CHEMICALENGINEERING DEPARTMENT

B. Tech. Chemical Engineering

Scheme & Syllabus w.e.f. 2024-25 Admitted Batch

Chemical Engineering Department

Maulana Azad National Institute of Technology Bhopal

Scheme of Undergraduate Program (B.Tech in Chemical Engineering)

Programme Educational Objective (PEOs):

1. To prepare students to achieve professional engineering competence.
2. To acquaint with the principles of basic chemical engineering and utilize them to formulate, solve and analyze industrial problems as well as to prepare them for advanced multidisciplinary research.
3. To take initiative and demonstrate ability towards independent learning and introduce professional ethics and codes of professional practices.

Programme Outcomes (POs):

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
4. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
5. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
6. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
7. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
8. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Scheme of UG Course

B. Tech. Third Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
MTH 231	Applied Numerical Methods	3	1	-	4
HUM 251	Fundamental of Entrepreneurship	3	-	-	3
CHE24-211	Chemical Process Calculations	3	-	-	3
CHE24-212	Transport Phenomena	3	-	-	3
CHE24-213	Chemical Engineering Thermodynamics-1	3	-	-	3
CHE24-214	Mechanical Operations	3	-	-	3
CHE24-215	Application of Scilab in Chemical Engineering	-	-	2	1
CHE24-216	Fuels and Combustion Lab	-	-	2	1
CHE24-217	Mechanical Operations Lab	-	-	2	1
CHE24-218	Professional Practice	-	2	-	2
Total Hours = 27		**18**	**3**	**6**	**24**
Total Credits (Cumulative)					**65**
Additional Subject: National Cadet Corps (NCC)					
NCC 251	National Cadet Corps III	**1**	**5**	**1**	**7**
Total Credits (Cumulative)					**11**

B. Tech. Fourth Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
ME 252	Fundamentals of Design Methods	2	1	-	3
CHE24-221	Heat Transfer	3	1	-	4
CHE24-222	Mass Transfer-1	3	-	-	3
CHE24-223	Chemical Reaction Engineering-1	3	-	-	3
CHE24-224	Fluid Mechanics	3	-	-	3
CHE24-225	Chemical Engineering Thermodynamics-2	3	-	-	3
CHE24-226	Heat Transfer Lab	-	-	2	1
CHE24-227	Fluid Mechanics Lab	-	-	2	1
CHE24-228	Project Based Lab-1	-	-	2	1
Total Hours = 25		**17**	**2**	**6**	**22**
Total Credits (Cumulative)					**87**
Additional Subject: National Cadet Corps (NCC)					
NCC 252	National Cadet Corps IV	**2**	**-**	**1**	**3**
Total Credits (Cumulative)					**14**

B. Tech. Fifth Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
ME 351	Engineering Management	3	-	-	3
CHE24-311	Chemical Process Equipment Design	3	1	-	4
CHE24-312	Mass Transfer-2	3	-	-	3
CHE24-313	Chemical Reaction Engineering-2	3	-	-	3
CHE24-314	Plant Design and Economics	3	-	-	3
	Departmental Elective-1 (A)	3	-	-	3
CHE24-315	Mass Transfer Lab	-	-	2	1
CHE24-316	Chemical Reaction Engineering Lab	-	-	2	1
CHE24-317	Process Equipment Design & Drawing Lab	-	-	2	1
CHE24-318	Internship/ Industrial Training	-	-	2	1
Total Hours = 27		**18**	**1**	**8**	**23**
Total Credits (Cumulative)					**110**
Additional Subject: National Cadet Corps (NCC)					
NCC 351	National Cadet Corps V	**1**	**5**	**1**	**7**
Total Credits (Cumulative)					**21**
***Optional**	[NPTEL/SWAYAM Courses only]	3	-	-	3

B. Tech. Sixth Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
CS 352	Data Structure and Algorithm	3	1	-	4
CHE24-321	Process Dynamic Models and Control Technology Tools	3	1	-	4
CHE24-322	Process Modeling and Simulation	3	-	-	3
CHE24-323	Chemical Process Technology	3	-	-	3
	Department Elective-2 (A)	3	-	-	3
CHE24-324	Chemical Process Technology Lab	-	-	2	1
CHE24-325	Process Modeling and Simulation Lab	-	-	2	1
CHE24-326	Process Control & Instrumentation Lab	-	-	2	1
CHE24-327	Mini Project	-	-	2	1
Total Hours = 25		**15**	**2**	**8**	**21**
Total Credits (Cumulative)					**131**
Additional Subject: National Cadet Corps (NCC)					
NCC 352	National Cadet Corps VI	**2**	**-**	**1**	**3**
Total Credits (Cumulative)					**24**

B. Tech. Seventh Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
HUM 451	Engineering Economics & IPR	3	-	-	3
CHE24-411	Safety & Hazard Management in Chemical Industries	3	-	-	3
	Department Elective-3 (A)	3	-	-	3
	Department Elective-4 (A)	3	-	-	3
	Open Elective-1(C)	3	-	-	3
CHE24-412	Application of AI in Chemical Engineering	-	-	2	1
CHE24-413	Project-1	-	-	4	2
CHE24-414	Internship/Field Training	-	-	2	1
Total Hours = 23		**15**	**-**	**8**	**19**
Total Credits (Cumulative)					**150**

B. Tech. Eight Semester (Chemical Engineering)

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
	Department Elective-5(A) [NPTEL/SWAYAM Courses only]	3	-	-	3
	Department Elective-6(A) [NPTEL/SWAYAM Courses only]	3	-	-	3
CHE24-421	Project-2 / Internship	-	-	16	8
CHE24-422	General Proficiency	-	-	-	1
Total Hours = 22		**6**	**-**	**16**	**15**
Cumulative Credits					**165**

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Group A: Departmental Electives

Departmental Elective- 1(A)

CHE24-351 Biochemical Engineering
CHE24-352 Oil and Paint Technology
CHE24-353 Sustainable Engineering
CHE24-354 Paper and pulp technology
CHE24-355 Petroleum Refinery Engineering
CHE24-356 Fertilizer Technology
CHE24-357 Novel Separation Techniques
CHE24-358 Advanced Material Characterization
CHE24-359 Bio Energy Technology
CHE24-360 Solid Waste Management

Departmental Elective- 2(A)

CHE24-361 Industrial Pollution Control
CHE24-362 Process Piping Design
CHE24-363 Packaging Technology
CHE24-364 Transport in Porous media
CHE24-365 Computer Aided Process Control & Design
CHE24-366 Fluidization Engineering
CHE24-367 Fuels and Combustion
CHE24-368 Economics and Managements of chemical Industries
CHE24-369 Advanced Analytical Techniques
CHE24-370 Material Synthesis processes

Departmental Elective- 3(A)

CHE24-451 Air Pollution and control
CHE24-452 Oil and Gas well testing and enhanced oil recovery
CHE24-453Membrane Science and Technology
CHE24-454 Industrial Catalysis
CHE24-455 Introduction to Multi Phase Flow
CHE24-456 Trends in Healthcare and Technology
CHE24-457 Wastewater Treatment
CHE24-458 Ceramic Technology
CHE24-459Advanced Process Optimization
CHE24-460 Introduction to Nanoscience and Technology

Departmental Elective- 4(A)

CHE24-461 Plant Utility
CHE24-462 Numerical and Statistical Methods in Chemical Engineering
CHE24-463 Cleaner Technologies in Chemical Process Industries
CHE24-464 Computational Fluid Dynamics
CHE24-465 Sustainability and Green Chemistry
CHE24-466 Nanotechnology in Catalysis
CHE24-467 Hazardous Waste Treatment and Management

CHE24-468 Rubber Technology
CHE24-469 Polymer Science &Technology
CHE24-470 Textile Technology
CHE24-471 Petrochemical Technology
CHE24-472 Statistical analysis and design of experiments in chemical engineering
CHE24-473 Electrochemical Engineering

Group C: Open Elective (Others)

CE 453 Remote Sensing and GIS
CE 475 Sustainable Development and Global Environmental Issues
CS 456 Web Search and IR
CS 466 Optimization Techniques
ECE 469 Neural Networks
ECE 468 Fuzzy Logic
EE 401 Fundamentals of Electric Drives
EE 402 Power System Protection
ME 581 Value engineering
ME 583 Mechatronics and NDT in engineering
ARC 401 Built and Unbuilt Heritage
ARC 402 Building Indoor and Outdoor Environment
PHY 401 Modern Engineering Physics
PHY 402 Nuclear Power Engineering
PHY 403 Fundamentals of Nanotechnology and Nanoscience
HUM 401 Applied Social Psychology
HUM 402 Basic Econometrics
RE 401 Renewable Energy

Open Electives offered to Students of Other Departments

CHE24-401 Petroleum Refinery & Petrochemicals
CHE24-402 Physico-chemical Separation Processes

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