ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY AND SCIENCES (AUTONOMOUS)

ACCREDITED BY NBA & NAAC WITH'A'GRADE

Affiliated to Andhra University

ANITS

Academic Regulations & Curriculum

DEPARTMENT OF CHEMICAL ENGINEERING

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY AND SCIENCES (AUTONOMOUS)

VISION

ANITS envisions to emerge as a world-class technical institution whose products represent a good blend of technological excellence and the best of human values.

MISSION

To train young men and women into competent and confident engineers with excellent communicational skills, to face the challenges of future technology changes, by imparting holistic technical education using the best of infrastructure, outstanding technical and teaching expertise and an exemplary work culture, besides moulding them into good citizens.

QUALITY POLICY

ANITS is engaged in imparting quality technical education. It constantly strives towards achieving high standards of teaching, training and development of human resources by encouraging its faculty and staff to work as a team and to update their knowledge and skills continually to match the needs of industry.

Foreword

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY AND SCIENCES (ANITS) was founded by Anil Neerukonda Educational Society (ANES) in the fond memory of Anil Neerukonda, son of Dr. B R Prasad Neerukonda.

Its humble journey started in 2001 with an intake of 220 students into four undergraduate B.Tech programmes. Within 14 years of its establishment, the institute registered phenomenal growth and is accredited by NAAC with 'A' and by NBA for the second time. It is permanently affiliated to Andhra University and has achieved autonomous status in 2015. Further, the institute has been currently ranked as 4th among the private engineering colleges in Andhra Pradesh by APSCHE. It has been recognised as "Centre for Excellence" by Infosys and is accorded by Andhra University as "Centre for Research".

Today, the institute offers seven B.Tech. programmes and four M.Tech. programmes with an annual total intake about 1100 students. The institute offers amenities like separate hostels for boys and girls, indoor and outdoor games, transport covering all the major locations of Visakhapatnam and medical aid provided by Anil Neerukonda hospital and NRI Institute of Medical Sciences, another educational institution of ANES.

Apart from the State-of-the-Art laboratories, well established teaching methodology and implementation of the best practices, the wonderful co-ordination of the Management, Faculty and Parents has so far played a crucial role in shaping the future of the ANITIANS and has been the talisman of the Institute's phenomenal growth.

The success stories of our champions at several qualifying exams for the higher studies like GRE, TOEFL, CAT and GATE, the impressive track record of the placements with highest known packages in MNCs like Google, Oracle, Infosys, TCS and so on are the sweetest fruits of our efforts.

PRAGNANAM BRAHMA, the motto of ANITS, is truly practiced by all the members of ANITS family, a direct effort to serve the society, nation and the mankind as well.

Hearty welcome to ANITS family.

Prof. T.V. Hanumantha Rao
PRINCIPAL

Achievements & Highlights

- ✓ Autonomous since May 2015

- ✓ NAAC with 'A' Grade

- ✓ Accredited and reaccredited by NBA, New Delhi

- ✓ UGC recognition under 2(f) and 12(B)

- ✓ Permanent affiliation to Andhra University, Visakhapatnam

- ✓ Among top 3 most preferred colleges in A.P.

- ✓ "AAA" rating accorded by "Careers Digest 360"

- ✓ Recognized as a Research Center by Andhra University

- ✓ Selected as Skill Development Center (SDC) by Govt. of A.P.

- ✓ First institute to be accorded "Center for Excellence" by Infosys

- ✓ Ranked 3rd among the Promising Private Engineering Colleges for excellence as per Competition Success Review (CSR) magazine in the year 2016.

- ✓ Recognized as "Silver Partner" of Keane India (Chennai) for the year 2007-2008

- ✓ Collaborated with "Mission (R&D)" funded by Wipro "On Campus Training" by IBM for the students

- ✓ Collaboration with Unisys Global Solutions India (Bangalore) for internship

- ✓ Highest package offer around 2 crores including perks – highest offer in South India 8 lacs to 10 lacs packages –for majority ANITIANS

Contents

Department Profile

The Department of **Chemical Engineering**, ANITS was started in the year 2012. The department offers B. Tech. Chemical Engineering with an intake of 60 students and M. Tech. Biotechnology with an intake of 18 students. The department has 15 qualified faculty members who have their degrees from premier institutes like IITs, IISc, NITs, BITS Pilani and Andhra University and a few of them have more than 30 years of teaching and research experience in Chemical Engineering. The department is sanctioned with a UGC major research project for an amount of Rs. 12.39 lakhs in 2014. The department is offering consultancy to various industries in and around Visakhapatnam. The faculty members have expertise in core Chemical Engineering and interdisciplinary research in the areas of Computational Biology, Bio-process Engineering, Bio-fuels, Photo-Catalytic Degradation, Chemical Reaction Engineering, Process Simulation and Industrial Pollution Control. The faculty published research papers in national and international journals of high repute. The department is well equipped with laboratories in addition to major equipment like gas chromatography, UV spectrophotometer and bioreactor. The students are exposed to latest and innovative developments in Chemical Engineering as well as to co-curricular activities like attending workshops, seminars and presenting research papers in various conferences and seminars. Some of them have secured prizes in paper presentations, technical quiz etc. at reputed institutes like IIT Kharagpur, NIT, Warangal and across India. The students undergo industrial internships in Government and private organizations like HPCL, RINL, RIL, Dr. Reddy's, IICT Hyderabad. The students got job opportunities in core and noncore industries with highest package of 6 lakhs per annum.

DEPARTMENT OF CHEMICAL ENGINEERING

VISION

To emerge as centre of excellence in Chemical Engineering and attain global recognition in fulfilling the needs of industry and society.

MISSION

To train young and budding Chemical engineers with quality education along with industry-academia interaction and to emerge as competent engineers for the society.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO-1   To provide the students with academic training in basic sciences, chemical and its interdisciplinary fields for their successful career.

PEO-2   To acquaint students with industrial exposure and research to serve the industry and society.

PEO-3   To inculcate good communication, entrepreneurship and leadership skills with ethical values empowering humanity for better society.

PROGRAM OUTCOMES (POs)

Graduates will be able to

PO-1: Engineering Knowledge: Apply the knowledge of basic sciences and engineering fundamentals to solve engineering problems.

PO-2: Problem analysis: Analyze the complex engineering problems and give solutions related to chemical and allied industries.

PO-3: Design / development of solutions: Identify the chemical engineering problems, design and formulate solutions to solve both industrial and social related problems.

PO-4: Conduct investigations of complex problems: design and conduct experiments, analyze and interpret the resulting data to solve Chemical engineering problems.

PO-5: Modern tool usage: Apply appropriate techniques, resources and modern engineering and IT tools for the design, modeling, simulation and analysis studies.

PO-6: The engineer and society: Assess societal, health, safety, legal and cultural issues and their consequent responsibilities relevant to professional engineering practice.

PO-7: Environment and sustainability: Understand the relationship between society & environment and work towards sustainable development.

PO-8: Ethics: Understand their professional & ethical responsibility and enhance their commitment towards best engineering practices.

PO-9: Individual and team work: Function effectively as a member or a leader in diverse teams and be competent to carry out multidisciplinary tasks.

PO-10: Communication: Communicate effectively in both verbal & non-verbal and able to comprehend & write effective reports.

PO-11: Project management and finance: Understand the engineering and management principles to manage the multidisciplinary projects in whatsoever position they are employed.

PO-12: Life-long learning: Recognize the need of self education and life-long learning process in order to keep abreast with the ongoing developments in the field of engineering.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO-1 The graduate will be competent in applying basic sciences & Chemical engineering principles to multi-disciplinary fields namely biotechnology, nanotechnology, environmental engineering and energy engineering.

PSO-2 The graduate will be able to apply the technical knowledge to solve the problems of chemical, allied industries and society.

ACADEMIC REGULATIONS FOR B.TECH PROGRAMME UNDER AUTONOMOUS STATUS

(W.E.F. THE ADMITTED BATCH OF 2015-16)

I.   Admissions:

Admissions into first year of B.Tech. Programme and admissions into second year (lateral entry) of B.Tech. Programme of the Institute will be as per the norms stipulated by Andhra University & Andhra Pradesh State Council for Higher Education (APSCHE), Govt. of Andhra Pradesh. The academic regulations of Autonomous status mentioned herewith will be applicable from 2016-17 in case of Lateral Entry admissions.

II.   Programmes Offered:

The following are the B.Tech. Programmes offered by the Institute.

1   Chemical Engineering
2   Civil Engineering
3   Computer Science & Engineering
4   Electrical & Electronics Engineering
5   Electronics & Communication Engineering
6   Information Technology
7   Mechanical Engineering

III. Structure of the B. Tech. Programme:

The programme consists of Humanities, Basic Sciences, Engineering Sciences and Technology. The complete programme is distributed over eight semesters with two semesters per academic year. Every branch of B.Tech programme will have a curriculum and syllabi for the courses recommended by the Board of Studies and approved by the Academic Council. The academic programmes of the Institute follow the credit system. The curriculum of B.Tech programme is designed to have a total of about 189 credits of which a student should acquire a minimum of 180 credits to get the degree awarded. If a student earns all the total credits, then the best 180 credits are considered to determine the final CGPA. The lateral entrants shall have a total of about 146 credits of which one should acquire a minimum of 137 credits to get the degree awarded. If a lateral student takes all the credits, then the best 137 credits are considered to determine the final CGPA.

Criteria for achieving the minimum credits:

Mandatory courses

All courses mentioned in the programme excluding open electives, professional electives and MOOCS come under mandatory courses.

Open Elective- A course offered by any department other than home department

The student has to choose one open elective out of the open electives offered by other departments during third year first semester or Final year first semester.

Professional Electives

The student has to register for at least (n-1) no. of professional electives (n = no. of professional electives offered by the department during the programme) as per his choice as provided in the curriculum. However, he can register for all the professional electives offered by the department.

MOOCs- Massive Open Online Courses

The student is required to register for one MOOCs course any time during second year first semester to fourth year second semester. However, its grade will be accorded at the end of fourth year second semester along with the fourth year second semester courses of the programme.

For the award of the degree, the student has to secure a minimum pass grade or above in all the mandatory courses, registered open elective, registered professional electives. However, the degree will still be awarded even if the student fails / opts out of MOOCs.

IV. Duration of the Programme:

The duration of the programme is four academic years consisting of two semesters in each academic year. A student is permitted to complete the programme in a stipulated time frame of 8 consecutive academic years from the date of initial admission. Students joining the programme in the 2nd year through lateral entry scheme shall have to complete the programme in a stipulated time frame of 6 consecutive academic years from the date of initial admission.

V. Medium of Instruction:

The medium of instruction and examination is English.

VI. Minimum Instruction Days:

Each semester normally consists of a minimum of 16 weeks of instruction.

VII. Academic Calendar:

The dates of all important events, such as commencement of class work, examinations, vacations, etc., during the academic year will be specified in the Academic Calendar of the Institute, as approved by the Academic Council.

VIII. Examinations & Evaluation Process:

The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks each for theory and practical/ drawing subjects.

(A) Theory Course:

For all lecture based theory courses, the assessment shall be for 40 marks through internal evaluation and 60 marks through external semester-end examination of three hours duration except for the subjects with 100% internal assessment in which case an internal examination will be conducted for 60 marks along with the semester-end examinations.

i) Internal evaluation:

The sessional marks shall be awarded through internal evaluation by the teachers concerned based on the continuous assessment which includes class tests, quiz, viva-voce, assignments, student regularity, two mid-examinations etc., according to a scheme notified by the department at the beginning of the semester.

Out of the 40 internal evaluation marks, 20 marks are assigned for 2 internal-mid exams, 10 marks for assignments, 5 marks for projects/ case studies /quiz/tests and 5 marks for attendance. The average of 2 internal-mid exams is considered for the 20 marks allocated.

Under any circumstances, no re-examination shall be conducted for the internal mid examinations.

ii) External evaluation:

The question paper shall be set externally and the answer scripts are valued through a double valuation system.

The average of the two valuations will be taken for the award of marks. In case, the difference of the marks obtained in the two valuations is more than 20%, then a third examiner shall value the script. Out of the three valuations, the average of marks obtained in third valuation and the marks obtained nearer to third valuation out of first two valuations shall be considered. No revaluation for any subject/course shall be entertained as already double valuation system is in existence. However, recounting is allowed on the request of the candidate on payment of specified fee. Challenge valuation shall also be entertained on payment of specified fee.

(B) Laboratory Course:

Each student will perform about 10 to 12 experiments in each laboratory course. Laboratory course will be evaluated for 100 marks, out of which 50 marks are for external examination and 50 marks are for internal evaluation. The internal marks are awarded based on continuous assessment, record work, internal lab examination and student regularity. The external examination will be conducted by two examiners, one of them being laboratory class teacher as internal examiner (nominated by the Principal on recommendation of HOD) and an external examiner nominated by the Principal from the panel of experts recommended by the HOD.

A candidate shall be declared to have passed any theory subject/ course if he secures not less than 40% in external theory examination and also a minimum of 40% of total marks of that course which assures a minimum of 'P' grade.

A candidate shall be declared to have passed any practical course if he secures not less than 50% in external laboratory examination and also a minimum of 50% of total marks of that course which assures a minimum of 'C' grade.

Only in the case of quantitative and verbal aptitude – I & II, if a candidate fails he is given an opportunity to improve to pass grade (P) irrespective of the score he gets over and above pass mark in the reexamination within one month on payment of special examination fee.

Any student appearing for the semester-end practical examination is eligible only if he submits the bonafide record certified by the laboratory class teacher and the HOD.

(C) Project Work:

The project work is evaluated for 300 marks out of which 100 through internal assessment in the IV Year I semester through continuous assessment followed by final evaluation by a committee nominated by the HOD. For the 200 marks in IV year II semester, assessment is done for 100 marks internally and for the remaining 100 marks by the committee consisting of at least one external expert nominated by the Principal. If a student fails in the fourth year first semester project he has to appear for reassessment within one month for which he has to pay the reexamination fee.

(D) Industrial Training:

The industrial training is assessed internally for 100 marks by an internal evaluation committee constituted by the HOD.

(E) Supplementary Exam:

There will be supplementary examination for the programme such that for odd semester courses the supplementary exams will be conducted during summer vacation and for the even semester courses, the supplementary exams will be conducted during the winter vacation.

IX. Attendance Regulations:

Attendance of a student is computed by considering total number of periods conducted in all courses as the denominator and the total number of periods actually attended by the student in all courses, as the numerator. It is desirable for a student to put in 100% attendance in all the subjects. However, a candidate shall be permitted to appear for the semester end examination provided he maintains a minimum of 75% overall attendance in the semester.

The shortage of attendance on medical grounds can be condoned up to a maximum of 9% provided the student puts in at least 66% attendance and provided the Principal is satisfied with the genuineness of the reasons. The Medical Certificates are to be submitted to the Head of the Department when the candidate reports to the classes immediately after the absence. Certificates submitted afterwards shall not be entertained. Condonation fee as fixed by the college for those who put in attendance between ε 66% and <75% shall be charged before the semester-end examinations.

In the case of students who participate in co-curricular, extra-curricular activities like student seminars, N.S.S, N.C.C, Inter-collegiate tournaments and any such other activities involving the representation of the Institute,

with the prior approval of the Principal, the candidate may be deemed to have attended the classes during the actual period of such activity, solely for the purpose of attendance.

A student, who could not satisfy the minimum attendance requirement of 66% in any semester, shall be declared 'Detained'. He is not eligible to appear for the semester end examinations. He will not be promoted to the next semester and shall have to repeat that semester with the next batch(es) of students. Such students who are detained and seek readmission, should submit an undertaking/a declaration that they will abide by the regulations existing at the time of readmission.

X.   Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No. IX.

A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory subject if only he secures not less than 40% marks in the semester-end examination and a minimum of 40% marks in the sum of the internal evaluation and semester-end examination taken together. In the labs/ projects, the student should secure a minimum of 50% marks in the external examination and a minimum of 50% marks in the sum of internal evaluation and external examination evaluation taken together.

Further, a candidate has to secure a minimum of 40 % in theory examination (excluding sessional marks) and a minimum of 50 % (excluding sessional marks) in the Practical Examination / Project / Field Work / Viva Voce / Industrial Training in Semester –End / Year – End Examination and 50% aggregate to pass.

A student will be promoted to the next semester, if only he satisfies the minimum attendance requirement.

A student shall be promoted from II Year to III Year only if he fulfills the academic requirement of total 50 % of all credits from regular and supplementary examinations of I Year and II Year – I Semester { i.e., total 3 semesters} examinations, irrespective of whether the candidate takes the examination in all the subjects or not.

A student shall be promoted from III Year to IV Year only if he fulfills the academic requirements of total 50% of credits from regular and supplementary examinations of I Year, II Year and III Year- I Semester {i.e., total 5 semesters}, irrespective of whether the candidate takes the examinations in all the subjects or not.

For lateral entry students, there is no credit based restriction for promotion from II year to III year. But a lateral entry student shall be promoted from III year to IV year only if he fulfills the academic requirements of total 50% of credits from regular and supplementary examinations of II year and III year- I Semester {i.e., total 3 semesters} irrespective of whether the candidate takes the examinations in all the subjects or not.

Students, who fail to complete their B.Tech. Programme within eight academic years from the year of their admission or fail to acquire the credits stipulated for the programme shall forfeit their seat in B.Tech. Programme and their admission shall stand cancelled. For lateral entry students they have to complete the programme in six years from their year of admission.

A candidate can avail the betterment chances during the validity of all courses.

XI.   Award of Grades:

The absolute grading system is adopted as follows:

S.No	Range of marks %		Grade	Grade Points	
1	> 90	≤ 100	O	10	Out Standing
2	> 80	≤ 90	A+	9	Excellent
3	> 70	≤ 80	A	8	Very Good
4	> 60	≤ 70	B+	7	Good
5	> 55	≤ 60	B	6	Above Average
6	≥ 50	≤ 55	C	5	Average
7	≥ 40	< 50	P	4	Pass
8		< 40	F	0	Fail
9				0	Ab (Absent)

Note: Minimum grade to pass in a laboratory course is 'C'.

The performance of a student at the end of the each semester is indicated in terms of Semester Grade Point Average (SGPA). The SGPA is calculated as below:

$$SGPA = \frac{\Sigma \ (Credits \ of \ a \ course \ x \ Grade \ points \ awarded \ for \ a \ course)}{\Sigma \ (Credits \ of \ a \ course)}$$

SGPA is calculated for the candidates who have passed in all the courses in that semester.

Cumulative Grade Point Average (CGPA) will be calculated from II semester onwards up to the final semester and its calculation is similar to that of SGPA, considering all the courses offered from the first semester onwards.

CGPA is calculated for those who clear all the courses in all the previous semesters.

XII. Award of Class:

For award of class, a total of best 180 credits are considered in case of four year programme and best 137 credits in case of lateral entry admitted students. A candidate, who becomes eligible for the award of B.Tech.Degree, shall be placed in one of the following classes.

S.No.	Class	CGPA
1	First Class with Distinction	7.0 or more*
2	First Class	6.0 or more but less than 7.0
3	Second Class/Pass	5.0 or more but less than 6.0

*First class with Distinction will be awarded only to those students who clear all the subjects of the program in first attempt of regular examinations.

The CGPA can be converted to aggregate percentage by multiplying CGPA with 10, in case of requirement by any other university or for any other purpose.

XIII. Eligibility for Award of B.Tech. Degree:

A student shall be eligible for the award of the B.Tech degree if he fulfills all the following conditions:

1) Registered and successfully completed all the components prescribed for eligibility in the Programme of study to which he/she is admitted within the stipulated period,

2) Obtained CGPA greater than or equal to 5.0 (Minimum requirement for Pass),

3) No disciplinary action is pending against him/her and

4) Has no dues to the Institute including hostels.

XIV. Malpractices:

The Controller of Examinations/Dean of Examinations shall refer the cases of suspected malpractices in mid examinations and semester-end examinations to Malpractice Enquiry Committee constituted by the Institute. Such committee shall follow the approved scales of punishment. The Principal shall take necessary action against the erring students based on the recommendations of the committee.

XV. Amendments To Regulations:

The Institute may, from time to time, revise, amend, or change the Regulations, Schemes of Examinations, and / or Syllabi and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

XVI. General:

(i) Where the words 'he', 'him', 'his', occur in the regulations, they include 'she', 'her', 'hers'.

(ii) The academic regulation should be read as a whole for the purpose of any interpretation.

(iii) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

CURRICULUM
First Year I – Semester

| CODE | SUBJECT NAME | Category | Instruction periods per week | | | | Max.Marks | | | Credits |
			Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	Total Marks	
CHE111	English	HS	3	1	-	4	40	60	100	3
CHE 112	Engineering Mathematics I	BS	3	1	-	4	40	60	100	3
CHE 113	Engineering Physics	BS	3	1	-	4	40	60	100	3
CHE 114	Engineering Drawing	ES	1	-	3	4	40	60	100	3
CHE115	Environmental Sciences	BS	3	1	-	4	40	60	100	3
CHE116	Engineering Physics Lab	BS	-	-	3	3	50	50	100	2
CHE117	Programming with C Lab	ES	2	-	3	5	50	50	100	3
CHE118	Work Shop	ES	-	-	3	3	50	50	100	2
CHE AC1	NCC/NSS/Sports	AC	-	-	3	3	-	-	-	-
	Total		*15*	*4*	*15*	*34*	*350*	*450*	*800*	*22*

First Year II – Semester

| CODE | SUBJECT NAME | Category | Instruction periods per week | | | | Max.Marks | | | Credits |
			Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	Total Marks	
CHE121	Engineering Mathematics II	BS	3	1	-	4	40	60	100	3
CHE122	Engineering Chemistry	BS	3	1	-	4	40	60	100	3
CHE123	Professional Ethics & Human Values	HS	2	1	-	3	100	-	100	2
CHE124	Physical Chemistry	BS	3	1	-	4	40	60	100	3
CHE125	Introduction to Chemical Engineering	PC	3	1	-	4	40	60	100	3
CHE126	Engineering Chemistry Lab	BS	-	-	3	3	50	50	100	2
CHE127	Language Lab	HS	-		3	3	50	50	100	2
CHEAC2	NCC/NSS / Sports	AC	-	-	3	3	-	-	-	-
	Total		*14*	*5*	*9*	*28*	*360*	*340*	*700*	*18*

BS : Basic Sciences; ES : Engineering Sciences; HS : Humanities and Social Sciences; PC : Professional Core;
PE : Professional Elective; OE : Open Elective; PW : Project Work; IT : Industrial Training; AC : Audit Course

Second Year I – Semester

CODE	SUBJECT NAME	Category	Instruction periods per week				Max.Marks			Credits
			Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	Total Marks	
CHE 211	Engineering Mathematics – III	BS	3	1	-	4	40	60	100	3
CHE 212	Organic Chemistry	BS	3	1	-	4	40	60	100	3
CHE 213	Mechanical Engineering and Strength of Materials	ES	3	1	-	4	40	60	100	3
CHE 214	Basic Electrical & Electronics Engineering	ES	3	1	-	4	40	60	100	3
CHE 215	Chemical Process Calculations	PC	4	1	-	5	40	60	100	4
CHE 216	Organic Chemistry Laboratory	BS	-	-	3	3	50	50	100	2
CHE 217	Mechanical Engineering Laboratory	ES	-	-	3	3	50	50	100	2
	Total		*16*	*5*	*6*	*27*	*300*	*400*	*700*	*20*

Second Year II –Semester

CODE	SUBJECT NAME	Category	Instruction periods per week				Max.Marks			Credits
			Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	Total Marks	
CHE 221	Engineering Mathematics – IV	BS	3	1	-	4	40	60	100	3
CHE 222	Momentum transfer	PC	4	1	-	5	40	60	100	4
CHE 223	Mechanical Operations	PC	4	1	-	5	40	60	100	4
CHE 224	Process Instrumentation	PC	4	1	-	5	40	60	100	4
CHE 225	Chemical Engineering Thermodynamics - I	PC	4	1	-	5	40	60	100	4
CHE 226	Momentum Transfer Laboratory	PC	-	-	3	3	50	50	100	2
CHE 227	Mechanical Operations Laboratory	PC	-	-	3	3	50	50	100	2
	Total		*19*	*5*	*6*	*30*	*300*	*400*	*700*	*23*

Third Year I – Semester

CODE	SUBJECT NAME	Category	Instruction periods per week				Max.Marks			Credits
			Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	Total Marks	
CHE 311	Open Elective – I	OE	3	1	-	4	40	60	100	3
CHE 312	Chemical Engineering Thermodynamics – II	PC	4	1	-	5	40	60	100	4
CHE 313	Heat Transfer	PC	4	1	-	5	40	60	100	4
CHE 314	Mass Transfer – I	PC	4	1	-	5	40	60	100	4
CHE 315	Chemical Reaction Engineering – I	PC	4	1	-	5	40	60	100	4
CHE 316	Elective – I	PE	4	1	-	5	40	60	100	4
CHE 317	Heat Transfer Laboratory	PC	-	-	3	3	50	50	100	2
CHE 318	Soft Skills Laboratory	HS	-	-	3	3	100	-	100	2
CHE 319	Quantitative and Verbal Aptitude – I	HS	4	-	-	4	100	-	100	2
	Total		*27*	*6*	*6*	*39*	*490*	*410*	*900*	*29*

Third Year II - Semester

CODE	SUBJECT NAME	Category	Instruction periods per week				Max.Marks			Credits
			Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	Total Marks	
CHE 321	Mass Transfer – II	PC	4	1	-	5	40	60	100	4
CHE 322	Chemical Reaction Engineering – II	PC	4	1	-	5	40	60	100	4
CHE 323	Material Science and Engineering	PC	4	1	-	5	40	60	100	4
CHE 324	Chemical Technology	PC	4	1	-	5	40	60	100	4
CHE 325	Elective - II	PE	4	1	-	5	40	60	100	4
CHE 326	Mass Transfer Laboratory	PC	-	-	3	3	50	50	100	2
CHE 327	Chemical Reaction Engineering Laboratory	PC	-	-	3	3	50	50	100	2
CHE 328	Chemical Technology Laboratory	PC	-	-	3	3	50	50	100	2
CHE 329	Quantitative and Verbal Aptitude – II	HS	4	-	-	4	100	-	100	2
	Total		*24*	*5*	*9*	*38*	*450*	*450*	*900*	*28*

Fourth Year I - Semester

CODE	SUBJECT NAME	Category	Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	Total Marks	Credits
			Instruction periods per week				Max.Marks			
CHE 411	Open Elective - II	OE	3	1	-	4	40	60	100	3
CHE 412	Transport Phenomena	PC	4	1	-	5	40	60	100	4
CHE 413	Process Dynamics and Control	PC	4	1	-	5	40	60	100	4
CHE 414	Process Modeling and Simulation	PC	4	1	-	5	40	60	100	4
CHE 415	Elective – III	PE	4	1	-	5	40	60	100	4
CHE 416	Process Dynamics and Control Laboratory	PC	-	-	3	3	50	50	100	2
CHE 417	Process Modeling and Simulation Laboratory	PC	-	-	3	3	50	50	100	2
CHE 418	Seminar	PW	-	-	3	3	100	-	100	4
CHE 419	Industrial Training*	IT	-	-	-	-		100	100	2
	Total		*19*	*5*	*9*	*33*	*400*	*500*	*900*	*29*

*There is Industrial Training at the end of III year II Semester for a minimum of three weeks during summer vacation.

Assessment for the Industrial Training is made during IV year I Semester.

Fourth Year II - Semester

CODE	SUBJECT NAME	Category	Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	Total Marks	Credits
			Instruction periods per week				Max.Marks			
CHE 421	Chemical Process Economics and Equipment Design	PC	4	1	-	5	40	60	100	4
CHE 422	Elective – IV	PE	4	1	-	5	40	60	100	4
CHE 423	Chemical Process Equipment Design Laboratory	PC	-	-	3	3	50	50	100	2
CHE 424	Project	PW	-	-	6	6	100	100	200	8
CHE 425	MOOCs	OE	-	-	-	-	100	-	100	2
	Total		*8*	*2*	*9*	*19*	*330*	*270*	*600*	*20*

LIST OF DEPARTMENT ELECTIVES

ELECTIVE SUBJECTS:

Elective – I

CHE 316(A) Polymer Technology
CHE 316(B) Fertilizer Technology
CHE 316(C) Paper Technology
CHE 316(D) Pharmaceutical Technology
CHE 316(E) Soap and Detergent Technology

Elective – II

CHE 325(A) Petrochemicals
CHE 325(B) Computer Applications in Chemical Engineering
CHE 325(C) Membrane Technology
CHE 325(D) Catalysis
CHE 325(E) Industrial Pollution and Control

Elective – III

CHE 415(A) Petroleum Refinery Engineering
CHE 415(B) Computer Aided Design
CHE 415(C) Nanotechnology
CHE 415(D) Computational Fluid Dynamics
CHE 415(E) Fundamentals of Biological Sciences

Elective – IV

CHE 422(A) Reservoir Engineering
CHE 422(B) Process Optimization
CHE 422(C) Energy Engineering
CHE 422(D) Industrial Management
CHE 422(E) Biochemical Engineering

OPEN ELECTIVES – I

III Year I – Semester

Department	Name of the Course offered
ELECTRONICS AND COMMUNICATION ENGINEERING	ECE 311 (A) Electronic Design with Integrated Circuits ECE 311 (B) Digital Electronics ECE 311 (C) Applications of Fields and Waves ECE 311 (D) Special Topics: Electronics ECE 311 (E) Applied Electronics
ELECTRICAL AND ELECTRONICS ENGINEERING	EEE 311 Renewable Energy Technologies
MECHANICAL ENGINEERING	MEC 311 (A) Robotics MEC 311 (B) Computer Aided Design
COMPUTER SCIENCE & ENGINEERING	CSE311(A) Computer Operating systems CSE311(B) Fundamentals of Computer Networks CSE311(C) Concepts of Object Oriented Programming CSE311(D) Database Management Systems
INFORMATION TECHNOLOGY	IT 311 (A) Essentials of Information Technology IT 311 (B) Data Structures IT 311 (C) Operating Systems IT 311 (D) Database Management Systems
CHEMICAL ENGINEERING	CHE 311(A) Industrial Safety and Hazards Management CHE 311(B) Engineering Biology CHE 311(C) Fuel Cell Technology CHE 311(D) Design of Experiments
CIVIL ENGINEERING	CIV 311 (A) Basic civil engineering CIV 311 (B) Building Planning and construction CIV 311 (C) Basics of Foundation Engineering
MATHEMATICS	MAT 311 (A) Numerical Methods MAT 311 (B) Fuzzy Set Theory & Fuzzy Logic and its Applications MAT 311 (C) Probability Statistics
PHYSICS	PHY 311 Nano Technology and Engineering Applications
CHEMISTRY	CHY 311 (A) Environmental Sciences CHY 311 (B) Characterisation of Materials

OPEN ELECTIVES – II

IV Year I - Semester

Department	Name of the Course offered
ELECTRONICS AND COMMUNICATION ENGINEERING	ECE 411 (A) Introduction to Embedded System Design ECE 411 (B) Introduction to VLSI Design ECE 411 (C) Introduction to Image Processing /Computer Vision
ELECTRICAL AND ELECTRONICS ENGINEERING	EEE 411 Fundamentals of Electric Power Utilization
MECHANICAL ENGINEERING	MEC 411 (A) Finite Element Analysis MEC 411 (B) Operation research
COMPUTER SCIENCE & ENGINEERING	CSE 411(A) Introduction to soft computing CSE 411(B) Cloud computing overview CSE 411(C) Digital Image processing CSE 411(D) Embedded Systems and Applications
INFORMATION TECHNOLOGY	IT 411 (A) Software Engineering Concepts IT 411 (B) Foundations of Web Development & Design IT 411 (C) Open Source Technologies IT 411 (D) Multimedia Concepts
CHEMICAL ENGINEERING	CHE 411(A) Food Processing Technology CHE 411(B) Corrosion Engineering CHE 411(C) Computational Tools for Engineers CHE 411(D) Bioinformatics
CIVIL ENGINEERING	CIV 411 (A) Elements of Environmental Engineering CIV 411 (B) Water Resources conservation CIV 411 (C) Elements of Transportation Engineering
PHYSICS	PHY 411 Principles & Applications of NDT Methods
CHEMISTRY	CHY 411 (A) Environmental Sciences CHY 411 (B) Green Technologies