SCHEME

OF

STUDIES AND EXAMINATIONS

B.Tech. (Chemical Engineering)
w.e.f. 2012-2013

Department of Chemical Engineering

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY
MURTHAL (SONEPAT)

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
SCHEME OF STUDIES & EXAMINATIONS
B. Tech. 1st YEAR (SEMESTER – I) (Common for all branches)
Credit Based Scheme w.e.f. 2012-13

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class Work	Exam. Marks		Total Marks	Credit	Duration of Exam.
			L	T	P		Theory	Practical			
1	HUM 101B	COMMUNICATIVE ENGLISH	3	1	-	25	75	-	100	4	3
2	MATH 101B	MATHEMATICS-I	3	1	-	25	75	-	100	4	3
3	PHY 101B	ENGINEERING PHYSICS-I	3	1	-	25	75	-	100	4	3
4	ME101B	MANUFACTURING PROCESSES (Gr-A)	3	1	-	25	75	-	100	4	3
		OR									
	CH101B	ENGINEERING CHEMISTRY (Gr-B)	3	1	-	25	75	-	100	4	
5	EE101B	PRINCIPLES OF ELECTRICAL ENGINEERING (Gr-A)	3	1	-	25	75	-	100	4	3
		OR									
	CSE 101B	INTRODUCTION TO COMPUTERS & PROGRAMMING (Gr-B)	3	1	-	25	75	-	100	4	
6	ME103B	ENGINEERING GRAPHICS & DRAWING (Gr-A)	1	-	4	40	-	60	100	3	3
		OR									
	ME105B	ELEMENTS OF MECHANICAL ENGINEERING (Gr-B)	3	1	-	25	75	-	100	4	
7	PHY 103B	PHYSICS LAB – I	-	-	2	20	-	30	50	1	3
8	ME107B	WORKSHOP PRACTICE (Gr-A)	-	-	4	40	-	60	100	2	3
		OR									
	CH103B	CHEMISTRY LAB (Gr-B)	-	-	2	20	-	30	50	1	
9	EE103**B**	PRINCIPLES OF ELECTRICAL ENGINEERING LAB (Gr-A)	-	-	2	20	-	30	50	1	3
		OR									
	CSE 103B	COMPUTER PROGRAMMING LAB (Gr-B)	-	-	2	20	-	30	50	1	
10	ME109B	ELEMENTS OF MECH. ENGINEERING LAB (Gr-B)	-	-	2	20	-	30	50	1	3
		TOTAL (Gr-A)	**16**	**5**	**12**	**245**	**375**	**180**	**800**	**27**	
		(Gr-B)	**18**	**6**	**08**	**230**	**450**	**120**	**800**	**28**	

Note: **1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency & Ethics Syllabus.**
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
4. All the branches are to be divided into group 'A' and 'B' as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
SCHEME OF STUDIES & EXAMINATIONS
B. Tech. 1st YEAR (SEMESTER – II) (Common for all branches)
Credit Based Scheme w.e.f. 2012-13

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class Work	Exam. Marks		Total Marks	Credit	Duration of Exam.
			L	T	P		Theory	Practical			
1	MATH 102B	MATHEMATICS-II	3	1	-	25	75	-	100	4	3
2	PHY 102B	ENGINEERING PHYSICS-II	3	1	-	25	75	-	100	4	3
3	ME101B	MANUFACTURING PROCESSES (Gr-B)	3	1	-	25	75	-	100	4	3
		OR									
	CH101B	ENGINEERING CHEMISTRY (Gr-A)	3	1	-	25	75	-	100	4	3
4	EE101B	PRINCIPLES OF ELECTRICAL ENGINEERING (Gr-B)	3	1	-	25	75	-	100	4	3
		OR									
	CSE 101B	INTRODUCTION TO COMPUTERS & PROGRAMMING (Gr-A)	3	1	-	25	75	-	100	4	
5	ECE102B	BASICS OF ELECTRONICS ENGINEERING	3	1		25	75	-	100	4	3
		OR									
	BT102B	BASICS OF BIO TECHNOLOGY									
		OR									
	HUM102 B	ORAL COMMUNICATION SKILLS									
		OR									
	CE102 B	BASICS OF CIVIL ENGINEERING									
6	ME103B	ENGINEERING GRAPHICS & DRAWING (Gr-B)	1	-	4	40	-	60	100	3	3
		OR									
	ME105B	ELEMENTS OF MECHANICAL ENGINEERING (Gr-A)	3	1	-	25	75	-	100	4	
7	PHY 104B	PHYSICS LAB – II	-	-	2	20	-	30	50	1	3
8	ME107B	WORKSHOP PRACTICE (Gr-B)	-	-	4	40	-	60	100	2	3
		OR					-				
	CH103B	CHEMISTRY LAB (Gr-A)	-	-	2	20		30	50	1	
9	EE103**B**	PRINCIPLES OF ELECTRICAL ENGINEERING LAB (Gr-B)	-	-	2	20	-	30	50	1	3
		OR									
	CSE 103B	COMPUTER PROGRAMMING LAB (Gr-A)	-	-	2	20	-	30	50	1	
10	ME109B	ELEMENTS OF MECH. ENGINEERING LAB (Gr-A)	-	-	2	20	-	30	50	1	3
11	GP102B	GENERAL PROFICIENCY & ETHICS	1	-	-	-	-	50	50	2	3
TOTAL		**(Gr-B)**	**17**	**5**	**12**	**245**	**375**	**230**	**850**	**29**	
		(Gr-A)	**19**	**6**	**08**	**230**	**450**	**170**	**850**	**30**	

Note: **1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency & Ethics Syllabus.**
2. Each student has to undergo a workshop at least 4 weeks (80-100 hours) at the end of II semester during summer vacations. Out of the four weeks, two weeks would be dedicated to general skills and two weeks training for specialized discipline /department. The evaluation of this training shall be carried out in the III semester.
3. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
4. Electronics gadgets including Cellular phones are not allowed in the examination.
5. All the branches are to be divided into group 'A' and 'B' as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.
6. The elective course HUM 102B ORAL COMMUNICATION SKILLS is deleted with effect from the session 21013-14.

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
SCHEME OF STUDIES & EXAMINATIONS
B. Tech. 2nd YEAR (SEMESTER – III) (CHEMICAL ENGINEERING)
Credit Based Scheme w.e.f. 2013-14

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	MGT201B	ENGINEERING ECONOMICS **(Common for all branches Except BT& BME) (Gr-A)**	4	-	-	25	75	-	100	4	3
		OR									
	GES201B	ENVIRONMENTAL STUDIES **(Common for all branches) (Gr-B)**	3	-	-	-	75	-	75	-	3
2	CH201B	ORGANIC & ANALYTICAL CHEMISTRY	3	1	-	25	75	-	100	4	3
3	CHE201B	INTRODUCTION TO UNIT OPERATIONS	3	1	-	25	75	-	100	4	3
4	CHE203B	FLUID FLOW	3	1	-	25	75	-	100	4	3
5	CHE205B	CHEMICAL ENGINEERING PROCESS CALCULALTIONS	3	1	-	25	75	-	100	4	3
6	CHE207B	PROCESS INSTRUMENTATION	3	1	-	25	75	-	100	4	3
7	ECE205B	ELECTRONICS ENGINEERING	3	1	-	25	75	-	100	4	3
8	CH203B	ORGANIC & ANALYTICAL CHEMISTRY LAB	-	-	3	20	-	30	50	1.5	3
9	CHE209B	FLUID FLOW LAB	-	-	2	20	-	30	50	1	3
10	EE231B	ELECTRICAL WIRING & INSTALLATION LAB (EE,EEE,IC,CHE)	-	-	2	20	-	30	50	1	2
11	ECE225B	ELECTRONIC ENGINEERING LAB	-	-	2	20	-	30	50	1	3
12	GES203B	ENVIRONMENTAL STUDIES FIELD WORK **(Common for all branches) (Gr-B)**	-	-	-			25	25	-	
13	ME217B	WORKSHOP **(Common for all branches Except BT & AE)**	-	-	2	50	-	-	50	2	-
		TOTAL (Gr-A)	**22**	**6**	**11**	**305**	**525**	**120**	**950**	**34.5**	
		(Gr-B)	**21**	**6**	**11**	**280**	**450**	**120**	**850**	**30.5**	

Note: **1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency & Ethics Syllabus.**
2. The Environmental studies (GES-201B) & Environmental studies field work (GES-203B) are compulsory & qualifying courses only.
3. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
4. Electronics gadgets including Cellular phones are not allowed in the examination.
5. All the branches are to be divided into group 'A' and 'B' as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.
6. Assessment of Workshop undergone at the end of II semester, will be based on seminar, viva-voce, report and certificate of professional training obtained by the student from in-house Workshop.

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
SCHEME OF STUDIES & EXAMINATIONS
B. Tech. 2nd YEAR (SEMESTER – IV) (CHEMICAL ENGINEERING)
Credit Based Scheme w.e.f. 2013-14

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	MGT201B	ENGINEERING ECONOMICS **(Common for all branches Except BT& BME) (Gr-B)**	4	-	-	25	75	-	100	4	3
	GES201B	OR ENVIRONMENTAL STUDIES **(Common for all branches) (Gr-A)**	3	-	-	-	75	-	75	-	3
2	MATH202B	NUMERICAL METHODS (CHE,AEI)	3	1	-	25	75	-	100	4	3
3	CHE202B	CHEMICAL ENGINEERING THERMODYNAMICS-I	3	1	-	25	75	-	100	4	3
4	CHE204B	MECHANICAL OPERATIONS	4	1	-	50	75	-	125	5	3
5	CHE206B	MATERIAL TECHNOLOGY	4	1	-	50	75	-	125	5	3
6	CH202B	UNIT PROCESSES	3	1	-	25	75	-	100	4	3
7	MATH204B	NUMERICAL METHODS LAB(CHE,AEI)	-	-	2	20	-	30	50	1	3
8	CHE208B	MECHANICAL OPERATIONS LAB	-	-	3	40	-	60	100	1.5	3
9	GES203B	ENVIRONMENTAL STUDIES FIELD WORK **(Common for all branches) (Gr-A)**	-	-	-	-	-	25	25	-	-
10	GPCHE202B	GENERAL PROFICIENCY & ETHICS	1	-	-	-	-	75	75	2	3
TOTAL		**(Gr-B)**	**22**	**5**	**5**	**260**	**450**	**165**	**875**	**30.5**	
		(Gr-A)	**21**	**5**	**5**	**235**	**375**	**165**	**775**	**26.5**	

Note: **1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency & Ethics Syllabus.**
2. The Environmental studies (GES-201B) & Environmental studies field work (GES-203B) are compulsory & qualifying courses only.
3. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
4. Electronics gadgets including Cellular phones are not allowed in the examination.
5. All the branches are to be divided into group 'A' and 'B' as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.
6. Each student has to undergo Professional training of at-least 4 weeks from the industry, institute, research lab, training center etc during summer vacation and its evaluation shall be carried out in the V semester.

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
SCHEME OF STUDIES & EXAMINATIONS
B. Tech. 3rd YEAR (SEMESTER – V) (CHEMICAL ENGINEERING)
Credit Based Scheme w.e.f. 2014-15

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	CHE301B	CHEMICAL REACTION ENGINEERING-I	3	1	-	25	75	-	100	4	3
2	CHE303B	CHEMICAL TECHNOLOGY-I	3	1	-	25	75	-	100	4	3
3	CHE305B	EQUIPMENT DESIGN	3	1	-	25	75	-	100	4	3
4	CHE307B	MASS TRANSFER-I	3	1	-	25	75	-	100	4	3
5	CHE309B	HEAT TRANSFER	3	1	-	25	75	-	100	4	3
6	CHE311B	CHEMICAL ENGINEERING THERMODYNAMICS-II	3	1	-	25	75	-	100	4	3
7	CHE313B	COMPUTER AIDED DESIGN LAB	-	-	2	20	-	30	50	1	3
8	CHE315B	MASS TRANSFER-I LAB.	-	-	2	20	-	30	50	1	3
9	CHE317B	HEAT TRANSFER LAB	-	-	2	20	-	30	50	1	3
10	CHE319B	PROFESSIONAL TRAINING-I	-	-	2	50	-	-	50	2	-
TOTAL			**18**	**6**	**8**	**260**	**450**	**90**	**800**	**29**	

Note: **1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency & Ethics Syllabus.**
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
4. Assessment of Professional Training-I undergone at the end of IV semester, will be based on seminar, viva-voce, report and certificate of professional training obtained by the student from the industry, institute, research lab, training centre etc.

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
SCHEME OF STUDIES & EXAMINATIONS
B. Tech. 3rd YEAR (SEMESTER – VI) (CHEMICAL ENGINEERING)
Credit Based Scheme w.e.f. 2014-15

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	CHE302B	CHEMICAL REACTION ENGINEERING-II	3	1	-	25	75	-	100	4	3
2	CHE304B	CHEMICAL TECHNOLOGY-II	3	1	-	25	75	-	100	4	3
3	CHE306B	PROCESS UTILITIES	3	1	-	25	75	-	100	4	3
4	CHE308B	MASS TRANSFER-II	3	1	-	25	75	-	100	4	3
5	CHE310B	TRANSPORT PHENOMENA	4	1	-	50	75	-	125	5	3
6	CHE312B	PROCESS EQUIPMENT DESIGN	3	1	-	25	75	-	100	4	3
7	CHE314B	CHEMICAL TECHNOLOGY LAB	-	-	3	40	-	60	100	1.5	3
8	CHE316B	MASS TRANSFER-II LAB	-	-	2	20	-	30	50	1	3
9	CHE318B	CHEMICAL REACTION ENGINEERING LAB	-	-	3	40	-	60	100	1.5	3
10	HUM302B	REPORT WRITING SKILLS	1	-	-	25	50	-	75	1	2
11	HUM304B	ORAL PRESENTATION SKILLS	-	-	2	20	-	30	50	1	2
12	GPCHE 302B	GENERAL PROFICIENCY & ETHICS	1	-	-	-	-	75	75	2	3
TOTAL			**21**	**6**	**10**	**320**	**500**	**255**	**1075**	**33**	

Note: **1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency & Ethics Syllabus..**
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
4. Each student has to undergo Professional training of 4 weeks from the industry, institute, research lab, training center etc during summer vacation and its evaluation shall be carried out in the VII semester.

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
SCHEME OF STUDIES & EXAMINATIONS
B. Tech. 4th YEAR (SEMESTER – VII) (CHEMICAL ENGINEERING)
Credit Based Scheme w.e.f. 2015-16

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	CHE401B	PETROLEUM ENGINEERING	3	1	-	25	75	-	100	4	3
2	CHE403B	PROCESS DYNAMICS AND CONTROL	3	1	-	25	75	-	100	4	3
3	CHE405B	ENERGY TECHNOLOGY	3	1	-	25	75	-	100	4	3
4	CHE407B	POLYMER SCIENCE & ENGINEERING	3	1	-	25	75	-	100	4	3
5	-	OPEN ELECTIVE*	4	-	-	25	75	-	100	4	3
6	CHE409B	PROCESS DYNAMICS AND CONTROL LAB	-	-	2	20	-	30	50	1	3
7	CHE411B	ENERGY TECHNOLOGY LAB	-	-	2	20	-	30	50	1	3
8	CHE413B	PROJECT	-	-	4	100	-	-	100	4	-
9	CHE415B	PROFESSIONAL TRAINING-II	-	-	2	50	-	-	50	2	-
TOTAL			**16**	**4**	**10**	**315**	**375**	**60**	**750**	**28**	

***LIST OF OPEN ELECTIVES:**

1	MEI 623B	ENTREPRENEURSHIP	6	BT401B	BIOINFORMATICS
2	BME451B	MEDICAL INSTRUMENTATION	7	AE417B	MODERN VEHICLE TECHNOLOGY
3	ECE305B	CONSUMER ELECTRONICS	8	CE451B	POLLUTION & CONTROL
4	EE451B	ENERGY AUDIT	9	CSE411B	MANAGEMENT INFORMATION SYSTEM
5	EEE457B	ENERGY RESOURCES & TECHNOLOGY	10	IT413B	CYBER SECURITY

Note:
1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Fitness for the Profession Syllabus.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
4. Students will be permitted to opt for any one elective run by the other department. However, the departments will offer those elective for which they have expertise. The choice of the students for any elective shall not be a binding for the department to offer, if the department does not have expertise. The minimum strength of the students should be 20 to run an elective course.
5. Assessment of Professional Training-II undergone at the end of VI semester will be based on seminar, viva-voce, report and certificate of professional training obtained by the student from the industry, institute, research lab, training centre etc.

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
SCHEME OF STUDIES & EXAMINATIONS
B. Tech. 4th YEAR (SEMESTER – VIII) (CHEMICAL ENGINEERING)
Credit Based Scheme w.e.f. 2015-16

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	CHE402B	PROCESS MODELING & SIMULATION	3	1	-	25	75	-	100	4	3
2	CHE404B	PROCESS ENGINEERING ECONOMICS	3	1	-	25	75	-	100	4	3
3	-	ELECTIVE-I (DEPARTMENTAL)	4	-	-	25	75	-	100	4	3
4	-	ELECTIVE-II (DEPARTMENTAL)	4	-	-	25	75	-	100	4	3
5	CHE408B	SEMINAR	-	-	2	50	-	-	50	2	-
6	CHE410B	ENVIRONMENTAL POLLUTION CONTROL LAB	-	-	2	20	-	30	50	1	3
7	CHE413B	PROJECT	-	-	8	75	-	125	200	8	3
8	CHE414B	MODELLING AND SIMULATION LAB	-	-	2	20	-	30	50	1	3
9	GFCHE 402B	GENERAL FITNESS FOR THE PROFESSION	1	-	-	-	-	100	100	4	3
TOTAL			**15**	**2**	**14**	**265**	**300**	**285**	**850**	**32**	

Departmental Elective-I

1. CHE451 B ENVIRONMENTAL POLLUTION CONTROL
2. CHE453B INTRODUCTION TO BIO-CHEMICAL ENGINEERING.

Departmental Elective-II

1. CHE452B NOVEL SEPARATION TECHNIQUES
2. CHE454B DESIGN OF PIPING SYSTEMS.

Note: 1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Fitness for the Profession Syllabus.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronics gadgets including Cellular phones are not allowed in the examination.

4. For the course CHE-408 Seminar, a student will select a topic from emerging areas of Engineering and Technology and study it independently. Student will give a seminar talk on the topic.

5. The evaluation of the students for his/her General Fitness for the Profession shall be carried out by a team consisting Dean of Faculty, Chairperson of Department and external examiner appointed by University.

6. The choice of the students for any elective shall not be a binding for the department to offer, if the department does not have expertise. The minimum strength of the students should be 20 to run an elective course.

SYLLABUS

HUM 101B : COMMUNICATIVE ENGLISH
B. Tech. Semester - I (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Objective

The course aims at developing the desired language (English) skills of students of engineering and technology so that they become proficient in communication to excel in their professional lives. The course has been designed so as to enhance their linguistic and communicative competence.

Course Content

UNIT I

Communicative Grammar:

A) Spotting the errors pertaining to tenses, conditional sentences, Concord – grammatical concord, notional concord and the principle of proximity b/w subject and verb

B) Voice, Reported Speech.

UNIT II

Langauge through Literature:

Linguistic Reading of the following texts

A) 'Kabuliwallah' by Rabindranath Tagore*

B) 'Am I Blue?' by Alice Walker*

C) 'If You are Wrong, Admit It' by Dale Carnegie*

D) 'Engine Trouble' by R.K. Narayan*

The prescribed texts will be used as case studies for various components of the syllabus. * the Source is given in the list of Texts Books given below.

UNIT III

Group Communication:

A) Communication: concept, Process and Barriers

B) Communicating using Standard Pronunciation with the help of IPA

C) Formal Speaking with peers (e.g. discussion, talks on current issues in a class)

B) Writing official letters on issues concerning students and social life

C) Writing small reports on scientific issues, IT issues, University fests/programmes

C) E-mail writing and writing for web

UNIT IV

Communicative Creativity:

A) Comprehension: Extracting, interpreting, summarizing, reviewing and analyzing the prescribed texts.

B) Composition: Developing themes and situations through role play activities or dialogue writing.

Contd.

TEXT BOOKS

1. Quirk, Randolph, Sidney Greenbaum, Geoffrey Leech & Jan Svartvik. *A Comprehensive Grammar of the English Language*. London: Longman, 1989
2. Communicative English for Engineers and Professionals by Nitin Bhatnagar & Mamta Bhatnagar New Delhi: Pearson / Longman
3. Crystal, David. Rediscover Grammar. London: Longman/Pearson, 1988.
4. *Tagore, Rabinder. "Kabuliwallah" , *Famous Indian Stories*. Ed. M.G.Narsimha Murthy .Mumbai: Orient Blackswan, 2009. (Web source: www.angelfire.com)
5. * Walker, Alice. "Am I Blue" , *An Anthology of Short Stories* . Ed. Usha Bande .New Delhi: OUP , 2004. (Web source- www.old.li.scru.edu)
6. *Narayanan .K.R. "Engine Trouble", *Contemporary English Prose* .Ed. K.P.K.Menon. New York: OUP,1976. (Web Source- www.scribd.com)

7. *Carnegie, Dale. "If you are wrong admit it", *An Anthology of Modern Prose*. Ed Manmohan K.Bhatnagar.Delhi :Macmillan India Ltd,2006.

SUGGESTED READING

1. Pink, M.A. and S.E. Thomas. *English Grammar, Composition and Correspondence.* Delhi: S. Chand and Sons
2. McRae, John and Roy Boardman. *Reading Between the Lines.* Delh: Foundation Books (Cambridge University Press)
3. Sharma, Sangeeta and Binod Mishra. *Communication Skills for Engineers and scientists*. Delhi: PHI, 2009
4. Fitikides, T.J. *Common Mistakes in English*. Essex: Pearson Education, 1936, 6th edition 2000.

SCHEME OF END SEMESTER EXAMINATION (MAJOR TEST)

Theory

1. The duration of the exam will be 3 hours.
2. The Question Paper for this theory course shall have seven questions in all covering all the units of the syllabus..
3. The student is required to attempt all the seven questions.
4. Questions No. 1 based on Unit I is of **15** marks. It may be in the form of 'Do as directed: trace the error, choose the correct alternative, supply the correct alternative/ s, change the voice, convert the speech from direct to indirect or vice-versa'.
5. Question no 2 and 3 based on prescribed texts in Unit II. Question no 2 of **10 m**arks is to evaluate the comprehension of the text through short answer questions or a long answer question to assess the students' reading comprehension, interpretative and analytical abilities. Question no 3 of **15** marks will judge the linguistic aspect of the text such as using a particular word in its various syntactic forms like noun, adjective, verb etc.; matching the lists of words and their explanation; providing opposite/ similar meanings and other grammar components prescribed in Unit I of the syllabus.
6. Question no 4 based on Unit III is of **10** marks. It may be in the form of transcription of words given, describe an event, classmate, discuss an issue etc.
7. Question no 5 based on Unit III is of **10** marks. It requires the student to frame either a small report on a topic given or write the given official letter, or e-mail a message.
8. Question no 6 based on unit IV is of **10** marks. It evaluates the Comprehension and Interpretation of the texts prescribed in Unit II. The vocabulary, general understanding and interpretation of the content may be evaluated in the form of question answer exercise, culling out important points, suggesting a suitable topic/title, summarising and interpreting.
9. Question No. 7 based on unit IV is of **5** marks. It requires the student to develop a hypothetical situation in a dialogue form, or to develop an outline, key expression, for role play activity.

MATH 101B : MATHEMATICS - I

B. Tech. Semester - I (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

Infinite series : Convergence and divergence, Comparison, D' Alembert's ratio, Integral, Raabe's, Logrithmic and Cauchy root tests, Alternating series, Absolute and conditional convergence.

Applications of Differentiation : Taylor's and Maclaurin's series, Asymptotes, Curvature Asymptotes.

UNIT-II

Partial Differentiation & its Applications : Functions of two or more variables; partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobians, Higher order partial derivatives.

Homogeneous functions, Euler's theorem, Taylor's series for functions of two variables (without proof), maxima-minima of function of two variables, Lagrange's method of undetermined multipliers, Differentiation under integral sign.

UNIT-III

Applications of Single & Multiple Integration : Applications of single integration to find volume of solids and surface area of solids of revolution. Double integral, change of order of integration, Double integral in polar coordinates, Applications of double integral to find area enclosed by plane curves and volume of solids of revolution.

Triple integral, volume of solids, change of variables, Beta and gamma functions and relationship between them.

UNIT-IV

Vector Calculus : Differentiation of vectors, scalar and vector point functions Gradient of a scalar field and directional derivative, divergence and curl of a vector field and their physical interpretations.

Integration of vectors, line integral, surface integral, volume integral, Green, Stoke's and Gauss theorems (without proof) and their simple applications.

TEXT BOOKS :

1. Advanced Engineering Mathematics : F. Kreyszig.
2. Higher Engineering Mathematics : B.S. Grewal.

REFERENCE BOOKS :

1. Engineering Mathematics Part-I : S.S. Sastry.
2. Differential and Integral Calculus : Piskunov.
3. Advanced Engineering Mathematics : R.K. Jain and S.R.K.Iyengar
4. Advanced Engg. Mathematics : Michael D. Greenberg

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

PHY 101B : ENGINEERING PHYSICS - I

B. Tech. Semester - I (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

PHYSICAL OPTICS:

Interference: Division of wave front-Fresnel's Biprism, Division of amplitude – Newton's rings, Michelson interferometer, applications.

Diffraction : Difference between Fraunhofer and Fresnel diffraction, Fraunhofer diffraction through a slit, Plane transmission diffraction grating and its spectra, dispersive and resolving powers.

Polarization : Polarised and unpolarized light, double refraction, Nicol prism, quarter and half wave plates, Plane, Elliptically & circularly polarised light, Polarimetry: Biquartz and Laurent's half-shade polarimeters.

UNIT-II

LASER & FIBRE OPTICS: Introduction, Spontaneous and stimulated emissions, Laser action, characteristics of laser beam, Ruby laser, He-Ne, Nd-Yag and semiconductor lasers, applications of laser.

Introduction, Propagation of light in fibres, Types of fiber (pulse & continuous), numerical aperture, Modes of propagation in optical fibre, application of optical fibre.

ACOUSTIC OF BUILDINGS: Introduction, Reverberation, Sabine's formula for reverberation time, Absorption coefficient and its measurements, factors affecting the architectural acoustics and their remedy, Sound absorbing materials.

UNIT-III

TRANSMISSION OF HEAT AND THERMAL RADIATION

Modes of transmission of heat, Thermal conductivity, Rectilinear flow of heat through a rod, Radial flow of heat through a spherical shell, determination of Thermal conductivity of good and bad conductors.

Black body, Emissive and Absorptive Powers, Wein's Displacement Law, Kirchhoff's Law, Stefan's Law, Determination of Stefan's Constant.

UNIT-IV

NUCLEAR & ELEMENTARY IDEA OF PARTICLE PHYSICS

Outline of interaction of charged particles and of Gamma-rays with matter. Counters: Gas filled counters (Ionization Chamber, Proportional Counter and G M Counter). Detector: Scintillation detector, Semiconductor detectors (p-n junction detector), Biological effects of nuclear radiation.

Introduction to elementary particles, Interaction in particle physics: strong, electromagnetic, weak and gravitational. .

TEXT BOOKS :

1. A text book of Optics – Brij Lal and Subramanyam
2. Perspectives of Modern Physics - Arthur Beiser (TMH)
3. Modern Engineering Physics – A.S. Vasudeva (S. Chand)
4. Engineering Physics by R.K. Gaur and S.L. Gupta
5. Engineering Physics by H.K Malik and A.K. Singh (Tata McGraw Hill).
7. Engineering Physics by S.P. Taneja (Chand Pub.)

REFERENCE BOOKS:

1.. Physics Vol-I & II – Resnick & Halliday (Wiley Eastern)
2. Heat and Thermodynamics – M.N. Saha & B.N. Srivastava
3. Nuclear Physics Principles and Applications by John Lilley(Wiley-India).

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

ME 101B : MANUFACTURING PROCESSES

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

Introduction: Introduction to Manufacturing Processes and their Classification , automation in manufacturing**,** Industrial Safety; Introduction, Types of Accidents, Causes and Common Sources of Accidents, Methods of Safety, Electric Safety Measures, First Aid.

Plant Layout, Principles of Plant Layout, Objectives of Layout, Types of Plant and shop layouts and their Advantages.

UNIT-II

Engineering Materials: General Properties and Applications of Engineering Materials, Mild Steel, Medium Carbon Steel, High Carbon Steel, High Speed Steel and Cast Iron, Non-Ferrous Materials, Shop's Tools Materials, Super Alloys or High Temperature Materials

Foundry: Introduction to Casting Processes, Basic Steps in Casting Process, Pattern, Types of Patterns, Pattern allowances, Risers, Runners, Gates, Molding Sand and its composition, Sand Preparation, Molding Methods, Core Sands and Core Making, Core Assembly, Mold Assembly, Melting (Cupola) and Pouring, Fettling, Casting Defects and Remedies. Testing of Castings

UNIT-III

Cold Working (Sheet Metal Work): Sheet Metal Operations, Measuring, Layout Marking, Shearing, Punching, Blanking, Piercing, Forming, Bending and Joining - Advantages and Limitations. Hot Working Processes: Introduction to Hot Working, Principles of Hot Working Processes, Forging, Rolling, Extrusion, Wire Drawing.

Introduction to Machine Tools: Specifications and Uses of commonly used Machine Tools in a Workshop such as Lathe, Shaper, Planer, Milling, Drilling, Slotter, Introduction to Metal Cutting. Nomenclature of a Single Points Cutting Tool and Tool Wear, Mechanics of Chips Formation, Type of Chips, Use of Coolants in machining.

UNIT-IV

Welding: Introduction to Welding, Classification of Welding Processes, Gas Welding: Oxy-Acetylene Welding, Resistance Welding; Spot and Seam Welding, Arc Welding: Metal Arc, TIG & MIG Welding, Welding Defects and Remedies, Soldering & Brazing, Comparisons among Welding, Brazing and Soldering

Surface Finishing Processes, Introduction to Heat Treatment Processes, Estimating of Manufacturing Cost

TEXT BOOKS:

1. Workshop Technology Vol. I & II - Hazra & Chaudhary, Asian Book Comp., New Delhi.
2. Process and Materials of Manufacture -- Lindberg, R.A. Prentice Hall of India,New Delhi.
3. Principles of Manufacturing Materials and Processes - Campbell, J.S.- McGraw- Hill.

REFERENCE BOOKS:

1. Manufacturing Science - Amitabha Ghosh & Ashok Kumar Malik, - East-West Press.
2. Manufacturing Process and Systems - Ostwald, Munoz , John Wiley.
3. Workshop Technology, Vol. 1, 2 & 3 – Chapman, WAJ, Edward Arnold.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

CH 101B : ENGINEERING CHEMISTRY

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

Thermodynamics –Second law, concept of entropy ,entropy change for ideal gas, free energy and work functions, free energy change ,chemical potential, Gibb's Helmholtz equation, Clausius –Clapeyron equation. Related numerical problems with above topics.

Phase-rule- Terminology, Derivation of Gibb's Phase Rule equation ,One component system(water system), Two components systems, system with Eutectic point (Pb-Ag), system with congruent melting point (Zn-Mg), system with incongruent melting point (Na-K), Applications of above systems. Elementary idea of Zone refining and Zone levelling

UNIT-II

Water and its treatment- Hardness of water and its determination, units of hardness, alkalinity of water and its determination, related numerical problems ,water softening, Ion-exchange process, mixed bed demineralisation, desalination of water by using different methods.

Corrosion and its prevention: Galvanic & concentration cell, dry and wet corrosion, Electrochemical theory of corrosion, Galvanic corrosion, Pitting corrosion , differential aeration corrosion, water line corrosion, stress corrosion, factor effecting corrosion, Preventing measures, electroless Plating of Ni and Cu.

UNIT-III

Polymers and Polymerization: Organic polymers, polymerisation, various types of polymerisation, effect of structure on properties of polymers, preparation properties and technical applications of thermoplastics (PE, PVC, PVA, Teflon), thermosets (PF, UF & MF) and elastomers (Synthetic Rubber including SBR, Buna-S, Buna-N, Thiokol & Polyurethanes) , Inorganic polymers (general properties) , Glass transition temperature, silicones

Composite Materials & their application: optical fibres, Fullerenes ,organic electronic material ,composite materials & their classification, constituents of composites, role of interface in composite performance and durability, fiber –Reinforced composite, advantage and applications of composites.

UNIT-IV

Lubricants and fuels: Friction, mechanism of lubrication, classification and properties of lubricants and selection of Lubricants, Definition and classification of fuel, Calorific value and methods of its determination.

Analytical methods: Thermal methods; Principle, method and application of TGA,DTA & DSC, interaction of E.M radiation with a molecule and origin of spectrum, Vibrational & electronic spectra (Experimental details are excluded), spectrophotometry, , conductometeric titrations, elementary discussion on Flame-photometery.

TEXT/ REFERENCE BOOKS:

1. Physical Chemistry, P.W. Atkins (ELBS, Oxford Press).
2. Physical Chemistry, W.J. Moore (Orient-Longman).
3. Instrumental methods of Chemical Analysis, MERITT & WILLARD (East-West Press).
4. Chemistry in Engineering & Tech., Vol.I& II, Rajaram, Kuriacose (TMH)
5.Engineering Chemistry ,ShashiChawla (DhanpatRai and co.)
6. Engineering Chemistry, P.C. Jain, Monica Jain (DhanpatRai& Co.).
7.Engeenring chemistry ,S.S Dara (S.chand&co.)

NOTE:

In the semester examination, the Examiners will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

EE101B : PRINCIPLES OF ELECTRICAL ENGINEERING

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-1

D.C. Circuit Analysis: Basic concepts of electric circuits, Ohm's Law, Independent energy sources, Dependent energy sources, passive elements, circuit properties, Kirchoff's laws, applications of Kirchoff's laws, Nodal and Loop methods of Analysis, , Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Maximum Power Transfer Theorem, Millman's Theorem, Star-Delta or delta-star transformation, Applications of network theorems P-spice for DC circuit analysis.

UNIT-2

A.C. Circuits: Sinusoidal signal, Phasors, polar & rectangular, exponential & trigonometric representations, Resistance, Inductance & Capacitance components, behavior of these components in A.C. circuits, Phasor relationship for circuit elements, Impedance & Admittance, instantaneous & peak values, average and RMS values, active power, reactive power, apparent power, power factor, complex power, behavior of AC series , parallel circuits, RL, RC & RLC A.C. circuits (series and parallel), Resonance-series and parallel R-L-C Circuits, Q-factor, cut-off frequencies & bandwidth.

UNIT-3

Three Phase Circuits: Phase and line voltages and currents, balanced star and delta circuits, power equation, measurement of power by two wattmeter method.

Measuring Instruments: Principle, Construction & working of moving coil type voltmeter & ammeter, moving iron type voltmeter & ammeter, Electrodynamic type wattmeter, single-phase induction type energy meter.

UNIT-4

Transformers: Ampere's law, Mutual Inductance, Construction, Working principle and phasor diagrams of Single-phase Transformer, Emf equation, Equivalent circuit, testing, efficiency and regulation of single-phase transformer, Auto transformer.

Rotating Machines: Construction and working principle of dc motor and generator and its characteristics. Construction and working principle of 3-phase Induction machines & 3-phase synchronous machines, torque-speed characteristics.

TEXT BOOKS:

1. Basic Electrical Engg (2nd Edition) : Kothari & Nagarath, TMH

2. Electrical Technology (Vol-I): B.L Theraja & A K Theraja, S.Chand

3. Fundamental of electrical Engineering, Rajendra Prasad, PHI, Edition 2005.

4. Basic Electrical Engineering, V.N Mittle & Arvind Mittal, TMH, Second Edition

5. Basic Electrical Engineering, S.N. Singh, PHI

REFERENCE BOOKS:

1. Electrical Engineering Fundamentals: Deltoro, PHI

2. Basic Electrical Engineering (TMH WBUT Series), Abhijit Chakrabarti & Sudipta Nath, TMH

3. Basic Electrical Engineering, T.K. Nagsarkar & M.S. Sukhija, Oxford

4. Introduction to Electrical Engineering, M.S. Naidu & S, Kamakshaiah, TMH

5. Basic Electrical Engineering, J.J. Cathey & S.A Nasar, TMH, Second Edition.

NOTE: In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

CSE 101B : INTRODUCTION TO COMPUTERS AND PROGRAMMING

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

An introduction of Computer System: Anatomy of a digital Computer, Different Units of Computer System, Classification of Computer Systems, Radix Number systems. Binary codes: BCD, Gray, EBCDIC, ASCII

Operating System: Operating System Concepts, Operating System services, Types of Operating Systems.

Introduction to PC Operating Systems: Unix/Linux, DOS, Windows.

UNIT-II

Programming Languages and algorithms: Machine, Assembly and High Level Language; Assembler, Linker, Loader, Compiler, Interpreter, debuggers, Programming fundamentals: problem definition, algorithms, flowcharts and their symbols

Computer Networks: Basic concepts of Computer Networks, Working of Internet and its Major features. Network Topologies: Bus, Star, Ring, Hybrid, Tree, Complete, Irregular; Types of Networks: LAN, MAN and WAN.

Electronic Mail: advantages and disadvantages, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management, Newsgroups, mailing lists, chat rooms.

UNIT-III

Basics of 'C' Language

C Fundamentals, Basic data types, local and external variables and scope, formatted input/ output, expressions, selection statements, loops and their applications; arrays, functions, recursive functions, pointers and arrays. Strings literals, arrays of strings; applications, Structures, Unions and Enumerations.

UNIT-IV

Advanced Features of 'C' Language

preprocessor directives, macro definition, conditional compilation, storage classes, type's qualifiers, Low level programming (Bitwise operators, Bit fields in structures, other low level techniques), error handling, file operations(low level/high level).

BOOKS

1. The C Programming Language by Dennis M Ritchie, Brian W. Kernigham, 1988, PHI.
2. Fundamentals of Computing and C Programming, R. B. Patel, Khanna Publications, 2010, New Delhi.
3. Information technology, Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, 1998, TMH
4. Theory and problem of programming with C, Byron C Gottfried, TMH
5. Using Computers and Information by Jack B. Rochester, 1996, Que Education & Training.
6. C Programming – A modern approach by K.N. King, 1996, WW Norton & Co.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

ME 103 B : ENGINEERING GRAPHICS AND DRAWING

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
1	--	4	3	**Class Work**	:	**40 Marks**
				Examination	:	**60Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT I

Basics of Engineering Graphics and Drawing – Drawing Papers, Minidrafter, Pencils. Drawing Paper Layout, Title Block, Types of Lines, Lettering, Dimensioning, types of Projections; First and Third Angle systems of Orthographic Projections. Projection of Points in different Quadrants.

Projections of Straight Lines – Contained by both Reference Planes, Contained by one and inclined to other Reference Plane, Contained by one and Parallel to other Reference Plane, Parallel to both Reference Plane, Perpendicular to one of the Reference Planes, Inclined to one Plane but Parallel to the other Reference Planes, Inclined to both the Reference Planes, True Length of a Line and its Inclination with Reference Planes, Traces of a Line.

UNIT II

Projections of Planes – Parallel to one Reference Plane, Inclined to one Plane but Perpendicular to the other, Inclined to both Reference Planes.

Projections of Polyhedral Solids and Solids of Revolution- in simple positions with axis perpendicular to a Reference Plane, with axis parallel to both Reference Planes, with axis parallel to one Reference Plane and inclined to the other Reference Plane, Projections of sections of Prisms, Pyramids, Cylinders and Cones. True Shape of Sections of Solids.

UNIT III

Development - Development of Surfaces of various Solids objects.

Free Hand Sketching - Orthographic Views from Isometric, Views of Simple Machine Components such as Brackets, Bearing Blocks, Guiding Blocks and Simple Couplings and Pipe Joints.

UNIT IV

Isometric Projections - Introduction, Isometric Scale, Isometric Views and Drawing of various Plane and Solids objects. Perspective drawing and oblique view.

Orthographic Drawings - Screw Threads, Bolts, Nuts and Washers, Bolted, Riveted and Welded Joints

TEXT BOOKS:

1. Engineering Drawing: MB Shah and BC Rana, Pearsons
2. Engineering Graphics and Drafting: P.S. Gill, S.K. Kataria and Sons.

REFERENCE BOOKS:

1. A Text Book of Engineering Drawing: RK Dhawan, S Chand & Company
2. Engineering Drawing Plane and Solid Geometry : N.D. Bhatt, Charotar Publishing House.

NOTE:

1. For class work, the students shall be assigned to prepare at least ten drawing sheets covering all units and each topic of the syllabus.
2. For practical examination, the examiner will set a question paper containing total eight questions, two questions from each unit covering each topic of the syllabus; students are required to attempt five questions at least one from each unit.

ME 105B : ELEMENTS OF MECHANICAL ENGINEERING
B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

Thermodynamics- Elementary definitions in thermodynamics, fundamentals of first and 2nd law of thermodynamic- concept of internal energy, enthalpy and entropy, heat pump and refrigerator, elementary numerical problems.

Properties of Steam & Boilers: properties of steam, use of steam tables and mollier diagram, measurement of dryness fraction of steam, Carnot and Rankin cycle, elementary numerical problems. Classification of boilers, Comparison of water and fire tube boilers mounting and accessories with their functions, Constructional and operational details of Cochran and Babcock and Wilcox boilers, elementary numerical problems.

Steam Turbines and Condensers: Classification of turbines and their working principles, Types of condensers and their uses.

UNIT-II

I.C. Engines and Gas Turbines: Introduction, Classification, Constructional details and working of two-stroke and four-stroke diesel and petrol engines, Efficiency of Otto & Diesel cycles , Working principle of gas turbine, elementary numerical problems.

Refrigeration and air conditioning- rating of refrigeration machine, coefficient of performance, simple vapor compression cycle, fundamentals of air conditioning, use of Psychrometric charts.

UNIT-III

Water Turbines and Pumps : Introduction, Classification, Construction details and working principle of Pelton, Francis and Kaplan turbines, Classification of water pumps and construction detail & working principle of centrifugal pump.

Simple Lifting Machines: Definition of machine, Velocity ratio, Mechanical advantage, Efficiency, Laws of machines, Reversibility of machine, Wheel and axle, Differential pulley block, Single, double and triple start worm and worm wheel, Single and double purchase winch crabs, Simple and compound screw jacks, elementary numerical problems.

UNIT-IV

Introduction to Power transmission and Devices: Belt drive, Rope drive, Chain drive, Types of gear and Gear train, Types and function of clutches, Types and function of brakes.

Stresses and Strains: Introduction, Concept & types of Stresses and strains, Poison's ratio, stresses and strains in simple and compound bars under axial loading, Stress-strain diagrams, Hooks law, Elastic constants & their relationships. Concept of shear force and bending moments in beams, elementary numerical problems.

TEXT BOOKS:

1. Hydraulic and Fluid Mechanics – Modi and Seth, Pub. – Standard Book House, New Delhi
2. Engineering Thermodynamics – C.P. Arora, Pub. - TMH, New Delhi
3. Thermal Engineering – A.S. Sarad, Pub. - Satya Prakashan, New Delhi.
4. Engineering Mechanics – K.L. Kumar, Pub. - TMH, New Delhi.
5. Theory of Machines – S.S. Rattan, Pub. – TMH, New Delhi.

REFERENCE BOOKS:

1. Strength of Materials – Popov, Pub. - PHI, New Delhi.

2. Hydraulic Machines – Jagdish Lal, Pub.- Metropolitan, Allahbad.
3. Thermal Science and Engineering – D.S. Kumar, Pub. – Kateria & Sons, New Delhi.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

PHY 103B : PHYSICS LAB - I

B. Tech. Semester - I (Common for all Branches)

L	T	P	Credits			
--	--	2	1	**Class Work**	:	**20Marks**
				Examination	:	**30Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

LIST OF EXPERIMENTS

1. To find the wavelength of sodium light by using Newton's rings experimental setup.
2. To find the wavelength of sodium light by Fresnel's biprism experimental setup
3. To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.
4. To find the refractive index and Cauchy's constants of a prism by using spectrometer.
5. To find the wavelength of sodium light by using Michelson interferometer.
6. To find the resolving power of a telescope.
7. To find the pitch of a screw using He-Ne laser.
8. To find the specific rotation of sugar solution by using a polarimeter.
9. To compare the capacitances of two capacitors by De'sauty bridge.
10. To find the flashing and quenching potentials of Argon and also to find the capacitance of unknown capacitor.
11. To study the photo conducting cell and hence to verify the inverse square law.
12. To find the temperature co-efficient of resistance by using platinum resistance thermometer and Callender and Griffith bridge.
13. To find the frequency of A.C. mains by using sonometer.
14. To find the velocity of ultrasonic waves in non-conducting medium by piezo-electric method.
15. To determine the value of Stefan's constant.
16. To find the coefficient of thermal conductivity of a good conductor by Searle's method.
17. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton method.

RECOMMENDED BOOKS :

1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)
2. Practical Physics – S.L.Gupta & V.Kumar (Pragati Prakashan).
3. Advanced Practical Physics Vol.I & II – Chauhan & Singh (Pragati Prakashan).

NOTE: Students will be required to perform 10 experiments in a semester.

ME 107B : WORKSHOP PRACTICE

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
--	--	4	2	**Class Work**	:	**40 Marks**
				Examination	:	**60Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

LIST OF EXPERIMENTS / JOBS

1. To study different types of measuring tools/instruments used in metrology and determine least counts of vernier calipers, micrometers and vernier height gauges.
2. To study different types of machine tools (lathe, shaper, planer, slotter, milling, drilling machines).
3. To prepare a job on a lathe involving facing, outside turning, taper turning, step turning, radius making and parting-off.
4. To study different types of fitting tools and marking tools used in fitting practice.
5. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.
6. To prepare joints for welding suitable for butt welding and lap welding.
7. To study various types of carpentry tools and prepare simple types of at least two wooden joints.
8. To prepare simple engineering components/ shapes by forging.
9. To prepare mold and core assembly, to put metal in the mold and fettle the casting.
10. To prepare horizontal surface/ vertical surface/ curved surface/ slots or V-grooves on a shaper/ planner.
11. To prepare a job involving side and face milling on a milling machine.
12. To study of CNC lathe, CNC Milling and EDM Machines.

NOTE:

1. At least ten experiments/ jobs are to be performed/ prepared by students in the semester.

2. At least 8 experiments/ jobs should be performed / prepared from the above list, remaining two may either be performed/ prepared from the above list or designed and set as per the scope of the syllabus of Manufacturing Processes.

CH 103B : CHEMISTRY LAB.
B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
--	--	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

LIST OF EXPERIMENTS

1. Determination of Ca++ and Mg++ hardness of water sample using EDTA solution.
2. Determination of alkalinity of water sample.
3. Determination of dissolved oxygen (DO) in the given water sample.
4. To find the melting and eutectic point for a two component system by using method of cooling curve.
5. Determination of viscosity of lubricant by red wood viscometer(No. 1 & No. 2).
6. To determine Flash point & Fire point of an oil by Pensky-Marten's flash point apparatus and by Abel's closed cup apparatus.
7. To prepare Phenol-formaldehyde and urea- formaldehyde resin.
8. To find out saponification No. of an oil..
9. Determination of concentration of KMnO4 solution spectrophotometerically.
10. Determination of strength of HCl solution by titrating it against NaOH solution conductometrically.
11. To determine amount of sodium and potassium in a given water sample by flame photometer
12. Estimation of total iron in an iron alloy.

SUGGESTED BOOKS:

1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand & Company Ltd.
2. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
3. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula(New Age).

NOTE:

1. The student will be required to perform 10 experiments/ exercises from the above list and any other two experiments designed by the department based on the theory course (course code101B Course Name Chemistry)
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/ exchange of calculator is prohibited in the examination.
3. Electronic gadgets including Cellular phones are not allowed in the examination.

EE 103B : PRINCIPLES OF ELECTRICAL ENGINEERING LAB

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
--	--	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

LIST OF EXPERIMENTS

1. To verify KCL and KVL.
2. To verify Thevenin's & Norton's Theorems.
3. To verify maximum power transfer theorem in D.C. Circuit.
4. To verify reciprocity theorem.
5. To verify Superposition theorem.
6. To study frequency response of a series R-L-C circuit and determine resonant frequency & Q- factor for various Values of R, L, C.
7. To study frequency response of a parallel R-L-C circuit and determine resonant frequency & Q -Factor for various values of R, L, C.
8. To perform direct load test of a transformer and plot efficiency Vs load characteristic.
9. To perform direct load test of a D.C. shunt generator and plot load voltage Vs load current curve.
10. To study various type of meters.
11. .Measurement of power by three voltmeters / three ammeters method.
12. Measurement of power in a three phase system by two watt meter method.

NOTE:

1. **At least 10 experiments are to be performed by students in the semester.**
2. **At least 8 experiments should be performed from the above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of EE101B.**

CSE 103B : COMPUTER PROGRAMMING LAB

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
--	--	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

LIST OF PRACTICAL PROBLEMS

1. Write a program to find the largest of three numbers. (if-then-else)
2. Write a program to find the largest number out of ten numbers (for-statement)
3. Write a program to find the average mail height & average female heights in the class (input is in form of sex code, height).
4. Write a program to find roots of quadratic equation using functions and switch statements.
5. Write a program using arrays to find the largest and second largest no. out of given 50 nos.
6. Write a program to multiply two matrices.
7. Write a program to sort numbers using the Quicksort Algorithm.
8. Represent a deck of playing cards using arrays.
9. Write a program to check that the input string is a palindrome or not.
10. Write a program to read a string and write it in reverse order.
11. Write a program to concatenate two strings.
12. Write a program which manipulates structures (write, read, and update records).
13. Write a program which creates a file and writes into it supplied input.
14. Write a program which manipulates structures into files (write, read, and update records).

NOTE: At least 5 to 10 more exercises to be given by the teacher concerned.

ME109B : ELEMENTS OF MECHANICAL ENGINEERING LAB.

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
--	--	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

LIST OF EXPERIMENTS

1. To study Cochran & Babcock & Wilcox boilers.
2. To study the working & function of mountings & accessories in boilers.
3. To study 2-Stroke & 4-Stroke diesel engines.
4. To study 2-Stroke & 4-Stroke petrol engines.
5. To calculate the V.R., M.A. & efficiency of single, double & triple start worm & worm wheel.
6. To calculate the V.R., M.A. & efficiency of single & double purchase winch crabs.
7. To draw the SF & BM diagrams of a simply supported beam with concentrated loads.
8. To study the simple & compound screw jacks and find their MA, VR & efficiency.
9. To study the constructional features & working of Pelton Turbine.
10. To prepare stress-strain diagram for mild steel & cast iron specimens under tension and compression respectively on a Universal testing machine.

NOTE: 1. Total ten experiments are to be performed in the Semester.

2. At least eight experiments should be performed from the above list. Remaining three experiments should be performed as designed & set as per the scope of the syllabus of ME – 101: Elements of Mechanical Engineering.

MATH 102B : MATHEMATICS - II
B. Tech. Semester - II (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**75 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

Ordinary Differential Equations & its Applications : Exact differential equations. Equations reducible to exact differential equations. Applications of Differential equations of first order & first degree to simple electric circuits, Newton's law of cooling, heat flow and orthogonal trajectories.

Linear differential equations of second and higher order. Complete solution, complementary function and particular integral, method of variation of parameters to find particular Integral, Cauchy's and Legender's linear equations, simultaneous linear equations with constant co-efficients.

UNIT-II

Laplace Transforms and its Applications : Laplace transforms of elementary functions, properties of Laplace transforms, existence conditions, transforms of derivaties, transforms of integrals, multiplication by t^n, division by t. Evaluation of integrals by Laplace transforms. Laplace transform of Unit step function, unit impulse function and periodic function. Inverse transforms, convolution theorem, application to linear differential equations and simultaneous linear differential equations with constant coefficients.

UNIT-III

Functions of Complex Variable : Definition, Exponential function, Trignometric and Hyperbolic functions, Logrithmic functions. Limit and Continuity of a function, Differnetiability and Analyticity.

Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and formula.

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues

UNIT-IV

Fourier Series and Fourier Transforms : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and consine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

TEXT BOOKS :

1. Advanced Engg. Mathematics F Kreyszig
2. Higher Engg. Mathematics B.S. Grewal

REFERENCE BOOKS:

1. Differential Equations – H.T.H. Piaggio.
2. Elements of Partial Differential Equations – I.N. Sneddon.
3. Advanced Engineering Mathematics – R.K. Jain, S.R.K.Iyengar.
4. Advanced Engg. Mathematics – Michael D. Greenberg.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

PHY 102B : ENGINEERING PHYSICS – II
B. Tech. Semester - II (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

ELECTRODYNAMICS & QUANTUM PHYSICS

Introduction, Displacement current, Equation of continuity, Gauss's Law in dielectric, applications of Gauss's law, Maxwell's equations (both differential and integral form), plane e.m. wave equations in free space, dielectric and conducting medium; Poynting vector.

Difficulties with Classical physics, Introduction to quantum mechanics-simple concepts, Black Body radiations, Planck's Law of radiation and its limitations, Group velocity and phase velocity, Schrodinger wave equations, Application of Schrodinger Equations (Particle in a box).

UNIT-II

CRYSTAL STRUCTURE

Space Lattice, unit cell and translation vectors, Miller indices, Bravis lattice structure in 3D, simple crystal structure (NaCl, ZnS and CsCl2), Elementary idea of reciprocal lattice, Ewald Construction, Experimental x-ray diffraction method, Laue method, powder Method.

FREE ELECTION THEORY

Elements of classical free electron theory , Drude's Theory of Conduction and its limitations, quantum theory of free electrons, Fermi level, Density of states, Fermi-Dirac distribution function, Thermionic emission, Richardson's equation.

UNIT-III

BAND THEORY OF SOLIDS

Origin of energy bands, Kronig, Penney Model (qualitative), E-K diagrams, Brillouin Zones, Concept of effective mass and holes, Classification of solids into metals, Semiconductors and insulators, Fermi energy and its variation with temperature, Conduction in Intrinsic and Extrinsic Semiconductors. Hall Effect and its Applications.

UNIT-IV

SUPERCONDUCTIVITY & NANOSCIENCE

Introduction to superconductivity, Critical temperature, Meissner Effect, Types of Superconductor, London Equations, penetration depth and coherence length, BCS Theory(qualitative ideas), High temperature superconductors.

Concept of Nano-materials, Size dependence of band gap, Top-down and bottom-up approach for preparing nano-materials, MEMS & NEMS, Properties and applications of Fullerene, Graphene, CNT, Nanowires, Nano-composites, Quantum dots..

TEXT BOOKS :

1. Solid State Physics – S.O.Pillai (6th Edition, New Age).
2. Quantum Mechanics – Ghatak & Loknathan.
3. Fundamentals of Solid State Physics – B.S.Saxena, R.C.Gupta & P.N.Saxena (Pragati Prakashan).
4. Solid State Physics by H. Ibach & H. Luth, Springer, Berlin.
5. Engineering Physics by H.K Malik and A.K. Singh (Tata McGraw Hill).
6. Engineering Physics by S.P. Taneja (Chand Pub.)

REFERENCE BOOKS :

1. Introduction to Solid State Physics (VII Ed.) - Charles Kittel (John Wiley).

2. Quantum Mechanics – Powell and Crasemann (Oxford & IBH)
3. Classical Electrodynamics by S.P. Puri (Narosa)
4. Nano-technology- Molecularly Designed Materials: G. M. Chow & K. E. Gonsalves (American Chemical society).

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

ECE102B : BASICS OF ELECTRONICS ENGINEERING

B. Tech. Semester – II (OPTIONAL- Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT I

Semiconductor Physics, Diodes and Applications: Basic concepts, intrinsic and extrinsic semiconductors, diffusion and drift currents ,Hall effect and its applications-pn junction under open circuit, reverse bias and forward bias conditions, p-n junction in the breakdown region, ideal diode, types of diodes –zener diode, varactor diode, LED and photodiode. Rectifier (half wave and full wave).

Amplifiers: Introduction of different types of BJT amplifiers & their characteristics.

UNIT II

Operational Amplifiers: OP-amps, its characteristics, inverting, non-inverting, summing, averaging, scaling ,difference, integrator and differentiator amplifiers.

Power Supplies: Introduction and working of switched mode power supply (SMPS), voltage regulator.

UNIT III

Digital Electronics: Binary, Octal and Hexadecimal number system and conversion, Boolean algebra, truth tables of logic gates AND, OR,NOT,EX-OR,EX-NOR, NAND, NOR AND their implementation using diodes transistors, switches and lamps, Universal gates.

Electronic Instruments: Transducers, Role, importance and applications of general purpose test instruments viz. multi meter (digital and analog), cathode ray oscilloscope (CRO), function/ signal generator.

UNIT IV

Communication System: Modulation, need of modulation, Block diagram of basic communication system, overview of AM, FM and PM.

Microprocessor: Basics of 8085 & its architecture. Instruction set, Interrupts, Addressing modes.

REFERENCE BOOKS:

1. Sedra A S and Smith K C. “Microelectronic Circuits” New York.Oxford University Press, New York
2. Tocci R J and widner N S “Digital Systems” – Principles and Applications”, Pearson Education India , new Delhi .
3. Cooper and Helfric, “Modern Electronic Instrumentation and Measuring Techniques”. Prentice Hall of India, New Delhi.
4. Boylestad and Nashelesky, “Electronic Devices and Circuit Theory”, Pearson Education India, New Delhi
5. Millman and Grabel, “Microelectronics”, Tata McGraw Hill
6. Millman and Halkias, “Electronics Devices and Circuits”. Tata McGraw Hill
7. Kennedy and Davis, “Electronic Communication Systems”, Tata McGraw Hill
8. Ramesh S. Gaonkar, “Microprocessor Architecture,Programming,and Applications with the 8085”,Penram International Publishing.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

BT102B : BASICS OF BIOTECHNOLOGY

B. Tech. Semester – II (OPTIONAL - Common for all Branches)

L	T	P	Credits			
3	1	--	4	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT – I

Introduction: Nature and scope of Biotechnology.

Cell Structure and Function: Prokaryotes and Eukaryotes- cell wall, cell membrane, nucleus, mitochondria, chloroplast, ribosome, vacuoles, bacteria and viruses: brief descriptions.

Biomolecules: A brief account of structure and functions of carbohydrates, lipids, proteins.

UNIT– II

Cell Division: Mitosis and meiosis

Genes and chromosomes: Classical- Mendel's laws and chromosomes, nature of genetic material, DNA and RNA as genetic material, concept of organization of genetic material into chromosomes.

DNA replication: DNA polymerases, replication mechanism.

UNIT-III

Gene Expression: Central dogma, genetic code, gene expression-a brief account of transcription and translation, housekeeping genes, mutations and their molecular basis.

Genetic Engineering: An introduction to genetic engineering: cloning (vectors, enzymes), DNA and genomic libraries, transgenics, DNA fingerprinting, genomics.

UNIT – IV

Applications of Biotechnology : Bioprocess and fermentation technology, cell culture, enzyme technology, biological fuel generation, single cell protein, sewage treatment, environmental biotechnology, biotechnology and medicine, biotechnology in agriculture & forestry industry, food and beverage technology, production of biological inventions, safety in biotechnology.

TEXT/ REFERENCE BOOKS:

- Biotechnology, Smith, Cambridge Press.
- Modern Concepts of Biotechnology, H. D. Kumar, Vikas Publishing House (P) Ltd.
- Elements of Biotechnology, P. K. Gupta, Rastogi Publications.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

HUM102B : ORAL COMMUNICATION SKILLS

B. Tech. Semester – II (OPTIONAL- Common for all Branches)

L	T	P	Credits			
3	1	--	4	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

OBJECTIVE

To train students to have proficiency in oral communication through interpersonal communicative situations.

COURSE CONTENT

UNIT I

Essentials of Speaking Skills:

Familiarity with phonetic sound symbols; Transcription of simple words using International Phonetic Alphabet; Use of dictionary to cultivate standard pronunciation and develop phonetic discrimination

UNIT II

Speaking Skills:

Need and Significance of Effective Oral Communication; Practice of Conversation – Interpersonal and Telephonic Conversation; Formal Group Discussion

UNIT III

Non-Verbal Elements in Oral Communication Skills:

Reading Face, eyes, gesture and body posture, time, space and culture in communicative situations; practicing verbal and non-verbal communication (Body Language) to acquire effective Oral communication;

UNIT IV

Listening Skills:

Essentials of Good Listening, Types of Listening, Barriers in Effective listening, Exercises in Listening to Talk Shows, Speech Reviews; Practice in English Sounds and Speech using RP/MRP

RECOMMENDED READING

1. Buck, Gary. *Assessing Listening.* Delhi: Foundation Books (Cambridge University Press), 200.
2. Balasubramanian, T. *A Textbook of English Phonetics for Indian Students.* Chennai: MacMillan,1981 (rpt 2007).
3. Gangal, J.K. *A Practical Course in Spoken English*. New Delhi: PHI, 2011
4. Raman, Meenakshi and Sangeeta Sharma. Communication Skills. Delhi: OUP, 2011
5. Ribbens, Geoff and Richard Thompson. *Body Language*. New York: Hodder & Stoughton, 2007.

CE 102B : BASICS OF CIVIL ENGINEERING

B. Tech. Semester – II (OPTIONAL- Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT - I

Materials for Construction: Stones, Sands, Lime, Bricks, Timber, Steel their Classification and Properties. Different Types of Cement and their Properties, manufacturing of Cement, Concrete, and properties of Concrete, Ingredient of Concrete and Their Functions

Component parts of a Building, Foundation, Masonry Works, Doors and Windows, Floors, Roofs, DPC, Building Services

UNIT - II

Surveying , Introduction to Surveying: Definition, importance, classification of surveys, Principle, Leveling: definitions of terms used in leveling, different types of levels, Contours, Definition, representation of reliefs, horizontal equivalent, contour interval, characteristics of contours, methods of contouring, contour gradient, uses of contour maps, Introduction to GIS, GPS and Remote sensing.

UNIT - III

Transportation: Various modes and means of transportation, Different types of transport systems, Importance of road transport, History of Road Development, Indian Road Congress. Main features of 20 years road development plans in India, PMGSY

Sources of power, estimation of water power, water budget equation, necessity and importance of harnessing small hydro power plants, Dams, Types of Dams, Location and Impact assessment of a Dam project.

UNIT - IV

Geotechnical Engineering: History and its applications, Soil Properties, Classification of Soil, Geotechnical and Geophysical investigation of Soil.

Irrigation Engineering: Necessity, advantages, disadvantages, impact of irrigation on human environment, need and development of irrigation in India.

TEXT BOOKS:

1. Basic Civil Engineering, Satheesh Gopi, Pearson.
2. Basic Civil Engineering, Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kr. Jain, Firewall Medi

REFERENCE BOOKS:

1. Surveying by Prof. N. Singh, Tata McGraw Hill, New Delhi
2. Basic Civil Engineering, Rakesh Beohar, Firewall Media
3. Highway Engg. by S. K. Khanna & C.e.G.Justo, Nem Chand & Bros,Roorkee
4. Water Resources Engineering by Linseley and Franzini
5. Basic Civil Engineering, L.G. Kulkarni A. D. Pawar S. P. Nitsure, Technical Publications.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

PHY 104B : PHYSICS LAB. - II

B. Tech. Semester - II (Common for all Branches)

L	T	P	Credits			
--	--	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

LIST OF EXPERIMENTS

1. To find the low resistance by Carey - Foster's bridge.
2. To find the resistance of a galvanometer by Thomson's constant deflection method using a post office box.
3. To find the value of high resistances by Substitution method.
4. To find the value of high resistances by Leakage method.
5. To study the characteristics of a solar cell and to find the fill factor.
6. To find the value of e/m for electrons by Helical method.
7. To find the ionisation potential of Argon/Mercury using a thyratron tube.
8. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus.
9. To study the characteristics of (Cu-Fe, Cu-Constantan) thermo couple.
10. To find the value of Planck's constant by using a photoelectric cell.
11. To find the value of co-efficient of self-inductance by using a Rayleigh bridge.
12. To find the value of Hall Co-efficient of semi-conductor.
13. To study the V-I characteristics of a p-n diode.
14. To find the band gap of intrinsic semi-conductor using four probe method.
15. To calculate the hysteresis loss by tracing a B-H curve.
16. To verify the Truth Table of various Logic Gates.

RECOMMENDED BOOKS :

1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)
2. Practical Physics – S.L.Gupta & V.Kumar (Pragati Prakashan).
3. Advanced Practical Physics Vol.I & II – Chauhan & Singh (Pragati Prakashan).

NOTE: Students will be required to perform 10 experiments in a semester.

GP 102B : GENERAL PROFICIENCY & ETHICS
B. Tech. Semester – II (Common for all Branches)

L	T	P	Credits			
				Examination	**:**	**50 Marks**
1	**--**	**--**	**2**	**Total**	**:**	**50 Marks**
				Duration of Examination	**:**	**3 Hours**

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him /her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/ her achievements during the current academic session in the form of a written report highlighting followings:

I.	Academic Performance --------	
II.	Extra Curricular Activities / Community Service, Hostel Activities	**(8 Marks)**
III	Technical Activities / Industrial, Educational tour	**(8 Marks)**
IV	Sports/games	**(4 Marks)**
V	Moral values & Ethics	**(10 Marks)**

NOTE: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/ her achievement and verbal & communicative skill through presentation before the committee. **(20 Marks)**

C. Moral values & Ethics

Syllabus - Introduction to Value Education. Understanding ethics, value system, happiness, prosperity

A minor test / Quiz will be conducted and It will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal.

The evaluation of this course will be made by the following Committee.

<u>University Departments:</u>

1	Chairperson of the Department	Chairman
2	Senior Most Faculty Counselor	Member
3	Vice- Chancellor's Nominee	Member

<u>Affiliated Colleges:</u>

1	Director/Principal	Chairman
2	Head of the Department/Sr. Faculty	Member
3	External Examiner to be appointed by the University	Member

Note: Remuneration will be paid to the external examiner only (at par with the other practical examinations).

GES201B: ENVIRONMENTAL STUDIES

B. Tech. Semester – III/IV (Common for all Branches)

L	T	P	Credits			
				Examination	**:**	**75 Marks**
3	**-**	**--**	**0**	**Total**	**:**	**75 Marks**
				Duration of Examination	**:**	**3 Hours**

UNIT – I The Multidisciplinary nature of environmental studies, Definition, scope and importance.
Need for Public awareness

UNIT – II NATURAL RESOURCES:

Renewable and non-renewable resources:

Natural resources and associated problems.

a) Forest resources: Use and over-exploitation: deforestation, case studies, Timber exploitation, mining, dams and their effects and forests tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources: World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources; case studies.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

UNIT- III ECOSYSTEMS:

- Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following eco-system:
  a) Forest ecosystem, Grassland ecosystem, Desert ecosystem.
  b) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT- IV BIODIVERSITY AND ITS CONSERVATIONS:

- Introduction – Definition: Genetic, species and ecosystem diversity.
- Biogeographically classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation.
- Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India.

UNIT – V ENVIRONMENTAL POLLUTION:

Definition, causes, effects and control, measures of:

Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal Pollution, Nuclear hazards

- Solid waste management: Causes effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management: Floods, earthquake, cyclone and landslides.

UNIT – VI SOCIAL ISSUES AND THE ENVIRONMENT:

a) From unsustainable to sustainable development
b) Urban problems related to energy
c) Water conservation, rain water harvesting, watershed management
d) Resettlement and rehabilitation of people; its problems and concerns, case studies

e) Environmental ethics: Issues and possible solutions
f) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies
g) Wasteland reclamation, Consumerism and waste products
h) Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act
i) Issues involved in enforcement of environmental legislation, Public awareness

UNIT – VII Human population and the Environment., Population growth, variation among nations.
Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/ AIDS, Woman and Child Welfare.
Role of Information Technology in Environment and human health.
Case Studies.

REFERENCES:

1. Agarwal, K.C. 2001, Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Franch, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380013, India .
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine Pllution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai. 1195p.
6. De A.K., Environmenal Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment ®.
8. Gleick, H.P., 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env. Institute, Oxford Univ., Press 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bomaby Natural History Scociety, Bombay (R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Helhi 284p.
12. Mckinney, M.L. & Schoch, RM 1996, Environmental Sciences Systems & Solutions, Web enhanced Edition 639p.
13. Mhaskar A.K., Mater Hazardous, Tekchno-Sciences Publications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsoworth Publishing Co. (TB).
15. Odum, E.P. 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
16. Rao M.N. & Dutta, A.K. 1987, Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd., 345p
17. Sharma, B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Sciences (TB).
20. Trivedi, R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II Enviro Mdiea (R).
21. Trividi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II Enviro Media (R).
22. Trividi R.K. and P.K. Goel, Introduction to air pollution, Techno Sciences Pub. (TB).
23. Wagner K.D., 1998, Environmental Management, W.B. Saunders Co. Philadelophia, USA 499p.
24. A text bok environmental education G.V.S. Publishers by Dr. J.P. Yadav.

(M) Magazine (R) Reference (TB) Textbook

NOTE: **1. Examiner will set eight questions. Students will be required to attempt five Questions.**
2. The awards of this paper shall not be counted in the award of the Degree/DMC.

CH201B: ORGANIC AND ANALYTICAL CHEMISTRY
B. Tech. Semester - III (Chemical Engineering)

L	T	P	Credits			
3	1	--	4	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Unit-I

Organic reactions:
Types of reactions, Reaction intermediates, the mechanism of the following types of reactions: Substitution-Electrophilic, nucleophilic, Free radical. Addition- Electrophilic, Nucleophilic, Free radical. Elimination-E_1, E_2, E_{cb}. Rearrangements: Migration with one electron pair (nucleophilic), Migration with one electron (free radical), migration without electron (electrophilic).

Chemistry of Hydrocarbons:
Sources, preparation and uses of cycloalkanes, dienes, alkynes, cracking & reforming, aromatic hydrocarbons, concept of aromaticity (Hückel rule, 4n+2 rule) and directive effect.

Unit-II

Chemistry of Functional Groups:
Preparation, general properties and uses of organic halides, Grignard reagents and organolithium, alcohols, poly alcohol (glycols) aldehydes, ketones, carboxylic acids and their derivatives (acyl chloride & anhydride).
Amines, diazonium salts, heterocyclic compound (pyridine).

Unit-III

Infrared Spectroscopy:
Introduction–Basic theory and instrumentation including FT-IR spectrum. Functional group and finger print regions, fundamental vibrations, overtones and Fermi resonance. Spectral features of major functional groups: alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols, ketones, aldehydes, carboxylic acids, and amines.

Ultraviolet and Visible Spectroscopy:
Introduction – Electronic energy levels, electronic transitions and selection rules. The origin, general appearance and designation of UV bands, absorption laws, chromophores, auxochrome, bathochromic shift, hypsochromic shift, hypochromic effect. The ultraviolet spectrometer- Woodward and Fisher's rules for calculating ultraviolet absorption maxima for dienes and unsaturated carbonyl compounds.

Unit-IV

Purification Techniques:
Introduction, R_f value, Partition Coefficient, Plate Theory and classification. Solid-Liquid chromatography (LSC) – Thin Layer Chromatography, Liquid-Liquid Chromatography (LLC)- Column Chromatography, Gel Permeable Chromatography, High Performance Liquid Chromatography & Reverse Phase HPLC, Gas-Liquid Chromatography (GLC), Counter current distribution.

TEXT BOOKS/ REFERENCE BOOKS:

1. Advanced organic Chemistry (Reaction Mechanism and structure) by Jerry March (Willey Eastern 3rd Edition).
2. Text Book of organic Chemistry by R.K. Bansal, T.M.H
3. Organic chemistry by Morrison, Bayd (P.H.L)
4. Chromatography by H. Kaur (Pragati Prakashan, Meerut).
5. Organic Chemistry Vol. I by I.L. Finar (ELBS).
6. Introduction to spectroscopy by Donald L. pavia, Brooks cole 4th edition.

NOTE:

1. **In the semester examination, the examiners will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronic gadgets including Cellular phones are not allowed in the examination.**

CHE201B: INTRODUCTION TO UNIT OPERATIONS
B. Tech. Semester - III (Chemical Engineering)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Dimensional Analysis: Rayleigh method; Buckingham method; dimensionless groups; geometric, Kinematic and dynamic similarity..

UNIT-II: Heat Transfer: Introduction to conduction, convection and radiation. Flow patterns: parallel, counter and cross flow; LMTD.

UNIT-III: Mass Transfer: Introduction to Distillation, Gas Absorption, Extraction, Adsorption, drying..

UNIT-IV: Fluid Flow: Types and Properties; Newton's law of viscosity; Laminar and Turbulent flow; Bernoulli's equation.

TEXT BOOKS:

1. "Unit Operations of Chemical Engineering", W.L. McCabe and J.C.Smith, McGraw Hill.
2. "Introduction to Chemical Engineering", Ghosal S. K., Sanyal S. K. and Datta S. , Tata McGraw Hill.

REFERENCE BOOKS:

1. "Principles of Unit Operations", A.S. Foust et al., John Wiley.
2. "Introduction to Chemical Engineering", Badger W.L. and Banchero J.T., Tata McGraw Hill, 1997.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE203B: FLUID FLOW

B. Tech. Semester - III (Chemical Engineering)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Properties of fluids, Classification of fluid-forces, Normal forces on fluids, Pressure-depth relation for compressible and incompressible fluids, Forces on submerged bodies, Rigid body motion, Pressure measurement, Kinematics of flow, Description of velocity fields, Angular velocity circulation, Stream function, Irrotational flow, Types of flow.

UNIT-II: Conservation of mass, momentum and energy, Euler's equation, Bernoulli's equation, Navier-Stoke's equation. Hagen-Poiseuille equation, Friction factor, Friction factor equations, Reynolds number and its significance, Dimensional analysis to fluid flow problems.

UNIT-III: Flow of incompressible fluids in conduits, Energy losses in beds, fittings, valves etc. Different fluid flow situations in conduits, series, parallel and networks of pipelines, Economic pipe diameter, Flow through open channels.

UNIT-IV: Compressible fluid flow in pipes, Flow measuring devices, Mixing of fluids, Power requirements, Pumps, Blowers, Valves and their characteristics, Selection and specification.

TEXT BOOKS:

1. "Chemical Engineering", J.M. Coulson and J.F.Richardson Vol-I, Pergamon.
2. "Unit Operations of Chemical Engineering", W.L. McCabe and J.C.Smith, McGraw Hill.

REFERENCE BOOKS:

1. "Fluid Mechanics", A.K.Jain, Khanna Publishers, New Delhi.
2. "Hydraulics & Fluid Mechanics", Jagdish Lal, Metropoliton Book Co. Pvt. Ltd. Delhi.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE205B : CHEMICAL ENGINEERING PROCESS CALCULATIONS
B. Tech. Semester - III (Chemical Engineering)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Brief introduction of chemical engineering unit processes and unit operations, Units and dimensions, Dimensional groups and constants, Stoichiometric relationships, Conservation of mass in chemical reactions, Excess reactants, Degree of completion, Behaviour of ideal gases, Gaseous mixtures, Vapour pressure, Clausius Clapeyron equation, Cox Chart, Duhring's plot, Raoult's law.

UNIT-II: Humidity and saturation, Relative humidity, Humid heat, Humid volume, Dew point, .
Humidity chart and its use.

Case study of selected problems, Aid of Computer in solving problems.

UNIT-III: Crystallization, Dissolution, Solving material balance problems with and without simultaneous equations, Recycle, Bypass and Purge calculations.

UNIT-IV: Heat capacity, Calculation of enthalpy changes, Energy balances with chemical reaction, Heat of vaporization, Heat of formation, Laws of thermochemistry, Heat of combustion, Heat of reaction.

TEXT BOOKS:

1. "Chemical Process Principles, D.A. Hougen & K.M. Watson Vol. I, Asia Publishing House.
2. "Basic Principles and Calculations in Chemical Engineering, D.M. Himmelblau, Prentice Hall.

REFERENCE BOOKS:

1. "Chemical Process Analaysis, Mass and Energy Balance", W.L. Luyben and L.A. Wenzel, Prentice Hall.
2. "Stoichiometry", Bhatt, B.I. and Vora, S.M., Tata McGraw Hill.
3. "Chemical Calculations", D.P.Tiwari, Vrinda Publication (Jalgaon).

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE207B : PROCESS INSTRUMENTATION
B. Tech. Semester - III (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: General principles of measurement, Static and Dynamic characteristics of instruments, sensors & transducers. Process instruments, Recording instruments, indicator and signaling instruments transmission of instrument reading, control centre, instrumentation diagram, online instrumentation in modern plants.

UNIT-II: Temperature measurement, Thermocouples, resistance thermometers, bimetallic thermometers, thermistors, optical and radiation pyrometer.

Pressure measurement, Use of manometer, Bourdon gauge, Bellows type gauge, measurement of vaccum, pressure transducers.

UNIT-III: Flow measurement, Use of obstruction type meters, variable area meters, pressure probes, positive displacement type meters, electromagnetic flowmeters and mass flow meters.

Liquid level measurement, Direct and differential method for the measurement in open pressure vessels

UNIT-IV: Miscellaneous measurements, Composition measurement, measurement of viscosity, conductivity, humidity, pH and nuclear radiations. Instrument for gas analysis, gas chromategraphy mass spectroscopy.

TEXT BOOKS:

1. Industrial Instrumentation: D.P. Eckmen - John Wiley.
2. Instrumentation in Process Control: W.J. Wightmen - Butterworth.

REFERENCE BOOKS:

1. Applied Instrumentation in the Process Industries Vol-I & II: W.G. Andrew - Gulf Publishing Company.
2. Process Instrumentation and Control Hand Book : J.M. Douglas - McGraw Hill.
3. Hand Book of Measurement Science: P.H. Sydenaam - John Wiley.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

ECE205B: ELECTRONICS ENGINEERING
B. Tech. Semester - III (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT I

SEMICONDUCTOR PHYSICS, DIODES AND APPLICATIONS:

Basic concepts, intrinsic and extrinsic semiconductors, diffusion and drift currents, Hall effect and its applications-pn junction under open circuit, reverse bias and forward bias conditions, p-n junction in the breakdown region, ideal diode, types of diodes –zener diode, varactor diode, LED and photodiode. Rectifier (half wave and full wave).

AMPLIFIERS:

Introduction of different types of BJT amplifiers & their characteristics.

UNIT II

OPERATIONAL AMPLIFIERS:

OP-amps, its characteristics, inverting, non-inverting, summing, averaging, scaling ,difference, integrator and differentiator amplifiers.

POWER SUPPLIES:

Introduction and working of switched mode power supply (SMPS), voltage regulator.

UNIT III

DIGITAL ELECTRONICS:

Binary, Octal and Hexadecimal number system and conversion, Boolean algebra, truth tables of logic gates AND, OR,NOT,EX-OR,EX-NOR, NAND, NOR AND their implementation using diodes transistors, switches and lamps, Universal gates.

ELECTRONIC INSTRUMENTS:

Transducers, Role, importance and applications of general purpose test instruments viz. multi meter (digital and analog), cathode ray oscilloscope (CRO), function/ signal generator.

UNIT IV

COMMUNICATION SYSTEM:

Modulation, need of modulation, Block diagram of basic communication system, overview of AM, FM and PM.

MICROPROCESSOR:

Basics of 8085 & its architecture. Instruction set, Interrupts, Addressing modes.

REFERENCE BOOKS:

1. Sedra A S and Smith K C. “Microelectronic Circuits” New York.Oxford University Press, New York
2. Tocci R J and widner N S “Digital Systems” – Principles and Applications”, Pearson Education India , new Delhi .
3. Cooper and Helfric, “Modern Electronic Instrumentation and Measuring Techniques”. Prentice Hall of India, New Delhi.
4. Boylestad and Nashelesky, “Electronic Devices and Circuit Theory”, Pearson Education India, New Delhi
5. Millman and Grabel, “Microelectronics”, Tata McGraw Hill
6. Millman and Halkias, “Electronics Devices and Circuits”. Tata McGraw Hill
7. Kennedy and Davis, “Electronic Communication Systems”, Tata McGraw Hill
8. Ramesh S. Gaonkar**,** “Microprocessor Architecture,Programming,and Applications with the 8085”,Penram International Publishing.

NOTE:

1. In the Semester examination, the examiner will set 08 questions in all selecting two from each Section & one from each unit. The candidates will be required to attempt five questions in all atleast one from each section. All questions carry equal marks.

CH203B: ORGANIC AND ANALYTICAL CHEMISTRY LAB
B. Tech. Semester - III (Chemical Engineering)

L	T	P	Credits			
-	-	3	1.5	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

LIST OF EXPERIMENTS:

1. **Identification of Organic Compounds**:
   Preliminary tests (elemental analysis, ignition, color, odor etc.), functional group analysis, and by the use of IR and UV spectroscopy.
   List of compounds for identification and analysis:
   1. Carboxylic acids- benzoic or oxalic acid.
   2. Aldehydes- acetaldehyde or benzaldehyde
   3. Ketones- acetophenone or benzophenone.
   4. Amides- Acetamide or benzamide
   5. Phenols-Phenol or Resorcinol.
   6. Amines-Aniline or p-naphthyl-amine
   7. Carbohydrates-Glucose or maltose.
   8. Hydrocarbons- Naphthalene or anthracene
2. **Quantitative organic analysis:**
   9. Estimation of phenol
   10. Estimation of aniline
3. **Chromatographic separation:**
   11. To separate a mixture of fluorescein and methylene blue by column chromatography.
4. **Preparation of organic Compounds:**
   12. Preparation of aspirin
   13. Preparation of p-nitro aniline

Purification should preferably be done by using recrystallization, extraction or column chromatography to ensure purity by TLC or HPLC.

BOOKS:

1. Qualitative organic analysis by A.I. Vogel (ELBS) Longmans
2. Quantitative Organic Analysis by A.I. Vogel (ELBS) Longmans
3. Advanced practical organic analysis by N K Vishnoi (Vikas Prakashan)
4. Practical organic chemistry by G. Mann, Longmans.

NOTE:

1. **The student will be required to perform 10-12 experiments/exercises from the above list and any other two experiments designed by the department based on the theory course (Course Code 201B, Course Name Organic and Analytical Chemistry).**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronic gadgets including Cellular phones are not allowed in the examination.**

CHE209B: FLUID FLOW LAB
B. Tech. Semester - III (Chemical Engineering)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

LIST OF PRACTICALS / DEMONSTRATIONS:

1. Flow measurement by Venturimeter.
2. Flow measurement by Orificemeter.
3. Calibration of Rotameter.
4. Flow measurement by V-notch.
5. Pressure drop in pipe flow.
6. Verification of Bernoulli's Theorem.
7. Centrifugal pump test rig.
8. Flow measurement by Pitot tube

NOTE:

1. **The students will be required to perform the 06 experiments from above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE203B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

EE231B: ELECTRICAL WIRING & INSTALLATION LAB

B. Tech. Semester - III (EE, EEE, IC, CHE)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**2 Hours**

LIST OF EXPERIMENTS:

1. Introduction of tools, electrical materials, safety procedure, symbols and abbreviations.
2. To study and make stair case wiring connections.
3. To study house wiring i.e., batten, cleat, casing-caping and conduit wirings.
4. To study & make fluorescent tube light connections, CFL & LED lights.
5. To study high pressure mercury vapour lamp (H.P.M.V) & Sodium Lamp.
6. To study circuit & working of SMPS, UPS & Inverter.
7. To study repairing of home appliances such as heater, electric iron, fans etc.
8. To study construction of moving iron, moving coil, electrodynamic & induction type meters.
9. To design & fabricate single phase transformer.
10. To study fuses, relays, contactors, MCBs and circuit breakers.
11. Insulation testing of electrical equipments.
12. To design and fabricate a PCB for a circuit, wire-up and test.
13. Drilling & mounting of components on above PCB.

NOTE:

1. **The students will be required to perform the 8 experiments/exercises from the above list and any other experiments designed on the basis course**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/ex-change of calculator is prohibited in the examinations.**
3. **Electronic gadgets including cellular phones are not allowed in the examination.**

ECE225B: ELECTRONICS ENGINEERING LAB
B. Tech. Semester - III (Chemical Engineering)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

LIST OF EXPERIMENTS:

1. Study of half wave and full wave rectifiers.
2. Study of zener diode as a voltage regulator.
3. Study of CE amplifier for voltage,current and Power gains input,output impedances.
4. Study of CC amplifier as a buffer.
5. To Study three terminal IC voltage regulator.
6. To study SMPS power supply.
7. Study of TTL gates –AND,OR,NOT,NAND,NOR,EX-OR,EX-NOR
8. To measure temperature using thermocouple.
9. To measure temperature using Thermister
10. To measure displacement using LDR.
11. To study Pulse width Modulation(PWM).
12. To study Pulse Position Modulation(PPM)
13. To study 8085 microprocessor.

NOTE:

1 **Total ten experiments are to be performed in the semester**

2 **At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.**

GES203B: ENVIRONMENTAL STUDIES FIELD WORK

B. Tech. Semester – III/IV (Common for all Branches)

L	T	P	Credits	Examination	:	25 Marks
-	-	-	0	Total	:	25 Marks

FIELD WORK:

- Visit to a local area to document environmental assets – river/ forest/ grassland/ hill/ mountain.
- Visit to a local polluted site-Urban/ Rural/ Industrial/ Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems – pond, river, hill slopes, etc. (Field work equal to 5 lectures hours).

NOTE: The awards of this paper shall not be counted in the award of the Degree/DMC.

ME217B: WORKSHOP

B. Tech. Semester - III (Common for all branches Except BT & AE)

L	T	P	Credits	Class Work	:	50 Marks
-	-	2	2	Total	:	50 Marks

Each student has to undergo a workshop atleast 4 weeks (80-100 hours) at the end of II semester during summer vacations. **Out of the four weeks, two weeks would be dedicated to general skills and two weeks training for specialized discipline/ department**. The evaluation of this training shall be carried out in the III semester

LIST OF JOBS TO BE CARRIED OUT DURING THIS PERIOD

1. To study and prepare different types of jobs on machine tools (lathe, shaper, planer, slotter, milling, drilling machines).
2. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.
3. To prepare joints for welding suitable for butt welding and lap welding.
4. To study various types of carpentry tools and prepare simple types of wooden joints.
5. To prepare simple engineering components/ shapes by forging.
6. To prepare mold and core assembly, to put metal in the mold and fettle the casting.
7. To study of CNC lathe, CNC Milling and EDM Machines.
8. Any work assigned in electrical workshop, computer hardware/ language lab, electronics workshop, biomedical hardware, automobile workshop etc.

This student will prepare job(s)/project as an individual or in a group using workshop in house infrastructure.

The student shall submit a typed report.
Training will be evaluated on the spot out of 20 marks.
The report will be evaluated in the III Semester by a Committee consisting of two teachers.
The student will interact with the committee through presentation to demonstrate his/ her learning. The basis of evaluation will primarily be the knowledge and exposure of students on different kinds of Machines/ instruments/ tools/ skills etc. The committee will evaluate out of 30 marks.
The committee shall submit the awards out of 50 marks.

MGT201B ENGINEERING ECONOMICS

B. Tech. Semester – III/IV (Common for all Branches Except BT& BME)

L	T	P	Credits			
4	-	--	4	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

COURSE OBJECTIVE: The aims of this course are to:

1. Acquaint the student with the basic economic concepts and their operational significance
2. Stimulate him to think systematically and objectively about cotemporary economic problems.

UNIT-I

Definition of economics- various definitions, nature of Economic problem, Micro and macro economics- their feature and scope, production possibility curve, Economic laws and their nature. Relation between Science, Engineering Technology and Economics. Concept and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility – its practical application and importance**.**

UNIT-II

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve. Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & application of the concept of elasticity of demand. Various concepts of cost-Fixed cost, variable cost, average cost, marginal cost, money cost, real cost, opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

UNIT III

Meaning of production and factors of production; Law of variable proportions, Law of Return to Scale, Internet and External economics and diseconomies of scale. Meaning of Market, Type of Marker– perfect Competition, Monopoly, Oligopoly, Monopolistic competition (Main features of these markers).

UNIT-IV

Supply and Law of Supply, Role of Demand & Supply in Price Determination and effect of changes in demand and supply on prices. Nature and characteristics of Indian economy, privatization – meaning, merits and demerits. Globalisation of India economy – merits and demerits. Elementary Concept of WTO & TRIPS agreement, Monitory Policy & Fiscal Policy

TEXT BOOKS:

1. Ahuja H.L"Micro Ecomomic Theory" S. Chand Publication, New Delhi
2. Dewett K.K "Modern Ecomomic Theory" S. Chand Publication, New Delhi
3. Jain T.R, Grover M.L, Ohri V.K Khanna O.P,"Economics for engineers" V.K .Publication ,New Delhi

SUGGESTED BOOKS:

1. Jhingan M.L"Micro Ecomomic Theory" S.Chand Publication ,New Delhi
2. Chopra P.N "Principle of Economics" Kalyani Publishers, Delhi
3. Mishra S.K "Modern Micro Economics" Pragati Publication Mumbai.
4. Dwivedi D.N "Micro Economics " Pearson Education, New Delhi.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

MATH202B : NUMERICAL METHODS
B. Tech. Semester –IV (CHE, AEI)

L	T	P	Credits			
3	1	-	4	Class Work	:	25 Marks
				Theory	:	75 Marks
				Total	:	100 Marks
				Duration of Exam.	:	3 Hours.

UNIT I

Interpolation and Curve Fitting:
Interpolation problem, Lagrangian polynomials, Divided differences, Interpolating with a cubic spline, Bezier curves and B-spline curves, Least Square Approximations.
Non-Linear Equations:
Bisection Method, Linear Interpolation methods, Newton's method, Muller's method, fixed point method.

UNIT II

Simultaneous Linear Equations:
Elimination Method, Gauss and Gauss-Jordan method, Jacobi's method, Gauss-Seidal method, Relaxation Method.
Numerical Differentiation and Integration:
Derivatives from differences tables, Higher order derivatives, Extrapolation techniques, Newton-cotes integration formula, Trapezoidal rule, Simpson's rule, Boo;e's rule and Weedle's rule, Romberg's integration

UNIT III

Numerical Solution of Ordinary Differential Equations:
Taylor series method, Euler and modified Euler method, Runge-Kutta method, Milne's method, Adams-Moulton method, Power method for Eigen values by interation .

UNIT IV

Numerical Solution of Partial Differential Equations:
Finite difference approximations of partial derivatives, solution of Laplace equation (Standard 5-point formula only), one-dimensional heat equation(Schmidt method, Crank-Nicolson method, Dufort and Frankel method) and wave equation.

TEXT BOOKS:

1. Applied Numerical Analysis: Curtis F. Gerald and Patrik G. Wheatley-Pearson, Education Ltd.
2. Numerical Method: E. Balaguruswamy T.M.H

REFERENCE BOOKS:

1. Numerical Methods for scientific and Engg. Computations: MK Jain, SRK Iyenger and R.K. Jain-Wiley Eastern Ltd.
2. Introductory Methods of Numerical Analysis S.S Sastry, PHI
3. Numerical Methods in Engineering and Science: BS Grewal

NOTE:
In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

CHE202B : CHEMICAL ENGINEERING THERMODYNAMICS - I

B. Tech. Semester - IV (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: **Basics of thermodynamics** -enthalpy, equilibrium, phase rule, heat capacity,ideal gas, real gas, heat effects,P-V-T Behaviour of Pure Fluids, Virial equations, cubic equations, generalised correlations and acentric factor, behaviour of liquids.

UNIT-II: Laws of Thermodynamics - Review, their applications to real processes, concept of entropy macroscopically and microscopically.

UNIT-III: Thermodynamics of Flow Processes - Metering and throttling processes, thermodynamic analysis of flow through nozzles, compression of gases in single as well as multistage compressors their volumetric and isentropic efficiencies.

UNIT-IV: Refrigeration & Liquefaction - Ideal refrigeration cycle, air, vapor compression and absorption refrigeration cycles, C.O.P., choice of refrigerants, Liquefaction processes and estimation of minimum work requirements

TEXT BOOKS:

1. Introduction to Chemical Engineering Thermodynamics: J .M. Smith and H.C. Van Ness - McGraw-Hill Book Company, New Delhi.
2. Chemical Engineering Thermodynamics: Y.V.C. Rao Universities Press (India) Ltd., Hyderabad, India

REFERENCE BOOKS:

1. Chemical and Process Thermodynamics: B.G. Kyle - Prentice Hall of India Pvt. Ltd., New Delhi.
2. Chemical Engineering Thermodynamics: T.E. Daubert - McGraw Hill, New Delhi.
3. Chemical Process Principles Vol-II: O.A. Haugen, K.M. Waston and R.A. Regatz - Wiley.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE204B: MECHANICAL OPERATIONS
B. Tech. Semester - IV (Chemical Engineering)

L	T	P	Credits			
4	1	-	5	**Class Work**	:	**50Marks**
				Examination	:	**75 Marks**
				Total	:	**125 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Particle size and shape, Size and shape distributions, Measurement and analysis, Concept of average diameter; Size reduction, Laws of grinding; Agglomeration and compaction; Screening, Design of screens.

UNIT-II: Flow around a single particle, Drag force and drag coefficient, Settling velocity of a particle in a fluid, Concept of relative velocity; Packed beds, Bed porosity, Flow through a bed of particles, Ergun's equation; Hindered & free settling of particles.

UNIT-III: Filtration, principle of filtration and types of filters; Thickeners; Gravity separation; Cyclones.

UNIT-IV: Fluidised beds and transport of particles; Storage of Solids, Flow of solids by gravity, Transport of solids by screw/ belt conveyors; Bag filters, Electrostatic precipitators, Elutriation, Particle collection systems, Mixing & agitation.

TEXT BOOKS:

1. "Chemical Engineering", J.M. Coulson & J.F. Richardson Vol. II, Pergamon Press.
2. "Unit Operations", G.G. Brown, Asia Publishing House.

REFERENCE BOOKS:

1. "Principles of Unit Operations", A.S. Foust et al., John Wiley.
2. "Unit Operations of Chemical Engineering", W.L.McCabe & J.C.Smith, McGraw Hill.
3."Mechanical Operations for Chemical Engineers", B.C.Bhattacharya & C.M. Narayanan, Khanna Publishers.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE206B : MATERIAL TECHNOLOGY
B. Tech. Semester - IV (Chemical Engineering)

L	T	P	Credits			
4	1	-	5	**Class Work**	:	**50 Marks**
				Examination	:	**75 Marks**
				Total	:	**125 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Factors affecting the selection of material for constructional purposes in chemical industries, Metallic and Non-Metallic materials of construction, Ferrous and Non-Ferrous metals. Corrosion, Various types, Mechanism, Methods of prevention and control

UNIT-II: Mechanical properties of various materials, Various modes of deformation, Crystal defects, Cold and hot working of metals and their effects on mechanical properties, Structure of solid phases, Different types of structure B.C.C., F.C.C. and H.C.P., Binary equilibria involving solid solution, Eutectic and peritectic systems, Cu-Ni, Cu-Zn, Fe-C diagrams, Heat treatment, General principles, TTT-curves, Annealing, normalizing, hardening, tempering and age hardening.

UNIT-III: Ferrous Metals, Grey and white cast iron, Malleable, Mechanite and nodular cast iron, Plain Carbon Steels: Classification, properties and applications, Alloy Steels: Stainless steels, ferritic, austenitic and martensitic, applications of stainless steels in chemical industries, Alloy tool steels, ultra high strength steels,cryogenic steel, bearing Metals(Babbits),Heat resisting alloys**.** Non-Ferrous metals, Copper Brass, Bronze, Aluminium and their mechanical properties, Workability and applications.

UNIT-IV: Non-Metallic materials of construction: (a) Ceramics: Various types, Speciality glasses and refractories, properties and applications. (b) Polymers: Classifications, Comparison and properties of various polymers and their relationship with chain structure, Some application in chemical industries.

TEXT BOOKS:

1. "Material Science & Engineering", V.Raghvan, Prentice Hall.
2. "Engineering Materials: Properties & Selection", Budinski, Prentice Hall (V Edition)
3. Material Science & Engineering : K M Gupta , Umesh Publications .

REFERENCE BOOK:

1. "Engineering Materials", Longman Vol.I & II.
2. "Materials of Engineering: Concepts and Applications", Van Vlack, L., Addison-Wesley.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination**

CH202B : UNIT PROCESSES

B. Tech. Semester - IV (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Unit-I

Halogenation: Products derived by halogenations, types of halogenations, survey of halogenations, substitution and addition halogenations reactions, Chlorination of propane, photo-halogenations, mechanism of dehydrohalogenation, design and construction of equipment for halogenations, flow sheets for manufacture of Chloroacetic acid, monochloroacetic acid and chloral.

Unit-II

Hydrogenation: Products derived from Hydrogenation, types of hydrogenation factors controlling hydrogenation, equipment for hydrogenation, apparatus and material of construction, high pressure autoclave, shaking autoclave, flow sheet for synthesis of methanol from carbon monoxide and hydrogen, hydrogenation of oil, hardening of fats, petroleum hydrogenation-hydroforming.

Unit-III

Nitration: Products derived from nitration, types of nitration, process equipment for nitration, batch nitration, continuous nitration, Schmidt nitrator, nitration of propane.

Oxidation: Types of oxidative reactions, oxidizing agents, liquid phase oxidation of xylenes, oxidation of methanol, oxidation of low molecular weight paraffin hydrocarbons, styrene from ethyl benzene, mechanism of oxidation, apparatus for oxidations.

Unit-IV

Sulfonation: Sulfonation & sulfonating agents, physical and chemical factors in sulfonation, mechanism of de-sulfonation, industrial equipment and techniques, batch sulfonation kettle, ball mill sulfonator, flowsheet for manufacturer of anthraquinone sulfonate, ethanol from ethylene.

Alkylation : Products derived from alkylation, types of alkylation, factors controlling alkylation, flow sheet for alkyl aryl sulfonates, sulfuric acid alkylation for petroleum industry, equipment for alkylation-kellogg cascade alkylator.

TEXT BOOKS/ REFERENCE BOOKS:

1. Unit process in organic synthesis by P.H. Groggins (MGH)
2. Chemical Technology by Merk and Hahn (MGH)
3. Chemical Technology., IIT, Madras (Organic)- II centre.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination**

MATH204B : NUMERICAL METHODS LAB
B. Tech. Semester - IV (CHE, AEI)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

LIST OF EXPERIMENTS:

Write down and execute the following programs using c/c++/matlab

1. To find the roots of non-linear equation using Bisection method
2. To find roots of non-linear equation using Newton's method
3. Curve fitting by least square approximations
4. To solve system of linear equations using Gauss-Elimination method
5. To solve system of linear equations using Gauss-Seidal iteration method
6. To solve system of linear equations using Gauss-Jordan method
7. To integrate numerically using Trapezoidal rule
8. To integrate numerically using Simpson's rule
9. To find largest Eigen value of a matrix by power-method
10. To find numerical solution of ordinary differential equations by Euler's method
11. To find numerical solution of ordinary differential equations by Runge-Kutta method
12. To find numerical solution of ordinary differential equations by Milne's method
13. To find numerical solution of Laplace equation
14. To find numerical solution of wave equation
15. To find numerical solution of heat equation

Books Suggested

1. Applied Numerical Analysis by Curtis F. Gerald and Patrick G. Wheatley-Pearson, Edu. Ltd.
2. Numerical Methods: E.Balaguruswamy T.M.H

Note:-Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.

CHE208B : MECHANICAL OPERATIONS LAB
B. Tech. Semester - IV (Chemical Engineering)

L	T	P	Credits			
-	-	3	1.5	**Class Work**	:	**40 Marks**
				Examination	:	**60 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

List of Practicals / Demonstrations:

1. Settling of single particle.
2. Sedimentation.
3. Size reduction by Jaw Crusher & Pulverizer.
4. Grinding in a Ball Mill.
5. Screen analysis.
6. Separation of dust particles from air.
7. Determination of pressure drop across a fluidized bed and a packed bed.
8. Filtration of slurry.

NOTE:

1. **The students will be required to perform the 06 experiments from above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE204B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

GPCHE202B : GENERAL PROFICIENCY & ETHICS
B. Tech. Semester – IV (Chemical Engineering)

L	T	P	Credits			
				Examination	**:**	**75 Marks**
1	**--**	**--**	**2**	**Total**	**:**	**75 Marks**
				Duration of Examination	**:**	**3 Hours**

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him / her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/ her achievements during the current academic session in the form of a written report highlighting followings:

I.	Academic Performance	--------
II.	Extra Curricular Activities / Community Service, Hostel Activities	**(8 Marks)**
III	Technical Activities / Industrial, Educational tour	**(8 Marks)**
IV	Sports/games	**(14 Marks)**
V	Moral values & Ethics	**(15 Marks)**

NOTE: Report submitted by the students should be typed on both sides of the paper.

B A student will support his/ her achievement and verbal & communicative skill through presentation before the committee. **(30 Marks)**

C. Syllabus - Process for Value Education, self-evaluation concept and process.

A minor test will be conducted during the semester and It will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal.

The evaluation of this course will be made by the following Committee.

<u>University Departments:</u>

1	Chairperson of the Department	Chairman
2	Senior Most Faculty Counselor	Member
3	Vice- Chancellor's Nominee	Member

<u>Affiliated Colleges:</u>

1	Director/Principal	Chairman
2	Head of the Department/Sr. Faculty	Member
3	External Examiner to be appointed by the University	Member

Note: Remuneration will be paid to the external examiner only (at par with the other practical examinations).

CHE301B : CHEMICAL REACTION ENGINEERING-I

B. Tech. Semester - V (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Unit-I: Kinetics of homogeneous reaction: concepts of rate equation, order and molecularity, Elementary and Non-elementary Reactions Kinetic Models for Non-elementary Reactions. Interpretation of Batch Reactor Data, Constant and Variable volume Batch Reactor; Introduction to reactor design.

Unit-II: Ideal Reactors**:** Batch, CSTR and PFR, Design or performance equation for Ideal Reactors; Design for Single Reactions: Size Comparison of Single Reactors, Multiple-Reactor Systems, Recycle Reactor, Autocatalytic Reactions.

Unit-III: Design for Multiple Reaction: Parallel and Series reactions, Qualitative and Quantitative discussion about product Distribution. Temperature and Pressure Effects in single reactions: General Graphical Design Procedure, Optimum Temperature Progression, Adiabatic and Nonadiabatic operations, Exothermic reaction in Mixed Flow Reactors; Multiple reactions.

Unit-IV: Non-Ideal Flow: RTD, experimental methods for determination of RTD, Dispersion Model, Tanks-in-Series Model.

TEXT BOOKS:

1. Chemical Reaction Engineering: Octave Levenspiel-Wiley Eastern Limited, New Delhi.
2. Elements of Chemical Reaction Engineering: H Scott Fogler-Prentice-Hall of India Pvt. Ltd., New Delhi.

REFERENCE BOOKS:

1. Kinetics and Mechanisms of Chemical Transformation: J.Rajaram and J.C.Kuriacose-Macmillan India Ltd.New Delhi.
2. Chemical Engineering Kinetics: J.M.Smith-Mcgraw-Hill Book Company, New Delhi.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE303B : CHEMICAL TECHNOLOGY -I

B. Tech. Semester - V (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Industrial gases: Oxygen, hydrogen, producer gas, nitrogen and carbon dioxide. Sulphur industries: Sulphuric acid and oleum. Phosphorous industries: Phosphorous, phosphoric acid, super- phosphates

UNIT-II: Nitrogen industries: Ammonia, nitric acid, nitrogenous and mixed fertilizers Chlor-Alkali industries: Common salt, caustic soda, chlorine, hydrochloric acid, soda ash and bleaching powder.

UNIT-III: Ceramic industries: Portland cement, glass refractories. Miscellaneous industries: Sodium, potassium, calcium and Magnesium.

UNIT-IV: Miscellaneous topics: Water, air, steam, nuclear materials, photographic products, fuel gases, cryogenics and electrochemistry.

TEXT BOOKS:

1. "Outlines of Chemical Technology", C.E. Dryden - East - West Press Pvt. Ltd., New Delhi.
2. "Shreve's Chemical Process Industries",G.T. Austin McGraw- Hill Book Company, New Delhi.

REFERENCE BOOKS:

1. "A text Book of Chemical Technology",S.D. Shukla and G.N. Pandey - Vol.-II Vikas Publishing House Pvt.Ltd., New Delhi.
2. "Industrial Chemical", W.L. Faith, D.B. Keyes and R.L. Clark - John Wiley.
3. "Chemical process industries", W.V.Mark, edited By S.C.Bhatia, vol. 2, edition 2:, CBS publisher & distributor, New Delhi.

NOTE:

a. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

b. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

c. Electronics gadgets including Cellular phones are not allowed in the examination.

CHE305B : EQUIPMENT DESIGN

B. Tech. Semester - V (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Unit-I: Mechanics of Materials: Stress, strain, Biaxial and tri-axial stress, Stress-strain relationship for elastic bodies, Theories of failure, Thermal stresses, Torsion of solid and hollow cylindrical shafts, Thin and thick cylinders.

Unit-II: Pressure Vessel: Introduction of codes for pressure vessel design, classification of pressure vessels, Design of cylindrical and spherical shells under internal and external pressure, selection and design of closures, optimum length of diameter ratio of pressure vessel using common types of closures.

Unit-III: Design of jacketed portion of vessels, Selection and design of nozzles, Elementary idea of compensation for openings, Selection of gaskets, selection and design of flanges, pipe thickness calculation under internal and external pressure. Complete design calculations and shop drawing for at least one pressure vessel using heads and flanges as per code specifications.

Unit-IV: Tall Tower Design: Design of shell, skirt, bearing plate and anchor bolts used at high wind and seismic conditions. Supports: Design of lug support and saddle support including bearing plates and anchor bolts. Storage Tanks: Filling and breathing losses, classification of storage tanks, Design of liquid and gas storage tanks.

TEXT BOOKS:

1. Process Equipment Design: L.E. Brownell and H.E. Loung- John Wiley, New Delhi.
2. Introduction of Chemical Equipment Design: B.C. Bhattacharya -Chemical Engineering Education Development Centre, IIT, Madras
3. Process Equipment Design: M.V. Joshi and V.V. Mahagani Macmillan India Ltd.

REFERENCE BOOKS:

1. Code for unfired pressure vessels: IS: 2825-1969-ISI, New Delhi.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE307B : MASS TRANSFER-I

B. Tech. Semester - V (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Unit-I: Diffusion in gases and liquids, Equation of continuity. Theories of mass transfer, Individual and overall mass transfer coefficients, Mass, heat and momentum transfer analogies. simultaneous heat and mass transfer.

Unit-II: Mass balance in co-current and counter-current continuous contact equipments. Continuous contact equipments. Gas absorption: Principles of Absorption, Tower packings, Limiting flow rates; Loading and Flooding. Stage efficiencies. HTU and NTU concepts. Design of Absorption Tower,

Unit-III: Humidification: Humidity, Wet-Bulb temperature, Lewis relation Dew point, Adiabatic saturation temperature, Humidity chart, Cooling Towers. Theory and calculation of Humidification Processes

Unit-IV: Drying: Principles of Drying, Rate of drying curves, Time of Drying, Batch Drying, Cross- circulation drying Through- circulation drying, Continuous drying, Drying Equipment .

TEXT BOOKS:

1. Mass Transfer Operations: R.E. Treybal-Mcgraw-Hill Book Company New Delhi.
2. Introduction to Chemical Engineering: W.L. Badger and J.T. Banchero-Mc-graw-Hill Book Company, New Delhi.

REFERENCE BOOKS:

1. Unit Operations of Chemical Engineering: W.L. Mc Cabe & J.C. Smith- Mc-graw Hill, New Delhi.
2. Chemical Engineering: J.M. Coulson and J.F. Richardson Vol-I- Perganon, New York.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE309B : HEAT TRANSFER

B. Tech. Semester - V (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Conduction: Basic equation-one dimensional, two dimensional and three dimensional, Steady-state conduction in slab, cylinder and sphere, Critical thickness of insulation. Finned surfaces,

Transient conduction Analytical solution for slabs, Use of transient temperature charts for slabs, cylinders and spheres and lumped system analysis.

UNIT-II: Convection: Equation of motion, Equation of energy, Solution of Boundary layer flow over flat plate, Forced convection inside tubes under laminar and turbulent flow conditions, Forced convection over cylinders and spheres. Natural convection: dimensionless parameters of natural convections, Empirical correlations for free convection for various shapes.

UNIT-III: Boiling and condensation heat transfer, Heat Exchangers: Basic types of heat exchanges, Overall heat transfer coefficient, log mean temperature difference, Effectiveness and NTU methods for heat exchanger analysis.

UNIT-IV: Radiation: Black body radiation, Concept of shape factor, Methods of determination of shape factor, Radiation exchange in enclosure with black surface. Evaporators: Types of Evaporators, Single and multiple effect evaporators, Calculations for surface area requirements.

TEXT BOOKS:

1. Unit operations of chemical Engineering: W.L. McCabe and J.C. Smith-McGraw Hill Book Company, New Delhi.
2. Heat Transfer: D.P. Tiwari- Umesh publications (Edition-2000), New Delhi.

REFERENCE BOOKS:

1. Heat Transfer: M. N. Ozisik- Mcgraw Hill International Editions
2. Heat Transfer: J. P. Holman- Mcgraw Hill Book Company

NOTE:

4. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
5. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
6. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE311B : CHEMICAL ENGINEERING THERMODYNAMICS - II

B. Tech. Semester - V (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Thermodynamic Properties of Pure Fluids - Relationship among thermodynamic properties, concept of residual properties. Thermodynamic properties of single and two-phase systems. Generalized correlations for thermodynamics properties of gases..

UNIT-II: Thermodynamic Properties of Homogeneous Mixtures - Property relationships for systems of variable composition, partial molar properties, fugacity and fugacity coefficients, fugacity in ideal solutions, property changes of mixing activity, heat effects in mixing processes, excess properties, activity coefficients, gaseous mixtures.

UNIT-III: Phase Equilibria - Importance of phase equilibria in process industries, vapour - Liquidequilibria (VLE) miscible, partiallymiscible and immiscible systems, their phase diagrams, Azeotropes, VLE calculations at low and high pressures, Analysis of multicomponent multiphase systems, Activity coefficients from experimental data - Margules, van-laar, Wilson Equations.

UNIT-IV: Chemical Reaction Equilibrium - Reaction coordinate, application of equilibrium criteria to chemical reactions, standard Gibbs free energy change and the equilibrium constant, effect of Temperature on equilibrium constant, evaluation of equilibrium constants and composition, calculation of equilibrium compositions for single reactions, phase rule and Duhem's theorem for reacting systems, introduction of multi reaction equilibria.

TEXT BOOKS:

1. Introduction to Chemical Engineering Thermodynamics: J .M. Smith and H.C. Van Ness - McGraw-Hill Book Company, New Delhi.
2. Chemical Engineering Thermodynamics: Y.V.C. Rao Universities Press (India) Ltd., Hyderabad, India

REFERENCE BOOKS:

1. Chemical and Process Thermodynamics: B.G. Kyle - Prentice Hall of India Pvt. Ltd., New Delhi.
2. Chemical Engineering Thermodynamics: T.E. Daubert - McGraw Hill, New Delhi.
3. Chemical Process Principles Vol-II: O.A. Haugen, K.M. Waston and R.A. Regatz - Wiley.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
4. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE313B : COMPUTER AIDED DESIGN LAB

B. Tech. Semester - V (Chemical Engineering)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

Module 1

Introduction to computer aided design - use of computers for physical property evaluation - thermodynamic properties of gases and binary mixtures - methods of calculating vapour-liquid equilibrium data for ideal and non- ideal mixture - bubble point and dew point – flash calculations.

Module 2

Design of pressure vessels - vessels under internal pressure - heads and closures - compensation requirements for openings and flanges - vessels under external pressure – tall vessels - development of CAD modules for design of pressure vessels.

Module 3

Computer aided design of heat exchanger systems - double pipe and shell and tube heat exchanger design - computer aided design of evaporators - design of single effect evaporator and multiple effect evaporator systems.

Module 4

Computer aided design of packed bed absorbers and strippers - computer aided mechanical design of bubble - cap distillation column.

NOTE:

1. **The students will be required to perform the 06 experiments from above modules and two experiments may either be performed from the above modules or designed and set by the Dept. as per the scope of the syllabus of CHE305B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE315B : MASS TRANSFER-I LAB

B. Tech. Semester - V (Chemical Engineering)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

List of Practicals / Demonstrations:

1. Mass Transfer of vapor in air from solid surface.
2. Diffusion ofvapor in air from liquid surface.
3. Drying of solids.
4. H.E.T.P. and H.T.U.
5. Liquid hold up.
6. Wetted wall column.
7. Determination of Mass Transfer coefficient.
8. Air-water absorption.

NOTE:

1. **The students will be required to perform the 06 experiments from above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE307B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE317B : HEAT TRANSFER LAB

B. Tech. Semester - V (Chemical Engineering)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

List of Experiments / Exercises:

1. Determination of overall heat transfer coefficient.
2. Filmwise & dropwise condensation.
3. Efficiency of a long tube evaporator.
4. Effectiveness of pin-fin.
5. Determination of LMTD.
6. Natural Convection heat transfer.
7. Forced convection heat transfer.
8. Thermal conductivity of insulating powder.
9. Determination of emissivity.

NOTE:

1. **The students will be required to perform the 06 experiments from above list and 02 experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE309B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE319B : PROFESSIONAL TRAINING-I

B. Tech. Semester – V (Chemical Engineering)

L	T	P	Credits			
--	--	2	2	**Class Work**	:	**50 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

At the end of 4th semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional Organization/ Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

The typed report should be in a prescribed format.

The report will be evaluated in the V Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning.

Teachers associated with evaluation work will be assigned 2 periods per week load.

CHE302B : CHEMICAL REACTION ENGINEERING-II
B. Tech. Semester - VI (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Introduction to catalysis, classification of catalysts, preparation and physical characteristics of solid catalysts, Concepts of physical adsorption and chemisorption. Kinetics of Fluid-Solid Catalytic Reactions, Rate of Adsorption, Desorption, Surface Reaction, Rate equation in terms of Fluid-Phase Concentrations at the catalyst surface.

UNIT-II: External Diffusion Effects on Heterogeneous reactions: Mass transfer diffusion fundamentals, External resistance to mass transfer, Shrinking Core Model. Kinetics of Catalyst Deactivation.

UNIT-III: Diffusion and reaction in porous catalyst: Diffusion and reaction in spherical catalyst pellets, Internal and Overall Effectiveness factors, mass-transfer and reaction in packed bed, multiphase reactor.

UNIT-IV: Design of Heterogeneous Catalytic reactors: Isothermal & Adiabatic reactors; Non-Isothermal, Non-adiabatic Fixed Bed Reactors; Fluidized Bed Reactors.

TEXT BOOKS:

1. Elements of Chemical Reaction Engineering: H.Scott Fogler-Prentice-Hall of India Pvt. Ltd., New Delhi.
2. Chemical Reaction Engineering: Octave Levenspiel-Wiley Eastern Limited, New Delhi.
3. Chemical Engineering Kinetics: J.M.Smith-Mcgraw-Hill Book company, New Delhi.

REFERENCE BOOK:

1. Kinetics and Mechanisms of Chemical Transformation: J.Rajaram and J.C.Kuriacose-Macmillan India Ltd.New Delhi.
2. Chemical Reactor Analysis and Design: Gilbert F. Froment, Kenneth B. Bischoff-John Wiley and Sons

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE304B : CHEMICAL TECHNOLOGY -II
B. Tech. Semester - VI (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Pulp and paper : Pulping processes, recovery of chemicals,stock preparation and paper making.Coal Chemicals : Coal for distillation and recovery of chemicals,feed stock, product profile. Petrochemicals : An Overview, ethylene oxide, ethylene glycol,acrylonitrile, styrene, butadiene.

UNIT-II: Leather Industry- Leather chemistry, manufacturing processes,and uses of leather,Food Industries : Food processing, food additives, oil & Fats : Soap & detergents,glycerin, waxes.

UNIV-III : Agrochemical Industries:Insecticides, herbicides,Pesticides, Surface-coating Industries : Paints, pigments, varnishes, lacquers. sugar & Starch : Sugar, starch and related products. Fermentation Industries : Alcohol, beer, wine, liquor, vinegar, citric acid, lactic acid.

UNIT-IV: Explosives & toxic chemicals: Nitrocellulose, nitroglycerine, TNT. PharmaceuticalIndustries:Alkylation,carboxylation,acetylation,Dehydration,halogenation,oxidation,sulphonation,antibiotics,harmones, vitamines.

TEXT BOOKS:

1. “Outlines of Chemical Technology”, C.E. Dryden - East - West Press Pvt. Ltd., New Delhi.
2. “Shreve's Chemical Process Industries”,G.T. Austin McGraw- Hill Book Company, New Delhi.

REFERENCE BOOKS:

1. “A text Book of Chemical Technology”,S.D. Shukla and G.N. Pandey - Vol.-II Vikas Publishing House Pvt.Ltd., New Delhi.
2. “Industrial Chemical”, W.L. Faith, D.B. Keyes and R.L. Clark - John Wiley.
3. “Chemical process industries”, W.V.Mark, edited By S.C.Bhatia, vol. 2, edition 2:, CBS publisher & distributor, New Delhi.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE306B : PROCESS UTILITIES
B. Tech. Semester - VI (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Heat Transfer Media-Characeteristic properties, classification, selection & their industrial applications . Utilities, Referigation ,Steam System - Applications, design of efficient steam heating systems, condensate utilization and flash steam, steam Traps.

UNIT-II: Air, Reciprocating air compressors, vacuum pumps, air receivers, different types of ejectors and barometric condensers, piping networks for water, steam condensate and air Utilisation. Water, its characteristics and conditioning for process industries, e.g. boiler feed, cooling etc. Recycling aspects of water.

UNIT-III: Hazards - Introduction, hazards due to fire explosion, toxicity and radiation, chemical hazards, maximum allowable concentration and threshold limiting values, protective and preventive measures in hazard control.

UNIT-IV: Disaster management - Scale of disaster, vapour cloud explosion, relief system emergency plans, standard safety programmes for disaster control, HAZOP analysis of plants. Indian legislation for safety and hazards, safety codes.

TEXT BOOK:

1. Chemical Process Safety Fundamentals with Applications: D.A. Crowl and J.F. Louvar - Prentice Hall.

REFERENCE BOOKS:

1. Loss Prevention in process Industry: F.P. Lees Vol I, II, III - Butterworths.
2. Safety in Process Design: G.C. Wells - John Wiley.
3. Refrigeration & Air conditioning : Manohar Prasad , New Age International Publishers.
4. Heat Transfer principles & Applications : B K Dutta, PHI

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE308B : MASS TRANSFER-II
B. Tech. Semester - VI (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Distillation : Raoult's Law, ideal solutions, x-y and T-x-y diagrams, Flash vaporization and condensation, Batch distillation, Steam distillation, Azeotropes.

UNIT-II: Binary distillation, McCabe Thiele and Ponchon_Savarit Method, Total reflux, Minimum and Optimum reflux ratios, Fenske equation, Multicomponent distillation.

UNIT-III: Liquid-Liquid extraction : Application of liqid-liquid extraction, Liquid Equilibria, Equilateral-Triangular Coordinates, Systems of Three Liquids-One pair partially soluble, Systems of Three Liquids-Two pairs partially soluble, Choice of Solvent, Single stage extraction, Multistage extraction. Extraction Equipment

UNIT-IV: Leaching : Application of leaching, Moving-bed leaching, Dispersed-solid leaching, Single stage leaching, Multistage leaching. Leaching Equipment. Adsorption : Types of Adsorption, Adsorption Isotherms, Single stage adsorption, Multistage adsorption, Adsorption Equipment.

TEXT BOOKS:

1. Mass Transfer Operations: R.E. Treybal-Mcgraw-Hill Book Company New Delhi.
2. Introduction to Chemical Engineering: W.L. Badger and J.T. Banchero-Mcgraw-Hill Book Company, New Delhi.

REFERENCE BOOKS:

1. Unit Operations of Chemical Engineering: W.L. Mc Cabe & J.C. Smith- Mcgraw Hill, New Delhi.
2. Chemical Engineering: J.M.Coulson and J.F. Richardson Vol-II- Pergamon Press.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE310B : TRANSPORT PHENOMENA
B. Tech. Semester - VI (Chemical Engineering)

L	T	P	Credits			
				Class Work	**:**	**50 Marks**
4	**1**	**-**	**5**	**Examination**	**:**	**75 Marks**
				Total	**:**	**125 Marks**
				Duration of Examination	**:**	**3 Hours**

UNIT-I: Similarity between momentum, heat and mass transfer, The continuum hypothesis, Basic laws of fluid motion, Newton's second law of motion, Principle of balance of momentum, Principle of conservation of energy, Newton's law of viscosity, Science of Rheology, Prediction of viscosity.

UNIT-II: Boundary conditions, Shell balance approach for stress distribution and velocity profile, Equation of continuity and equation of motion and their application in fluid flow problems, unsteady state momentum transport, Flow near a wall suddenly set in motion, Momentum transport phenomena in turbulent flows.

UNIT-III: Fourier's law of heat conduction, Thermal conductivities, Boundary conditions, Shell balance approach for energy transfer problem, Heat sources, Principle of extended surface, Types of cooling fins, Free and forced convection, Unsteady state heat transport, Unsteady heat conduction in solids, Heating of semi- infinite slab, Heating of a finite slab.

UNIT--IV: Concentration, velocities and mass fluxes, Fick's law of diffusion, Boundary conditions, Shell balance approach for mass transfer problems, Problems of diffusion with chemical reaction in porous catalyst, The effectiveness factor, Equation of continuity for multicomponent mixtures.

TEXT BOOKS:

1. "Transport Phenomena", R.B.Bird, W.E. Stewart and E.N.Lightfoot, John Wiley & Sons.
2. "Transport Processes and Unit Operations", C.J. Geankoplis, Prentice Hall of India.

REFERENCE BOOKS:

1. "Transport Phenomena-A unified approach", R.S. Brodkey & H.C. Hershey, McGraw Hill.
2. "Unit Operations of Chemical Engineering", W.L. McCabe & J.C.Smith, McGraw Hill.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE312B : PROCESS EQUIPMENT DESIGN
B. Tech. Semester - VI (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Heat Exchangers - Auxiliary calculations, Review of kern method, Bell's method and HTRI method of shell and tube heat exchanger design. Reboilers - Design of kettle and thermosyphonreboilers.

UNIT-II: Evaporators-sizing of drum, central core pipe size and number of tubes for short-and long-tube evaporators.

UNIT-III: Extractors - Design of solid-liquid, Liquid-Liquid extraction systems.Crystallizers - Design of crystallizers.

UNIT-IV: Gas-Liquid Contact systems - Distillation column, Tray hydraulics of sieve and valve trays, Design of packed bed columns.

TEXT BOOKS:

1. Chemical Engineering Vol-6: J.M. Coulson and J.F. Rechardson - Pergamon Press.
2. Process Equipment Design: M.V. Joshi and V.V. Mahajani - Macmillan India Ltd.

REFERENCE BOOKS:

1. Process Heat Transfer: D.Q. Kern - McGraw Hill.
2. Design of Equilibrium Stage Processes: B.D. Smith–Mc-Graw Hill, New Delhi.
3. Applied Process Design for Chemical & Petrochemical Plants Vol-I, II, III: E.E. Ludwig- Gulf Publishing Company, Houston.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE314B : CHEMICAL TECHNOLOGY LAB
B. Tech. Semester - VI (Chemical Engineering)

L	T	P	Credits			
-	-	3	1.5	**Class Work**	:	**40 Marks**
				Examination	:	**60 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

List of Experiments / Exercises:

1. Estimation of calcium in lime stone.
2. Determination of percentage of available chlorine in a given sample of bleaching powder.
3. Determination of Potassium in a given sample of fertilizer by cobaltinitrite method OR by Flame photometry.
4. To estimate the percentage of sucrose in a given sample of cane sugar.
5. Estimation of non-reducing sugar.
6. To extract Caffiene from tea leaves.
7. To prepare fluorescein dye and Eosin dye.
8. To prepare soap.
9. To prepare urea formaldehyde resin.
10. To prepare cold cream.
11. To compare cleansing powers of two samples of detergent.
12. Determination of Tannin in fruit juice.

NOTE:

1. **The students will be required to perform the 08 experiments from above list and 02 experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE303B & CHE304B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE316B : MASS TRASNFER-II LAB
B. Tech. Semester - VI (Chemical Engineering)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

List of Practicals / Demonstrations:

1. Batch distillation.
2. Solid liquid extraction.
3. Vapour liquid equilibrium.
4. Liquid - Liquid extraction.
5. Batch distillation with reflux.
6. Adsorption isotherms.

NOTE:

1. **The students will be required to perform the 05 experiments from above list and three experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE308B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE318B : CHEMICAL REACTION ENGINEERING LAB
B. Tech. Semester - VI (Chemical Engineering)

L	T	P	Credits			
-	-	3	1.5	**Class Work**	:	**40 Marks**
				Examination	:	**60 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

List of Practicals / Demonstrations:

1. Adsorption isotherms.
2. Inversion of cane sugar.
3. Flow analogy for series and parallel reactions.
4. Rate constant of saponification reaction in PFR.
5. Rate constant of esterification reaction in batch reactor.
6. Rate constant of saponification reaction in batch reactor.
7. Rate constant of saponification reaction in CSTR.

NOTE:

1. **The students will be required to perform the 06 experiments from above list and two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE301B & CHE302B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

HUM302B : REPORT WRITING SKILLS
B. Tech. Semester - VI (Common for all branches)

L	T	P	Credits			
1	-	-	1	**Class Work**	:	**25 Marks**
				Examination	:	**50 Marks**
				Total	:	**75 Marks**
				Duration of Examination	:	**2 Hours**

OBJECTIVE

The course aims at developing competence for report writing with a focus on its complex writing techniques and procedures.

COURSE CONTENT

UNIT I

Report Writing

Reports: meaning, their importance and types, Structure of reports, Formats of reports, Use of illustrations

UNIT II

Writing of Business and Technical Reports:

Preliminary steps and procedure of writing report, writing various types of reports on technical, business related topics

RECOMMENDED READING

1. Borowick, Jerome. N. *Technical Communication and its Applications*. New Delhi: PHI, 2000
2. Guffey, Mary Ellen. *Business Communication: Process & Product*. USA: South western College Publishing, 2000.
3. Kumar, Sanjay and Pushp Lata. *Communication Skills*. Delhi: OUP, 2011

SCHEME OF END SEMESTER EXAMINATION (MAJOR TEST) AND INSTRUCTIONS FOR THE EXAMINER

1. The duration of the exam will be 2 hours.
2. The Question Paper for this theory course shall have three questions in all covering both the units. All will be compulsory with internal choice.
3. Question no. 1 will be of 10 marks. The question may have two/ three parts with enough internal choice, covering various components of both the Units.
4. Question no 2 with internal choice will be of 10 marks covering contents of the Unit I. It will be theoretical in nature.
5. Question no 3 will have two parts of 15 marks each. The student will be asked to write reports on business and technical subject/ issue covering contents of Unit II. The emphasis would be on testing the actual report writing on a given business and technical situation/ subject in letter format.

HUM304B : ORAL PRESENTATION SKILLS
B. Tech. Semester - VI (Common for all branches)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**2 Hours**

OBJECTIVE

To enable students to develop their speaking skills with professional proficiency

COURSE CONTENT

Oral Presentations:

Group Discussion; Mock interviews

Note for the Teacher:

The teacher concerned, by devising her/ his method, must preview and review the student's spoken proficiency at the beginning and end of the semester respectively to find the efficacy of the course and degree of improvement in the student.

RECOMMENDED READING

1. Konar, Nira. *English Language Laboratories: A Comprehensive Manual*. Delhi: PHI, 2011
2. Kumar, Sanjay and Pushp Lata. *Communication Skills*. Delhi: OUP, 2011

SCHEME OF END SEMESTER EXAMINATION (Practical)

An external Practical exam of 30 marks of 2 hour duration for the course will be conducted by an external examiner appointed by the competent authority of the University's.

NOTE: **Students will be tested for their oral communication competence making them participate in Group discussion, mock situations for interview. Students may also be evaluated through a viva conducted by an external examiner.**

GPCHE302B : GENERAL PROFICIENCY & ETHICS
B. Tech. Semester – VI (Chemical Engineering)

L	T	P	Credits			
				Examination	**:**	**75 Marks**
1	**--**	**--**	**2**	**Total**	**:**	**75 Marks**
				Duration of Examination	**:**	**3 Hours**

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him /her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

A The student will present a written report before the committee with following in view:

The student will present before the committee his/ her achievements during the current academic session in the form of a written report highlighting followings:

I.	Academic Performance	--------
II.	Extra Curricular Activities / Community Service, Hostel Activities	**(8 Marks)**
III	Technical Activities / Industrial, Educational tour	**(8 Marks)**
IV	Sports/games	**(14 Marks)**
V	Moral values & Ethics	**(15 Marks)**

NOTE: Report submitted by the students should be typed on both sides of the paper.

B A student will support his/ her achievement and verbal & communicative skill through presentation before the committee. **(30 Marks)**

C. Moral values & Ethics

Syllabus - A few topics from the below mentioned books

1. R.R.Gaur, R. Sangal and G.P. Bagaria, " Bagaria, " A foundation course in Human Values and Professional Ethics", Pub: Excel Books, New Delhi-110028.
2. M. Govindrajan, S Natrajan & V.S. Senthil Kumar, " Engineering Ethics (including Human Values)" Eastern Economy Edition, Prentics Hall of India Ltd.

A minor test/ Quiz will be conducted during the semesterand It will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal.

The evaluation of this course will be made by the following Committee.

<u>University Departments:</u>

1	Chairperson of the Department	Chairman
2	Senior Most Faculty Counselor	Member
3	Vice- Chancellor's Nominee	Member

<u>Affiliated Colleges:</u>

1	Director/Principal	Chairman
2	Head of the Department/Sr. Faculty	Member
3	External Examiner to be appointed by the University	Member

Note: Remuneration will be paid to the external examiner only (at par with the other practical examinations).

CHE401B: PETROLEUM ENGINEERING
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Unit-I: Origin, composition, classification and constituents of petroleum, processing of crude oil - distillation. Pretreatment of crude oil, fractional distillation, refinery products, applications of petroleum products.

Unit-II: Cracking – types of cracking, Thermal & catalytic, Commercial processes, Pyrolysis, Fluid catalytic cracking

Reforming – Types, Thermal & catalytic, Hydrocracking, naptha reforming process, visbreaking, coking

Unit-III: Purification of Petroleum products - Sweetening processes, Dewaxing, Deasphalting etc.

Polymerization, Alkylation and Isomerization, commercial processes.

Unit-IV: Properties of Petroleum products - Viscosity index, flash and fire point, cloud and pour point, octane and cetane number etc. Gasoline, diesel and fuel oil, storage and handling of fuel oils.

TEXT BOOK:

1. Petroleum Refinery Engineering: W.L. Nelson, Mc Graw Hill.
2. Elements of Fuels, Furnaces and Refractories: O.P. Gupta - Khanna Publishers.

REFERENCE BOOKS:

1. Modern petroleum Technology Vol. I and II: G.D. Hopson- John wiley & Sons
2. Chemical Technology of Petroleum: W.A. Gruse and D.R. stevens- Mc Graw Hill
3. American Petroleum Refinery: H.S. Bell Van Nostrand Co.
4. Advances in petroleum chemistry and Refining: Kobe, K.A., McKetta,J.J.-Interscince.
5. Modern Petroleum Refinery Processes - B.K. Bhaskar Rao.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE403B : PROCESS DYNAMICS & CONTROL
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Unit-I: Laplace Transform, Properties of Transform; First-order systems and its response, Linearization, First-order systems in series.

Unit-II: Higher-order systems and Transportation Lag. Linear closed-loop systems, Control systems, Controllers & Final Control Elements, Closed-loop Transfer Functions, Transient Response of Simple Control Systems.

Unit-III: Stability, Routh Test for stability, Root Locus. Control valve, construction, valve sizing, characteristics, and valve positioner.

Unit-IV: Introduction to Frequency Response, Bode diagrams, Bode Stability Criteria, Gain Margins and Phase Margins. Controller Tuning, Criteria for Good Control, Tuning Rules-Ziegler-Nichols Rules, Cohen and Coon Rules, Process Identification-Step, Pulse and Frequency Testing

TEXT BOOKS:

1. Chemical Process Control - An Introduction to Theory and Practice: G. Stephanopoulos – Prentice Hall of India, New Delhi.
2. Process System Analysis and Control: D.R. Coughanowr - McGraw - Hill.

REFERENCE BOOKS:

1. Process Dynamics and Control: J.M. Douglas - Prentice Hall of India, New Delhi.
2. An Introduction to Process Dynamics and Control: T.W. Weber - John Wiley.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE405B : ENERGY TECHNOLOGY
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

Unit-I: Solid Fuels: Classification of coals, origin, composition, charactertistics of coal, washing, storage of coal, pulverlized fuel, coal carbonization, properties of coal.

Unit-II: Liquid Fuels: Origin, composition, classification of petroleum, processing of crude oil, cracking, reforming, octane & cetane number, purification of petroleum products, properties of petroleum products.

Unit-III: Gaseous Fuels: Natural gas, L.P.G., Water Gas, Producer Gas, Flue Gas analysis. Combustion: General principles of combustion, types of combustion processes, Burners, combustion calculation.

Unit-IV: Alternate Energy System: Solar Energy and its applications, wind energy, geothermal energy, fuel cells, tidal energy, wave energy, hydrogen energy, Biomass, bio fuels, biodiesel, Biogas, biogas plants, biomass gasification.

TEXT BOOKS:

1. Elements of Fuels, Furnaces and Refractories: O.P. Gupta- Khanna Publishers
2. Energy Technology: S.Rao, B.B. Parulekar- Khanna Publisher.

REFERENCE BOOKS:

1. Fuels & Combustion: S.Sarkar - Longman Publishers India Ltd. - IInd Edition.
2. Fuels and their combustion: R.T. Haslam and R.P. Russel- McGraw-Hill.
3. Renewable Energy Resources: J. Twindell and Tonyweir- E & FNspon.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE407B : POLYMER SCIENCE AND ENGINEERING

B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Chemistry of Polymerization Reactions- Functionality, Polymerization reactions, polycondensation, addition, free radical and chain polymerization. Copolymerization, block and graft polymerizations, stereospecific polymerization. Polymer Blends.

UNIT-II: Polymerization Kinetics- Kinetics of radical, Chain and ionic polymerisation and copolymerisation systems. Polymerisation Processes - Bulk, Solution, Emulsion and suspension polymerisation, Q-e Scheme, Spherulites, Additives.

UNIT-III: Molecular Weight Estimation -Average molecular weight: number average and weight average. Theoretical distributions, methods for the estimation of molecular weight. Characterisation and Analysis of Polymer :- Polymer degradation, Membrane Osmometry ,Thermal Analysis and other methods.

Rheology:- simple rheological response, simple linear viscoelastic models- maxwell. voigot, material response time, temperature dependence of viscosity. Rheological studies.

UNIT-IV: Processing methods, Mixing including internal mixture, Calendering, Extrusion, Moulding Technique, Forming Technique, Casting, Thermoforming, Applications of polymers in different fields

TEXT BOOKS:

1. Text Book of Polymer Science: Jr. Billmayer & W. Fred- Wiley Tappers.
2. Polymer Science: Shreedhar & Gowarikar.
3. Polymer Science & Technology : Premamoy Ghosh , Tata Mc Graw Hill

4 Polymer Chemistry An Introduction:-Malcolm P. Stevens

REFERENCE BOOKS:

1. Principles of Polymers systems: Rodringuez- Tata Mc Graw Hill.
2. Polymer Processing: J.M. Mc kelvey -John wiley.
3. Polymer Science and Engineering: Davil J. Williams- Prentice Hall of India, New Delhi.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

MEI 623B: ENTREPRENEURSHIP (Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

ENTREPRENEURIAL DEVELOPMENT PERSPECTIVE: Concepts of Entrepreneurship Development, Evolution of the concept of Entrepreneur, Entrepreneur Vs. Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs.Manager, Attributes and Characteristics of a successful Entrepreneur, Role of Entrepreneur in Indian economy and developing economies with reference to Self-Employment Development, Entrepreneurial Culture

UNIT II

CREATING ENTREPRENEURIAL VENTURE: Business Planning Process, Environmental Analysis - Search and Scanning, Identifying problems and opportunities, Defining Business Idea, Basic Government Procedures to be complied with.

UNIT III

ENTREPRENEURSHIP DEVELOPMENT AND GOVERNMENT: Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available; Role of Central/State agencies in the Entrepreneurship Development - District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).

UNIT IV

PROJECT MANAGEMENT AND CASE STUDIES

Technical, Financial, Marketing, Personnel and Management Feasibility, Estimating and Financing funds requirement - Schemes offered by various commercial banks and financial institutions like IDBI, ICICI, SIDBI, SFCs, Venture Capital Funding, Why do Entrepreneurs fail - The Four Entrepreneurial Pitfalls (Peter Drucker), Case studies of Successful Entrepreneurial Ventures, Failed Entrepreneurial Ventures and Turnaround Ventures.

TEXTS AND REFERENCES:

1. Entrepreneurship: New Venture Creation - David H. Holt.
2. Entrepreneurship - Hisrich Peters.
3. The Culture of Entrepreneurship - Brigitte Berger.
4. Project Management - K. Nagarajan.
5. Dynamics of Entrepreneurship Development - Vasant Desai.
6. Entrepreneurship Development - Dr. P.C.Shejwalkar.
7. Thought Leaders - Shrinivas Pandit.
8. Entrepreneurship, 3rd Ed. - Steven Brandt.
9. Business Gurus Speak - S.N.Char.
10. The Entrepreneurial Connection - Gurmit Narula.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

BME 451B : MEDICAL INSTRUMENTATION(Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT-I

PHYSIOLOGY AND TRANSDUCERS: Cell and its structure – Action and resting – Potential propagation of action potential – Sodium pump – Nervous system – CNS – PNS – Nerve cell – Synapse – Cardio pulmonary system – Physiology of heart and lungs – Circulation and respiration – Transducers – Different types – Piezo-electric, ultrasonic, resistive, capacitive, inductive transducers – Selection criteria.

UNIT-II

ELECTRO – PHYSIOLOGICAL AND NON-ELECTRICAL PARAMETER MEASUREMENTS: Basic components of a biomedical system – Electrodes – Micro, needle and surface electrodes – Amplifiers – Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier. ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms. Measurement of blood pressure – Cardiac output – Cardiac rate – Heart sound – Respiratory rate – Gas volume – Flow rate of CO_2, O_2 in exhaust air - PH of blood, ESR, GSR measurements – Plethysmography.

UNIT-III

MEDICAL IMAGING AND PATIENT MONITORING SYSTEMS: X-ray machine - Radio graphic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography – Different types of biotelemetry systems and patient monitoring – Electrical safety. Biological effects of X-rays and precautions.

UNIT-IV

ASSISTING AND THERAPEUTIC EQUIPMENTS: Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialyzers. Respiratory Instrumentation - Mechanism of respiration, Spirometry, Pnemuotachograph Ventilators.

TEXT BOOKS

1. Biomedical Instrumentation and Measurements – Leslie Cromwell and F.J. Weibell, E.A. Pfeiffer, PHI, 2nd Ed, 1980.
2. Medical Instrumentation, Application and Design – John G. Webster, John Wiley, 3rd Ed., 1998.

REFERENCE BOOKS

1. Principles of Applied Biomedical Instrumentation – L.A.Geoddes and L.E. Baker, John Wiley, 1975.
2. Hand-book of Biomedical Instrumentation – R.S. Khandpur, TMH, 2nd Ed., 2003.
3. Biomedical Telemetry – Mackay, Stuart R., John Wiley, 1

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ECE 305B : CONSUMER ELECTRONICS (Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT I

MONOCHROME TV (INTRODUCTION): Elements of a TV System,Picture transmission,Sound transmission,Picture reception,Sound reception,Synchronization,Receiver control,Image continuity, Scanning Process, Aspect Ratio, Flicker, Composite Video Signal, Picture Elements,Kell factor, Vertical Resolution,Horizontal Resolution,Video bandwidth,Interlacing, 625 Line System,Bandwidths for TV Transmission,Vertical and horizontal synch detail,Vestigial Side Band transmission(Advantages and Disadvantages)

MONOCHROME TV (PICTURE AND CAMERA TUBES): Monochrome picture tube,beam reflection,Beam focussing,Screen Phosphor,Face plate,Picture tube characteristics,picture tube circuit controls,Monochrome Camera Tubes:Basic principle,Image Orthicon, Vidicon,Plumbicon

UNIT II

COLOUR TV ESSENTIALS: Compatibility , Colour perception,Three Colour theory,Luminance,Hue and Saturation, Dispersion and Recombination of light,Primary and secondary colours,luminance signal,Chrominance Signal, Colour picture tube,colour TV Camera,Colout TV display Tubes,colour Signal Transmission,Bandwidth for colour signal transmission,Colour TV controls. Cable TV,Block Diagram and principle of working of cable TV.

PLASMA AND LCD: Introduction,liquid crystals,types of LCD's,TN,STN,TFT,Power requirements,LCD working,Principle of operation of TN display,Construction of TN display,Behaviour of TN liquid crystals,Viewing angle,colour balance, colour TN display, limitatons, advantages, disadvantages, applications.

UNIT III

LED AND DMD : Introduction to LED Television , comparison with LCD and Plasma TV's, schematic of DMD, introduction to Digital MicroMirror device, Diagram of DMD, principle of working, emerging applications of DMD.

MICROWAVE OVENS AND AIR CONDITIONERS: Microwaves, Transit Time, Magnetron, Waveguides, Microwave Oven, Microwave Cooking. Air conditioning,Components of air conditioning systems,all water Air conditioning systems,all air air conditioning Systems,Split air conditioner.

UNIT IV

MICROPHONES: Introduction, characteristics of microphones,types of microphone:carbon,moving coil,wireless,crystal,introduction to tape recorder.

LOUDSPEAKER: Introduction to ideal and basic loudspeaker,loudspeaker construction types of loudspeaker: Dynamic and permanent magnet,woofers,tweeters,brief introduction to baffles,equalisers.

TEXT BOOKS :

1.Consumer Electronics by S. P. Bali(Pearson Education)
2.Complete Satellite and Cable T.V by R.R Gulati(New Age International Publishers)

REFERENCE BOOKS:

1. Monochrome and Colour Television by R. R. Gulati

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

EE 451B: ENERGY AUDIT (Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT I

INTRODUCTION TO THE POWER DISTRIBUTION SYSTEM: Description of the power distribution system- voltage levels, Components of the distribution system- Substation, Transformer, feeders, distribution system planning, operation & maintenance objectives, activities involved in O&M, grid management, load scheduling & dispatch, load balancing, 66-33/11 KV substation equipment, 11/0.4 KV substation equipment, Distribution transformers- reasons for DT failures.

UNIT II

ENERGY ACCOUNTING & ENERGY AUDIT: Need for energy accounting, objectives & functions of energy accounting, Energy flow diagram in power distribution system, energy accounting procedure- Energy measurement, and problemsin energy accounting & overcoming these problems in energy accounting, Definition, need and types of energy audit, energy audit instruments,procedure for conducting an energy audit.

UNIT III

AT&C LOSS REDUCTION & EFFICIENCY IMPROVEMENT: Concepts and principles of distribution losses- transmission & distribution losses, AT&C losses in power distribution network, factors contributing to high technical & commercial losses. Technical loss reduction- Short term measures for technical loss reduction, long term plans for technical loss reduction, Commercial loss reduction- reasons for commercial losses, measures for commercial loss reduction.

UNIT IV

DEMAND SIDE MANAGEMENT: An introduction, Why DSM?, Benefits of DSM, DSM in power systems: load management, DSM techniques and emerging trends, EC Act 2001, DSM on consumer side – the industrial sector, the agricultural sector, the domestic & commercial sectors, ESCO-a route for DSM.

TEXT BOOKS:

1. Handbook of Energy Engineering, The Fairmont Press, INC.-Albert Thumann& Paul Mehta.
2. Energy Management Supply & Conservation, Butterworth Heinemann, 2002-dr. Clive Beggs.

REFERENCE BOOKS:

1. Hand book on energy audit & environment management by ISBN 81-1993.0920 TERI

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

EEE457B: ENERGY RESOURCES & TECHNOLOGY (Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

ENERGY SOURCES & AVAILABILITY: World energy situation. Indian energy scenario. Comparative study of thermal, hydro, nuclear and gas power plants. Impact of thermal, gas, hydro and nuclear power stations on environment, air and water pollution, green house effect (global warning), Plasma confinement - magnetic confinement and inertial confinement, geothermal, hydrogen energy, fuel cells, Alkaline fuel cells (AFC), Solid oxide fuel cell (SOFC), Molten carbonate fuel cells (MCFC), thermo-electric power, MHD power generation OTEC & tidal waves.

UNIT-II

SOLAR ENERGY: Solar constant, solar radiation geometry, local solar time, day length, solar radiation measurement, radiation on inclined surface, solar radiation data & solar charts. Flat plate collectors , liquid and air type. Theory of flat plate collectors, advanced collectors, optical design of concentrators, selective coatings, solar water heating, solar dryers, solar stills, solar cooling and refrigeration. Thermal storage. Conversion of heat into mechanical energy. Active and passive heating of buildings. Solar cells.

UNIT-III

WIND ENERGY: Wind as a Source of Energy, Characteristics of wind, wind data. Horizontal & Vertical axis wind Mills, Wind Energy: Wind energy potential measurement, general theories of wind machines, basic laws and concepts of aerodynamics, wind mill and wind electric generator. Basic electric generation schemes- constant speed constant frequency, variable speed constant frequency and variable speed variable frequency schemes. Applications of wind energy.

UNIT-IV

BIOMASS ENERGY: Introduction to biomass, biofuels & their heat content, biomass conversion technologies. Aerobic & anaerobic digester, Factors affection biogestion, biogas plants - types & description. Utilisation of biogas - Gasifiers, direct thermal application of Gasifiers. Advantages & problems in development of Gasifiers, use in I.C. engines , Energy plantation. Pyrolysis scheme. Alternative liquid fuels –ethanol and methanol. Ethanol production.

TEXT BOOKS:

1. Electric Power Generation, B.R.Gupta
2. Power Generation, Operation and Control, Wood and Wollenberg, John Wiley & Sons,1984.
3. Power Plant Engg: G.D. Rai

REFERENCE BOOKS:

1. Renewable Energy Resources: John Twidell and Tony Weir
2. Renewable Energy Resources Conventional & Non- Conventional: M.V.R Koteswara Rao
3. Science & Technology of Photovoltaics: Jayarama Reddy P.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

BT401B: BIOINFORMATICS (Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

INTRODUCTION: Internet, intranet and extranet, networking, protocols, genomic data, organization, representation, data base management systems.

SEQUENCING DATA BANK: Introduction, collecting and storing sequence in laboratory, nucleic acid data bank – Gen Bank, EMBL, AIDS and RNA, protein data bank (PDB), cambridge structural database CSD, genome data bank, hybridoma data bank structure and others.

UNIT-II

SEQUENCE ANALYSIS: Analysis tools for sequence data banks, pair wise alignment: NEEDLEMAN and WUNSCH algorithms, Smith Waterman, multiple alignment – CLUSTAL-W, BLAST, FASTA, sequence patterns and motifs and profiles.

PREDICTIONS: Secondary and tertiary structure: algorithms Chao-Fasman algorithm, hidden Markov model, neural networking, protein classification, fold libraries, fold recognition (threading), homology detection, SRS-access to biological data banks.

UNIT-III

PHYLOGENETIC ANALYSIS– Basic concepts in systematics, taxonomy and phylogeny, phylogenetic trees- various types and their construction, tree building methods, distance methods, multiple alignment character based method, phylogenetic software.

MANAGING SCIENTIFIC DATA: Introduction, challenges faced in integration of biological information, SRS, Kleisli Query System TAMBIS, P/FDM mediator for a bioinformatics database, federation, discovery link and data management.

UNIT-IV

GENOMICS & PROTEOMICS: Genome mapping, assembly and comparison, functional genomics: sequence based approaches & microarray based approaches, proteomics: technology of protein expression analylsis & posttranslational modifications, protein sorting, protein-protein interaction.

TEXT / REFERENCE BOOKS:

- Developing Bioinformatics Computer Skill, ed. Gibes & Jombeck, Shroff Publication
- Bioinformatics, ed. David W. Mount

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

AE417B : MODERN VEHICLE TECHNOLOGY (Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT I

TRENDS IN POWER PLANTS: Hybrid vehicles – stratified charged / lean burn engines – Hydrogen engines – battery vehicles – Electric propulsion with cables – magnetic track vehicles.

UNIT II

SUSPENSION BRAKES AND SAFETY: Air suspension – Closed loop suspension – antiskid braking system, Retarders, Regenerative braking safety cage – air bags – crash resistance – passenger comfort

UNIT III

NOISE & POLLUTION: Reduction of noise – Internal & external pollution control through alternate fuels / power plants – Catalytic converters and filters for particulate emission.

UNIT IV

VEHICLE OPERATION AND CONTROL: Computer control for pollution and noise control and for fuel economy – Transducers and actuators – Information technology for receiving proper information and operation of the vehicle like optimum speed and direction.

VEHICLE AUTOMATED TRACKS: Preparation and maintenance of proper road network – National highway network with automated roads and vehicles – Satellite control of vehicle operation for safe and fast travel.

TEXT BOOKS

1. Heinz Heisler, "Advanced Vehicle Technology" - Arnold Publication.

REFERENCES BOOKS

1. Beranek.L.L., Noise reduction, McGraw Hill Book Co., Inc., Newyork, 1993.
2. Bosch Hand Book, 3rd Edition, SAE, 1993.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

CE451B: POLLUTION & CONTROL (Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT – I

WATER POLLUTION – Classification of water pollutants, water characteristics, effluent standards, primary treatment, secondary treatment – aerobic (activated sludge, aerated lagoons, trickling filter, roughing filter, rotating biological contactor) anaerobic (contact process, UASB).

UNIT – II

AIR POLLUTION: Classification of air pollutants, Particulates: Physical characteristics, mode of formation, setting properties, Control measures.
HYDROCARBONS: Nature; sources, control, Carbon Monoxide: Source, harmful effects on human health, control measures. Oxides of Sulphur and Nitrogen Sources, effects on human health and plants. Control measure.

UNIT – III

SOLID WASTE: Types, sources and properties of solid waste, methods of solid waste treatment and disposal
SOLID WASTE MANAGEMENT – Generation, Collection and techniques for ultimate disposal, Elementary discussion on resource and energy recovery.

UNIT – IV

Elementary treatment of nuclear pollution, metal pollution, noise pollution their effects & control.
Trace element: Mechanism of distribution, essential and non essential elements, trace of element in marin environment, its ecological effects and biological effects.

SUGGESTED BOOKS:

1. Environmental Engg.: by Howard s. Peavy & Others, MGH International.
2. Metacaf – EDDY – Waste-water engineering revised by George Teholonobus (TMH)
3. Environmental Chemistry by B.K. Sharma, Goel Publishing, Meerut.
4. Environmental Chemistry, A.K.DE, Wiley Eastern.
5. Air Pollution: H.C. Perking – Mc Graw Hill.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

CSE411B: MANAGEMENT INFORMATION SYSTEM (Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT I

FOUNDATIONS:-

INFORMATION SYSTEM: Introduction to Information System and MIS, Decision support and decision making systems, systems approach, the systems view of business, Managing the digital firm, Electronic Commerce and Electronic business, DBMS, RDBMS , introduction to Telecommunication and Networks

I.T.INFRASTRUCTURE:- Managing Hardware Assets, Managing Software Assets, Managing Data Resources. Internet And New It Infrastructure .

UNIT II

CONCEPTUAL SYSTEM DESIGN: Define the problems, set systems objective, establish system constraints, determine information needs determine information sources, develop alternative conceptual design and select one document the system concept, and prepare the conceptual design report. Information Systems Security and Control, Ethical and Social Impact of Information Systems.

UNIT III

DETAILED SYSTEM DESIGN: Inform and involve the organization, aim of detailed design, project management of MIS detailed design , identify dominant and trade of criteria, define the sub systems, sketch the detailed operating sub systems and information flow, determine the degree of automation of each operation, inform and involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools propose an organization to operate the system, documentation of detailed design

UNIT IV

IMPLEMENTATION, EVALUATION AND MAINTENANCE OF THE MIS: Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files test the system, cut-over, document the system, evaluate the MIS control and maintain the system. Pitfalls in MIS development, Redesigning the organization with Information systems, Managing Knowledge Work.

TEXT BOOKS:

1.Management Information System by W. S. Jawadekar, 2002, Tata McGraw Hill.

2.Management Information System by K.C. Laudon & J.P. Laudon 7th Edition 2003 Pearson Education Publishers Indian Reprint.

3.Information System for Modern Management (3rd edition)- Robert G. Murdick, Loel E. Ross & James R. Claggett. PHI

REFERENCE BOOKS:

1.Management Information System; O Brian; TMH

2.Management Information System by Davis Olson Mac Graw Hill

3.Management Information System by Stallings,(Maxwell Mc Millman Publishers)

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

IT413B: CYBER SECURITY (Open Elective)

B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT I

INTRODUCTION TO CYBERCRIME: Cybercrime and Information Security, Classifications of Cybercrimes, The need for Cyberlaws, The Indian IT Act Challenges to Indian Law and Cybercrime Scenario in India, Weakness in Information Technology Act and it consequences, Digital Signatures and the Indian IT Act, Cybercrime and Punishment; Technology, Students and Cyberlaw; Survival tactics for the Netizens, Cyber-offenses: Cyberstalking, Cybercafe and Cybercrimes, Botnets, Attack Vector, Cloud Computing;

UNIT II

TOOLS AND METHODS USED IN CYBERCRIME: Proxy Servers and Anonymizers, Phishing and identity theft, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow; Cybercrime: Mobile and Wireless Devices: Trends in Mobility, Attacks on Wireless Networks, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones.

UNIT III

UNDERSTANDING COMPUTER FORENSICS: The Need for Computer Forensics, Cyberforensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Challenges in Computer Forensics, Forensics Auditing, Antiforensics.

UNIT IV

CYBERSECURITY: ORGANIZATIONAL IMPLICATIONS: Cost of Cybercrimes and IPR Issues, Web Threats for Organizations, Security and Privacy Implications from Cloud Computing, Social Media Marketing, Social Computing and the Associated Challenges for Organizations, Protecting People's Privacy in the Organization, Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling, Forensics Best Practices, Media and Asset Protection, Importance of Endpoint Security in Organizations.

TEXT BOOKS:

- "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Nina Godbole, Sunit Belapur, Wiley India Publications, April, 2011

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

CHE409B : PROCESS DYNAMICS & CONTROL LAB
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

List of Practicals / Demonstrations:

1. Liquid Level Tank (Non-interacting system).
2. Liquid Level Tank (Interacting system).
3. Time constant of a Mercury Thermometer.
4. Pressure control system trainer.
5. Temperature control system trainer.
6. Level control system trainer..
7. Flow control system trainer.
8. Ratio control system trainer
9. Analysis of Valve.

NOTE:

1. **The students will be required to perform the 06 experiments from above list and two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE403B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE411B : ENERGY TECHNOLOGY LAB
B. Tech. Semester - VII (Chemical Engineering)

L	T	P	Credits			
-	-	2	1	Class Work	:	20 Marks
				Examination	:	30 Marks
				Total	:	50 Marks
				Duration of Examination	:	3 Hours

List of Practicals / Demonstrations:

1. Determination of Flash point and fire point.
2. Determination of Calorific value.
3. Proximate analysis of coal.
4. Cloud point and pour point.
5. Smoke point.

NOTE:

1. **The students will be required to perform the 05 experiments from above list and three experiments may be performed from the list designed and set by the Dept. as per the scope of the syllabus of CHE405B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE413B : PROJECT

B. Tech. Semester – VII (Chemical Engineering)

L	T	P	Credits	Class Work	:	100Marks
--	--	4	4	Total	:	100 Marks

The primary objective of this course is to develop in students the professional quality of synthesis employing technical knowledge obtained in the field of Engineering & Technology through a project work involving design, analysis augmented with creativity, innovation and ingenuity.

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. which commences in the VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairman of Department	: Chairperson
Project coordinator	: Member Secretary
Respective project supervisor	: Member

The student will be required to submit two copies of his/ her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

CHE415B : PROFESSIONAL TRAINING-II

B. Tech. Semester – VII (Chemical Engineering)

L	T	P	Credits			
				Class Work	**:**	**50Marks**
--	--	2	2	**Total**	**:**	**50 Marks**

- At the end of 6th semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional / Organization/ Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.
- The typed report should be in a prescribed format.
- The report will be evaluated in the VII Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.
- The student will interact with the committee through presentation to demonstrate his/her learning.
- Teachers associated with evaluation work will be assigned 2 periods per week load.

CHE402B: PROCESS MODELING & SIMULATION
B. Tech. Semester - VIII (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Introduction: Definition and Use of mathematical models, scope of coverage, principles of formulations. Fundamental Laws- continuity equations, energy equations, equations of motion, transport equations, equation of state, equilibrium, chemical kinetics. Lumped and distributed parameter systems. Use of Partial and ordinary differential equations in modeling.

UNIT-II: Mathematical Models of Chemical Engineering System - Series of isothermal constant hold up CSTRs, Gravity flow tank, CSTRs with variable hold ups, Heated tanks, Gas phase pressurized CSTR, Isothermal and non-isothermal CSTRs systems. Single and Multi-component vaporizers. Reactor with mass transfer, Interacting and non interacting tanks, bioreactor,

UNIT-III: Batch reactor, semi batch reactor, Plug flow reactor, Ideal and non-ideal binary Distillation Column, Batch Distillation with hold up, pH systems, absorption column, liquid liquid extraction, double pipe heat exchanger.
Numerical simulation methods, Interval Halving, Newton Raphson Methods etc., Numerical Integration.

UNIT-IV: Analysis and design of advanced control - Dead time compensation, Inverse response, Control System with Multiple Loops, Feed forward and Ratio control, Adaptive and Inferential control. Process control using digital computers-Digital Computer Control loops, Continuous and Discrete time systems, Z-Transforms.

TEXT BOOKS:

1. Process modelling simulation and control: W.L. Luyben- McGraw Hill.
2. Chemical Process Control - An Introduction to Theory and Practice: G. Stephanopoulos - Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. Chemical Process simulation: Asghar Husain- Wiley Eastern.
2. Chemical Engineering Dynamics: E.J. Dunn- V.C.H.
3. Modeling and simulation in chemical Engineering: R.G.E. Franks Wiley Interscience.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE404B : PROCESS ENGINEERING ECONOMICS
B. Tech. Semester - VIII (Chemical Engineering)

L	T	P	Credits			
3	1	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Introduction, Flow-sheeting, Plant Location, Plant Layout, Health and Safety Hazards, Degree of freedom, Environmental Protection.

UNIT- II: Cost and Asset Accounting: Basic relationships in accounting, Balance Sheet Cost Estimation: Cash Flow, Capital Investments, Methods for estimating Capital Investments, Cost Indexes, Total Product Cost

Interest and Investment Costs: Types of Interest, Present Worth and Discount, Annuities, Perpetuities and Capitalized Costs

UNIT- III: Depreciation and Taxes: Types of Taxes, Types of Depreciation, Methods for Determining Depreciation, Insurance: Types of Insurance & legal responsibility.

UNIT- IV: Profitability: Profitability standards, Methods for Profitability Evaluation, Alternative Investments.

Optimum design: General Procedure for determining optimum conditions, Break-Even chart and its significance for optimum analysis, optimum conditions in cyclic operations, Examples of optimum design in a chemical process plant.

TEXT BOOKS:

1. Plant design and Economics for chemical Engineering: M.S. Peters and K.D. Timmerhaus- Mc Graw Hill.
2. Chemical Engineering Vol. 6: J.M. Coulson and Richardson J.F.- Pergamon Press.

REFERENCE BOOKS:

1. Strategy of process engineering: D.F. Rudd and C.C. wat sons- John wiley and sons.
2. Optimization Theory and practice: G.S.G. Beveridge and R.S. Schechter- Mc Graw Hill.
3. Project Engineering of Processes Plants: H.F. Rase and M.H. Barrow - John Willey.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE451B : ENVIRONMENTAL POLLUTION CONTROL (ELLECTIVE-I)
B. Tech. Semester - VIII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Causes of Environmental Pollution: Interaction of systems, Environmental disturbances, public awareness and action, population and economic growth, Industrialization, Energy growth, Man made disturbances, ozone layer depletion, global warming, Acid rain effect.

UNIT-II: Air Pollution : Types of air pollutants, Sources of air pollution, effects of air pollutants, Air sampling, Air pollution control equipments, Lapse rate, different plume patterns, air pollution legislation and regulations

UNIT-III: Water Pollution: types of water pollutants, sources of water pollution, Effects of water pollution, control of water pollution, Wastewater and sludge treatment methods, Sources and characteristics of wastewater, Primary treatment, Secondary treatment, Tertiary treatment, Adsorption, Disinfection, Sources and characteristics of sludge, Sludge treatment and disposal methods, wastewater reclamation and reuse, water pollution legislation and regulations

UNIT-IV: Solid waste management and disposal methods,Industrial pollution monitoring and control including treatment methods in various process industries (such as refineries, fertilizer, paper and pulp industries, sugar manufacturing units,textile, dairy waste, mining and metallurgical industries etc.)

TEXT BOOKS:

1. "Environmental Engineering", Peavy H.S.and Rowe D.R.-McGraw Hill.
2. "Environment Pollution Control Engineering", revised second edition, C.S.Rao, New Age International Limited Publishers.

REFERENCE BOOKS:

1. "Air Pollution", M.N. Rao and H.V.N. Rao- Tata McGraw Hill.
2. "Environmental Engineering", G.N. Panday and G.C. Carney- Tata Mc Graw Hill.
3. "Wastewater treatment disposal and Reuse", Metcalf and Eddy - Tata Mc-Graw Hill.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE453B : INTRODUCTION TO BIOCHEMICAL ENGINEERING (ELECTIVE-I)

B. Tech. Semester - VIII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Aspects of microbiology, cell theory, structure of microbial cells, classification of micro-organism, influence of environmental parameters on micro-organisms. Introduction to Bio-chemistry - Chemical composition of the cell, Lipids, Carbohydrates, Proteins and enzymes.

UNIT-II: Metabolism and Energetics - Assimilatory and dissimilatory process, The metabolic mechanism of the cells. Bio-Chemical Kinetics - Simple enzyme kinetics with one or two substrate, Modulation and regulation of enzymatic activity, enzyme reactions in heterogeneous systems. Microbial Fermentation Kinetics - Growth - cycle phases for batch cultivation, mathematical modeling of batch growth, product synthesis, Kinetics, overall kinetics and thermal death kinetics of cells and spores.

UNIT-III: UNIT operations in Bio-Chemical process - Agitation and aeration, gas-liquid mass transfer, determination of oxygen transfer rates, determination of 'a' and 'KLa' scaling of mass transfer equipment. Heat balance and heat transfer correlations for biochemical system, sterilization, filtration and drying. Immobilization of cells and enzymes.

UNIT-IV: Design and Analysis of Bio-Reactors - Classification and characterization of different bioreactors, batch and continuous reactors, tubular, CSTR and tower reactors. Aerobic and anaerobic fermentation, process design and operation of typical aerobic and anaerobic fermentation processes, manufacture of microbial products, e.g. antibiotics, alcohol/wine etc. use of immobilized enzymes and whole cells for industrial process.

TEXT BOOKS:

1. Biochemical Engineering: S.Aiba, A.E. Humhrey, N.F. Mills, 2nd ed., Academic Press, New York, 1973.
2. Biochemical Engineering Fundamentals: J.E. Baley, D.F. Ollis, 2nd ed., McGraw Hill, 1986.

REFERENCE BOOKS:

1. Biochemical Reactor: B.Atkinson, Pion Ltd., London, 1974.
2. Elements of Bio-technology: P.K. Gupta, Rastogi Publication first ed. reprint, 1997.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE452B : NOVEL SEPARATION TECHNIQUES (ELECTIVE-II)
B. Tech. Semester - VIII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: Separation processes in Chemical & Biochemical industries, categorization of separation processes, equilibrium and rate governed processes.

UNIT-II: Nature of bubbles and foams, stability of foams, foam fraction techniques, batch, continuous, single stage and multistage columns.

UNIT-III: Physical factors in membranes, osmotic pressure, partition coefficient and permeability, concentration polarization, electrolyte diffusion facilitated transport. Ultrafiltration, reverse osmosis and electrodialysis, membrane structure and production. Theory and application of pervapouration, permeation, critical extraction and freeze drying.

UNIT -IV: Theory of adsorption, application, adsorption isotherms, adsorption hysteresis, batch and continuous adsorption etc.

REFERENCE BOOKS:

1. Separation Processes - C.J. King, Tata Mc-Graw Hill.
2. New separation Techniques - J.D. Henry & N.N. Li, AICHE Today Series, AICHE (1975).
3. Hand Book of Separation Techniques for Chemical Engineers by Philip A. Schweitzer - McGraw Hill Book Company.
4. Separation Process Principles – J D Seader, E J Henley – Wiley.

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE454B : DESIGN OF PIPING SYSTEMS (ELECTIVE-II)
B. Tech. Semester - VIII (Chemical Engineering)

L	T	P	Credits			
4	-	-	4	**Class Work**	:	**25 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I: FLOW OF FLUIDS- Frictional loss in pipe and ducts; Equivalent resistance of fittings, valve and bends; carrying capacity of pipes; piping networking; pressure drop and diameter calculations of pipe carrying steam, water, oil and gases. VAPOUR LIQUID PIPING-Flow pattern, piping design for two-phase flow; Design of piping for reboiler and condenser systems.

UNIT-II: HYDRAULIC TRANSPORT-Design of homogeneous and heterogeneous slurry transport line; correlations for various flow regimes. PNEUMATIC TRANSPORT-Conveying systems; solid gas flow pattern in vertical, horizontal and inclined pipe lines; concept of saltation and choking velocities. Pressure drop calculations in different pipe lines carrying gas solid mixture; Design of feeding systems for pneumatic transport of solids.

Optimum pipe line diameter calculations and optimum pipe network design.

UNIT-III: PIPES AND FITTINGS-Standard sizes, wall thickness, tolerances, design of flanges and other fittings. STRENGTH AND FAILURE OF MATERIALS-Stable and unstable deformation, plasticity plastic instability, design assumptions, stress evaluation and design limits, codes and standards. Local components of pipe bends, branch connections and bolted flange connections.

Unit-IV: SIMPLIFIED METHODS FOR FLEXIBILITY ANALYSIS-Thermal expansion loops, code rules, approximate solutions and flexibility analysis by model tests. Approaches to reducing expansion effects, expansions joints. Piping layout consideration, elements of supporting system, fixtures and pipe attachments. Introduction to piping vibrations, their prevention and control.

TEXT BOOKS:

1. Design of Piping Systems: Kellogg, M.W.- Kellog Company (1961).

REFERENCE BOOKS:

1. Piping Hand Book: King, R. C.: and Crocker, S.-McGraw Hill(1967)

NOTE:

1. **In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE408B : SEMINAR

B. Tech. Semester - VIII (Chemical Engineering)

L	T	P	Credits	Class Work	:	50 Marks
-	-	2	2	Total	:	50 Marks

The objectives of the course remains

- To learn how to carry out literature search
- To learn the art of technical report writing
- To learn the art of verbal communication with the help of modern presentation techniques

A student will select a topic in emerging areas of Engineering & Technology and will carry out the task under the observation of a teacher assigned by the department.

He/She will give a seminar talk on the same before a committee constituted by the chairperson of the department. The committee should comprise of three faculty members from different specializations. The teacher associated in the committee will be assigned 2 hours teaching load per week.

However, guiding students' seminar will not be considered towards teaching load.

The format of the cover page and the organization of the body of the seminar report for all the undergraduate programs will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

CHE410B : ENVIRONMENTAL POLLUTION CONTROL LAB
B. Tech. Semester - VIII (Chemical Engineering)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

List of Experiments / Exercises:

1. Determination of pH and Temperature
2. Determination of dissolved oxygen
3. Determination of BOD
4. Determination of COD
5. Determination of Solids
6. Determination of Conductivity
7. Determination of Turbidity
8. Determination of Acidity and Alkalinity
9. Determination of Hardness
10. Determination of Chlorides, Fluorides and Nitrates
11. Determination of Heavy Metals.
12. Determination of Air pollutants.

NOTE:

1. **The students will be required to perform the 08 experiments from above list and two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE451B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

CHE413B : PROJECT

B. Tech. Semester – VIII (Chemical Engineering)

L	T	P	Credits			
-	-	8	8	**Class Work**	:	**75 Marks**
				Examination	:	**125 Marks**
				Total	:	**200 Marks**
				Duration of Examination	:	**3 Hours**

The project started in VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairperson of Department	: Chairperson
Project coordinator	: Member
External expert	: To be appointed by the University

The student will be required to submit two copies of his/ her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B. Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

CHE414B : MODELING AND SIMULATION LAB
B. Tech. Semester - VIII (Chemical Engineering)

L	T	P	Credits			
-	-	2	1	**Class Work**	:	**20 Marks**
				Examination	:	**30 Marks**
				Total	:	**50 Marks**
				Duration of Examination	:	**3 Hours**

Modeling and Simulation of Chemical Engineering Systems like:

1. Isothermal CSTR
2. Non-Isothermal CSTR
3. Isothermal Batch Reactor
4. Non-Isothermal Batch Reactor
5. Ideal Binary Distillation Column
6. Flash Calculation
7. Gravity flow tank
8. Runga –kutta method/Euler's method

Software such as Aspen Plus/Chem-CAD, MATLAB, C++ etc. may be used in modeling above problems. Mathematical modeling of Chemical Engineering problems will be done on computers with the help of related software packages.

NOTE:

1. **The students will be required to perform the 06 experiments from above list and two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE402B.**
2. **The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.**
3. **Electronics gadgets including Cellular phones are not allowed in the examination.**

GEN401B : MORAL VALUES & ETHICS

B. Tech. Semester – VII/VIII (Common for all Branches)

University Rules/ Regulation specifically related to students and academic ordinances. University Vision, Mission, Goals, objectives, code of conduct.

Introduction to Value Education. Understanding ethics, value system, happiness, prosperity.

BOOKS

1. R.R.Gaur, R. Sangal and G.P. Bagaria, " Bagaria, " A foundation course in Human Values and Professional Ethics", Pub: Excel Books, New Delhi-110028.
2. M. Govindrajan, S Natrajan & V.S. Senthil Kumar, " Engineering Ethics (including Human Values)" Eastern Economy Edition, Prentics Hall of India Ltd.

NOTE:

1. A minor test will be conducted during the semester and its award out of ten will be forwarded to respective Chairperson of the Department.
2. Weightage of Ethics is given in General Proficiency Syllabus.

GFCHE402B : GENERAL FITNESS FOR THE PROFESSION

B. Tech. Semester – VIII (Chemical Engineering)

L	T	P	Credits			
				Examination	**:**	**100Marks**
1	**--**	**--**	**4**	**Total**	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

The evaluation will be made by the committee of examiners constituted as under:

1. Dean, Faculty of Engineering & Technology/ Director /Principal of affiliated college : Chairperson
2. Chairperson of the department : Member
3. External expert : Appointed by the university

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

I.	Academic Performance	--------
II.	Extra Curricular Activities / Community Service, Hostel Activities	**(12 Marks)**
III	Technical Activities / Industrial, Educational tour	**(12 Marks)**
IV	Sports/games	**(16Marks)**

Note: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/ her achievement and verbal & communicative skill through presentation before the examiners. **(40 Marks)**

C. Faculty Counselor Assignment **(20 Marks)**

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.
4. Moral values & Ethics- Syllabus (one lecture/ week on the topics of Human values/ Ethics is to be delivered)