

Rajiv Gandhi University of Knowledge Technologies-AP

NUZVIDRK VALLEY**SRIKAKULAM**ONGOLE**



DEPARTMENT OF CHEMICAL ENGINEERING
COURSE STRUCTURE
AND DETAILED SYLLABI OF
B.TECH PROGRAM IN CHEMICAL ENGINEERING

Effective from the batches admitted in **2020-2021** and onwards

CONTENTS

Sl.No	Chapter	Title
1	1	General, Course Structure, Theme & Semester-wise credit distribution
2	2	Detailed syllabus of 4-year curriculum
	(i)	Basic Science Courses
		1. Biology for Engineers
		2. Physical and Organic Chemistry
		3. Differential Equations and Multivariable Calculus
		4. Physical and Organic Chemistry Lab
		5. Engineering Physics
		6. Mathematical Methods
		7.Transform Calculus
	(ii)	Engineering Science Courses
		1.Introduction to Chemical Engineering
		2.Engineering and Solid Mechanics
		3.Workshop
		4.Engineering Graphics and Computer Drafting
		5.Programming and Data Structures
		6.Programming and Data Structures Lab
		7.Mechanical Technology
		8.Thermo Dynamics-I
		9.Basics of Electrical and Electronics Engineering
		10.Object Oriented programming through JAVA

		11.Object Oriented programming through JAVA Lab
	(iii)	Humanities and Social Sciences including Management courses
		1. English Language Communication Skills Lab-I
		2.Managerial Economics and Financial Analysis
		3. English Language Communication Skills Lab -II
		4. English Language Communication Skills Lab -III
		5.Indian Community Services
	(iv)	Mandatory Courses
		1.Environmental Science
		2.Indian constitution
		3. Aptitude and Reasoning
	(v)	Professional Core Courses
		1.Chemical Process Calculations
		2.Fluid Mechanics
		3.Heat Transfer
		4.Mechanical Unit Operations
		5.Fluid Mechanics Lab
		6.Chemical Reaction Engineering – I
		7.Mass Transfer Operations-I
		8.Thermodynamics-II
		9. Heat Transfer Lab
		10.Mechanical Unit Operations Lab
		11.Chemical Process Dynamics and Control

		12.Chemical Technology
		13.Chemical Reaction Engineering-II
		14.Mass Transfer Operations-II
		15.Numerical Methods in Chemical Engineering
		16.Chemical Reaction Engineering Lab
		17.Numerical Methods in Chemical Engineering Lab
		18.Process Equipment Design
		19. Plant Design and Economics
		20.Transport Phenomena
		21.Chemical Process Dynamics and Control Lab
		22.Mass Transfer Operations Lab
	(vi)	Professional Elective Courses
		Advanced Mathematical Techniques in Chemical Engineering
		Computational Fluid Dynamics
		Fluidization Engineering
		Food Process Engineering
		Fuel Technology
		Industrial Safety and Hazard Management
		Material Science for Chemical Engineers
		Multiphase Flow
		Novel Separation Processes
		Optimization Methods for Chemical Engineering
		Petrochemical Technology
		Petroleum Refinery Engineering

		Polymer Engineering
		Process Instrumentation and Instrumental Methods of Analysis
		Process Integration
		Process Modeling and Simulation
		Technology of Oils and Fats
		Pharmaceuticals and Fine Chemicals
		Fuel cells and Flow Batteries
		Fertilizer Technology
		Green Technology
		CO2 capture and Utilization
		Sustainable Process Engineering
		Process Intensification
		Solid Waste Management
	(vii)	Open Elective Courses
		1. Corrosion Engineering
		2. Environmental Pollution and Control
		3. Introduction to Nano Technology
		4. Renewable Energy
		5. Waste to Energy Conversion
	(viii)	Summer Internship/Projects
		1. Summer Internship
		2. Project-I
		3. Project-II

Chapter-1

General, Course structure, Theme and semester-wise credit distribution

A. Definition of Credit:

1 Hour Lecture(L) per week	1 credit
1 Hour Tutorial(T) per week	1 credit
3 Hours Practical(Lab)/week	1.5 credits

B. Total number of credits: 160

C. Minimum number of contact hours/weeks per semester: 15 weeks of teaching

- For 1 credit course: 15 contact hours per semester
- For 2 credit course: 30 contact hours per semester
- For 3 credit course: 45 contact hours per semester
- For 4 credit course: 60 contact hours per semester

D. Course code and definition

Course code	Definitions
BSC	BASIC SCIENCE COURSE
ESC	ENGINEERING SCIENCE COURSE
HSC	HUMANITIES, SOCIAL SCIENCES AND MANAGEMENT COURSE
PCC	PROFESSIONAL CORE COURSE
PEC	PROFESSIONAL ELECTIVE COURSE
OEC	OPEN ELECTIVE COURSE
MC	MANDATORY COURSE
SI	SUMMER INTERNSHIP
PROJ	PROJECT

E. Structure of Program

S.No	Category	Break up of credits
1	Basic Science Courses	22.5
2	Engineering Science Courses	27
3	Humanities and Social Sciences including Management courses	10.5
4	Professional core courses	61
5	Professional Elective courses	15
6	Open Elective courses	9
7	Project work, seminar and internship in industry or elsewhere	15
8	Mandatory courses	0
Total		160

F. Semester-wise Credits Distribution

COURSE CODE	E1 SEM1	E1 SEM2	E2 SEM1	E2 SEM2	E3 SEM1	E3 SEM2	E4 SEM1	E4 SEM2	SUMMER INTERNSHIP	CREDITS
BSC	11.5	7	4	0	0	0	0	0	0	22.5
ESC	6.5	7	6	7.5	0	0	0	0	0	27
HSC	2.5	0	3	0	1.5	1.5	0	2	0	10.5
MC	0	0	0	0	0	0	0	0	0	0
PCC	0	7	8.5	13	19	13.5	0	0	0	61
PEC	0	0	0	0	0	3	6	6	0	15
OEC	0	0	0	0	0	3	3	3	0	9
PROJECT/ SUMMER INTERNSHIP	0	0	0	0	0	3	6	6	0	15
Total Credits	20.5	21	21.5	20.5	20.5	24	15	17	0	160

Notations:

E1-S1: First Year Engineering First Semester

E1-S2: First Year Engineering Second Semester

E2-S1: Second Year Engineering First Semester

E2-S2: Second Year Engineering Second Semester

E3-S1: Third Year Engineering First Semester

E3-S2: Third Year Engineering Second Semester

E4-S1: Fourth Year Engineering First Semester

E4-S2: Fourth Year Engineering Second Semester

Final Approved Course structure in BOS meeting (30-12-2020)
Mandatory Induction Program

3 Weeks Duration

- **Physical Activity**
- **Creative Arts**
- **Universal Human Values**
- **Literary**
- **Proficiency Modules**
- **Lectures by Eminent People**
- **Visit to Local Areas**
- **Familiarization of Department/Branch Innovations**

I Year – SEMESTER – I
COURSE STRUCTURE

S.NO	Category	Course Code	Subject Name	L-T-P	Credits
1	BSC	20BE1102	Biology for Engineers	3-0-0	3
2	BSC	20CY1101	Physical and Organic Chemistry	3-0-0	3
3	BSC	20MA1101	Differential Equations and Multivariable Calculus	3-1-0	4
4	ESC	20CH1101	Introduction of Chemical Engineering	2-0-0	2
5	ESC	20ME1111	Engineering and Solid Mechanics	3-0-0	3
6	HSC	20EG1181	English Language Communication Skills Lab-I	1-0-3	2.5
7	BSC	20CY1181	Physical and Organic Chemistry Lab	0-0-3	1.5
8	ESC	20ME1185	Workshop	0-0-3	1.5
Contact periods=22/25		Contact hours=33/37.5		Total credits	20.5

I Year – SEMESTER – II
COURSE STRUCTURE

S.No	Category	Course Code	Subject Name	L-T-P	Credits
1	BSC	20PY1203	Engineering Physics	3-0-0	3
2	BSC	20MA1201	Mathematical Methods	3-1-0	4
3	ESC	20CE1214	Engineering Graphics and Computer Drafting	1-0-3	2.5

4	ESC	20CS1208	Programming and Data Structures	3-0-0	3
5	PCC	20CH1201	Chemical Process Calculations	3-0-0	3
6	PCC	20CH1202	Fluid Mechanics	3-1-0	4
7	ESC	20CS1288	Programming and Data Structures Lab	0-0-3	1.5
Contact periods=24/25 Contact hours= 36/37.5 Total Credits					21

II Year – SEMESTER – I

COURSE STRUCTURE

S.No	Category	Course Code	Subject Name	L-T-P	Credits
1	BSC	20MA2103	Transform Calculus	3-1-0	4
2	ESC	20ME2112	Mechanical Technology	3-0-0	3
3	ESC	20CH2101	Thermodynamics-I	3-0-0	3
4	PCC	20CH2102	Heat Transfer	3-1-0	4
5	PCC	20CH2103	Mechanical Unit Operations	3-0-0	3
6	HSC	20BM2101	Managerial Economics and Financial Analysis	3-0-0	3
7	PCC	20CH2181	Fluid Mechanics Lab	0-0-3	1.5
Contact periods=24/25 Contact hours= 36/37.5 Total Credits					21.5

II Year – SEMESTER – II

COURSE STRUCTURE

S.No	Category	Course Code	Subject Name	L-T-P	Credits
1	ESC	20EC2209	Basics of Electrical and Electronics Engineering	3-0-0	3
2	ESC	20CS2207	Object Oriented programming through JAVA	3-0-0	3
3	PCC	20CH2201	Chemical Reaction Engineering-I	3-1-0	4

4	PCC	20CH2202	Mass Transfer Operations-I	3-0-0	3
5	PCC	20CH2203	Thermo Dynamics-II	3-0-0	3
6	ESC	20CS2287	Object Oriented programming through JAVA Lab	0-0-3	1.5
7	PCC	20CH2281	Heat Transfer Lab	0-0-3	1.5
8	PCC	20CH2282	Mechanical Unit Operations Lab	0-0-3	1.5
Contact periods=22/25				Contact hours= 33/37.5	Total Credits 20.5

III Year – SEMESTER – I

COURSE STRUCTURE

S.No	Category	Course Code	Subject Name	L-T-P	Credits
1	PCC	20CH3101	Chemical Process Dynamics and Control	3-1-0	4
2	PCC	20CH3102	Chemical Technology	3-0-0	3
3	PCC	20CH3103	Chemical Reaction Engineering-II	3-0-0	3
4	PCC	20CH3104	Mass Transfer Operations-II	3-0-0	3
5	PCC	20CH3105	Numerical Methods in Chemical Engineering	3-0-0	3
6	PCC	20CH3181	Chemical Reaction Engineering Lab	0-0-3	1.5
7	PCC	20CH3182	Numerical Methods in Chemical Engineering Lab	0-0-3	1.5
8	HSC	20EG3182	English Language Communication Skills Lab –II	0-0-3	1.5
Contact periods=22/25				Contact hours= 33/37.5	Total Credits 20.5

III Year – SEMESTER – II

COURSE STRUCTURE

S.No	Category	Course Code	Subject Name	L-T-P	Credits
1	PCC	20CH3201	Process Equipment Design	3-0-1	3.5
2	PCC	20CH3202	Plant Design and Economics	3-0-0	3
3	PCC	20CH3203	Transport Phenomena	3-1-0	4
4	PEC	20CH32XX	Professional Elective Course-1	3-0-0	3
5	OEC	20XX32XX	Open Elective Course-1	3-0-0	3
6	PCC	20CH3281	Chemical Process Dynamics and Control Lab	0-0-3	1.5
7	PCC	20CH3282	Mass Transfer Operations Lab	0-0-3	1.5
8	HSC	20EG3283	English Language Communication Skills Lab -III	0-0-3	1.5
Sub Total Credits					21
9	SI	20CH3291	Summer Internship		3
Contact periods =22/25 (Excluding Internship project) Contact hours =33/37.5					24
Total Credits					

IV Year – SEMESTER – I

COURSE STRUCTURE

S.No	Category	Course Code	Subject Name	L-T-P	Credits
1	PEC	20CH41XX	Professional Elective Course-2	3-0-0	3
2	PEC	20CH41XX	Professional Elective Course-3	3-0-0	3
3	OEC	20XX41XX	Open Elective Course-2	3-0-0	3
4	MC	20HS4104	Aptitude and Reasoning	2-0-0	0
5	MC	20HS4101	Indian Constitution	2-0-0	0
6	PROJ-I	20CH4192	Project	0-0-6	6
(Excluding project) contact periods = 15/25 contact hours = 22.5/37.5					15
Total Credits					

IV Year – SEMESTER – II**COURSE STRUCTURE**

S.No	Category	Course Code	Subject Name	L-T-P	Credits
1	PEC	20CH42XX	Professional Elective Course-4	3-0-0	3
2	PEC	20CH42XX	Professional Elective Course-5	3-0-0	3
3	OEC	20XX42XX	Open Elective Course-3	3-0-0	3
4	HSC	20HS4299	Indian Community Services	0-0-4	2
5	PROJ-II	20CH4293	Project	0-0-6	6
6	MC	20BE4201	Environmental Science	2-0-0	0
(Excluding project) Contact periods =15/25 Contact hours =22.5/37.5				Total Credits	17

LIST OF ELECTIVE COURSES

	Category	Code	Course Name	Credits
1	PEC	20CHXX21	Advanced Mathematical Techniques in Chemical Engineering	3
2	PEC	20CHXX22	CO2 capture and Utilization	3
3	PEC	20CHXX23	Computational Fluid Dynamics	3
4	PEC	20CHXX24	Fertilizer Technology	3
5	PEC	20CHXX25	Fluidization Engineering	3
6	PEC	20CHXX26	Food Process Engineering	3
7	PEC	20CHXX27	Fuel cells and Flow Batteries	3
8	PEC	20CHXX28	Fuel Technology	3
9	PEC	20CHXX29	Green Technology	3
10	PEC	20CHXX30	Industrial Safety and Hazard Management	3
11	PEC	20CHXX31	Material Science for Chemical Engineers	3
12	PEC	20CHXX32	Multiphase Flow	3
13	PEC	20CHXX33	Novel Separation Processes	3
14	PEC	20CHXX34	Optimization Methods for Chemical Engineering	3
15	PEC	20CHXX35	Petrochemical Technology	3
16	PEC	20CHXX36	Petroleum Refinery Engineering	3
17	PEC	20CHXX37	Pharmaceuticals and Fine Chemicals	3
18	PEC	20CHXX38	Polymer Engineering	3
19	PEC	20CHXX39	Process Instrumentation and Instrumental Methods of Analysis	3
20	PEC	20CHXX40	Process Integration	3
21	PEC	20CHXX41	Process Intensification	3
22	PEC	20CHXX42	Process Modeling and Simulation	3
23	PEC	20CHXX43	Solid Waste Management	3
24	PEC	20CHXX44	Sustainable Process Engineering	3
25	PEC	20CHXX45	Technology of Oils and Fats	3

LIST OF OPEN ELECTIVE COURSES

	Category	Code	Course Name	Credits
1	OEC	20CHXX51	Corrosion Engineering	3
2	OEC	20CHXX52	Environmental Pollution and Control	3
3	OEC	20CHXX53	Introduction to Nano Technology	3
4	OEC	20CHXX54	Renewable Energy	3
5	OEC	20CHXX55	Waste to Energy Conversion	3