques used in industries.
5	25EE101	Basics of Electrical & Electronics Engineering	2025	Skill Development: Develop basic knowledge of electrical circuits, electronic devices, and industrial electrical systems.

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill Development
6	25ME101	Engineering Drawing	2025	Skill Development: Acquire drafting and visualization skills for engineering design and technical communication.
7	25CS101	Programming in C	2025	Skill Development: Develop programming and logical thinking skills using C language for engineering problem solving.
8	25EN103	English Proficiency and Communication Skills (PET)	2025	Employability: Improve communication, listening, speaking, reading, and writing skills for professional and academic environments.
9	25CT101	Environmental Studies	2025	Employability: Understand environmental sustainability, pollution control, and ecological conservation practices.
10	25MS101	Management Studies	2025	Entrepreneurship: Develop managerial, leadership, and decision-making skills required for industrial and business management.
11	25CS102	Problem Solving through Python	2025	Skill Development: Learn problem-solving techniques and programming skills using Python for engineering applications.
12	25EN104	Technical English Communication	2025	Employability: Enhance technical communication, presentation, and professional writing skills.

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill Development
13	25CY101	Cyber Security	2025	Employability: Understand cyber threats, data protection, and safe digital practices in industrial and organizational systems.
14	25MT202	Engineering Statistics and Probability Applications	2026	Skill Development: Apply statistical and probabilistic methods for data analysis and engineering decision-making.
15	25CH201	Analytical Chemistry	2026	Skill Development: Gain practical knowledge of chemical analysis techniques and instrumentation used in industries.
16	25CS201	Data Structures	2026	Skill Development: Develop programming efficiency and computational problem-solving skills using data structures.
17	25CH202	Design Thinking and Engineering Orientation	2026	Entrepreneurship: Foster innovation, creativity, and design thinking for solving engineering and societal problems.
18	25CH203	Momentum Transfer	2026	Skill Development: Understand fluid flow behavior and transport phenomena in chemical engineering operations.
19	25CH204	Chemical Engineering Thermodynamics – I	2026	Skill Development: Apply thermodynamic principles to chemical processes and energy systems.

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill Development
20	25CH205	Chemical Process Calculations	2026	Skill Development: Perform material and energy balance calculations for chemical process industries.
21	25CH206	Transforms and Numerical Techniques	2026	Skill Development: Apply numerical methods and transforms for solving engineering and mathematical problems.
22	25CH804	Industry–Interface (I2) Course	2026	Employability: Provide industrial exposure and practical understanding of workplace technologies and practices.
23	—	Open Elective–1	2026	Skill Development: Enhance interdisciplinary knowledge and professional competencies.
24	25CH207	Process Heat Transfer	2026	Skill Development: Understand heat transfer mechanisms and design of thermal equipment used in process industries.
25	25CH208	Chemical Reaction Engineering – I	2026	Skill Development: Analyze chemical reaction kinetics and reactor performance in process industries.
26	25CH209	Chemical Engineering Thermodynamics – II	2026	Skill Development: Apply advanced thermodynamic concepts to phase and reaction equilibria in chemical systems.

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill Development
27	25CH210	Mechanical Unit Operations	2026	Skill Development: Learn particle and fluid handling operations used in chemical and allied industries.
28	25CH211	Field Project	2026	Employability: Gain practical field experience and industrial problem-solving abilities.
29	25EN301	Soft Skills Laboratory	2027	Employability: Develop teamwork, leadership, interpersonal, and communication skills for professional growth.
30	25TP301	Quantitative Aptitude and Logical Reasoning	2027	Employability: Improve aptitude, reasoning, and analytical skills for competitive exams and placements.
31	25CH301	Mass Transfer Operations – I	2027	Skill Development: Understand diffusion and separation processes used in chemical industries.
32	25CH302	Chemical Reaction Engineering – II	2027	Skill Development: Analyze advanced reactor design and non-ideal reactor behavior.
33	25CH303	Chemical Engineering Process Design and Economics	2027	Entrepreneurship: Develop process design, economic evaluation, and project feasibility analysis skills.
34	25CH304	Process Dynamics and Control	2027	Skill Development: Understand process control strategies and dynamic behavior of industrial systems.

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill Development
35	25EN302	Professional Communication Skills	2027	Employability: Enhance professional interaction, presentation, and workplace communication abilities.
36	25CH305	Chemical Technology	2027	Employability: Understand industrial manufacturing processes and applications of chemical products.
37	25CH306	Mass Transfer Operations – II	2027	Skill Development: Learn advanced separation techniques and industrial mass transfer equipment operations.
38	25CH307	Inter-departmental Project	2027	Entrepreneurship: Promote interdisciplinary innovation, teamwork, and project management skills.
39	25CH401	Professional Ethics for Chemical Engineers	2028	Employability: Understand professional ethics, safety responsibilities, and sustainable engineering practices.
40	25CH402	Internship	2028	Employability: Gain industrial training, practical exposure, and professional experience in chemical engineering industries.
41	25CH403	Project	2028	Skill Development: Apply engineering knowledge and research skills to solve real-world industrial problems.

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill Development
42	25CH803	Environmental Engineering	2027	Employability: Learn pollution prevention and environmental management practices for sustainable industries.
43	25CH804	Health, Environment and Safety Management	2026	Employability: Develop safety management and occupational health skills for industrial workplaces.
44	25CH805	Industrial Instrumentation	2026	Skill Development: Understand industrial measurement, instrumentation, and process monitoring systems.
45	25CH806	Environmental Regulations and Impact Analysis	2026	Employability: Gain knowledge of environmental laws, standards, and impact assessment procedures.
46	25CH807	Industrial Effluent Treatment Methods	2026	Skill Development: Learn treatment technologies for industrial wastewater and pollution control.
47	25CH808	Solid Waste Management and Treatment	2027	Employability: Understand waste handling, recycling, and disposal techniques for sustainable management.
48	25CH809	Conventional and Non-Conventional Energy Resources	2027	Employability: Gain knowledge of renewable and conventional energy technologies and applications.

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill Development
49	25CH810	Energy Management and Auditing	2027	Employability: Develop energy conservation and auditing skills for industrial energy optimization.
50	25CH811	Green Fuels	2027	Entrepreneurship: Explore sustainable fuel technologies and opportunities in renewable energy sectors.
51	25CH812	Waste Heat Recovery	2027	Skill Development: Learn techniques for energy recovery and thermal efficiency improvement in industries.
52	25CH813	Waste to Energy Conversion	2027	Entrepreneurship: Understand waste utilization technologies for sustainable energy generation.
53	25CH814	Industrial Safety Engineering	2027	Employability: Develop knowledge of industrial hazards, risk assessment, and accident prevention techniques.
54	25CH815	Natural Gas Engineering and Energy Resources Management	2027	Employability: Learn natural gas processing, transportation, and energy resource management concepts.
55	25CH816	Petrochemicals	2027	Employability: Understand petrochemical production processes and industrial applications.
56	25CH817	Petroleum Refinery Engineering	2027	Employability: Gain knowledge of refinery operations, petroleum

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill Development
				processing, and product manufacturing.
57	25CH818	Surface Production Operation	2027	Skill Development: Understand oil and gas surface production systems and operational practices.
58	25CH819	Aspen Plus: Chemical Engineering Application	2027	Skill Development: Develop simulation and process modeling skills using Aspen Plus software.
59	25CH820	Computational Fluid Dynamics	2027	Skill Development: Apply CFD techniques for analyzing fluid flow and heat transfer problems.
60	25CH821	Fundamentals of Nanotechnology	2027	Employability: Gain knowledge of nanomaterials and nanotechnology applications in modern industries.
61	25CH822	MATLAB Programming for Chemical Engineers	2028	Skill Development: Develop computational and programming skills using MATLAB for engineering analysis.
62	25CH823	Novel Separation Processes	2028	Skill Development: Learn advanced and emerging separation technologies used in process industries.
63	25CH824	Process Modelling, Simulation and Optimization Techniques	2028	Skill Development: Apply modeling, simulation, and optimization tools for process improvement and design.

S. No.	Course Code	Course Title	Year of Introduction	Employability / Entrepreneurship / Skill Development
64	25CH825	Transport Phenomena	2028	Skill Development: Understand momentum, heat, and mass transfer principles in engineering systems.
65	25CH826	Analysis of Techno-Economic Feasibility of the Chemical Process Plant	2028	Entrepreneurship: Evaluate technical and economic feasibility of chemical process plants and projects.
66	25CH827	Chemical Process Flow Sheeting	2028	Skill Development: Develop process flow diagram preparation and process integration skills for industries.

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APPENDIX III

Comparison of Course Contents between R25-C25 and R22-C22/C24 Curriculums

S. No	Course Code	Course Title	% Changes	Justification for the changes
1	25CH202	Design Thinking and Engineering Orientation	10%	Updated syllabus with IKS and SGDs
2	25CH203	Momentum Transfer	30%	Updated syllabus with IKS integration and enhanced fluid flow applications.
3	25CH204	Chemical Engineering Thermodynamics – I	25%	Added SDG/IKS components and revised thermodynamic cycles/applications.
4	25CH205	Chemical Process Calculations	25%	Expanded material and energy balance problems including recycle, bypass and purge systems.
5	25CH206	Transforms and Numerical Techniques	40%	Numerical methods and chemical engineering applications significantly enhanced.
6	25CH207	Process Heat Transfer	30%	Updated design and performance analysis of heat transfer equipment.
7	25CH208	Chemical Reaction Engineering – I	20%	Refined reactor design and kinetic modeling topics.
8	25CH209	Chemical Engineering Thermodynamics – II	25%	Advanced equilibrium and solution thermodynamics strengthened.
9	25CH210	Mechanical Unit Operations	30%	Improved industrial applications and equipment design coverage.
10	25CH301	Mass Transfer Operations – I	25%	Enhanced separation process concepts and practical applications.
11	25CH302	Chemical Engineering Process Design and Economics	35%	Greater emphasis on economic evaluation and process design methodology.

12	25CH304	Process Dynamics and Control	30%	Added modern control strategies and modeling practices.
13	25CH305	Chemical Technology	40%	Industry-oriented process technologies and case studies incorporated.
14	25CH306	Mass Transfer Operations – II	25%	Advanced separation techniques and design aspects updated.
15	25CH401	Professional Ethics for Chemical Engineers	15%	Updated with ethics, sustainability and professional responsibility aspects.
16	25CH803	Environmental Engineering	10%	Minor restructuring in course framework and credit distribution for better alignment with sustainability-oriented practices.
17	25CH804	Health, Environment and Safety Management	15%	Updated industrial safety practices and environmental compliance aspects are included.
18	25CH805	Industrial Instrumentation	20%	Modern instrumentation concepts and process automation applications are strengthened.
19	25CH806	Environmental Regulations and Impact Analysis	25%	Updated environmental regulations, compliance standards, and industrial case studies are incorporated.
20	25CH807	Industrial Effluent Treatment Methods	20%	Advanced treatment technologies and industrial wastewater management practices are added.
21	25CH808	Solid Waste Management and Treatment	20%	Emphasis added on sustainable waste handling and circular economy concepts.
22	25CH8096	Conventional and Non-Conventional Energy Resources	15%	Renewable energy technologies and energy transition topics are strengthened.
23	25CH810	Energy Management and Auditing	10%	Minor updates introduced in industrial energy auditing methodologies and standards.
24	25CH811	Green Fuels	20%	Recent developments in biofuels, hydrogen fuels, and sustainable energy systems are included.
25	25CH812	Waste Heat Recovery	15%	Industrial energy recovery systems and efficiency improvement techniques are enhanced.
26	25CH813	Waste to Energy Conversion	20%	Emerging waste-to-energy technologies and environmental applications are added.

27	25CH814	Industrial Safety Engineering	15%	Updated industrial safety regulations and hazard analysis techniques are incorporated.
28	25CH815	Natural Gas Engineering and Energy Resources Management	20%	Enhanced coverage on LNG systems, energy management, and modern gas processing technologies.
29	25CH816	Petrochemicals	10%	Minor revision with updated industrial applications and process trends.
30	25CH817	Petroleum Refinery Engineering	15%	Refinery process optimization and cleaner fuel technologies are included.
31	25CH818	Surface Production Operation	10%	Minor updates with industrial field operation practices and equipment handling.
32	25CH819	Aspen Plus: Chemical Engineering Application	25%	Additional simulation-based industrial case studies and process optimization exercises are included.
33	25CH820	Computational Fluid Dynamics	20%	Updated numerical simulation techniques and engineering applications are introduced.
34	25CH821	Fundamentals of Nanotechnology	15%	Recent advancements in nanomaterials and industrial applications are incorporated.
35	25CH822	MATLAB Programming for Chemical Engineers	20%	AI-assisted computation, modelling, and process analysis examples are strengthened.
36	25CH823	Novel Separation Processes	25%	Emerging membrane and hybrid separation technologies are added with industrial case studies.
37	25CH824	Process Modelling, Simulation and Optimization Techniques	30%	More focus on simulation tools, optimization methods, and process intensification techniques.
38	25CH825	Transport Phenomena	10%	Minor refinement in transport analysis and application-oriented problems.
39	25CH826	Analysis of Techno-Economic Feasibility of the Chemical Process Plant	5%	Very minimal modifications in techno-economic evaluation methods and industrial costing.

40	25CH827	Chemical Process Flow Sheeting	100%	Newly introduced course focusing on industrial process flow diagram development, process integration, and simulation practices based on industrial needs.

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APPENDIX IV

List of New Courses in the R25-C25 Curriculum

S. No.	Course Code	Course Title	% of Change	Justification for the Changes
1.	25CH203	Momentum Transfer	30%	Updated syllabus with IKS integration and enhanced fluid flow applications.
2	25CH204	Chemical Engineering Thermodynamics – I	25%	Added SDG/IKS components and revised thermodynamic cycles/applications.
3	25CH205	Chemical Process Calculations	25%	Expanded material and energy balance problems including recycle, bypass and purge systems.
4	25CH206	Transforms and Numerical Techniques	40%	Numerical methods and chemical engineering applications significantly enhanced.
5	25CH207	Process Heat Transfer	30%	Updated design and performance analysis of heat transfer equipment.
6	25CH208	Chemical Engineering Thermodynamics – II	25%	Advanced equilibrium and solution thermodynamics strengthened.
7	25CH209	Mechanical Unit Operations	30%	Improved industrial applications and equipment design coverage.
8	25CH301	Mass Transfer Operations – I	25%	Enhanced separation process concepts and practical applications.
9	25CH303	Chemical Engineering Process Design and Economics	35%	Greater emphasis on economic evaluation and process design methodology.
10	25CH304	Process Dynamics and Control	30%	Added modern control strategies and modeling practices.
11	25CH305	Chemical Technology	40%	Industry-oriented process technologies and case studies incorporated.

12	25CH306	Mass Transfer Operations – II	25%	Advanced separation techniques and design aspects updated.
13	25CH806	Environmental Regulations and Impact Analysis	25%	Updated environmental regulations, compliance standards, and industrial case studies are incorporated.
14	25CH819	Aspen Plus: Chemical Engineering Application	25%	Additional simulation-based industrial case studies and process optimization exercises are included.
15	25CH823	Novel Separation Processes	25%	Emerging membrane and hybrid separation technologies are added with industrial case studies.
16	25CH824	Process Modelling, Simulation and Optimization Techniques	30%	More focus on simulation tools, optimization methods, and process intensification techniques.
17	25CH827	Chemical Process Flow sheeting	100%	This subject is added to help students learn how chemical processes work in industries, how different equipment are connected, and how to draw process flow diagrams. It also improves practical skills and prepares students for industrial jobs.

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APPENDIX V

I. Details of IKS Components Incorporated in R25-C25 Curriculum

Course Type	Total number of Courses	Number of Courses Incorporating IKS	Percentage
Professional Core	13	13	100%
Department Electives	25	25	100%
Total	**38**	**38**	-

II. Details of IKS Components Incorporated in R25-C25 Curriculum

Course Code	Course Title	Type	Module	IKS Components
25CH202	Design Thinking and Engineering Orientation	Basic Engineering	M2(U1)	Innovation and indigenous problem-solving approaches
25CH203	Momentum Transfer	Professional Core	M2(U1,U3)	Jala Yantra and traditional fluid-flow concepts
25CH204	Chemical Engineering Thermodynamics – I	Professional Core	M1(U2),M2(U3)	Agni Tattva and Pancha Mahabhuta theory
25CH205	Chemical Process Calculations	Professional Core	M2(U2)	Samatva (balance and equilibrium concepts)
25CH206	Transforms and Numerical Techniques	Basic Sciences	M2(U2,U3)	Aryabhata algorithms and Rasashastra applications
25CH207	Process Heat Transfer	Professional Core	M1(U1)	Traditional heat-processing principles
	Professional Ethics for Chemical Engineers	Humanities	M1(U1)	Dharma-based ethics
25CH209	Chemical Engineering Thermodynamics – II	Professional Core	M1(U2)	Prakriti–Purusha Principle

25CH304	Process Dynamics and Control	Professional Core	M1(U1)	Aryabhata, Bhaskara
25CH305	Chemical Technology	Professional Core	M1(U1, U2), M2(U1,U2)	Sajji-Kshaar, Gandhaka, Chunam, Taila
25CH306	Mass Transfer Operations – II	Professional Core	M1(U1,U2), M2(U1,U2,U3)	Patan Yantra, Adhibhautika, Patan Yantra, Para Nisindan, Adhibhautika
25CH803	Environmental Engineering	Dept. Elective	M1 (U1, U2)	• Ancient Indian water purification methods • Traditional ecological conservation practices
25CH804	Health, Environment and Safety Management	Dept. Elective	M2 (U1)	•Ayurveda-based occupational health concepts • Ancient Indian safety and wellness practices
25CH805	Industrial Instrumentation	Dept. Elective	M1 (U2)	Nyaya and Vaisheshika principles for logical measurement and observation
25CH806	Environmental Regulations and Impact Analysis	Dept. Elective	M2 (U1, U2)	Traditional Indian environmental ethics and sustainable living concepts
25CH807	Industrial Effluent Treatment Methods	Dept. Elective	M1 (U1)	Ancient Indian wastewater management and natural filtration systems
25CH808	Solid Waste Management and Treatment	Dept. Elective	M2 (U2)	Traditional Indian waste reuse and recycling practices
25CH809	Conventional and Non-Conventional Energy Resources	Dept. Elective	M1 (U1, U2)	Ancient Indian renewable energy utilization methods • Sustainable energy concepts from Vedic practices
25CH810	Energy Management and Auditing	Dept. Elective	M2 (U1)	Indian traditional energy conservation methods in architecture and metallurgy

25CH811	Green Fuels	Dept. Elective	M1 (U2)	Traditional biofuel preparation methods and biomass utilization
25CH812	Waste Heat Recovery	Dept. Elective	M2 (U1)	Ancient Indian furnace and thermal efficiency practices
25CH813	Waste to Energy Conversion	Dept. Elective	M2 (U2)	Traditional biomass conversion and energy recovery methods
25CH814	Industrial Safety Engineering	Dept. Elective	M1 (U1)	Ancient Indian industrial safety and fire protection concepts
25CH815	Natural Gas Engineering and Energy Resources Management	Dept. Elective	M2 (U1, U2)	Traditional natural resource management approaches in India
25CH816	Petrochemicals	Dept. Elective	M1 (U2)	Ancient Indian distillation and extraction techniques
25CH817	Petroleum Refinery Engineering	Dept. Elective	M2 (U1)	Indigenous oil extraction and purification practices
25CH818	Surface Production Operation	Dept. Elective	M1 (U1)	Ancient Indian mining and production methodologies
25CH819	Aspen Plus: Chemical Engineering Application	Dept. Elective	M2 (U2)	Traditional Indian process optimization concepts in metallurgy and chemical processing
25CH820	Computational Fluid Dynamics	Dept. Elective	M1 (U1)	Ancient Indian mathematical approaches for fluid flow and motion analysis
25CH821	Fundamentals of Nanotechnology	Dept. Elective	M2 (U1)	Nanoparticle usage concepts in Ayurveda and ancient metallurgy
25CH822	MATLAB Programming for Chemical Engineers	Dept. Elective	M1 (U2)	Panini's rule-based systems and algorithmic thinking

25CH823	Novel Separation Processes	Dept. Elective	M2 (U2)	Ancient Indian separation and purification methods used in Rasashastra
25CH824	Process Modelling, Simulation and Optimization Techniques	Dept. Elective	M1 (U1, U2)	Kerala School mathematical modelling approaches • Indian computational traditions
25CH825	Transport Phenomena	Dept. Elective	M2 (U1)	Ancient Indian concepts of heat, mass, and fluid transport in metallurgy
25CH826	Analysis of Techno-Economic Feasibility of the Chemical Process Plant	Dept. Elective	M2 (U2)	Arthashastra principles related to industrial economics and resource management
25CH827	Chemical Process Flow Sheeting	Dept. Elective	M1 (U1, U2)	Ancient Indian systematic process planning and workflow representation methods

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APPENDIX VI

I. Details of SDG Mapped Courses in R25-C25 Curriculum

Course Type	Total number of Courses	Number of Courses Mapped with SDGs	Percentage
Professional Core	13	30	100%
Department Electives	25	25	100%
Total	84	84	-

II. List of R25-C25 Courses Mapped with SDGs along with Justification

Course Code	Course Title	Type	SDGs	Justification
25CH202	Design Thinking and Engineering Orientation	Basic Engineering	3,4,8,9,11,12	Promotes innovation and quality education
25CH203	Momentum Transfer	Professional Core	3,4,6,7,9,12	Efficient resource utilization and industrial sustainability
25CH204	Chemical Engineering Thermodynamics-I	Professional Core	4,7,9,12	Energy efficiency and sustainable engineering
25CH205	Chemical Process Calculations	Professional Core	3,4,6,9,12,13	Process optimization and resource conservation
25CH206	Transforms and Numerical Techniques	Basic Sciences	4,7,9,12,13	Computational skills and innovation
	Professional Ethics for Chemical Engineers	Humanities	4,6,11,12,13,16	Ethical practice and responsible engineering
25CH209	Chemical Engineering Thermodynamics-II	Professional Core	3,4,7,9,12,13	Energy efficiency and sustainable engineering
25CH301	Mass Transfer Operations – I	Professional Core	2,6,9,13	Contributes to water treatment, pollution control, and efficient separation processes.

25CH303	Chemical Engineering Process Design and Economics	Professional Core	4,8,9,12,16	Encourages sustainable plant design, economic growth, and responsible production.
25CH304	Process Dynamics and Control	Professional Core	4,7,9,12	Improves process efficiency, safety, automation, and resource optimization.
25CH305	Chemical Technology	Professional Core	3,6,7,9	Focuses on sustainable industrial technologies and environmentally responsible manufacturing.
25CH306	Mass Transfer Operations – II	Professional Core	2,6,9,13	Supports advanced separation technologies for cleaner production and resource recovery.
25CH803	Environmental Engineering	Dept. Elective	3,4,7,9,12,13	Focuses on water treatment, pollution control, environmental sustainability, and ecosystem protection.
25CH804	Health, Environment and Safety Management	Dept. Elective	3,4,7,8,9,11,12,13,17	Promotes occupational health, industrial safety, and sustainable workplace practices.
25CH805	Industrial Instrumentation	Dept. Elective	4,7,9,12,13	Supports industrial automation, efficient monitoring, and sustainable industrial operations.
25CH806	Environmental Regulations and Impact Analysis	Dept. Elective	3,4,7,9,12,13	Emphasizes environmental compliance, sustainable policy implementation, and responsible industrial practices.
25CH807	Industrial Effluent Treatment Methods	Dept. Elective	6,9,11,12,13	Focuses on wastewater treatment, pollution prevention, and protection of aquatic ecosystems.
25CH808	Solid Waste Management and Treatment	Dept. Elective	3,4,7,9,12,13	Encourages waste minimization, recycling, and sustainable urban waste management.

25CH809	Conventional and Non-Conventional Energy Resources	Dept. Elective	7,9,12,13,14,15	Covers renewable energy technologies and sustainable energy utilization.
25CH810	Energy Management and Auditing	Dept. Elective	7,9,12,13	Promotes efficient energy utilization, auditing, and conservation practices in industries.
25CH811	Green Fuels	Dept. Elective	7,9,12,13	Addresses sustainable fuel technologies and reduction of carbon emissions.
25CH812	Waste Heat Recovery	Dept. Elective	7,9,12,13	Enhances industrial energy efficiency and minimizes thermal energy losses.
25CH813	Waste to Energy Conversion	Dept. Elective	7,9,12,13	Supports sustainable waste utilization and renewable energy generation.
25CH814	Industrial Safety Engineering	Dept. Elective	3,4,8,9,12,13	Improves industrial safety systems, worker protection, and resilient industries.
25CH815	Natural Gas Engineering and Energy Resources Management	Dept. Elective	4,7,9,12,13	Covers efficient management of energy resources and cleaner fuel technologies.
25CH816	Petrochemicals	Dept. Elective	4,7,9,12,13	Supports industrial production systems with emphasis on process optimization and sustainability.
25CH817	Petroleum Refinery Engineering	Dept. Elective	4,7,9,12,13	Focuses on cleaner refinery operations and efficient petroleum processing technologies.
25CH818	Surface Production Operation	Dept. Elective	4,7,9,12,13	Enhances industrial production systems and operational efficiency.

25CH819	Aspen Plus: Chemical Engineering Application	Dept. Elective	4,7,9,12,13	Enables process simulation and optimization for sustainable industrial design.
25CH820	Computational Fluid Dynamics	Dept. Elective	4,7,9,12,13	Supports advanced engineering simulations for efficient and sustainable system design.
25CH821	Fundamentals of Nanotechnology	Dept. Elective	4,7,9,12,13	Promotes advanced materials development for healthcare and industrial innovation.
25CH822	MATLAB Programming for Chemical Engineers	Dept. Elective	4,7,9,12,13	Enhances computational skills, engineering analysis, and digital engineering education.
25CH823	Novel Separation Processes	Dept. Elective	3,4,6,9,12	Focuses on advanced separation technologies for efficient resource utilization.
25CH824	Process Modelling, Simulation and Optimization Techniques	Dept. Elective	7,9,12,13	Promotes sustainable process optimization and industrial efficiency improvement.
25CH825	Transport Phenomena	Dept. Elective	7,9,12,13	Supports efficient transport process analysis and energy/resource optimization.
25CH826	Analysis of Techno-Economic Feasibility of the Chemical Process Plant	Dept. Elective	3,4,8,9,11,12	Integrates economic feasibility with sustainable industrial development and resource utilization.
25CH827	Chemical Process Flow Sheeting	Dept. Elective	4,7,9,12,13	Newly introduced course emphasizing sustainable process integration and industrial workflow optimization.

III. Mapping of R25-C25 Courses with individual SDGs

SDG No.	SDG Name	No. of courses mapped	Percentage of courses mapped
1	No Poverty		
2	Zero Hunger		
3	Good Health and Well-Being	12	30 %
4	Quality Education	27	67.5%
5	Gender Equality		
6	Clean Water and Sanitation	8	20 %
7	Affordable and Clean Energy	27	67.5%
8	Decent Work and Economic Growth	5	12.5 %
9	Industry, Innovation and Infrastructure	34	50%
10	Reduced Inequalities		
11	Sustainable Cities and Communities	5	12.5 %
12	Responsible Consumption and Production	34	85 %
13	Climate Action	29	72.5 %
14	Life Below Water	1	2.5 %
15	Life On Land	1	2.5 %
16	Peace, Justice and Strong Institutions	2	5 %
17	Partnerships for the Goals	1	2.5 %

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APPENDIX VII

Action Taken Report (ATR) on the suggestions given in earlier BoS meetings

S.No.	Action Point	Response
1.	There is a need to introduce a Process Flow Sheeting-related course, as it is essential for industrial applications and practices.	A new course titled "Chemical Process Flow Sheeting" has been introduced in the R-25 curriculum to meet industrial requirements and enhance students' practical knowledge in process design and operations.
2.	More focus should be given to the design of process equipment	Design of equipment is added as a practice in Process Heat Transfer, Mechanical Unit Operations, and Mass Transfer Operations labs
3.	No honor streams in Chemical Engineering domain	An Honor Stream in Process Engineering has been introduced, which includes the following courses: Process Engineering of Fluid Flow Systems, Process Engineering of Heat Transfer Operations, Process Engineering of Separation Processes, Piping and Instrumentation Diagrams (P&ID) in Process Engineering, and a Capstone Project.
4.	Introduce recent advancements in hydrogen storage materials, LOHC technologies, and pipeline transportation safety.	The Industry Interface course titled Advancing sustainable energy systems: Green Hydrogen pathways and Emerging Technological Paradigms will be conducted for the IV year students

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