V.S.B. ENGINEERING COLLEGE, KARUR.

(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai.

NH – 67, Covai Road, Karudayampalayam PO, Karur - 639 111.

CURRICULUM AND SYLLABI

REGULATIONS – 2023

Department of

Chemical Engineering

I. Vision and Mission of the Institute

Vision

We endeavor to impart futuristic technical education of the highest quality to the student community and to inculcate discipline in them to face the world with self-confidence and thus we prepare them for life as responsible citizens to uphold human values and to be of service at large. We strive to bring of the Institution as an Institution of academic excellence of International standard.

Mission

We transform persons into personalities by the state-of the art infrastructure, time consciousness, quick response and the best academic practices through assessment and advice.

II. Vision and Mission of the Department

Vision

To be a centre of excellence for development and dissemination of knowledge in Chemical Engineering for the Nation and beyond

Mission

•	Impart knowledge to students at all levels through a vibrant, dynamic and state of the art intellectual delivery to ensure the creation of a complete Chemical Engineer with a high sense of social responsibility and professional ethics
•	Synergize the efforts of the students and faculty to evolve innovative engineering practices and teaching methodologies
•	Generate an environment of continuous learning and research

III. Program Educational Objectives(PEOs)

PEO1:	Apply principles of mathematics, science, and engineering to analyze and solve problems

	encountered in chemical engineering and related areas.
PEO2:	Think critically and creatively, especially about the use of technology to address local and global problems and become a socially responsible engineer by involving with community and professional organizations.
PEO3:	Exhibit professional, ethical codes of conduct, team work and continuous learning for catering the ever changing needs of the society

IV. Program Outcomes(POs)

Graduates of the CHEMICAL ENGINEERING will be able to

PO1:	**Engineering knowledge** Apply the knowledge of mathematics, science, engineering fundamentals to the solution of complex engineering problems in the major areas of Chemical Engineering.
PO2:	**Problem analysis** Identify, formulate, review research literature, and analyze complex problems of Chemical Engineering reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3:	**Design/development of solutions** Design solutions for complex Chemical engineering problems and design construction related components and processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4:	**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.
PO5:	**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.

PO6:	**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 Chemical engineering practice.
PO7:	**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.
PO8:	**Ethics** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9:	**Individual and team work** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10:	**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.
PO11:	**Project management and finance** Demonstrate the acquisition of the body of engineering knowledge and insight and management principles and apply them as member /leader in teams and multidisciplinary environments.
PO12:	**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.

V. Program Specific Outcomes(PSOs)

Graduates of the CHEMICAL ENGINEERING will be able to

PSO1:	Applying knowledge in core and allied fields to solve complex Engineering problems.
PSO2:	Able to expose their skills using latest tools to arrive cost effective and appropriate solutions.
PSO3:	Apply the contextual knowledge with professional ethics to manage different projects in multi-disciplinary environment.

VI. PEOs mapped with POs and PSOs

Particular	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
PEO 1	2	2	3	2	2	1	1	1	1	1	1	2	3	2	1
PEO 2	3	2	3	3	2	2	2	1	1	2	2	2	3	3	1
PEO 3	3	2	3	2	3	2	2	1	2	1	2	2	3	2	2

1-low 2-medium 3-high '-' – no correlation

VII. Mapping of Course Outcomes(Cos) with Program Outcomes(POs)

		COURSE NAME	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**
YEAR 1	**SEMESTER 1**	Professional English - I	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-
		Matrices and Calculus	3	2	1	1	-	-	-	-	-	-	-	1	-	-	-
		Engineering	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	-

		Physics														
		Engineering Chemistry	3	1	1.6	-	1	1	1	-	-	-	1	1	-	-	-
		Programming in C	2	2.4	2.2	1	2.2	1	1.2	1	2	-	3	2.4	1.8	2.2	-
		தமிழர் மரபு /Heritage of Tamils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Programming in C Laboratory	1.8	2.4	2.6	1.6	1.4	1.6	-	-	2.2	1	2.4	2.4	2.4	2.4	-
		Physics and	3	2.4	2.6	1	1	-	-	-	-	-	-	-	-	-	-
		Chemistry Laboratory	3	1	-	-	-	1	1	-	2	-	1	1	-	-	-
		English Laboratory	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
	SEMSTER 2	Professional English II	1	-	-	-	-	-	1	2	1	3	2	3	-	-	-
		Computational Methods	3	2	2	2	2	1	-	-	-	-	-	1	-	-	-
		Physics of Materials	3	2.25	2	1.66	2	1.6	1.75	1				1			
		Basic Electrical, Electronics and Instrumentation Engineering	2.2	1.6	1.6	2		2	2	1.2		2		3	1		2
		Engineering Graphics	3	1	2		2					3		2	2	2	
		Basics of Chemical Engineering	3	2.25	2	3	2.25	2	1	1	-	-	2.25	2	3	2.25	-
		தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

		Engineering Practice Laboratory	3	2			1	1	1					2	2	1	1
		Basic Electrical, Electronics and Instrumentation Engineering Laboratory	3	3	2	1	-	-	-	1	3	-	-	-	2	2	-
		Communication Laboratory / Foreign Language	1	0	0	0	0	0	2	2	2	3	2	3	-	-	-
YEAR 2	**SEMESTER 3**	Transforms and Partial Differential Equations	3	3	2.4	1.8	1.6	1	0.4	0	0.4	0.2	0.6	1.6	2	1.2	1
		Basic Mechanical Engineering	2.6	2.6	2.8	2	2.3	2.2	1.6	1.5	2.6	2	2.4	2.8	2.4	2	2
		Mechanics of Solids	2.4	2.4	2.8	2.0	2.3	2.3	2.3	2.5	2.6	1.8	2.4	2.8	2.4	2.0	2.0
		Chemical Process Calculations	2	3	2	3	3	2	1	1	1	1	1	1	2	3	1
		Fluid Mechanics for Chemical Engineers	2.7	3.0	3.0	3.0	2.0	2.0	1.7	1.0	-	2.0	1.5	2.5	3.0	1.7	2.0
		Chemical Process Industries	2.4	2.4	2.8	2.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	1.3	1.8	2.0	2.0
		Basic Mechanical Engineering Laboratory	2.6	2.6	2.8	2.0	2.3	2.3	2.3	2.5	2.6	2.0	2.4	2.8	2.4	2.0	2.0
		Technical Analysis Laboratory	1.0	2.6	2.8	2.0	2.3	2.3	2.3	2.5	2.6	2.0	2.4	2.8	2.4	1.8	1.3

	SEMESTER 4	Statistics and Quality Control	3	2	1	1	-	-	-	-	-	-	-	1	-	-	-
		Mass Transfer I	3.0	3.0	3.0	2.4	1.4	1.0	1.0	1.0	1.2	1.0	1.4	3.0	2.2	1.5	1.2
		Mechanical Operations	2.6	2.2	2.4	2.2	1.6	1.2	2.0	1.3	1.4	1.8	2.2	1.8	2.0	2.4	1.8
		Chemical Engineering Thermodynamics-I	2.6	2.2	1.8	2.0	1.3	1.3	1.5	1.7	2.0	1.4	1.5	1.3	2.7	2.3	1.7
		Heat Transfer	2.2	2.4	2.8	2.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	1.3	1.6	1.6	1.4
		Environmental Science and Sustainability	3.0	1.0	1.0	-	1.0	1.0	2.0	-	2.0	-	1.0	1.0	-	-	-
		Fluid Mechanics Laboratory	3.0	3.0	3.0	3.0	2.0	-	2.0	-	-	3.0	2.0	2.2	3.0	3.0	3.0
		Mechanical Operations Laboratory	3.0	2.8	2.0	2.2	1.4	2.0	2.4	1.6	2.4	1.8	1.6	1.8	3.0	2.4	1.4
YEAR 3	SEMESTER 5	Mass Transfer II	3	3	2	-	-	1	1	1	-	1	-	3	3	2	2
		Chemical Engineering Thermodynamics –II	3	3	3	2.8	2.8	-	-	-	-	-	-	3	3	3	-
		Computational Chemical Engineering Laboratory	3	3	3	3	3	-	2	1	1	-	-	-	3	3	-
		Heat Transfer Laboratory	3	3	3	3	2	1	1	1	2	3	2	2	3	3	-
		Mass Transfer Laboratory	3	3	-	3	-	-	-	-	2	-	-	2	3	3	-
	SEM	Chemical Reaction	3	3	3	2	2	2	2	-	-	-	-	-	3	3	-

		Engineering-I															
		Process Dynamics and Control	3	3	3	3	2	2	3	-	2	2	2	2	3	3	1
		Chemical Reaction Engineering Laboratory	3	3	3	2	2	2	2	-	-	2	2	1	3	3	-
		Process Equipment design and drawing	3	3	-	3	-	-	-	-	2	-	-	2	3	3	-
		Mini Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
YEAR 4	**SEMEST 7**	Chemical Reaction Engineering-II	3	3	3	3	2	2	2	-	-	-	-	3	3	3	-
		Transport Phenomena	3	3	3	2	1	-	-	-	1	-	-	1	3	3	-
		Process Control Laboratory	3	3	2	3	3	2	1	1	1	1	1	1	2	3	1
		Project Work I	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	SEM 8	Project Work II	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

1-Low,2-Medium,3-High,"-"-no correlation

B.Tech. CHEMICAL ENGINEERING

Regulations 2023

For the students admitted from 2023 onwards

CHOICE BASED CREDIT SYSTEM

CURRICULUM FOR I – VIII SEMESTERS

SEMESTER I

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week	Total Contacts	Credits

					L	T	P	Period	
1	23IP101	Induction Programme	-	-	-	-	-	-	0
THEORY									
2	23HST101	Professional English – I	HSMC	40/60	3	0	0	3	3
3	23MAT101	Matrices and Calculus	BSC	40/60	3	1	0	4	4
4	23PHT101	Engineering Physics	BSC	40/60	3	0	0	3	3
5	23CYT101	Engineering Chemistry	BSC	40/60	3	0	0	3	3
6	23GET101	Programming in C	ESC	40/60	3	0	0	3	3
7	23GET102	தமிழர் மரபு /Heritage of Tamils	HSMC	40/60	1	0	0	1	1
PRACTICALS									
8	23GEP101	Programming in C Laboratory	ESC	60/40	0	0	4	4	2
9	23PHP101	Physics and Chemistry Laboratory	BSC	60/40	0	0	4	4	2
10	23HSP102	English Laboratory $	EEC	100/-	0	0	2	2	1
TOTAL				**-**	**16**	**1**	**10**	**27**	**22**

$ Skill Based Course

SEMESTER II

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									

1	23HST201	Professional English – II	HSMC	40/60	2	0	0	2	2
2	23MAT201	Computational Methods	BSC	40/60	3	1	0	4	4
3	23PHT207	Physics of Materials	BSC	40/60	3	0	0	3	3
4	23EET203 R	Basic Electrical, Electronics and Instrumentation Engineering	ESC	40/60	3	0	0	3	3
5	23GET201	Engineering Graphics	ESC	40/60	2	0	4	6	4
6	23CHT201	Basics of Chemical Engineering	PCC	40/60	3	0	0	3	3
7	23GET202	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HSMC	40/60	1	0	0	1	1
8	-	NCC Credit Course Level 1[#]	-	-	2	0	0	2	2[#]
PRACTICALS									
9	23GEP201	Engineering Practices Laboratory	ESC	60/40	0	0	4	4	2
10	23EEP202	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ESC	60/40	0	0	4	4	2
11	23GEP202	Communication Laboratory /Foreign Language [$]	EEC	60/40	0	0	4	4	2
TOTAL				**-**	**19**	**1**	**16**	**36**	**26**

[#] NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students willbe recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA. [$] Skill Based Course

SEMESTER III

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1	23MAT301	Transforms and Partial Differential Equations	BSC	40/60	3	1	0	4	4
2	23CHT301	Basic Mechanical Engineering	ESC	40/60	3	0	0	3	3
3	23CHT302	Mechanics of Solids	PCC	40/60	3	0	0	3	3
4	23CHT303	Chemical Process Calculations	PCC	40/60	3	0	0	3	3
5	23CHT304	Fluid Mechanics for Chemical Engineers	PCC	40/60	3	0	0	3	3
6	23CHT305	Chemical Process Industries	PCC	40/60	3	0	0	3	3
PRACTICALS									
7	23CHP301	Basic Mechanical Engineering Laboratory	ESC	60/40	0	0	4	4	2
8	23CHP302	Technical Analysis Laboratory	PCC	60/40	0	0	4	4	2
9	23GEP301	Professional Development	EEC	100/-	0	0	2	2	1
TOTAL				**-**	**18**	**1**	**10**	**29**	**24**

[$]**Skill Based Course**

SEMESTER IV

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1	23MAT403	Statistics and Quality control	BSC	40/60	3	1	0	4	4
2	23CHT401	Mass Transfer I	PCC	40/60	3	0	0	3	3
3	23CHT402	Mechanical	PCC	40/60	3	0	0	3	3

		Operations							
4	23CHT403	Chemical Engineering Thermodynamics – I	PCC	40/60	3	0	0	3	3
5	23CHT404	Heat Transfer	PCC	40/60	3	0	0	3	3
6	23GET401	Environmental Science and Engineering	BSC	40/60	2	0	0	2	2
7		NCC Credit Course Level 2[#]	-	-	3	0	0	3	3[#]
PRACTICALS									
8	23CHP401	Fluid Mechanics Laboratory	PCC	60/40	0	0	3	3	1.5
9	23CHP402	Mechanical OperationsLaboratory	PCC	60/40	0	0	3	3	1.5
TOTAL				**-**	**20**	**1**	**6**	**27**	**21**

[#] NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER V

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1	23CHT501	Chemical Engineering Thermodynamics – II	PCC	40/60	3	0	0	3	3
2	23CHT502	Mass Transfer II	PCC	40/60	3	0	0	3	3
3		Mandatory Course-I[&]	MC	100/-	3	0	0	3	0
4		Professional Elective I	PCC	40/60	3	0	0	3	3
5		Professional Elective II	PEC	40/60	3	0	0	3	3

6		Professional Elective III	PEC	40/60	3	0	0	3	3
PRACTICALS									
7	23CHP501	Computational ChemicalEngineering Laboratory	PCC	60/40	0	0	4	4	2
8	23CHP502	Heat Transfer Laboratory	PCC	60/40	0	0	4	4	2
9	23CHP503	Mass Transfer Laboratory	PCC	60/40	0	0	4	4	2
TOTAL				**-**	**18**	**0**	**12**	**30**	**21**

[&] **Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under MC-I)**

SEMESTER VI

S. No	**Course Code**	**Course Title**	**Category**	**Internal / External**	**Periods per Week**			**Total Contacts Period**	**Credits**
					L	**T**	**P**		
THEORY									
1	23CHT601	Chemical Reaction Engineering – I	PCC	40/60	3	0	0	3	3
2		Open Elective – I*	OEC	40/60	3	0	0	3	3
3		Professional Elective IV	PEC	40/60	3	0	0	3	3
4		Professional Elective V	PEC	40/60	3	0	0	3	3
5		Professional Elective VI	PEC	40/60	3	0	0	3	3
6	23CHT602	Process Dynamics and Control	PEC	40/60	3	0	0	3	3
7		Mandatory Course-II[&]	MC	100/-	3	0	0	3	0
8		NCC Credit Course		-	3	0	0	3	3 #

		Level 3[#]							
PRACTICALS									
9	23CHP601	Chemical Reaction Engineering Laboratory	PCC	60/40	0	0	3	3	1.5
10	23CHP602	Process Equipment Design and Drawing	PCC	60/40	0	0	3	3	1.5
11	23CHP603	Mini Project	EEC	60/40	0	0	4	4	2
TOTAL				**-**	**24**	**0**	**12**	**36**	**23**

***Open Elective – I shall be chosen from the emerging technologies.**

[&] Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under MC-II)

[#] NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER VII

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1	23CHT701	Chemical Reaction Engineering II	PCC	40/60	3	0	0	3	3
2	23CHT702	Transport Phenomena	PCC	40/60	3	0	0	3	3
3	23GET701	Human values and Ethics	HSMC	40/60	2	0	0	2	2
4		Elective - Management [#]	HSMC	40/60	3	0	0	3	3
5		Open Elective – II**	OEC	40/60	3	0	0	3	3
PRACTICALS									
6	23CHP701	Process Control Laboratory	PCC	60/40	0	0	4	4	2
7	23CHP702	Industrial Training /Internship I[#]	EEC	100/-	-	-	-	-	1
8	23CHP703	Project Work I	EEC	60/40	-	-	8	8	4

TOTAL	**-**	**14**	**0**	**12**	**26**	**21**

##Two weeks industrial training/internship carries one credit. Industrial training/Internship during VI Semester Summer Vacation will be evaluated in VII semester

SEMESTER VIII

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1		Open Elective – III***	OEC	40/60	3	0	0	3	3
2		Open Elective – IV***	OEC	40/60	3	0	0	3	3
PRACTICALS									
1	23CHP801	Project Work II	EEC	60/40	0	0	12	12	6
TOTAL					**6**	**0**	**12**	**18**	**12**

ELECTIVE - MANAGEMENT COURSES

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1	23EMT001	Principles of Management	HSMC	40/60	3	0	0	3	3
2	23EMT002	Total Quality Management	HSMC	40/60	3	0	0	3	3
3	23EMT003	Engineering Economics and Financial Accounting	HSMC	40/60	3	0	0	3	3
4	23EMT004	Human Resource Management	HSMC	40/60	3	0	0	3	3
5	23EMT005	Knowledge Management	HSMC	40/60	3	0	0	3	3

6	23EMT006	Industrial Management	HSMC	40/60	3	0	0	3	3
TOTAL					**18**	**0**	**0**	**18**	**18**

MANDATORY COURSES I

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1.	23MCT001	Introduction to Women and Gender Studies	MC	100/-	3	0	0	3	0
2.	23MCT002	Elements of Literature	MC	100/	3	0	0	3	0
3.	23MCT003	Film Appreciation	MC	100/	3	0	0	3	0
4.	23MCT004	Disaster Management	MC	100/	3	0	0	3	0
TOTAL				**-**	**12**	**0**	**0**	**12**	**0**

MANDATORY COURSES II

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
THEORY									
1	23MCT006	Well Being with traditional Practices (Yoga, Ayurveda and	MC	100/	3	0	0	3	0

		Siddha)							
2	23MCT007	History of Science and Technology in India	MC	100/	3	0	0	3	0
3	23MCT008	Political and Economic Thought for a Humane Society	MC	100/	3	0	0	3	0
4	23MCT009	State, Nation Building and Politics in India	MC	100/	3	0	0	3	0
5	23MCT010	Industrial Safety	MC	100/	3	0	0	3	0
TOTAL					**15**	**0**	**0**	**15**	**0**

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I Petroleum Process Technology	Vertical II Energy Engineering	Vertical III Biochemical Engineering	Vertical IV Environmental and Safety Engineering	Vertical V Computational Chemical Engineering	Vertical VI Emerging Technologies

Petroleum Chemistry and Refining Fundamentals	Bioenergy	Biochemistry	Air Pollution Engineering	Computational Techniques	Polymer Technology
Chemical Plant Design	Renewable Energy Resources	Bioprocess Technology	Waste Water Treatment	Optimization of Chemical Processes	Process Automation
Design Safety	Pinch Technology	Fermentation Technology	Solid waste Management	Process Modeling and Simulation	Nano Technology
Refinery Advancements and Environmental Regulations	Hydrogen And Fuel Cell Technology	Downstream Processing Technology	Environmental Impact Assessment	Pinch Analysis and Heat Exchange Network Design	Material Selection
Process Utilities	Power Plant Engineering	Enzyme Technology	Process Safety Management	Chemical Process Flow sheeting	Industry 4.0 Concepts
Petrochemical Technology	Non-Renewable Energy Sources	Bioreactor Design	Risk and HAZOP Analysis	Computational Fluid Dynamics	Mineral Processing Technology

Registration of Professional Elective Courses from Verticals:

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialisation. Students are permitted to choose all Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in semester VI. The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree refer to Regulations 2021 Clause 4.10.

PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL 1: PETROLEUM PROCESS TECHNOLOGY

S. No	COURSE CODE	COURSE TITLE	CATEGORY	Internal /External	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
					L	T	P		
1	23CHE001	Petroleum Chemistryand Refining Fundamentals	PEC	40/60	3	0	0	3	3
2	23CHE002	Chemical Plant Design	PEC	40/60	3	0	0	3	3
3	23CHE003	Design Safety	PEC	40/60	3	0	0	3	3
4	23CHE004	Refinery Advancements and Environmental Regulations	PEC	40/60	3	0	0	3	3
5	23CHE005	Process Plant Utilities	PEC	40/60	3	0	0	3	3
6	23CHE006	Petrochemical Technology	PEC	40/60	3	0	0	3	3

VERTICAL 2: ENERGY ENGINEERING

S. No	COURSE CODE	COURSE TITLE	CATEGORY	Internal/ External	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
					L	T	P		
1	23CHE007	Bioenergy	PEC	40/60	3	0	0	3	3
2	23CHE008	Renewable Energy Resources	PEC	40/60	3	0	0	3	3
3	23CHE009	Pinch Technology	PEC	40/60	3	0	0	3	3
4	23CHE010	Hydrogen And Fuel Cell Technology	PEC	40/60	3	0	0	3	3
5	23CHE011	Power Plant Engineering	PEC	40/60	3	0	0	3	3
6	23CHE012	Non-Renewable Energy Sources	PEC	40/60	3	0	0	3	3

VERTICAL 3: BIOCHEMICAL ENGINEERING

S. No	COURSE CODE	COURSE TITLE	CATE GORY	Internal/ External	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
					L	T	P		
1	23CHE013	Biochemistry	PEC	40/60	2	0	2	4	3
2	23CHE014	Bioprocess Technology	PEC	40/60	2	0	2	4	3
3	23CHE015	Fermentation Technology	PEC	40/60	2	0	2	4	3
4	23CHE016	Downstream Processing Techniques	PEC	40/60	2	0	2	4	3
5	23CHE017	Enzyme Technology	PEC	40/60	3	0	0	3	3
6	23CHE018	Bioreactor Design	PEC	40/60	3	0	0	3	3

VERTICAL 4: ENVIRONMENTAL AND SAFETY ENGINEERING

S. No	COURSE CODE	COURSE TITLE	CATE GORY	Internal/ External	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
					L	T	P		
1	23CHE019	Air PollutionEngineering	PEC	40/60	3	0	0	3	3
2	23CHE020	Waste Water Treatment	PEC	40/60	3	0	0	3	3
3	23CHE021	Solid waste Management	PEC	40/60	3	0	0	3	3
4	23CHE022	Environmental Impact Assessment	PEC	40/60	3	0	0	3	3
5	23CHE023	Process SafetyManagement	PEC	40/60	3	0	0	3	3
6	23CHE024	Risk and HAZOPAnalysis	PEC	40/60	3	0	0	3	3

VERTICAL 5: COMPUTATIONAL CHEMICAL ENGINEERING

S. No	COURSE CODE	COURSE TITLE	CATEGORY	Internal/ External	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
					L	T	P		
1	23CHE025	Computational Techniques	PEC	40/60	3	0	0	3	3
2	23CHE026	Optimization of Chemical Processes	PEC	40/60	3	0	0	3	3
3	23CHE027	Process Modeling and Simulation	PEC	40/60	3	0	0	3	3
4	23CHE028	Pinch Analysis and Heat Exchange Network Design	PEC	40/60	3	0	0	3	3
5	23CHE029	Chemical Process Flowsheeting	PEC	40/60	3	0	0	3	3
6	23CHE030	Computational Fluid Dynamics	PEC	40/60	3	0	0	3	3

VERTICAL 6: EMERGING TECHNOLOGIES

S. No	COURSE CODE	COURSE TITLE	CATEGORY	Internal/ External	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
					L	T	P		
1	23CHE031	Polymer Technology	PEC	40/60	3	0	0	3	3
2	23CHE032	Process Automation	PEC	40/60	3	0	0	3	3
3	23CHE033	Nanotechnology	PEC	40/60	3	0	0	3	3
4	23CHE034	Material Selection	PEC	40/60	3	0	0	3	3
5	23CHE035	Industry 4.0 Concepts	PEC	40/60	3	0	0	3	3

6	23CHE036	Mineral Processing Technology	PEC	40/60	3	0	0	3	3

OPEN ELECTIVES

Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories.

OPEN ELECTIVE I AND II (EMERGING TECHNOLOGIES)

To be offered other than Faculty of Information and Communication Engineering

S. No	COURSE CODE	COURSE TITLE	CATEGORY	Internal/ External	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
					L	T	P		
1	23CSO001	Artificial Intelligence and Machine Learning Fundamentals	OEC	50/50	2	0	2	4	3
2	23CSO002	IoT Concepts and Applications	OEC	50/50	2	0	2	4	3
3	23CSO003	Data Science Fundamentals	OEC	50/50	2	0	2	4	3
4	23CSO004	Augmented and Virtual Reality	OEC	50/50	2	0	2	4	3

OPEN ELECTIVES – III

S. No.	COURSECODE	COURSE TITLE	CATEGORY	Internal/ External	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
					L	T	P		
1.	23HSO001	English for Competitive Examinations	OEC	40/60	3	0	0	3	3
2.	23MGO001	NGOs and Sustainable Development	OEC	40/60	3	0	0	3	3

3.	23MGO002	Democracy and Good Governance	OEC	40/60	3	0	0	3	3
4.	23EEO001	Renewable Energy Technologies	OEC	40/60	3	0	0	3	3
5.	23MEO001	Applied Design Thinking	OEC	40/60	2	0	0	4	3
6.	23MEO002	Reverse Engineering	OEC	40/60	3	0	0	3	3
7.	23MEO003	Sustainable Manufacturing	OEC	40/60	3	0	0	3	3
8.	23EEO002	Electric and Hybrid Vehicle	OEC	40/60	3	0	0	3	3
9.	23ECO002	Space Engineering	OEC	40/60	3	0	0	3	3
10.	23MGO004	Industrial Management	OEC	40/60	3	0	0	3	3
11.	23MGO003	Quality Engineering	OEC	40/60	3	0	0	3	3
12.	23CHO001	Fire Safety Engineering	OEC	40/60	3	0	0	3	3
13.	23CEO001	Introduction to non- destructive testing	OEC	40/60	3	0	0	3	3
14.	23MEO004	Mechatronics	OEC	40/60	3	0	0	3	3
15.	23MEO005	Foundation of Robotics	OEC	40/60	3	0	0	3	3
16.	23MEO006	Fundamentals of Aeronautical engineering	OEC	40/60	3	0	0	3	3
17.	23CEO002	Remote Sensing Concepts	OEC	40/60	3	0	0	3	3
18.	23CEO003	Urban Agriculture	OEC	40/60	3	0	0	3	3
19.	23CEO004	Drinking Water Supply and Treatment	OEC	40/60	3	0	0	3	3
20.	23EEO003	Electric Vehicle technology	OEC	40/60	3	0	0	3	3
21.	23EEO004	Introduction to PLC Programming	OEC	40/60	3	0	0	3	3
23.	23CHO002	Nano Technology	OEC	40/60	3	0	0	3	3
23.	23MEO007	Functional Materials	OEC	40/60	3	0	0	3	3

24.	23BMO001	Biomedical Instrumentation	OEC	40/60	3	0	0	3	3
25.	23BTO001	Traditional Indian Foods	OEC	40/60	3	0	0	3	3
26.	23BTO002	Introduction to food processing	OEC	40/60	3	0	0	3	3
27.	23BTO003	IPR for Pharma Industry	OEC	40/60	3	0	0	3	3
28.	23CHO003	Basics of Textile Finishing	OEC	40/60	3	0	0	3	3
29.	23CHO004	Industrial Engineering for Garment Industry	OEC	40/60	3	0	0	3	3
30.	23CHO005	Basics of TextileManufacture	OEC	40/60	3	0	0	3	3
31.	23CHO006	Introduction to Petroleum Refining and Petrochemicals	OEC	40/60	3	0	0	3	3
32.	23EEO005	Energy Conservation and Management	OEC	40/60	3	0	0	3	3
33.	23CHO007	Basics of Plastics Processing	OEC	40/60	3	0	0	3	3
34.	23ECO003	Signals and Systems	OEC	40/60	3	0	0	3	3
35.	23ECO004	Fundamentals of Electronic Devices and Circuits	OEC	40/60	3	0	0	3	3
36.	23MEO008	Foundation Skills inintegrated product Development	OEC	40/60	3	0	0	3	3
37.	23BMO002	Assistive Technology	OEC	40/60	3	0	0	3	3
38.	23MAO001	Operations Research	OEC	40/60	3	0	0	3	3
39.	23MAO002	Algebra and Number Theory	OEC	40/60	3	0	0	3	3
40.	23MAO003	Linear Algebra	OEC	40/60	3	0	0	3	3

OPEN ELECTIVES – IV

S. No.	COURSECODE	COURSE TITLE	CATEGORY	Int./Ext.	PERIODS PER WEEK			TOTAL CONTACT	CREDITS
					L	T	P		

								PERIODS	
1.	23HSO002	Project Report Writing	OEC	40/60	3	0	0	3	3
2.	23MAO004	Advanced Numerical Methods	OEC	40/60	3	0	0	3	3
3.	23MAO005	Random Processes	OEC	40/60	3	0	0	3	3
4.	23MAO006	Queuing and Reliability Modelling	OEC	40/60	3	0	0	3	3
5.	23MGO004	Production and Operations Managementfor Entrepreneurs	OEC	40/60	3	0	0	3	3
6.	23MGO005	Multivariate Data Analysis	OEC	40/60	3	0	0	3	3
7.	23MEO009	Additive Manufacturing	OEC	40/60	3	0	0	3	3
8.	23MEO010	New ProductDevelopment	OEC	40/60	3	0	0	3	3
9.	23MEO011	Industrial Design & Rapid Prototyping Techniques	OEC	50/50	2	0	2	4	3
10.	23MEO012	Micro and PrecisionEngineering	OEC	40/60	3	0	0	3	3
11.	23MEO013	Cost Management of Engineering Projects	OEC	40/60	3	0	0	3	3
12.	23EEO011	Batteries and Management system	OEC	40/60	3	0	0	3	3
13.	23EEO006	Sensors and Actuators	OEC	40/60	3	0	0	3	3
14.	23ECO005	Space Vehicles	OEC	40/60	3	0	0	3	3
15.	23MGO006	Management Science	OEC	40/60	3	0	0	3	3
16.	23MEO014	Production Planning and Control	OEC	40/60	3	0	0	3	3
17.	23MGO007	Operations Management	OEC	40/60	3	0	0	3	3
18.	23BMO003	Industrial Hygiene	OEC	40/60	3	0	0	3	3
19.	23CHO008	Chemical Process Safety	OEC	40/60	3	0	0	3	3

20.	23EEO007	Electrical, Electronic and Magnetic materials	OEC	40/60	3	0	0	3	3
21.	23CHO009	Nanomaterials and applications	OEC	40/60	3	0	0	3	3
23.	23CEO010	Hydraulics and Pneumatics	OEC	40/60	3	0	0	3	3
23.	23EEO008	Sensors	OEC	40/60	3	0	0	3	3
24.	23MEO005	Foundation of Robotics	OEC	40/60	3	0	0	3	3
25.	23ECO006	Concepts in Mobile Robotics	OEC	40/60	3	0	0	3	3
26.	23MEO015	Marine Propulsion	OEC	40/60	3	0	0	3	3
27.	23MEO016	Marine Merchant Vehicles	OEC	40/60	3	0	0	3	3
28.	23MEO017	Elements of MarineEngineering	OEC	40/60	3	0	0	3	3
29.	23ECO007	Drone Technologies	OEC	40/60	3	0	0	3	3
30.	23CEO005	Geographical Information System	OEC	40/60	3	0	0	3	3
31.	23CEO006	Agriculture Entrepreneurship Development	OEC	40/60	3	0	0	3	3
32.	23CEO009	Biodiversity Conservation	OEC	40/60	3	0	0	3	3
33.	23EEO009	Introduction to controlsystems	OEC	40/60	3	0	0	3	3
34.	23MEO021	Introduction to Industrial Automation Systems	OEC	40/60	3	0	0	3	3
35.	23EEO010	Energy Technology	OEC	40/60	3	0	0	3	3
36.	23BTO004	Fundamentals of Food Engineering	OEC	40/60	3	0	0	3	3
37.	23BTO005	Food safety and Quality Regulations	OEC	40/60	3	0	0	3	3
38.	23BTO006	Nutraceuticals	OEC	40/60	3	0	0	3	3
39.	23CHO010	Basics of Dyeing and Printing	OEC	40/60	3	0	0	3	3
40.	23CHO011	Fibre Science	OEC	40/60	3	0	0	3	3

41.	23CHO012	Garment Manufacturing Technology	OEC	40/60	3	0	0	3	3
42.	23CEO008	Industrial safety	OEC	40/60	3	0	0	3	3
43.	23CHO013	Unit Operations in Petro Chemical Industries	OEC	40/60	3	0	0	3	3
44.	23MEO018	Plastic Materials for Engineers	OEC	40/60	3	0	0	3	3
45.	23MEO019	Properties and Testing of Plastics	OEC	40/60	3	0	0	3	3
46.	23ECO008	VLSI Design	OEC	40/60	3	0	0	3	3
47.	23ECO009	Wearable devices	OEC	40/60	3	0	0	3	3
48.	23BMO004	Medical Informatics	OEC	40/60	3	0	0	3	3

SUMMARY

Name of the Programme										
S.No	**Subject Area**	**Credits per Semester**								**Total Credits**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII/VIII**	**VIII/VIII**	
1	**HSMC**	**4**	**3**					**5**		**12**
2	**BSC**	**12**	**7**	**4**	**6**					**29**
3	**ESC**	**5**	**11**							**16**
4	**PCC**		**3**	**19**	**15**	**15**	**6**	**8**		**66**

5	**PEC**					**6**	**12**			**18**
6	**OEC**						**3**	**3**	6	**12**
7	**EEC**	**1**	**2**	**1**			**2**	**5**	**6**	**17**
8	**Non-Credit (Mandatory)**					√	√			
Total		**22**	**26**	**24**	**21**	**21**	**23**	**21**	**12**	**170**

VERTICALS FOR MINOR DEGREE

(In addition to all the verticals of other programmes)

Vertical I Fintech and Block chain	Vertical II	Vertical III	Vertical IV	Vertical V
Fintech and Block Chain	**Entrepreneurship**	**Public Administration**	**Business Data Analytics**	**Environment and Sustainability**

Financial Management	Foundations of Entrepreneruship	Principles of Public Administration	Statistics for Management	Sustainable infrastructure Development
Fundamentals of Investment	Team Building and Leadership Management for Business	Constitution of India	Datamining for Business Intelligence	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity and Innovation in Entrepreneurship	Public Personnel Administration	Human Resource Analytics	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management for Business	Administrative Theories	Marketing and Social Media Web Analytics	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Indian Administrative System	Operation and Supply Chain Analytics	Green Technology
Introduction to Fintech	Financing New Business Ventures	Public Policy Administration	Financial Analytics	Environmental Quality Monitoring and Analysis
-	-	-	-	Integrated Energy Planning for Sustainable Development
-	-	-	-	Energy Efficiency for Sustainable Development

Vertical I : FINTECH AND BLOCK CHAIN

S.	Course	Course Title	Category	Internal	Periods	Total	Credits

No	Code			/ External	per Week			Contacts Period	
					L	T	P		
1.	23CMG001	Financial Management	PEC	40/60	3	0	0	3	3
2.	23CMG002	Fundamentals of Investment	PEC	40/60	3	0	0	3	3
3.	23CMG003	Banking, Financial Services and Insurance	PEC	40/60	3	0	0	3	3
4.	23CMG004	Introduction to Blockchain and its Applications	PEC	40/60	3	0	0	3	3
5.	23CMG005	Fintech Personal Finance and Payments	PEC	40/60	3	0	0	3	3
6.	23CMG006	Introduction to Fintech	PEC	40/60	3	0	0	3	3
TOTAL				**-**	**18**	**0**	**0**	**18**	**18**

Vertical II : ENTREPRENERUSHIP

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1.	23CMG007	Foundations of Entrepreneruship	PEC	40/60	3	0	0	3	3

2.	23CMG008	Team Building and Leadership Management for Business	PEC	40/60	3	0	0	3	3
3.	23CMG009	Creativity and Innovation in Entrepreneurship	PEC	40/60	3	0	0	3	3
4.	23CMG010	Principles of Marketing Management for Business	PEC	40/60	3	0	0	3	3
5.	23CMG011	Human Resource Management for Entrepreneurs	PEC	40/60	3	0	0	3	3
6.	23CMG012	Financing New Business Ventures	PEC	40/60	3	0	0	3	3
TOTAL				**18**	**18**	**0**	**0**	**18**	**18**

Vertical III : PUBLIC ADMINISTRATION

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1.	23CMG013	Principles of Public Administration	PEC	40/60	3	0	0	3	3
2.	23CMG014	Constitution of India	PEC	40/60	3	0	0	3	3
3.	23CMG015	Public Personnel Administration	PEC	40/60	3	0	0	3	3

4.	23CMG016	Administrative Theories	PEC	40/60	3	0	0	3	3
5.	23CMG017	Indian Administrative System	PEC	40/60	3	0	0	3	3
6.	23CMG018	Public Policy Administration	PEC	40/60	3	0	0	3	3
TOTAL				**18**	**0**	**0**	**18**	**18**	**18**

Vertical IV : BUSINESS DATA ANALYTICS

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1.	23CMG019	Statistics for Management	PEC	40/60	3	0	0	3	3
2.	23CMG020	Datamining for Business Intelligence	PEC	40/60	3	0	0	3	3
3.	23CMG021	Human Resource Analytics	PEC	40/60	3	0	0	3	3
4.	23CMG022	Marketing and Social Media Web Analytics	PEC	40/60	3	0	0	3	3
5.	23CMG023	Operation and Supply Chain Analytics	PEC	40/60	3	0	0	3	3
6.	23CMG024	Financial Analytics	PEC	40/60	3	0	0	3	3

		TOTAL		**18**	**0**	**0**	**18**	**18**	**18**

Vertical V : Environment and Sustainability

S. No	Course Code	Course Title	Category	Internal / External	Periods per Week			Total Contacts Period	Credits
					L	T	P		
1.	23CES001	Sustainable Infrastructure Development	PEC	40/60	3	0	0	3	3
2.	23CES002	Sustainable Agriculture and Environmental Management	PEC	40/60	3	0	0	3	3
3.	23CES003	Sustainable Bio Materials	PEC	40/60	3	0	0	3	3
4.	23CES004	Materials for Energy Sustainability	PEC	40/60	3	0	0	3	3
5.	23CES005	Green Technology	PEC	40/60	3	0	0	3	3
6.	23CES006	Environmental Quality Monitoring and Analysis	PEC	40/60	3	0	0	3	3

7.	23CES007	Integrated Energy Planning for Sustainable Development	PEC	40/60	3	0	0	3	3
8.	23CES008	Energy Efficiency for Sustainable Development	PEC	40/60	3	0	0	3	3
		TOTAL		**18**	**0**	**0**	**18**	**18**	**18**