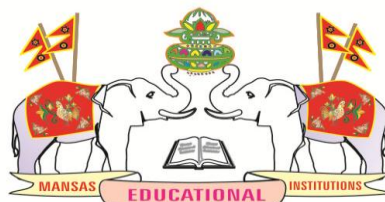


# CURRICULUM

## CHEMICAL ENGINEERING (B.Tech. Programme)

Applicable to the students admitted from the  
Academic year 2015-2016



## MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING (Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)  
Re-Accredited by NBA, Re-accredited by NAAC with 'A' Grade,  
Listed u/s 2(f) & 12(B) of UGC Act 1956.  
Vijayaram Nagar Campus, Chintalavalasa,  
Vizianagaram-535005, Andhra Pradesh

## The visionaries



**Late Dr. P V G Raju**  
Raja Saheb of Vizianagaram  
Founder Chairman-MANSAS  
Ex-Minister for Education and Health, Govt. of  
AP  
Ex Member of Parliament



**Late Dr. P. AnandGajapathiRaju**  
Ex Chairman-MANSAS  
Ex-Minister for Education and Health  
Govt. of AP  
Ex Member of Parliament



**P. Ashok GajapathiRaju**  
Chairman-MANSAS  
Union Minister for Civil Aviation,  
Govt. of India  
Ex-Minister for Finance, Govt. of AP

## 1. PROGRAM STRUCTURE:

1.1 The total program will consist of the following components.

a) Foundation Mandatory	FM	39-45 credits
• Basic Science Core(BSC)		
• Engineering Science Core(ESC)		
• Mandatory Learning Core(MLC)		
• English & Humanities Core(EHC)		
b) Foundation Elective	FE	06-09 credits
c) Core Mandatory(Theory)	CM	68-76 credits
d) Core Mandatory(Lab)	CM(L)	18-22 credits
e) Core Elective (Theory)	CE(T)	21-27 credits
f) Open Elective	OE	06-09 credits
g) Directed Study	DS	02-04 credits
h) Project	PR	08-12 credits
i) Audit Courses	AC	S/N

- Open electives offered by the parent department are listed in the course structure and are offered to students of other programs also.
- For audit course a student is expected to meet minimum contact hours, as prescribed by the department and shall also comply with the requirements of submission of assignments/projects.

### List of Foundation electives:

1. Professional Communication
2. Business Communication
3. Material Science
4. Engineering Mathematics-II
5. Electro Magnetic Theory
6. Instrumental Methods of Analysis
7. Thermodynamics
8. Applied Analysis
9. Probability & Statistics
10. Complex variables & Statistical Methods

### List of Audit courses:

1. Professional Ethics & IPR
2. Soft Skills-I
3. Soft Skills-II
4. General Aptitude
5. NSS/NCC/Sports/Cultural/Yoga
6. Health and Nutrition
7. Entrepreneurship Development
8. Foreign Language (Chinese/Japanese/Korean/German/French)

\*For all the programs offered, in the list of courses for electives one of the choices would be “MOOCs”. Each department shall short list MOOCs course/(s) meeting the requirements of course duration, credits, etc., from time to time. The same shall be placed in the immediate BoS meeting for ratification.

## 2. GRADING SYSTEM:

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

Semester Grade Point Average (SGPA) is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded.

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

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

Where  $C_i$  is the number of credits of the  $i^{\text{th}}$  course and  $G_i$  is the grade point scored by the student in the  $i^{\text{th}}$  course.

The **CGPA** is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

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

Where  $S_i$  is the SGPA of the  $i^{\text{th}}$  semester and  $C_i$  is the total number of credits in that semester.

The UGC recommends a 10-point grading system with the following letter grades as given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
C	(Average)	5
P	(Pass)	4
F	(Fail)	0
Ab	(Absent)	0

- iii. A student with Grade F is required to reappear for the examination.

### Illustration for Computation of SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	<b>20</b>			<b>139</b>

Thus, **SGPA** =  $139/20 = 6.95$

**COURSE STRUCTURE  
(B.TECH. CHEMICAL ENGINEERING)**

<b>I Semester</b>						
<b>S.No</b>	<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
1	A1MAT001	Engineering Mathematics-I	3	0	0	3
2	A1CYT002	Chemistry for Chemical Engineers-I	3	0	0	3
3	A1CIT001	Computer programming	3	0	0	3
4	A1CET001	Basics of Civil & Mechanical Engineering	3	0	0	3
5	A1CHT002	Introduction to Chemical Engineering	3	0	0	3
6	A1EHL001	English Language Practice –I	1	0	2	2
7	A1CYL001	Engineering Chemistry lab	0	0	3	2
8	A1CIL001	Computer programming Lab	0	0	3	2
Total Number of credits						<b>21</b>

<b>II Semester</b>						
<b>S.No</b>	<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
1	A1MAT002	Mathematical Methods	3	0	0	3
2	A1CHT001	Environmental Studies	3	0	0	3
3	A1PYT001	Engineering Physics	3	0	0	3
4	A1EET001	Basic Electrical and Electronics Engineering	3	0	0	3
5	A1MED001	Engineering Drawing	3	0	0	3
6	A1EHL002	English Language Practice –II	1	0	2	2
7	A1PYL001	Engineering Physics Lab	0	0	3	2
8	A1MEW001	Basic Engineering Workshop	0	0	3	2
9	A1EHA5XX	Audit Course 1	-	-	-	
Total Number of credits						<b>21</b>

<b>III Semester</b>						
<b>S.No</b>	<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
1	A1CHT201	Material Science for Chemical Engineers	4	0	0	4
2	A1CHT202	Chemical Process Calculations	3	1	0	4
3	A1CHT203	Fluid Mechanics for Chemical Engineers	3	1	0	4
4	A1CHT204	Chemical Technology	4	0	0	4
5	A1CYT205	Organic Chemistry	4	0	0	4
6	A1XXT1XX	Foundation Elective-1	3	0	0	3
7	A1CHL201	Fluid Mechanics Lab for Chemical Engineers	0	0	3	2
8	A1CHL202	Chemical Technology Lab	0	0	3	2
9	A1EHA5XX	Audit Course-2	-	-	-	-
Total Number of credits						<b>27</b>

<b>IV Semester</b>						
<b>S.No</b>	<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
1	A1XXT4XX	Open elective-I	3	0	0	3
2	A1CHT206	Process Heat Transfer	3	1	0	4
3	A1CHT207	Chemical Engineering Thermodynamics-I	3	1	0	4
4	A1CHT208	Mechanical Unit Operations	3	1	0	4
5	A1CHT3XX	Core Elective-I	3	0	0	3
6	A1XXT1XX	Foundation elective-II	3	0	0	3
7	A1CHL203	Process Heat Transfer Lab	0	0	3	2
8	A1CHL204	Mechanical Unit Operations Lab.	0	0	3	2
9	A1EHA5XX	Audit Course-3		-	-	
Total Number of credits						<b>25</b>

<b>V Semester</b>						
<b>S.No</b>	<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
1	A1CHT209	Process Instrumentation	3	0	0	3
2	A1CHT210	Chemical Engineering Thermodynamics-II	3	1	0	4
3	A1CHT211	Chemical Reaction Engineering-I	3	1	0	4
4	A1CHT212	Mass Transfer Operations-I	3	1	0	4
5	A1CHT3XX	Core Elective-II	3	0	0	3
6	A1CHT3XX	Core Elective-III	3	0	0	3
7	A1CHL205	Chemical Reaction Engineering Lab	0	0	3	2
8	A1CHL206	Mass Transfer Operations Lab	0	0	3	2
9	A1EHA5XX	Audit Course-4	.	.	.	
Total Number of credits						<b>25</b>

<b>VI Semester</b>						
<b>S.No</b>	<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
1	A1CHT213	Mass Transfer Operations-II	3	1	0	4
2	A1CHT214	Process Dynamics & Control	3	1	0	4
3	A1CHT215	Chemical Reaction Engineering-II	3	1	0	4
4	A1CHT216	Process Modeling & Simulation	3	1	0	4
5	A1CHT3XX	Core Elective-IV	3	0	0	3
6	A1CHT3XX	Core Elective-V	3	0	0	3
7	A1CHL207	Process Dynamics & Control Lab	0	0	3	2
8	A1CHL208	Process Modeling and Simulation lab using MATLAB	0	0	3	2
9	A1EHA5XX	Audit Course-5	.	.	.	
Total Number of credits						<b>26</b>

<b>VII Semester</b>						
<b>S.No</b>	<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
1	A1MST001	Managerial Economics & Financial Analysis	3	0	0	3
2	A1CHT217	Transport Phenomena	3	1	0	4
3	A1CHT218	Plant Design & Economics for Chemical Engineers	3	1	0	4
4	A1CHT3XX	Core Elective – VI	3	0	0	3
5	A1CHT3X0X	Core Elective – VII	3	0	0	3
6	A1CHT3XX	Core Elective-VIII	3	0	0	3
7	A1XXT4XX	Open Elective-II	3	0	0	3
8	A1CHD201	Process Equipment Design & Drawing using Auto CAD	0	0	3	2
9	A1EHA5XX	Audit Course- 6	-	-	-	-
Total Number of credits						<b>25</b>

<b>VIII Semester</b>						
<b>S.No</b>	<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
1	A1CHP601	Directed Study	0	0	0	02
2	A1CHP602	Project Work	0	0	0	08
Total Number of credits						<b>10</b>

<b>Foundation Electives</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject Name</b>
1	A1EHT10001	Professional Communication
2	A1EHT10002	Business Communication
3	A1PYT10003	Material Science
4	A1MAT10004	Engineering Mathematics - II
5	A1PYT10005	Electromagnetic Theory
6	A1CYT10006	Instrumental methods of Analysis
7	A1MET10007	Thermodynamics
8	A1CYT10008	Applied Analysis
9	A1MAT10009	Probability & Statistics
10	A1MAT10010	Complex Variable & Statistical Methods



<b>Audit Course Electives</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject Name</b>
1	A1EHA501	NSS
2	A1EHA502	NCC
3	A1EHA503	Sports
4	A1EHA504	Cultural
5	A1EHA505	Yoga
6	A1EHT506	Health & Nutrition
7	A1EHT507	Entrepreneurship Development
8	A1EHT508	Foreign Language (Chinese/Japanese/Korean/German)
9	A1EHT509	Professional Ethics & IPR
10	A1EHT510	Soft Skills - I
11	A1EHT511	Soft Skills - II
12	A1EHT512	General Aptitude
13		MOOC

<b>Open Electives offered by Chemical Engineering Department to other Departments</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject Name</b>
1	A1CHT401	Non conventional sources of energy
2	A1CHT402	Design and analysis of experiments
3	A1CHT403	Industrial Pollution Control Engineering

<b>Open Electives offered by Chemical Engineering Department to other Departments</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject Name</b>
1	A1CHT405	Energy Engineering
2	A1CHT406	Green Chemistry & Technology
3	A1CHT407	Environmental impact assessment

<b>Core Elective - I</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject</b>
1	A1CHT301	Fertilizer Technology
2	A1CHT302	Petroleum Refining & Petrochemicals
3	A1CHT303	Polymer technology

<b>Core Elective - II</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject</b>
1	A1CHT304	Paper technology
2	A1CHT305	Fuel Cell Technology
3	A1CHT306	Ceramic technology

<b>Core Elective - III</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject</b>
1	A1CHT307	Industrial pollution control and engineering
2	A1CHT308	Petroleum and Petro Chemical Technology
3	A1CHT309	Nanotechnology

<b>Core Elective - IV</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject</b>
1	A1CHT310	Food technology
2	A1CHT311	Mineral process engineering
3	A1CHT312	Technology of Pharmaceuticals and Fine Chemicals

<b>Core Elective - V</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject</b>
1	A1CHT313	Biochemical Engineering
2	A1CHT314	Project Management
3	A1CHT315	Process intensification

<b>Core Elective - VI</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject</b>
1	A1CHT316	Industrial biotechnology
2	A1CHT317	Corrosion and control
3	A1CHT318	Optimization of Chemical Processes

<b>Core Elective - VII</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject</b>
1	A1CHT319	Fermentation Engineering
2	A1CHT320	Nuclear Reactor Engineering
3	A1CHT321	Industrial Safety and Hazard Management

<b>Core Elective - VIII</b>		
<b>S. No</b>	<b>Subject Code</b>	<b>Subject</b>
1	A1CHT322	Statistical molecular thermodynamics
2	A1CHT323	Organic solar cells
3	A1CHT324	Bio electricity