

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES

RAJAMPET - 516126

(AUTONOMOUS)



www.aitsrajampet.ac.in

DEPARTMENT OF MECHANICAL ENGINEERING

ACADEMIC REGULATIONS (R17)

AND

COURSE STRUCTURE & SYLLABI

For the students admitted to

B. Tech., Regular Four-Year Degree Programme in CBCS

from the Academic Year 2017-18

and

Regulations & Course Structures for

B. Tech., Lateral Entry Scheme from the Academic Year 2018-19



B. Tech., MECHANICAL ENGINEERING

VISION AND MISSION OF THE INSTITUTION

Vision

We impart futuristic technical education and instill high patterns of discipline through our dedicated staff who set global standards, making our students technologically superior and ethically strong, who in turn shall improve the quality of life of the human race.

Mission

Our mission is to educate students from the local and rural areas, and from other states so that they become enlightened individuals, improving the living standards of their families, industry and society. We provide individual attention, world-class quality of Technical education and take care of character building.

VISION AND MISSION OF THE DEPARTMENT

Vision

We envision the department as one of the best in the region with a stimulating environment to make an impact on, and lead in the field through its education and research.

Mission

The mission of the Department is to provide an excellent and comprehensive education in the field of Mechanical engineering which in turn mould students for a wide range of careers and to exhibit a high level of professionalism, ethical behavior and exercise social responsibility.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The B. Tech., Mechanical Engineering graduates will be able to:

- PEO 1. Work productively as Mechanical engineers, including supportive and leadership roles on multi- disciplinary teams.
- PEO 2. Meet the needs of Indian and Multinational companies to synthesize data and technical concepts for application in new product design.
- PEO 3. Communicate effectively, recognize, and incorporate societal needs and constraints in their professional endeavors along with professional ethics in their professional practice.
- PEO 4. Engage in continuous learning, such as graduate study to remain current in their profession and be leaders in the technological society.

PROGRAMME OUTCOMES (POs)

A graduate of Mechanical Engineering will have an ability to:

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Correlation levels 1, 2 and 3 as defined below

1. Slightly (Low)
 2. 2. Moderate (Medium)
 3. 3. Substantial (High)
- No correlation, put “-“

Index

Serial Number	Description	Page Number
1	Academic Regulations	6
2	Curriculum Structure	16

ACADEMIC REGULATIONS

B. Tech, Four Year Degree Programme with CBCS

(For the batches admitted from the academic year 2017-18)

and

B. Tech. Lateral Entry Scheme

(For the batches admitted from the academic year 2018-19)

The following rules and regulations will be applicable for the batches of Four-year B.Tech. degree admitted from the academic year 2017-18 onwards.

1. ADMISSION:

1.1 Admission into First year of Four-year B. Tech. Degree programme of study in Engineering:

As per the existing stipulations of Andhra Pradesh State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year of four-year B. Tech. Degree programme as per the following pattern.

- a) Category-A seats will be filled by the Convener, AP-EAMCET.
- b) Category-B seats will be filled by the Management as per the norms stipulated by Govt. of Andhra Pradesh.

1.2 Admission into the Second Year of Four-year B.Tech. Degree programme (lateral entry).

As per the existing stipulations of Andhra Pradesh State Council of Higher Education (APSCHE), Government of Andhra Pradesh. Seats will be filled by the Convener, AP-ECET.

2. PROGRAMMES OF STUDY OFFERED BY AITS LEADING TO THE AWARD OF B.TECH DEGREE:

Following are the four year Under Graduate Degree Programmes of study offered in various disciplines at Annamacharya Institute of Technology and Sciences, Rajampet leading to the award of B.Tech. (Bachelor of Technology) Degree:

1. B.Tech. (Computer Science and Engineering)
2. B.Tech. (Electrical and Electronics Engineering)
3. B.Tech. (Electronics and Communication Engineering)
4. B.Tech. (Mechanical Engineering)
5. B.Tech. (Civil Engineering)

and any other programme as approved by the concerned authorities from time to time.

3. ACADEMIC YEAR:

The entire course of study is of four academic years and each year will have **TWO** Semesters (Total **EIGHT** Semesters). The minimum instruction days for each semester shall be 90.

4. COURSE STRUCTURE:

Each programme of study shall consist of:

4.1 General Courses comprising of the following :(5 to 10%)

- a) Language / Communication Skills
- b) Humanities and Social Sciences: Environmental Science
- c) Economics and Accounting
- d) Principles of Management

4.2 Basic Science Courses comprising of the following: (15 to 20%)

- a) Computer Literacy with Numerical Analysis
- b) Mathematics
- c) Physics
- d) Chemistry

4.3 Basic Engineering Courses comprising of the following (depending on the branch) :(15 to 20%)

- a) Engineering Drawing
- b) Engineering and IT Workshop
- c) Engineering Mechanics
- d) Basic Mechanical Engineering
- e) Electrical and Electronics Engineering
- f) Basic Civil Engineering
- g) Computer Programming

4.4 Compulsory Discipline Courses:(30 to 40%)

The lists of professional subjects are chosen as per the suggestions of the experts, to impart broad based knowledge needed in the concerned branch of study.

4.5 Professional subjects - Electives: (10 to 15%)

Electives will be offered to the students to diversify the spectrum of knowledge, based on the interest of the student to broaden his individual skill and knowledge.

4.6 Open Electives: (5 to 10%)

Open subjects will be offered from other technical and / or emerging subject areas

4.7 Project Work, Seminar and /or Internship:(10-15%)

Project Work, Seminar and /or Internship in industry or elsewhere.

4.8 Mandatory Courses:

Environmental Studies, Technical English and professional communication & Soft Skills are included as subjects under mandatory courses but with credit weightage.

4.9 There shall be a subject like comprehensive Mechanical Engineering with 2 hours per week introduced in final year first semester.

4.10 Every programme of study shall be designed to have 42-44 theory courses and **22- 28** laboratory/seminar/comprehensive courses.

4.11 Every programme has included foundation courses to the extent of 30%, programme core and programme elective subjects to the extent of 60%, open electives and mandatory courses to the tune of 10% approximately of the total credits.

4.12 Audit Courses (to be included in I B.Tech II Semester and III B.Tech. I Semester):

Interested students who want to supplement their knowledge can opt for audit courses namely Gender sensitization, Professional Ethics/Stress Management & Advanced English Communication laboratory and can appear/Pass in Continuous Internal Evaluation and Semester End Examination of these courses, will be included in marks memo only when they pass.

4.13 Open Elective:

IV Year I Semester student has to necessarily select a subject from the list of open electives.

4.14 Contact Hours: Depending on the complexity and volume of the course, the number of contact hours per week will be assigned.

5. CREDIT SYSTEM:

Credits are assigned based on the following norms.

	Semester Pattern	
	Period(s) / Week	Credit(s)
Theory	01	01
Practical	03	02
Comprehensive Course	02	02
Seminar	–	01
Final Year Project	12	08

6. EXAMINATION SYSTEM: All components in any programme of study will be evaluated continuously through internal evaluation and an external evaluation component conducted as semester-end examination.

6.1 Distribution of Marks:

S. No.	Description	Marks	Examination and Evaluation	Scheme of Evaluation
1	Theory	70	Semester-End Examination.	The question paper shall be of subjective type with Five questions with internal choice to be answered in 180 Minutes duration.
		30	<p>Mid-Examinations of 120 Minutes duration to be evaluated for 20marks.</p> <p>The question paper shall be of subjective type in which four questions with an internal choice are to be answered.</p> <p>Remaining 10 marks is for continuous evaluation which includes weekly/fortnightly class tests, homework assignments, problem solving, group discussions, quiz, seminar, mini-project and other means.</p> <p>The method of allotting these marks will be decided by the teacher dealing that subject in consultation with the Head of the Department. Teacher has to announce the evaluation method in the beginning of the semester.</p>	<p>Two MID - Examinations are to be conducted for 20 marks each in a semester. 80% weightage for better performance and 20% for other shall be considered.</p> <p>MID-I: After first spell of instructions (I & II-Units).</p> <p>MID-II: After second spell of instructions (III, IV & V-Units). The student who has missed both the Mid examinations will be permitted to appear for a substitute examination covering the total syllabus. This substitute examination will be given a weightage of 80%. This is to be conducted before the commencement of end semester exams, can be even outside the working hours, can be even two mid exams a day also.</p>

S. No.	Description	Marks	Examination and Evaluation	Scheme of Evaluation
2	Laboratory or Drawing	70	Semester - End Lab Examination	For laboratory courses: 180 minutes duration – two examiners. For Drawing and /or Design: similar to theory examination.
		30	20 Marks for Day to Day evaluation	Performance in laboratory experiments / Drawing practices
			10 Marks for Internal evaluation	Performance of one best out of two tests to be considered.
3	Seminar	100	Internal Evaluation: 20 Marks for Report 20 Marks for subject content 40 Marks for presentation 20 Marks for Question and Answers	Continuous evaluation during a semester by the Departmental Committee (DC) consisting of two / three faculty members allotted by Head of the Department.
4	Comprehensive Viva-Voce	100	The marks can be allotted based on the performance in viva-voce conducted by Head of the department and two senior faculty members in the department.	
5	Project Work	100	70 Marks for External evaluation	Semester-End Project Viva-Voce Examination by Committee as detailed under 6.2
			30 Marks for Internal evaluation	Continuous evaluation by the DC 15 Marks by DC as detailed under 6.2.1 15 Marks by Supervisor

6.2 Project Work Evaluation:

- 6.2.1 The Internal Evaluation shall be made by the Departmental Committee, on the basis of average of two seminars presented by each student on the topic of his project, the best one to be considered. The presentations shall be evaluated by the Departmental Committee (DC) consisting of Head of the Department, supervisor and a senior faculty member.
- 6.2.2 The Semester-End Examination (viva-voce) shall be conducted by a Committee consisting of External examiner nominated by the Chief Controller of Examinations, HOD and Supervisor. The evaluation of project work shall be conducted at the end of the IV Year II Semester.

6.3 Eligibility to appear for the Semester-End examination:

- 6.3.1 A student shall be eligible to appear for end examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects in the semester.
- 6.3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the Institute Academic Committee if the reason for shortage is convincing.
- 6.3.3 Shortage of Attendance below 65% in aggregate shall in no case be condoned.
- 6.3.4 A stipulated fee shall be payable towards condonation of shortage of attendance to the Institute as per following slab system
 - 1stSlab:** Less than 75% attendance but equal to or greater than 70% a normal condonation fee can be collected from the student.
 - 2ndSlab:** Less than 70% but equal to or greater than 65%, double the condonation fee can be collected from the student.
- 6.3.5 Students whose shortage of attendance is not condoned in any semester are not eligible to take their End Examination of that class and their registration for that semester shall stand cancelled.
- 6.3.6 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable.
- 6.3.7 A student detained due to shortage of attendance, will have to repeat that semester when offered next.

6.4 Revaluation / Recounting:

Students shall be permitted to request for recounting/ revaluation of the end theory examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records are updated with changes if any and the student will be issued a revised memorandum of marks. If there are no changes, the student shall be intimated the same through a letter or a notice.

6.4.1 Challenge valuation

Student can apply challenge valuation by paying stipulated fee. The photo copy of the answer booklet shall be given to the student on notified date.

- If the improvement is 15% of maximum marks or more, the new marks will be awarded to the student. Otherwise there will be no change in the old marks
- If the improvement is 15% of max marks or more 90% of the fee paid will be refunded to the student. If the student's status changes from fail to pass, 50% of fee will be refunded to the student. Otherwise the student will forfeit the amount which he/she paid.
- No challenge valuation for Laboratory Examination.

6.4.2 Improvement of Marks

Students are permitted for improvement examinations once for a maximum of four subjects after completion of the study course but before applying for provisional certificate and consolidated marks memo after payment of prescribed fee.

6.5 Readmission of Students:

A student who has satisfied the minimum attendance requirement in any semester may repeat that semester, after obtaining written permission from the Principal and cancelling the previous record of attendance and academic performance (viz; internal evaluation and external evaluation marks) of the semester or year. This facility may be availed by any student at the maximum twice for a 4 year B. Tech., and only once by Lateral Entry student & PG student during the entire course of study.

6.6 Supplementary Examination:

- a) All Regular examinations are understood as Regular/Supplementary examinations. The supplementary students have to appear for the supplementary examinations along with their regular examinations conducted at the end of each semester. However, separate supplementary examinations will be conducted for the II-Semester subjects at the end of I-Semester and vice-versa.

- b) In case of Seminars and Comprehensive Viva-Voce examinations, supplementary seminar / comprehensive Viva-Voce will be conducted along with the next batch of students if available. If the next batch of students is not available, a separate supplementary examination will be conducted.

6.7 Internship Programme:

The weightage of two credits given for an internship of three weeks duration and more, when a student undergoes internship / industrial training from the Specified Industries / Research Organizations / Universities. In such a case, the student has to submit a report on that internship which will be evaluated by a team of three faculty members (decided by the HOD) of the department for those two credits. Student is given a chance to drop one seminar in place of a successful internship / industrial training.

6.8 Massive Open Online Course (MOOC):

MOOC is one of the courses introduced in IV year I semester. The list of subjects under MOOC will be intimated before commencement of class work.

7. ACADEMIC REQUIREMENTS FOR PROMOTION/ COMPLETION OF B. Tech. PROGRAMME OF STUDY:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/ completion of B.Tech. Programme of study.

7.1 For students admitted into B.Tech. (Four Year) programme:

- 7.1.1.** A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, drawing subject if he secures not less than 35% of marks in the End Examination and a minimum of 40% of marks in the sum total of the Internal Evaluation and End Examination taken together.
- 7.1.2.** For promotion from I B.Tech. to II B.Tech. a student must satisfy the attendance requirements in I year (two semesters).
- 7.1.3.** A Student shall be promoted from II year to III year, if he fulfills the academic requirements of securing a minimum of **50** credits from I year I and II-Semesters, II year I and II-Semesters examinations conducted till that time.
- 7.1.4.** A student shall be promoted from III year to IV year if he / she fulfill the academic requirements of securing a minimum of **74** credits from I year I and II-Semesters, II year I and II-Semesters and the III year I and II-Semester examinations conducted till that time.

7.1.5. A student shall register for all the subjects and earn all the **195** credits. Marks obtained in all the credits shall be considered for the calculation of the class based on CCPA.

7.1.6. A student who fails to earn all the **195** credits as indicated in the course structure within **Eight** academic years from the year of admission shall forfeit his seat in B.Tech. Programme and his admission stands cancelled.

7.2. For Lateral Entry Students (batches admitted from 2018-2019):

7.2.1 Academic requirements for pass in a subject are the same as in 7.1 and attendance requirements as in 6.3.

7.2.2 A student shall be promoted from II year to III year if he fulfills the academic requirements of securing a minimum of **22** credits from II year I and II-Semesters examinations conducted till that time.

7.2.3 A student shall be promoted from III year to IV year if he fulfills the academic requirements of securing a minimum of **46** credits from II year I and II-Semesters and the III year I and II-Semester examinations conducted till that time.

7.2.4 A student shall register for all the subjects and earn all **143** credits. Marks obtained in all such credits shall be considered for the calculation of the class based on CCPA.

7.2.5 A student who fails to earn all the 143 credits as indicated in the course structure within **six** academic years from the year of his admission shall forfeit his seat in B.Tech. Programme and his admission stands cancelled.

8. TRANSITORY REGULATIONS:

Students who got detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work for the next batch or later batches with the same (or) equivalent subjects as and when subjects are offered and they continue to be in the academic regulations of the batch he is joining later.

9. CREDIT POINT AVERAGE (CPA) AND CUMULATIVE CREDIT POINT AVERAGE (CCPA):

9.1. For a Semester:

$$\text{Credit Point Average [CPA]} = \frac{1}{10} \frac{\sum_i C_i T_i}{\sum_i C_i}$$

Where C_i = Credits earned for Course i in any semester,

T_i = Total marks obtained for course i in any semester.

9.2. For the entire programme:

$$\text{Cumulative Credit Point Average [CCPA]} = \frac{1}{10} \frac{\sum_n \sum_i C_{ni} T_{ni}}{\sum_n \sum_i C_{ni}}$$

Where n = the semester in which such courses were credited

9.3. Overall Performance:

CCPA	Classification of final result
7.0 & above	First class with distinction
6.0 & above but below 7.0	First class
5.0 & above but below 6.0	Second class
4.0 & above but below 5.0	Pass

10. TRANSCRIPTS:

After successful completion of the entire programme of study, a transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued up to any point of study to a student on request.

11. ELIGIBILITY:

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

- (i) Registered and successfully completed all the components prescribed in the programme of study to which he is admitted.
- (ii) Successfully acquired all **195/143 credits** as specified in the curriculum corresponding to the branch of study within the stipulated time.
- (iii) No disciplinary action is pending against him.

12. AWARD OF B. TECH DEGREE:

12.1. A student is permitted to select one of the extracurricular / extension activities like NSS / Sports / Games / Cultural activities. A certificate in one of these activities is a must for the student to become eligible for the award of Provisional Certificate or Degree. It is resolved that a certificate of participation to the extent of 65% attendance is required for the students to become eligible for the award of degree.

12.2. The B.Tech. Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendations of the Principal of Annamacharya Institute of Technology and Sciences, Rajampet.

13.AMENDMENTS TO REGULATIONS:

The chairman, Academic Council of Annamacharya Institute of Technology and Sciences, Rajampet reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

14.Any legal issues are to be resolved in Rajampet Jurisdiction.

15.GENERAL:

Where the words "he", "him", "his", "himself" occur in the regulations, there include "she", "her", "herself".

CURRICULUM STRUCTURE

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)
DEPARTMENT OF MECHANICAL ENGINEERING

Regulations: **R17**Programme Code: **G5****I Year B. Tech., I Semester**

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7GC11	Technical English & Professional Communication	4	1	0	4
7GC12	Engineering chemistry	3	1	0	3
7GC14	Engineering Mathematics-I	4	1	0	4
7G111	Problem solving techniques & C Programming	3	1	0	3
7G511	Engineering Graphics –I	2	--	5	4
7G512	Engineering Mechanics - Statics	3	1	0	3
7GC15	Engineering chemistry lab	--	--	3	2
7G112	Programming in C Lab	--	--	3	2
7G514	Engineering workshop	--	--	3	2
Total		19	5	14	27

I Year B. Tech., II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7GC23	Engineering Physics	3	1	0	3
7GC24	Engineering Mathematics-II	4	1	0	4
7G121	Data Structures	3	1	0	3
7G521	Engineering Graphics –II	2	--	5	4
7G522	Engineering Mechanics - Dynamics	3	1	0	3
7GC26	Engineering Physics Lab	--	--	3	2
7G124	Programming in Data structures Lab	--	--	3	2
7GC27	ELCS Lab	--	--	4	2
7G123	IT Workshop	--	--	3	2
Audit course	Gender sensitization	2	--	--	--
Total		17	4	18	25

Note: L - Lecture; T-Tutorial; P – Practical; C – Credits

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)
DEPARTMENT OF MECHANICAL ENGINEERING

Regulations: **R17**Programme Code: **G5****II Year B. Tech., I Semester**

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7GC32	Engineering Mathematics –III	3	1	0	3
7G531	Mechanics of Solids	4	1	0	4
7G532	Metallurgy & Material Science	3	1	0	3
7G533	Basic Thermodynamics	3	2	0	3
7G534	Manufacturing Technology	3	1	0	3
7G535	Machine Drawing	2	--	5	4
7G538	Manufacturing Technology Lab	0	--	3	2
7G539	Material Science Lab	0	--	2	1
7G53A	Mechanics of Solids Lab	0	--	2	1
7G53B	Seminar – I	1	--	0	1
	Sports & Extension Activities	--	--	1	0
Total		19	06	13	25

NOTE:

#The End exam for Machine Drawing will be for 4 hrs in the following format.

All questions are to be answered

Q1: Questions set on section I & II of the syllabus 2 out of 3 or 2 out of 4 to be answered with a weightage of 4 marks each – 08 marks

Q2: Questions set on Section II of the syllabus 2 out of 3 to be answered with a weightage of 10 marks each – 20 marks

Q3: Drawing of assembled views of Section III items of Syllabus with a weightage of 42 marks. Note that, all answers should be on the drawing sheet only. Answers on the drawing sheet only will be valued.

II Year B. Tech., II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7GC42	Probability and Statistics	3	1	0	3
7GC41	Environmental Science	3	1	0	3
7G245	Electrical and Electronics Engineering	3	1	0	3
7G541	Applied Thermodynamics – I	4	1	0	4
7G542	Fluid Mechanics and Hydraulic Machinery	4	1	0	4
7G543	Kinematics of Machinery	4	1	0	4
7G248	Electrical and Electronics Engineering lab	0	--	2	1
7G544	Fluid Mechanics and Hydraulic Machines Lab	0	--	2	1
7G545	Kinematics of Machinery lab	0	--	2	1
7GC44	Aptitude and Reasoning Skills	0	2	--	1
Total		21	06	07	25

Note: L - Lecture; T-Tutorial; P – Practical; C – Credits

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B.Tech., I Semester

(7GC11) Technical English and Professional Communication

(Common to all branches)

**L T P
4 1 0**

Course Objectives:

- To improve the language proficiency of the students in English with respect to accuracy and fluency
- To enable the students to acquire comprehension skills to study academic subjects with greater felicity
- To develop English communication skills of the students in formal and informal situations
- To enable the students to gain familiarity with the dynamics of communication, stumbling blocks in communication

UNIT I

Sure Outcomes: Technology with a Human Face

Grammar: Kinds of Verbs and their Use; Writing: Official Letters; Vocabulary: Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases

Technical Communication: Features; Distinction between General and Technical communication; Language as a tool of communication; Elements of Human Communication

UNIT II

Sure Outcomes: Climatic Change and Human Strategy

Grammar: Tenses; Writing: Letters of Application; Vocabulary: One-word Substitutes

Levels of Communication: Intrapersonal; Interpersonal, Organizational, Mass communication

The Flow of Communication: Downward, Upward, Lateral or Horizontal (Peer group)

UNIT III

Sure Outcomes: Emerging Technologies: Solar Energy in Spain

Grammar: Types of Sentences: Simple, Compound and Complex; Declarative, Interrogative, Imperative and Exclamatory; Writing: E-mails; Vocabulary: Commonly Confused Words

Non-verbal Communication: Kinesics; Proxemics; Paralinguistic features; Chronemics. Role of Body Language during Presentation, GD and Interview

UNIT IV

Sure Outcomes: Water: The Elixir of Life

Grammar: Subject-Verb Agreement; Writing: Official Reports, Technical Reports; Vocabulary: English Spelling, Commonly misspelt words

Barriers to Communication: Definition of Noise; Classification of Barriers; overcoming barriers

Listening: Types of Listening; Traits of a Good Listener; Active vs. Passive Listening; Empathetic Listening

UNIT V

Sure Outcomes: The Secret of Work

Grammar: Active and Passive Voice; Writing: Note-making; Vocabulary: Connotations

The Models of Communication: Linear; Interactive; Transactional; Johari Window; Transactional Analysis

Communicative Styles: Assertive, Aggressive, Passive-aggressive, Submissive, Manipulative

Prescribed Textbooks:

1. *Sure Outcomes* published by Orient Black Swan (with CD)
2. *Technical Communication, Principles and Practices*, Meenakshi Raman and Sangeeta Sharma, 3rd Edition, Oxford University Press, 2015

The books prescribed serve as students' handbooks. The reader comprises essays which are particularly relevant to the needs of engineering students. The teacher should focus on developing LSRW skills of students while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and to write short paragraphs and essays. The main aim is to encourage two-way communication in place of one-sided lecture.

References:

1. *Developing Communication Skills*, 2/e. by Krishna Mohan & Meera Banerji, Macmillan, 2009
2. *Essential Grammar in Use*, (with CD), Raymond Murphy, 3/e, Cambridge University Press, 2009
3. *English Grammar and Composition*, David Grene, Mc Millan India Ltd.
4. *Everyday Dialogues in English* by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
5. *Basic Communication Skills for Technology*, Andrea J Ruthurford, Pearson Education, Asia.
6. *English for Technical Communication*, Aysha Viswamohan, Tata Mc-Graw Hill

7. Communication Skills for Technical Students, Farhathullah, T.M., Orient Blackswan, 2008
8. English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.

Course Outcomes:

1. Students will increase their vocabulary through the study of word parts, use of context clues, idiomatic expressions, and practice with a dictionary
2. Students exhibit effective writing skills and create effective documents in technical communication such as letters, reports and emails
3. Students will understand the factors that influence the use of grammar and vocabulary in speech and writing
4. Students shall develop professional communication skills, which are necessary for effective collaboration and cooperation with other students
5. Students will learn to effectively utilize his body language to communicate in his academic and professional career

Mapping of COs and POs

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	-	-	-	-	-	-	-	-	1	3	-	3
CO2	-	-	-	-	-	-	-	-	-	3	-	3
CO3	-	-	-	-	-	-	-	-	-	3	-	2
CO4	-	-	-	-	-	-	-	-	3	3	-	1
CO5	-	-	-	-	-	-	-	-	1	2	-	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B.Tech., I Semester

(7GC12) Engineering Chemistry
(Common to CSE, CE and ME)

L	T	P
3	1	0

Course Objectives:

- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The course is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells.
- The student will understand the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, analytical methods, engineering materials and water chemistry

UNIT I

WATER TREATMENT: Impurities in water, Hardness of water and its units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, and alkalinity in water. Water treatment for domestic purpose. Disinfection - Definition, Kinds of disinfectants (Bleaching powder & Ozone) Break point chlorination.

Industrial Use of water, Boiler troubles-Priming and foaming, Scale & Sludge, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water: Internal Treatment- Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate conditioning. External Treatment- Zeolite Process, Ion-Exchange process, Desalination of brackish water by Reverse Osmosis

UNIT II

ELECTROCHEMISTRY: Basic concepts-Nernst equation, Galvanic cell, Standard Reductional Potential (SRP), numerical calculations on EMF.

Batteries: types of batteries, primary batteries-Dry cell, Secondary batteries-Ni-Cd, Lithium Ion Batteries. Fuels cells-Hydrogen-Oxygen fuel cell & Methanol-Oxygen fuel cell.

Conductometry-basic concepts, conductance, molar and equivalent conductance, measurement of conductance, Types of conductometric titrations-strong acid Vs. strong base, weak acid Vs. weak base, strong acid Vs. weak base and weak acid Vs. weak base.

CORROSION: Definition & Types -dry & wet Corrosions, Electrochemical theory of corrosion, concentration cell corrosion, galvanic corrosion, factors affecting the corrosion, Prevention: Anodic and Cathodic protection, Electroplating -Nickel, copper & Electroless plating-Nickel.

UNIT III

POLYMERS: Introduction to polymers, Types of Polymerization: Addition, Condensation & Co-polymerization (without mechanism). Plastics-Thermoplastics and Thermosetting Plastics: Preparation, properties and applications of Bakelite, Nylons-6,6, PVC and PE.

Natural Rubber: Processing of natural rubber, vulcanization and compounding of rubber. Elastomers: Preparation, properties and Engineering applications of Buna-S, Buna-N and polyurethane rubbers.

Conducting polymers: Synthesis, mechanism & applications of Polyacetylene

Inorganic Polymers: Introduction, Silicones, Polyphosphazenes and polydispersive Index

UNIT IV

FUEL TECHNOLOGY: Classification of Fuels, Calorific Value – Units, its determination using Bomb calorimeter, Numerical Problems on calorific value and Combustion Solid Fuels - Coke: Manufacture of Coke by Otto Hoffmann's by product oven.

Liquid Fuels: Petroleum: Refining of Petroleum, Synthetic Petrol: Bergius Processes, Fischer Tropsch's synthesis. Gasoline: Knocking, Octane Number. Diesel - Cetane number.

Gaseous Fuels: Origin, Production and uses of Natural gas, Water Gas and Biogas. Flue Gas analysis by Orsat's apparatus

UNIT V

CHEMISTRY OF ENGINEERING MATERIALS: Cement: Composition & manufacture of Portland cement, Setting and Hardening (Hydration and Hydrolysis) Refractories: Definition, classification with suitable examples, properties -Refractoriness, RUL, Dimensional Stability, Porosity and Thermal spalling and Applications of refractory materials

Lubricants: Definition, classification, mechanism of lubrication and properties of lubricants- Viscosity, viscosity index, flash and fire point, cloud and pour point, mechanical strength, neutralizing number and Aniline point, applications of lubricants.

Prescribed Text Books:

1. Engineering Chemistry by K.N Jayaveera, G.V Subba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, 1st edition, 2013.
2. A Text Book of Engineering Chemistry, Jain and Jain, Dhanapath Rai Publishing Company, New Delhi, 17th Edition, 2013

Reference Books:

1. A Text book of Engineering Chemistry by S.S Dhara, S.S Umare, S. Chand Publications, New Delhi, 14th Edition, 2014.
2. Engineering Chemistry by K.B Chandra Sekhar, UN. Das and Sujatha Mishra, SCITECH, Publications India Pvt. Limited, Chennai, 2nd Edition, 2012.
3. Concepts of Engineering Chemistry- Ashima Srivastava and N.N. Jahnvi, Acme Learning Pvt Ltd, First Edition, 2013.
4. Text Book of Engineering Chemistry, Shashichawla, DhanapathRai & Co Publications, New Delhi, 4th Edition, 2014.
5. Engineering Chemistry, K. Sessa Maheswaramma and Mrudula Chugh, Pearson Education, First Edition, 2013.

Course Outcomes:

1. The students will be able to understand the basic concepts of water analysis methods which help them in solving problems related to water treatment methods.
2. The students will be able to understand the basic principles of conductometry, batteries & fuel cells, and extends the knowledge to solve problems of corrosion.
3. The students will be able to synthesize and differentiate different types of polymers.
4. The students will be able to derive or manufacture different types of fuels and elucidate their properties

5. The students will be able to manufacture cement, understand the basic concepts of refractories, lubricants and elucidate their properties

Mapping of COs and POs

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	2	2	1	-	-	2	-	-	-	-	-	-
CO2	3	2	1	-	-	1	-	-	-	-	-	2
CO3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	-

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech., I Semester

**(7GC14)Engineering Mathematics – I
(Common to all branches)**

L	T	P
4	1	0

Course Objectives:

- The subject gives the knowledge about matrices and applications to solve linear equations.
- The course intends to provide an overview of Eigen values and Eigen vectors which occur in Physical and engineering problems.
- To understand the differential equations of first order with their applications.
- To provide an overview of differential equations of second and higher order with their applications
- To understand the concepts of mean value theorems and functions of several variables

UNIT I

Real Matrices: Types - definitions - Elementary transformations – Rank – Echelon form – Consistency-Solution of Linear System of Homogenous and Non-Homogeneous equations.

Eigen Values & Eigen Vectors: Eigen Values, Eigen vectors – Properties, Cayley – Hamilton Theorem.

UNIT II

Diagonalization of matrix - Quadratic form: Reduction of quadratic form to canonical form - nature - Linear Transformation –Orthogonal Transformation.

Complex Matrices - Hermitian, Skew-Hermitian, Unitary matrices- Eigen Values, Eigen vectors – Properties.

UNIT III

Differential Equations of first order and first degree: Linear and Bernoulli equations. Applications to Newton’s law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT IV

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax/\cos ax$, polynomials in x , $e^{ax} \sin ax/e^{ax} \cos ax/e^{ax} x^n$, $x \sin ax/x \cos ax$, method of variation of parameters. Applications to oscillatory electrical circuits.

UNIT V

Rolle's Theorem – Lagrange's Mean Value Theorem (without proof). Functions of several variables – Partial differentiation- Chain rule-Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

Prescribed Text Books:

Higher Engineering Mathematics, B.S.Grewal, 43rd Edition, Khanna publishers, 2014.

Reference Books:

1. Advanced Engineering Mathematics, EriwinKreyszig, 9th edition, Wiley International edition.
2. Engineering Mathematics, H.K.Dass and Verma Rama, S. Chand, 2007.
3. Engineering Mathematics, Pal and Bhunia, First edition, Oxford University, 2015.
4. Higher Engineering Mathematics, B.V. Ramana, Tata McGraw Hill Publishing Company limited, 2006.
5. Higher Engineering Mathematics, John Bird 7th Edition, Routledge-Taylor and Francis Group London, 2014.

Course Outcomes:

1. Students will be able to apply this knowledge to solve linear equations.
2. Student will understand the concept of modeling or translating a physical or any other.
3. Students will be able to solve first order differential equations and their applications.
4. Students will learn the usage of higher order differential equations that are applied to real world problems.
5. Students will exhibit an ability to identify, formulates, and solve the problems on functions of several variables.

Mapping of COs and POs

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3	3	-	-	-	-	-	-	-	-	-	3
CO2	3	2	-	-	-	-	-	-	-	-	-	3
CO3	3	-	2	-	-	-	-	-	-	-	-	3
CO4	3	-	2	-	-	-	-	-	-	-	-	2
CO5	3	3	-	-	-	-	-	-	-	-	-	2

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech., I Semester

**(7G111) PROBLEM SOLVING TECHNIQUES AND C
PROGRAMMING**

(Common to all branches)

L	T	P
3	1	0

Course Objectives:

- Introduction to computer peripherals, Software development.
- Describe when and how to use the C statement and to Write, Compile and Debug basic C programs using an IDE
- Write and debug programs using an IDE and the principles of designing
- Structured programs when and how to use the appropriate statements available in the C language
- Write basic C programs using, Selection statements, Repetitive statements, Functions, Arrays and Strings

UNIT I

Introduction to Computer Problem Solving: Introduction to Computer Systems, Computer Environments, Computer Languages, Introduction to Problem Solving Aspect, Top- down Design, Implementation of Algorithms, Flow Charts, SDLC.

UNIT II

Introduction to C Language: Structure of a C Language program, Creating and Running C programs, Keywords, Identifiers, Data Types, typedef, enumerated Types variables, constants, input/output. Operators and Expressions, precedence and associativity, Type Conversions, Bitwise Operators. Example programs for each topic.

UNIT III

C Program Statements, Selection and Decision-making Statements-two-way selection –if...else statements, multi way selection-switch statements. Loop Control Statements-concept of a loop, Loops in C-while loop, do...while loop, for loop, Other Related Statements -break, continue, goto. Example programs for each topic.

UNIT IV

ARRAYS: Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Multidimensional Arrays.

Strings: String Basics, String Library Functions, Array of Strings. Example programs for each topic.

UNIT V

Functions: Library Functions in C, User defined Functions, -declaration, definition, calling of function, types of User defined functions, Parameter passing methods-pass by value, pass by reference, Scope, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type Qualifiers, Recursion - Recursive Functions, Preprocessor Commands. Using Array Elements as Function Arguments. Example programs for each topic.

Text Books:

1. C Programming and Data Structures.B. A Forouzan,R. F. Gilberg, Cengage learning, Indian edition.
2. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
3. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill.
4. How to Solve it By Computer, R.G.Dromey,PHI.

Reference Books:

1. C and Data Structures, A snapshot oriented treatise with live engineering examples, Dr. N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand.
2. LET US C, Yeswanth Kanitkar, Ninth Edition, BPB Publication.

Course Outcomes:

After completion of the course student will be able to

1. Understand the importance of the software development process and System development tools.
2. Understand general principles of C programming language and able to write simple programs in C.
3. Understand the conditional and iteration statements in C language and able to write simple programs.
4. Able to develop the programs based on arrays and strings.
5. Able to develop the programs based on user-defined functions and their principles.

Mapping of COs and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	3	-	1	-	-		-	-	-
CO2	3	3	3	3	3	-	-	-	1	-	-	-
CO3	3	2	1	2	1	-	-	-	1	-	-	2
CO4	2	3	2	2	3	-	-	-	1	-	1	2
CO5	3	2	2	2	2	-	-	-	1	-	-	2

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech., I Semester

(7G511) ENGINEERING GRAPHICS – I

(Common to ME and CE)

L	T	P
2	0	5

Course Objectives:

- To enable the students with various concepts like Dimensioning, Conventions and standards related to working drawing in order to become professionally efficient.
- To introduce fundamental concepts of curves used in engineering, projection of points, lines and planes.
- To impart and inculcate proper understanding of the theory of projections.
- Able to understand and visualize geometrical curves, projections of lines and planes.

UNIT I

INTRODUCTION: Lettering – Geometrical constructions - Curves used in Engineering Practice: Conic Sections– General method only. Special methods: Ellipse – Oblong method, Arcs of circle method, Concentric circles methods - Rectangle method and Tangent method for Parabola - Rectangular Hyperbola.

UNIT II

CYCLOIDAL CURVES: Cycloid, Epicycloid and Hypocycloid (treatment of simple problems) –Involute – Square, Pentagon, Hexagon and Circle.

UNIT III

PROJECTIONS OF POINTS AND LINES: Projections of Points and Projections of Lines-Inclined to one reference plane - Inclined to both reference planes, Finding the True lengths - Traces.

UNIT IV

PROJECTIONS OF PLANES: Projections of regular Plane surfaces inclined to one reference plane and both reference planes.

UNIT V

AUXILIARY PLANES: Projection of lines and planes using auxiliary planes.

Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana, P. Kanniah, Scitech Pub.

Reference Books:

1. Engineering Drawing and Graphics, Venugopal/ New age.
2. Engineering Drawing, Johle, Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education

Course Outcomes:

1. Understands the concepts of Conic Sections.
2. Understands the concept of Cycloidal Curves, Involutives and the application of industry standards.
3. Students are capable to understand the Orthographic Projections of Points and Lines and are able to improve their visualization skills so that they can apply these skills in developing the new products.
4. Students are capable to understand Orthographic Projections of Planes.
5. Understands the Auxiliary Projections of Points, Lines and Planes.

Mapping of COs and Pos

Cos	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	-	-	-	-	3	2	-	1	2	-	-
2	3	-	-	-	-	3	2	-	1	2	-	-
3	3	2	-	-	-	3	2	-	1	2	-	-
4	3	2	-	-	-	3	2	-	1	2	-	-
5	3	2	-	-	-	3	2	-	1	2	-	-

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech., I Semester

(7G512) ENGINEERING MECHANICS-STATICS

(Common to ME and CE)

L	T	P
3	1	0

Course Objectives:

- This course will serve as a basic course by introducing the concepts of basic mechanics which will help as a foundation to various courses.
- Develop an understanding of the principles of statics and the ability to analyze problems in a systematic and logical manner, including the ability to draw free-body diagrams. Ability to analyze the statics of trusses, frames and machines.

UNIT I

INTRODUCTION TO ENGINEERING MECHANICS: Basic concepts - System of forces–Resultant of a force system, Moment of forces and its Application & Couples, Spatial Forces-Components in space, Resultant Equilibrium of system forces, free body diagrams.

UNIT II

TYPES OF SUPPORTS: Support reactions for beams with different types of loading – concentrated, uniformly distributed load, uniformly varying loading and couple.

ANALYSIS OF FRAMES (ANALYTICAL METHOD): Types of Frames – Assumptions for forces in members of a perfect frame. Method of Joints, Method of Sections, Cantilever and Simply supported Frames.

UNIT III

FRICTION: Types of friction– Static and Dynamic Frictions, laws of Friction– Limiting friction and impending motions–Cone of limiting friction– Motion of bodies – Wedge friction – Ladder friction.

UNIT IV

CENTROID AND CENTER OF GRAVITY: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies –Theorem of Pappu’s and Guldinus Centre of Gravity of Composite figures. (Simple problems only).

UNIT V

MOMENT OF INERTIA: Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures,

MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids, Moment of Inertia of composite masses. (Simple problems only).

Text Books:

1. Engineering Mechanics-Statics and Dynamics, A.Nelson, Tata McGraw-Hill Company.
2. Engineering Mechanics, R.K Bansal - Laxmi Publications
3. Singer's Engineering Mechanics, B. Vijay kumarreddy – B.S. Publishers.
4. Engineering Mechanics, Bhavikatti and Rajasekharappa

Reference Books:

1. Engineering Mechanics by Timoshenko & young, Tata McGraw-Hill Company
2. Engineering Mechanics – B. Bhathacharya- Oxford University Publications
3. Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning
4. Engineering Mechanics-Statics & Dynamics—Johnson & Beer

Course Outcomes:

The students are able to

1. Understand the concept of force, moment, couple and their applications.
2. Draw Free Body Diagram, understand and apply the conditions of equilibrium to find out unknown forces.
3. Determine reactions at the supports of beam for different types of loading.
4. Analyze the forces in the members of the frames/truss.
5. Understand the concept of friction and its applications.
6. Understand the concept of centroid and location of centroid of plane figures and material bodies.
7. Understand moment of inertia, determining moment of inertia of plane figures and material bodies.

Mapping of COs and POs

Cos	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	-	-	-	-	-	-	-	-	-	-	-
2	X	-	-	-	-	-	-	-	-	-	-	-
3	X	-	-	-	-	-	-	-	-	-	-	-
4	X	X	-	-	-	-	-	-	-	-	-	-
5	X	X	-	-	-	-	-	-	-	-	-	-
6	X	-	-	-	-	-	-	-	-	-	-	-
7	X	-	-	-	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech, I Semester

(7GC15) Engineering Chemistry Lab
(Common to ME and CE)

L	T	P
0	0	3

Course Objectives:

- The student will learn practical understanding of the redox reaction.
- The student will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications.
- The student will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology.

LIST OF EXPERIMENTS

Any 10 of the following experiments has to be performed

VOLUMETRIC ANALYSIS

Redox Titrations

1. Estimation of iron (II) using Diphenylamine indicator (Dichrometry – Internal indicator method)

Water analysis

2. Determination of total hardness of water by EDTA method
3. Estimation of calcium hardness using Murexide indicator
4. Estimation of Dissolved Oxygen by Winkler's method
5. Determination of Alkalinity of Water.

Iodometry

6. Determination of Copper by Iodometry

INSTRUMENTATION

Colorimetry

7. Estimation of Iron in Cement by Colorimetry.

Conductometry

8. Conductometric titration of mixture of acids Vs strong base (Neutralization titration)
9. Determination of pH of various water samples.

Fuel analysis

10. Determination of Calorific Value of fuel by using Bomb Calorimeter

Lubricants

- 11.Determination of Viscosity of oils using Redwood Viscometer I
- 12.Determination of Viscosity of oils using Redwood Viscometer II
- 13.Determination of Flash and fire points of Lubricants

PREPARATION OF POLYMERS

- 14.Preparation of Bakelite
- 15.Preparation of Thiokol rubber

Manual cum Record: Prepared by the Faculty Members of Engineering Chemistry of the college will be used by Students.

REFERENCE BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.
2. Chemistry Practical – Lab Manual by K.B. ChandraSekhar, G.V. Subba Reddy and K.N. Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.

Course Outcomes:

1. Students will understand the concept of redox systems
2. Students will exhibit skills to handle the analytical methods with confidence
3. Students will be able to acquire the operating principles and the reaction mechanisms of the instruments
4. Students will be able apply his knowledge on the basic principles of batteries

Mapping of COs and POs

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	2	-	2	2	-	3	-	-	-	-	-	-
CO2	-	3	-	2	-	3	-	-	-	-	-	-
CO3	3	-	-	2	-	2	-	-	-	-	-	-
CO4	2	-	-	2	-	2	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech., I Semester

(7G112) PROGRAMMING IN C LAB

(Common to all branches)

L	T	P
0	0	3

Course Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Exercise 1:

Minimum of 4 programs on Data types, Variables, Constants and Input and Output.

Exercise 2:

Minimum of 4 programs on each Operator, Expressions and Type Conversions.

Exercise 3:

Minimum of 4 programs on Conditional Statements [two way and multipath].

Exercise 4:

Minimum of 4 programs on each Loop Control Statements [for, while and do-While]

Exercise 5:

Minimum of 4 programs on Unconditioned JUMP Statements- break, continue, Goto.

Exercise 6:

Minimum of 4 programs on Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.

Exercise 7:

Minimum of 4 programs on Multidimensional Arrays.

Exercise 8:

Minimum of 4 programs on String Basics, String Library Functions and Array of Strings.

Exercise 9:

Minimum of 4 programs on simple user defined functions, Parameter passing methods- pass by value, pass by reference.

Exercise 10:

Minimum of 4 programs on Storage classes- Auto, Register, Static and Extern

Exercise 11:

Minimum of 4 programs on Recursive Functions, Preprocessor commands.

Exercise 12:

Minimum of 4 programs on using Array Elements as Function Arguments.

Course Outcomes:

After Completion of the course student should able to

- Know concepts in problem solving
- To do programming in C language
- To write diversified solutions using C language.

Mapping of COs and Pos

Course outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3	2	-	2	2	-	-	-	2	2	1	2
CO2	2	2	-	-	-	-	-	-	1	-	-	2
CO3	3	-	-	1	-	-	-	-	1	-	-	2

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

**I Year B. Tech. I Semester
(7G514) ENGINEERING WORKSHOP
(Common to ME and CE)**

L	T	P
0	0	3

Course Objective:

The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially, know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

1. TRADES FOR EXERCISES:

- A. **CARPENTRY SHOP**– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 50 x 50 mm soft wood stock
- B. **FITTING SHOP**– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock.
- C. **SHEET METAL SHOP**– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22- or 20-gauge G.I. sheet.
- D. **HOUSE-WIRING**– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
- E. **FOUNDRY**–Preparation of two moulds (exercises): for a single pattern and a double pattern.
- F. **WELDING** – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint

2. TRADES FOR DEMONSTRATION:

A. PLUMBING

B. MACHINE SHOP

C. METAL CUTTING

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

Reference Books:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

Course outcomes:

- An ability to identify and apply suitable tools for manufacturing of components in workshoptrades of Fitting, Carpentry, Foundry, Tin smithy, Welding.
- An ability to identify and use hand tools for electrical wiring and give power supply to Domesticinstallations.

Mapping of COs and POs

CO'S	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
1	3	-	-	-	-	-	-	-	-	-	-	3
2	1	-	-	-	-	-	-	-	2	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I. Year B. Tech. II Semester

(7GC23) ENGINEERING PHYSICS

(Common to CSE, ME, CE)

L	T	P
3	1	0

Course Objectives:

- The mission of Engineering Physics course is to prepare students for careers in Engineering where Physics principles can be applied to the advancement of technology.
- The Engineering Physics course educates the principles of optical science and Engineering necessary to understand optical systems.
- The crystallography, X-ray diffraction of crystals explain how basic structure modulates properties of materials.
- The principles of Quantum mechanics and Electron theory of metals give an idea on basic development of energy in metals.
- The main objective of this course is to provide basic understanding of different Engineering materials such as semiconductors, magnetic, superconductors and nanomaterials.

UNIT I

PHYSICAL OPTICS, LASERS AND FIBRE OPTICS:

Physical Optics: Interference (review) Interference in thin films by reflection – Newton’s Rings – Fraunhofer diffraction and grating-spectrum.

Lasers: Introduction - Characteristics of laser – Spontaneous and stimulated emission of Radiation– Einstein’s coefficients - Population inversion – Ruby laser - He-Ne laser – Semiconductor laser - Applications of lasers.

Fibre optics: Introduction– Construction and working principle of optical fiber – Numerical aperture and acceptance angle – Types of optical fibers – Optical fiber communication system – Applications of optical fibers in sensors and medicine.

UNIT II

CRYSTALLOGRAPHY AND ULTRASONICS:

Crystallography: Introduction – Space lattice – Unit cell – Lattice parameters – Bravais lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction - Bragg’s law – Powder method of diffraction.

Ultra-sonics: Introduction – Production of ultra-sonics by piezoelectric method – Properties and detection – Applications in non-destructive testing.

UNIT III**QUANTUM MECHANICS AND FREE ELECTRON THEORY:**

Quantum Mechanics: Introduction to matter waves – De’Broglie hypothesis Heisenberg’s uncertainty principle - Schrodinger’s time independent wave equation – Significance of wave function - Particle in a one-dimensional infinite potential well.

Free electron theory: Classical free electron theory – Sources of electrical resistance – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution – Kronig - Penny model (qualitative) – Classification of solids into conductors, semiconductors and insulators.

UNIT IV**SEMICONDUCTORS AND SUPERCONDUCTORS:**

Semiconductors: Introduction – Intrinsic and extrinsic semiconductors – Drift & diffusion currents and Einstein’s equation – Hall effect - Direct and indirect band gap semiconductors – Working principle of p-n junction diode, LED and photodiode.

Superconductors: Introduction – Properties of superconductors - Meissner effect – Type I and type II superconductors – Flux quantization – BCS theory(qualitative) -ac and dc Josephson effects- High T_c Superconductors - Applications of superconductors.

UNIT V**MAGNETIC MATERIALS AND NANOMATERIALS:**

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magneton – Classification of magnetic materials into dia, para, ferro, anti-ferro and ferri magnetic materials – Hysteresis - Soft and hard magnetic materials and applications.

Nanomaterials: Introduction - Significance of nanoscale – Basic principles of nano materials (Surface area and quantum confinement) – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials: ball mill, chemical vapour deposition, sol-gel methods – structure and properties of CNT - Applications of nanomaterials.

Prescribed Text Books:

1. Engineering Physics –K. Thyagarajan, II Edition, MacGraw Hill Publishers, 2013.
2. Engineering physics –P.K.Palanisamy, 2nd Edition, Scitech publisher, 2013.

Reference Books:

1. Engineering physics – S. ManiNaidu, I Edition, Pearson Education, 2012.
2. Engineering Physics – D K Pandey, S. Chaturvedi, I Edition, Cengage Learning, 2012.
3. Engineering Physics – Gaur and Gupta Dhanapati, 7th Edition, RaiPublishers , 1992.
4. Engineering Physics – M. Arumugam, II Edition, Anuradha Publications, 1997.
5. Text book of Nanoscience and Technology: B S Murthy, P.Shankar, Baldev Raj B BRath, James Murday, I Edition, University Press, 2012.
6. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar, Chand and Co, Revised Edi 2013.

Course Outcomes:

- Students gain knowledge about basic concepts of optics, fiber optics, and lasers.
- Students will be able to identify different types of crystal structures that occur in materials and understand production and application of Ultrasonics.
- The student exhibits knowledge of the roots and founding principles of Quantum Mechanics and band theory of solids.
- Students develop an understanding of the basic principles underlying the semiconductor and superconductors.
- Students become familiar with the general properties of magnetic materials and nanomaterials.

Mapping of COs and Pos

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech., II Semester

(7GC24) Engineering Mathematics II
(Common to all branches)

L	T	P
4	1	0

Course Objectives:

- To apply this knowledge to evaluate the Multiple Integrals in real life situations.
- To introduce the concepts of Laplace transforms.
- To apply the knowledge of Inverse Laplace transforms-for engineering problems.
- To provide the concepts of vector-differentiation and integration.
- To apply the knowledge of Green's theorem, Stroke's theorem and Gauss divergence theorem.

UNIT I

Curve Tracing – Cartesian and Polar curves

Multiple integrals: Double integral – Evaluation - Change of Variables - Change of order of integration- Triple integral - Evaluation.

UNIT II

Laplace transforms of standard functions– First shifting Theorem, Change of scale property, Multiplication by t^n , division by t , Transforms of derivatives and integrals – Second shifting theorem– Laplace transform of Periodic functions.

UNIT III

Inverse Laplace transforms – Convolution theorem. Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT IV

Vector Calculus: Scalar and vector point functions, Gradient, Divergence, Curl, Properties, Del applied twice to point functions, Line integral - Area, Surface and volume integrals.

UNIT V

Vector integral theorems: Green's theorem – Stroke's theorem - Gauss's Divergence Theorem (without proofs) and their applications.

Prescribed Text Book:

Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-43rd Edition (2014)

Reference Books:

1. Advanced Engineering Mathematics, Eriwin Kreyszig, 9 th edition, Wiley International edition.
2. Engineering Mathematics, H.K.Dass and Verma Rama, S. Chand, 2007.
3. Engineering Mathematics, Pal and Bhunia, First edition, Oxford University, 2015.
4. Higher Engineering Mathematics, B.V. Ramana, Tata McGraw Hill Publishing Company Limited, 2006.
5. Higher Engineering Mathematics, John Bird 7th Edition, Routledge-Taylor and Francis Group London, 2014.

Course Outcomes:

- Student will understand the applications of Curve tracing and Multiple integration
- Student will exhibit the Knowledge of Laplace transforms.
- Student will exhibit the Knowledge of Inverse Laplace transforms and solve the ordinary differential equations with given initial boundary conditions in engineering subjects
- Student will be able to analyze the Vector differentiation and Integration in various domains.
- Student understands the applications of Vector Integral theorems.

Mapping of COs and Pos

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3	3	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	3	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech., II Semester

(7G121) DATA STRUCTURES

(Common to ALL branches)

L	T	P
3	1	0

Course Objectives:

- Structured programs when and how to use the appropriate statements available in the C language
- Implementation of C programs using Structures, Unions, Files and Pointers.
- Implementation of various types of searching and sorting techniques.
- Implementation of linear Data structures.
- Implementation of non-linear Data structures.

UNIT I

Pointers - Introduction, Features of Pointers, Pointer Declaration and Definition, Void Pointers, pointers for inter function communication, Pointers to Pointers, Pointer Applications: arrays and pointers, pointer arithmetic, Dynamic Memory Allocation, Pointers to Functions, pointer to void and command line arguments.

UNIT II

Structures – Definition, initialization, accessing structures, nested structures, array of structures, structures and functions. Pointers and Structures. Unions. Sample programs

Files: Introduction to Streams and Files, Standard library input / output functions, formatted input / output functions, character input/output functions; Text versus binary Streams, Standard library functions for files. File examples.

Searching and Sorting - Exchange (Bubble) Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort, Searching- Linear and Binary Search Methods.

UNIT III

Data Structures: Overview of Data Structure. **Stack:** Representation of a Stack, Operation on a Stack, Implementation of a Stack using Arrays and Pointers, Representation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Recursion.

Queues: Representation of Queue, Insertion, Deletion, Searching Operations, Circular Queues.

UNIT IV

Linked List: Singly Linked List, Linked List with and without header, Insertion, Deletion and Searching Operations.

Doubly Linked List: Insertion, Deletion and Searching Operations.

Circular Linked List: Insertion, Deletion and Searching Operations.

UNIT V

Trees: Introduction to Trees, Binary Trees, creation of binary tree, Operations on Binary Tree. Introduction to Binary Search Tree, Operations on Binary Search Trees.

Graphs: Defining graph, basic terminology, graph representation.

Text Books:

1. C Programming and Data Structures. B.A Forouzan,R. F.Gilberg, Cengage learning, Indian edition.
2. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
3. Data Structures and Algorithms: Concepts, Techniques and Applications G.A.V. Pai[UNIT-V]

Reference Books:

1. C and Data Structures, A snapshot oriented treatise with live engineering examples, Dr. N.B.Venkateswarlu, Dr. E.V. Prasad, S. Chand.
2. LET US C, Yeswanth Kanitkar, Ninth Edition, BPB Publication.

Course Outcomes:

1. Understand the purpose of pointers for parameter passing, referencing and dereferencing.
2. Understands the concepts of structures, unions, File management and how to solve the applications like searching and sorting using C programming language.
3. Understand what and how to design data structure programs of stacks and queues using C programming language.
4. Understand what and how to design data structure programs of different types of linked list.
5. Understand how to design the non-linear data structures of trees and graphs.

Mapping of COs and POs

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	1	-	-	-	-	-	-	1
CO2	2	1	-	-	1	-	-	1	2	1	-	1
CO3	2	-	-	-	1	-	-	-	1	1	-	1
CO4	2	2	1	1	-	-	-	-	2	1	-	2
CO5	2	1	1	1	-	1	-	-	2	1	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech., II Semester

(7G521) ENGINEERING GRAPHICS – II

(Common to ME and CE)

L	T	P
2	0	5

Course Objectives:

- To impart and inculcate proper understanding of the theory of projections of solids and simple machine components.
- Able to visualize projections of solids with sectioning, isometric views and orthographic views.
- To prepare the student for future engineering positions.

UNIT I

PROJECTIONS OF SOLIDS: Projections of Regular Solids – Cylinder, Cone, Prism and Pyramid - inclined to one reference plane & both reference planes – Auxiliary Views.

UNIT II

SECTIONS OF SOLIDS: Section Planes and Sectional views of Right Regular Solids–Prism, Cylinder, Pyramid and Cone. True shapes of the sections.

UNIT III

DEVELOPMENT OF SURFACES: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectioned parts.

INTERPENETRATION OF RIGHT REGULAR SOLIDS: Projections of curves of Intersection of Cylinder Vs Cylinder – Cylinder Vs square prism – Cylinder Vs Cone and Square prism Vs Square prism (Axis bisecting problems only).

UNIT IV

ISOMETRIC PROJECTIONS / VIEWS: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids.

UNIT V

CONVERSION OF VIEWS: Conversion of Isometric views to Orthographic Views and Conversion of Orthographic views to Isometric views.

Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana, P. Kanniah, Scitech Pub.

Reference Books:

1. Engineering Drawing and Graphics, Venugopal/ New age.
2. Engineering Drawing, Johle, Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education

Course Outcomes:

1. Able to understand and analyze the Orthographic Projections of Solids.
2. Able to apply sectional views for industrial engineering components.
3. Students are capable to develop a sheet which meets the specifications of an object and can analyze the image of an intersected solids.
4. Can employ freehand 3D pictorial sketching to aid in the visualization process and to efficiently communicate ideas graphically.
5. Analyze a drawing and can efficiently communicate ideas graphically.

Mapping of COs and Pos

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	-	-	-	-	2	2	-	3	3	-	-
2	3	-	-	-	-	-	2	-	3	3	-	-
3	3	2	-	-	-	-	2	-	3	3	-	-
4	3	2	-	-	-	-	2	-	3	3	-	-
5	3	2	-	-	-	-	2	-	3	3	-	-

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech., II Semester

(7G522) ENGINEERING MECHANICS-DYNAMICS

(Common to ME and CE)

L	T	P
3	1	0

Course Objectives:

- This course will serve as a basic course by introducing the concepts of Basic mechanics which will help as a foundation to various courses.
- To teach the basic principles of particle and rigid body kinematics and kinetics. Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.

UNIT I

KINEMATICS OF PARTICLES: Introduction, motion of particle, displacement, velocity and acceleration, Rectilinear motion, Rectilinear motion Along X-axis, Uniformly Accelerated motion, motion curves, rectilinear motion along vertical Y-axis

CURVILINEAR MOTION: introduction, rectangular coordinates, projectile motion, tangential and normal components of acceleration, radial and transverse components of acceleration.

UNIT II

KINEMATICS OF RIGID BODIES: Introduction, rotational motion about a fixed axis, rotational motion with constant angular acceleration, rotational motion with constant angular velocity, relationship between angular and linear motions, general plane motion.

UNIT III

KINETICS OF PARTICLES: Introduction, laws of motion, motion of bodies in rectangular coordinates, motion of connected bodies, D'Alembert's principle, variable acceleration, tangential and normal components of acceleration, Virtual work method.

UNIT IV

WORK AND ENERGY: Introduction, work done by a force, work done by a variable force, work done in stretching a spring, power, energy, work done by internal forces, potential energy.

IMPULSE AND MOMENTUM: Introduction, impulsive force, impulse and momentum, non-impulsive force, impact of jet on plates or vanes.

UNIT V

KINETICS OF RIGID BODIES: Introduction, system of particles, translational motion of a system of particles, rotational motion of system of particles, kinetic equations of motion for a rigid body, work energy method.

Text Books:

1. Engineering Mechanics-Statics and Dynamics, A.Nelson, Tata McGraw-Hill Company.
2. Engineering Mechanics, R.K Bansal - Laxmi Publications
3. Singer's Engineering Mechanics, B. Vijay kumar reddy – B.S. Publishers.
4. Engineering Mechanics, Bhavikatti and Rajasekharappa.

Reference Books:

1. Engineering Mechanics by Timoshenko & young, Tata McGraw-Hill Company
2. Engineering Mechanics – B. Bhathacharya- Oxford University Publications
3. Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning
4. Engineering Mechanics-Statics & Dynamics—Johnson & Beer.

Course Outcomes:

The students are able to

1. Understand basic kinematic concepts – displacement, velocity and acceleration.
2. Analyze rectilinear motion and curvilinear motion.
3. Understand the concepts of angular displacement, angular velocity and angular acceleration.
4. Analyze general plane motion of bodies.
5. Understand the applications of Newton's laws of motion, D-Alembert's principle.
6. Calculate tangential and normal component of acceleration.
7. Understand virtual work and its applications.
8. Understand work, energy and their applications.
9. Understand Impulse, momentum and their applications.
10. Write kinetic equations of motion of rigid body and apply work-energy method for solving kinetics.

Mapping of Cos and Pos

Course Outcomes	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	X	-	-	-	-	-	-	-	-	-	-	-
CO2	X	-	-	-	-	-	-	-	-	-	-	-
CO3	X	-	-	-	-	-	-	-	-	-	-	-
CO4	X	X	-	-	-	-	-	-	-	-	-	-
CO5	X	-	-	-	-	-	-	-	-	-	-	-
CO6	X	-	-	-	-	-	-	-	-	-	-	-
CO7	X	-	-	-	-	-	-	-	-	-	-	-
CO8	X	-	-	-	-	-	-	-	-	-	-	-
CO9	X	-	-	-	-	-	-	-	-	-	-	-
CO10	X	X	-	-	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech, II Semester

(7GC27) Engineering Physics Lab
(Common to CSE, ME, CE)

L	T	P
0	0	3

Course Objectives:

- The student will be able to handle and understanding of different apparatus to perform experiments.
- The student will learn practical measurement of different physical quantities.
- The student will be able to characterize the materials and their properties.
- The student allows learning practical experience of theory conceptual values.

LIST OF EXPERIMENTS

Any 10 of the following experiments have to be performed

1. Determination of wavelengths of various colors of mercury spectrum using diffraction grating in normal incidence method
2. Determination of dispersive power of the prism
3. Determination of thickness of thin object by wedge method
4. Determination of radius of curvature of lens by Newton's Rings
5. Laser: Diffraction due to single slit
6. Laser: Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber
9. Melde's experiment: Determination of the frequency of tuning fork
10. Determination of particle size by using laser.
11. Energy gap of a material using p-n junction diode
12. Hall effect: Determination of mobility of charge carriers in semiconductor
13. B-H curve: Hysteresis loss.
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
15. Determination of rigidity modulus – Torsional pendulum

Manual cum Record:

Prepared by Engineering Physics Faculty Members of Annamacharya Institute of Technology and Sciences.

Reference Books:

1. Engineering Physics Practicals – Dr. B. Srinivasa Rao V.K.V. Krishna K.S Rudramamba
2. Engineering Practical Physics – S.L Kakani& Shubra Kakani

Course Outcomes:

1. Students will understand the characteristics and behavior of various materials
2. Students will be able to understand the applications of optics using basic fundamentals of physics
3. Students will exhibit an ability to use techniques and skills associated with modern engineering tools such as lasers and fiber optics
4. Students will be able to measure properties of a semiconductor and magnetic materials.

Mapping of Cos and Pos

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	2	-	-	-	2	-	-	-	-	-	-	-
CO2	3	2	-	-	3	-	-	-	-	-	-	-
CO3	2	2	-	2	3	-	-	-	-	-	-	-
CO4	2	3	-	-	2	-	-	-	-	-	-	-

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech., II Semester

(7G124) PROGRAMMING IN DATA STRUCTURES LAB

(Common to CE, EEE, ECE and ME)

Course Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Exercise 1 : Minimum of 3 Programs on pointer basics.

Exercise 2 : Minimum of 3 Programs on Pointers applications.

Exercise 3 : Minimum of 3 programs on structures and unions

Exercise 4 : Minimum of 3 programs on basic File operations.

Exercise 5 : Minimum of 3 programs on searching and sorting techniques.

Exercise 6 : Implementation of Stack and perform all Stack operations using
i) Arrays ii) Pointers

Exercise 7 : Implementation of Queue and perform all Queue operations using
i) Arrays ii) Pointers

Exercise 8 : Implement Circular Queue (its operations) using
i) Arrays ii) Pointers

Exercise 9 : Implementation of Single Linked List and its operations using
i) Arrays ii) Pointers

Exercise 10 : Implementation of Double Linked List and its operations using
 i) Arrays ii) Pointers

Exercise 11 : Implementation of Circular Linked List and its operations using
 i) Arrays ii) Pointers

Exercise 12 : C program that uses Stack operations to perform the following:
 i) Converting infix expression into postfix expression
 ii) Evaluating the postfix expression

Exercise 13 : Implement Binary Tree using Double Linked List and its operations.

Course Outcomes

1. Student will be able to choose appropriate data structure as applied to specified problem definition.
2. Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. Students will be able to use linear and non-linear data structures like stacks, queues, linked list etc.

Mapping of COs and POs

Course Outcomes	Programme Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO1 1	PO1 2
CO1	3	3	2	2	-	-	1	-	1	-	-	2
CO2	3	2	2	2	-	-	-	-	-	2	-	3
CO3	2	2	2	2	-	-	-	-	2	2	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech., II Semester

(7GC27) English Language Communication Skills Lab

(Common to CE, ME, ECE, EEE)

L T P
0 0 4

Course Objectives:

- To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
- To train students to use language effectively in everyday conversations
- To enable the students, understand rudiments of public speaking skills and acquire presentation skills
- To equip the students with better pronunciation through emphasis on individual speech sounds, accent and intonation.

SYLLABUS:

The following course content is prescribed for the **English Language Laboratory** sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants
2. Introduction to Stress and Intonation
3. Situational Dialogues
4. Telephone Skills
5. Describing Objects / Situation / People
6. Oral Presentations
7. Information Transfer

Manual cum Record, prepared by the Faculty Members of English of the college will be used by Students.

Minimum Requirement:

The English Language Lab shall have two parts:

- **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
- **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V. an LCD projector, a digital stereo –audio & video system and camcorder etc.

Suggested Software:

Sky Pronunciation Suite

Clarity Pronunciation Power – Part I

Learning to Speak English - 4 CDs

Course Outcomes:

1. Students will learn about the significance of pronunciation, accent and intonation and will attempt to neutralize their accent
2. Students will be able to express themselves in social and professional contexts fluently
3. Students will be able to converse over phone confidently and clearly in English
4. The student will be able to describe people, objects and situations using adjectives
5. Students will enhance their public speaking skills and make technical presentations confidently
6. Students will analyze and interpret data from graphs/pie charts.

Mapping of COs and Pos

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	2	2	-	1
CO2	-	-	-	-	-	-	-	-	2	3	-	2
CO3	-	-	-	-	-	-	-	-	3	2	-	2
CO4	-	-	-	-	-	-	-	-	2	2	-	1
CO5	-	-	-	-	-	-	-	-	2	3	-	3
CO6	-	-	-	-	-	-	-	-	1	2	-	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech., II Semester

(7G123) I.T WORKSHOP

(Common to CE, ME)

Course Objectives:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching.

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and troubleshooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: Operating system features: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimping activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, inserting header and Footer, changing the font, changing the color, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Optional Tasks:

Task 11: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.Tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

Task 12: Software: Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B. Tech., to IV. B.Tech., The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB
- CAD/CAM software
- AUTOCAD

REFERENCE BOOKS:

1. Introduction to Computers, Peter Norton, Mc Graw Hill
2. MOS study guide for word, Excel, Powerpoint & Outlook Exams”, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs”, Bigelows, TMH

Course Outcome:

1. Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
2. Prepare the Documents using Word processors
3. Prepare Slide presentations using the presentation tool
4. Interconnect two or more computers for information sharing
5. Access the Internet and Browse it to obtain the required information
6. Install single or dual operating systems on computer.

Mapping of COs and POs

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	3	-	2	-	-	-	2	-	-	-
CO2	-	-	-	-	3	-	-	-	-	3	1	2
CO3	-	-	-	-	3	-	-	-	-	3	1	2
CO4	-	-	3	-	2	-	-	-	2	-	-	-
CO5	-	-	-	-		-	-	-	2	-	-	2
CO6	-	-	3	-		-	-	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)
GENDERSENSITIZATION
(Audit Course)

Course Objectives:

- To develop students' sensibility with regard to issues offender in contemporary India.
- To provide acritical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

UNIT I

UNDERSTANDING GENDER:

Gender: Why should we study it? (Towards a world of Equals: Unit-1). Socialization: Making Women, Making Men (Towards a world of Equals: Unit-2). Introduction, Preparing for Womanhood, Growing up Male, First lessons in Caste, Different Masculinities. Just relationships: Being together as Equals (Towards a World of Equals: Unit-12). Mary Kom and other. Love and Acid just do not mix, Love Letters, Mothers and Fathers.

UNIT II

GENDER ANDBIOLOGY:

Missing Women: Sex Selection and its consequences (Towards a world of Equals: Unit-4) Declining Sex Ratio, Demographic Consequences. Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit-10) Two or Many? Struggles with Discrimination. Additional Reading: Our Bodies, Our Health (Towards a World of Equals: Unit-13)

UNIT III

GENDER ANDLABOUR:

Housework: The Invisible Labour (Towards a World of Equals: Unit-3) "My mother doesn't Work". "Share the Load". Women's Work: Its Politics and Economics (Towards a World of Equals: Unit-7) Fact and Fiction, Unrecognized and Unaccounted work.

UNIT IV

ISSUES OF VIOLENCE:

Sexual Harassment: Say No! (Towards a World of Equals: Unit-6) Sexual Harassment, not Eve-teasing-Coping with Everyday Harassment.

Domestic Violence: Speaking Out (Towards a World of Equals: Unit-8) Is Home a Safe Place? -When Women Unite [Film], Rebuilding Lives Thinking about Sexual Violence (Towards a World of Equals: Unit-11) Blaming the Victim-“I Fought for my Life.....”.

UNIT V

GENDER STUDIES:

Knowledge: Through the Lens of Gender (Towards a World of Equals-Unit-5) Point of View. Gender and the Structure of Knowledge.

Whose History? Questions for Historians and Others (Towards a World Equals: Unit-9) Reclaiming a Past. Writing other Histories.

Prescribed Text Books:

“Towards a world of equals: A Bilingual Textbook on gender”, A. Suneeta, Uma Bhugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Suise Tharu.

Note: Since it is interdisciplinary Course, Resource Person can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field.

Reference Books:

1. Sen, Amartya. “More than one Million Women are Missing.” New York Review of Books 37.20(20 December 1990).print
2. TripiLahiri, Bythe Numbers: Where Indian Women Work, Women’s Studies Journal(14 November 2012)<<http://blogs.wsj.com/Indiarealtime/2012/11/14/by-the-numbers-where-Indian-Women-work/>>
3. K. Satyanarayana and Susie Tharu (Ed.) Steal Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu and Kannada
4. Vimala. “vantillu (the kitchen)”. Women writing in India: 600 BC to the present volume II; The 20th century. Ed. Susie Tharu and K. Lalita. Delhi: Oxford university press, 1995, 599-601.
5. Shatrughna, veena et al., women’s work and its impact on child health and nutrition, Hyderabad, national institute of nutrition, Indian council of medical research. 1993.
6. Gautam, Liela and Gita Ramaswamy. ”A ‘Conversation’ between a Daughter and a Mother”. Broadsheet on contemporary Politics, special issue on sexuality and harassment; Gender politics on campus today, Ed. Madhumeeta Sinha and Asma Rasheed. Hyderabad: Anveshi Research

center for women's Studies, 2014.

7. Abdulali Sohaila. "I fought for my life....and won". Available on line at: <http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdul/>
8. Virginia Woolf. A Room of one's own. Oxford; Black swan. 1992.

Course Outcomes:

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a clear grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the text book will empower students to understand and respond to gender violence in a mature way.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. I Semester

7GC32 ENGINEERING MATHEMATICS III

(Common to all branches)

L	T	P
	3	10

Course objectives:

- The course gives the knowledge about the solution of algebraic and transcendental equations and to solve differential equations by numerical methods.
- The course intends to provide an over view about interpolation, numerical differentiation and integration.
- The course explains the concept of curve fitting and partial differential equations.
- The course provides an opportunity to learn how to solve Fourier series and Fourier integral transforms in all engineering fields.

UNIT I

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS-
Bisection Method-Method of false Position-Newton-Raphson method.

NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS-
Taylor's Series-Euler's methods-Runge-Kutta fourth order Method-Milne's predictor-corrector method. (Without proofs)

UNIT II

INTERPOLATION - Introduction – Forward Differences – Backward Differences – Newton's forward and backward difference interpolation formulae – Lagrange's Interpolation formula.

NUMERICAL DIFFERENTIATION - NUMERICAL INTEGRATION – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT III

CURVE FITTING: Fitting a straight line-second degree parabola-Exponential curve –power curve by the method of least squares.

PARTIAL DIFFERENTIAL EQUATIONS: Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions-solutions of linear equation-Nonlinear equation by Charpit's method-Method of separation of variables.

UNIT IV

FOURIER SERIES: Determination of Fourier coefficients-Fourier series of even and odd functions-Fourier series in an arbitrary interval-half range Fourier sine and cosine expansions.

UNIT V

FOURIER INTEGRALS AND FOURIER TRANSFORMS: Fourier Integral theorem-Fourier Transforms-Fourier sine transform - Fourier Cosine Transform-Properties-Inverse Transforms -Finite Fourier sine and Cosine Transforms.

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, 42nd edition, Khanna Publishers, New Delhi.

References:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 8th edition, New Age International (Pvt) Limited.
2. A text book of Engineering Mathematics, B. V. Ramana, Tata McGraw Hill.
3. Mathematical Methods, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.

Course Outcomes: Students will be able to,

1. Apply the knowledge of numerical methods to solve algebraic, transcendental and ordinary differential equations.
2. Improve the ability of data analysis in numerical differentiation and integration with the help of interpolation.
3. Derive the equations of various curves by the method of least squares to assess the relation between them and to solve partial differential equations.
4. Derive Fourier series for the given periodic function in any arbitrary intervals.
5. Apply the knowledge of Fourier integrals and Fourier transforms to solve differential equations.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	-	-	-	3	-	-	-	-	-	-	2
2	3	3	-	2	-	-	-	-	-	-	-	1
3	3	-	-	3	2	-	-	-	-	-	-	2
4	3	2	-	-	-	-	-	-	-	-	-	2
5	3	2	-	-	2	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

7G531 – MECHANICS OF SOLIDS

L	T	P
4	1	0

Course Objectives:

- To understand the nature of stresses induced in material under different loads.
- To plot the variation of shear force and bending moments over the beams under different types of loads.
- To understand the behavior of beams subjected to bending and shear loads.
- To calculate the deflection of beams under complex loading.
- To analyze the cylindrical and spherical shells under circumferential and radial loading conditions.

UNIT I

SIMPLE STRESSES & STRAINS: Elasticity and plasticity – Types of stresses & strains–Hooke’s law– stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson’s ratio & volumetric strain – Elastic moduli & the relationship – Bars of varying section – composite bars – Thermal stresses. Strain energy – Resilience –Mohr’s circle for plane stress and plain strain (Simple problems).

UNIT II

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL, uniformly varying loads and combination – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT III

FLEXURAL STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis –Determination of bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections.

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections.

UNIT IV

DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L, uniformly varying load.

UNIT V

THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders– Thin spherical shells.

THICK CYLINDERS: lame's equation – cylinders subjected to inside & outside pressures – compound cylinders.

COLUMNS AND STRUTS: Classification of columns – Assumptions – Expression for crippling load of different cases – effective length of a column- slenderness ratio – limitation of Euler's formula – Rankine's formula

Text Books:

1. Bhavikatti, *Strength of Materials*, Lakshmi publications.
2. B C Punmia, *Mechanics of Materials*, Lakshmi publications.

References:

1. Jindal, *Strength of Materials*. Umesh Publications.
2. Vazirani and Ratwani, *Analysis of structures*, Khanna publishers.
3. S.B.Junnarkar , *Mechanics of Structures Vol-III*, Charotar publishing house.
4. S.Timoshenko, *Strength of Materials, D Van Nostrandcompany*.

Course Outcomes: Students will be able to:

1. Determine the simple stresses and strains when members are subjected to axial loads.
2. Draw the shear force and bending moment diagrams for the beam subjected to different loading conditions.
3. Evaluate stresses induced in different cross-sectional members subjected to bending and shear loads.
4. Evaluate the deflections in beams subjected to different loading conditions.
5. Analyze the columns and struts, thin and thick cylindrical shells.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	-	3	-	-	3	3	-	-	-	-	-
2	3	3	3	-	-	3	3	-	-	-	-	-
3	3	3	3	-	-	3	3	-	-	-	-	-
4	3	3	3	-	-	3	3	-	-	-	-	-
5	3	-	3	-	-	3	3	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

7G532 METALLURGY AND MATERIAL SCIENCE

L	T	P
3	1	0

Course Objectives:

- To understand the basic structure, properties of metals, mechanism of crystallization and imperfections in crystals.
- To study the importance of binary phase diagrams.
- To acquire knowledge on properties and structure of ferrous and nonferrous alloys and to select suitable materials for various engineering applications.
- To learn various methods of heat treatment and surface coating processes.
- To gain knowledge on advanced materials and concepts of metallurgy.

UNIT I

STRUCTURE OF METALS: Bonds in Solids – Metallic bond - crystallization of metals, imperfections, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

CONSTITUTION OF ALLOYS: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT II

EQUILIBRIUM DIAGRAMS: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of binary phase diagram of Fe-Fe₃C.

UNIT III

CAST IRONS AND STEELS: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

NON-FERROUS METALS AND ALLOYS: Structure and properties of copper and its alloys, Aluminum and its alloys, Titanium and its alloys.

UNIT IV

HEAT TREATMENT OF ALLOYS: Effect of alloying elements on Iron – Iron carbon system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability, surface - hardening methods, Age hardening.

SURFACE ENGINEERING: Surface treatment processes and their characteristics and applications, mechanical coatings, Diffusion coatings.

UNIT V

CERAMIC MATERIALS: Crystalline ceramics, glasses, cermet.

COMPOSITE MATERIALS: Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal – matrix composites and Carbon – Carbon composites.

METALLURGY: Steel Making - Introduction, Methods of steelmaking – crucible process, Bessemer converter process, Open Hearth Process, Introduction to Powder Metallurgy.

Text books:

1. Kodgire, *Material Science and Metallurgy*, 42nd edition Everest Publishing House 2017.
2. Donald R. Askeland, *Essential of Materials Science and Engineering*. Thomson Publications 2014.

References:

1. Sidney H. Avener, *Introduction to Physical Metallurgy*, TMH
2. William and collister, *Materials Science and Engineering*, wiley pub. 2014.
3. V. Raghavan, *Material science and engineering*, PH Pub. 2015.
4. R.K.Rajput, *Engineering materials and metallurgy*. S.Chand & Co. 2006.
5. O.P. Khanna, *Material Science and Metallurgy*. Dhanpatrai Pub. 2014.

Course Outcomes: Students will be to,

1. Understand the mechanism of crystallization, methods of determining grain size and factors affecting the solid solubility.
2. Use the phase diagrams of binary systems and iron-carbide diagram to select the material composition.
3. Understand the structure and properties of various cast irons, steels and non-ferrous alloys.
4. Apply the various heat treatment processes, TTT diagram, surface hardening methods & coatings depending on material requirements.
5. Understand the importance of ceramics, composites and concepts of metallurgy.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	3	3	3	3	3	-	-	-	-	3
2	3	3	3	3	3	3	3	-	-	-	-	3
3	3	3	3	3	3	3	3	-	-	-	-	3
4	3	3	3	3	3	3	3	-	-	-	-	3
5	3	3	3	3	3	3	3	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
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II Year B. Tech. I Semester**7G533 – BASIC THERMODYNAMICS**

L	T	P
3	2	0

Course Objectives:

- To get the awareness on fundamental laws of thermodynamics.
- To enable the students to understand second law of thermodynamics and its applications to various systems.
- To make students understand about properties of pure substances and usage of mollier chart and steam tables.
- To help the students understand various gas laws and equations of state and can able to solve problems of estimating enthalpy, entropy, specific heat and internal energy.
- To learn the concepts of mixture of gases and to calculate the property values during any process.

UNIT I

BASIC CONCEPTS: System, Control Volume, Surrounding, Boundary, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility, Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State and in Transition - Types, Work and Heat, Point and Path function.

ZEROth LAW OF THERMODYNAMICS –Ideal Gas Scale – PMM I - Joule’s Experiments – First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation.

UNIT II

LIMITATIONS OF THE FIRST LAW – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot’s principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature. Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility – Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the Third Law of Thermodynamics.

UNIT III

PURE SUBSTANCES: P-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron Equation, Constructional use of Property tables. Mollier charts – Various Thermodynamic processes and energy Transfer – Steam Calorimetry.

UNIT IV

PERFECT GAS LAWS: – Equation of State, specific and Universal Gas constants – various Non-flow processes, properties, end states, Heat and Work Transfer, changes in Internal Energy – Throttling and Free Expansion Processes – Flow processes – Deviations from perfect Gas Model – Vander Waals Equation of State – Compressibility charts – variable specific Heats – Gas Tables.

UNIT V

MIXTURE OF PERFECT GASES: – Mole Fraction, Mass fraction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction, Volume fraction and partial pressure, Equivalent Gas constant and Molecular Internal Energy, Enthalpy, specific heats and Entropy of Mixture of perfect Gases and Vapour.

Text Books:

1. *Engineering Thermodynamics*. PK Nag, TMH, 5TH Ed.2013.
2. *Basic Engineering Thermodynamics*. A. Venkatesh, Universities Press; First edition (2007).
3. *Thermodynamics – An Engineering Approach*. YunusCengel& Boles, TMH. Mcgraw Higher Ed Edition: 8, 2015

References:

1. *Fundamentals of Thermodynamics*. Sonntag, Borgnakke and Van wylen, John Wiley & sons (ASIA) Pt Ltd. Publisher: Wiley; 8 edition (December 26, 2012)
2. *Thermodynamics*. McGraw Hill J.P.Holman, McGraw-Hill College; 4th edition (January 1, 1988)
3. *An introduction to Thermodynamics*. YVC Rao, Universities Press, 3rd edition 2004
4. *Engineering Thermodynamics*, Jones & Dugan, PHI INDIA (2011)

Course Outcomes: Students will be able to,

1. Apply the fundamentals to the thermodynamic problems.
2. Solve the problems related to performance of thermal engineering devices by the concept of Second law of Thermodynamics.
3. Demonstrate the importance of phase change diagrams of various pure substances and calculate the performance of vapour power cycles by using Mollier charts and steam tables.
4. Differentiate the ideal and real gas behavior and can evaluate the performance of gas power cycles by demonstrating the usage of thermodynamic properties and equations of state.
5. Show their knowledge in design of the thermal related components in various fields of energy transfer equipment's.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	-	-	-	-	3	-	-	-	-	3
2	3	3	-	-	-	-	3	-	1	-	-	3
3	3	3	-	-	-	-	-	-	-	-	-	3
4	3	3	-	-	-	-	-	-	-	-	-	3
5	3	3	-	-	-	-	3	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

7G534 – MANUFACTURING TECHNOLOGY

L	T	P
3	1	0

Course Objectives:

- By this subject the students will understand how manufacturers use technology to convert raw materials into useful products. The students shall also introduce the basic concepts of casting, pattern preparation, gating system.
- Students shall also introduce the basic knowledge on basic features of various welding and cutting processes.
- To study the concepts of metal forming processes, mechanism and their working principle, tools and dies, its types and applications.
- Students shall also introduce the basic knowledge on plastics, classification, processing of plastics and its applications.

UNIT I

CASTING: Steps involved in making a casting– Types of patterns - Patterns and Pattern making — Materials used for patterns, pattern allowances and their Construction, Principles of Gating, Gating ratio and design of Gating systems- defects in casting. Solidification of casting– Concept – Solidification of pure metal and alloys, short & long freezing range alloys, Solidification time calculations. Risers – Types, function and design, casting design considerations, special casting processes 1) Centrifugal 2) Die 3) Investment.

UNIT II

WELDING: Classification of welding process, types of welds, forward, backward welding and welded joints. Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding. Inert Gas welding, TIG & MIG welding Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies – destructive and nondestructive testing of welds. Cutting of metals: Oxy – Acetylene Gas cutting, Cutting of ferrous, non-ferrous metals.

UNIT III

METAL WORKING PROCESS: Hot working, cold working, strain hardening, recovery, re-crystallization and grain growth, Comparison and properties of Cold and Hot worked parts, Rolling fundamentals – theory of rolling, types of Rolling mills and products. Problems on Forces in rolling and power requirements – defects in rolled products. Press working process: Stamping, forming and other cold working processes: Blanking and piercing –

Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning.

UNIT IV

EXTRUSION OF METALS: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion. Forging processes: Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects.

UNIT V

Plastics: Classification – Properties – Plastics as engineering materials – Method of processing plastics – Injection moulding, Blow moulding, extrusion moulding, compression moulding, transfer moulding.

Text Books:

1. P.N. Rao, *Manufacturing Technology*. TMH, 2017.
2. Kalpak Jain, *Manufacturing Technology*. Pearson education, 2015.
3. Lindberg, PE, *Process and materials of manufacturing*, Allyn and Bacon, 1977.

References:

1. R.K. Jain, *Production Technology*, Khanna Publisher, 2004.
2. Rosenthal, *Principles of Metal Castings*, TMH, 1976.
3. Parmar, *Welding Process*, Khanna Publishers, 2010.
4. R.K. Rajput, *Manufacturing Technology*. Laxmi Publications, 2007.
5. K.L Narayana, *Production Technology*. I.K. International Pub, 2010.
6. Hazra choudary, *Elements of workshop technology volume – 1*, Indian book distributing company, Calcutta, 2010.

Course Outcomes: Students will be able to,

1. Understand various casting process involved in the conversion of raw materials to useful products, gating system features and designing of risers.
2. Identify and analyze various welding and metal cutting operations.
3. Apply the knowledge of metal working process in sheet metal forming processes, drawing and rolling and analyzing the process variables.
4. Understand the primary forming processes like forging, extrusion, equipment used, and process variables.
5. Identify various plastic parts manufacturing techniques and their methods.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	-	3	3	-	3	3	-	-	-	-	-
2	3	3	-	3	-	3	3	2	-	-	-	-
3	3	3	3	-	-	3	3	-	-	-	-	1
4	3	3	3	3	-	3	3	-	-	-	-	-
5	3	-	3	-	-	3	3	2	-	-	1	-

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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II Year B. Tech. I Semester

7G535 – MACHINE DRAWING

L	T	P
2	--	5

Course Objectives:

- Student shall understand and draw conventional representation of material and machine elements.
- Students shall understand to draw keys, cotter joints, riveted joints and shaft couplings.
- Students shall understand to create assembly drawings from sub assembly components.
- Students shall understand to draw part drawings of the machine components.

UNIT I

DRAWING CONVENTIONS: Conventional representation of materials, common machine elements.

DRAWING OF MACHINE ELEMENTS AND SIMPLE PARTS: Selection of Views, additional views for the following machine elements and parts with every drawing proportion. Popular forms of Screw threads, bolts, nuts, washer, locking arrangements for nuts, stud bolts, tap bolts, set screws.

UNIT II

KEYS: Saddle-Hollow and Flat, Sunk-Taper, Gib head, parallel, wood ruff.

Cotter joints: Socket and spigot, sleeve and cotter, Gib and cotter and knuckle joint.

BEARINGS: Solid and bushed Journal bearing, pivot and collar and foot step bearings.

UNIT III

RIVETED JOINTS: Different types of rivet heads, single riveted lap joint, double riveted chain and zigzag lap and butt joints.

SHAFT COUPLINGS: Muff couplings, flange coupling, Universal coupling, spigot and socket pipe joint, Oldham coupling.

UNIT IV

ASSEMBLY DRAWINGS: Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions. Engine parts – stuffing box, cross head, Eccentric, Petrol Engine connecting rod, piston assembly. Other machine parts – Screw jack, Machine Vice, Drill jig, Tailstock. Valves- Steam stop valve, feed check valve and air cock.

UNIT V

Part Drawings: Plummer block, Blow- off cock, indexing drill jig, Tool post.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

Text books:

1. Dhawan, *Machine Drawing*, S.Chand Publications.
2. K.L.Narayana, P.Kannaiah & K. Venkata Reddy, *Machine Drawing*, New Age Publishers.
3. Production Drawing, K.L. Narayana, New Age International.
4. K.C.John, *Textbook of Machine Drawing*, PHI learning, 2016.

References:

1. P.S.Gill, *Machine Drawing*, S K Kataria & Sons.
2. Luzzader, *Machine Drawing*.

COURSE OUTCOMES: Students will be able to:

1. Understand the conventional representation of materials, machine parts and draw the simple machine parts. Student has an idea at International standards and will be able to convey the drawings much effective.
2. Draw the machine elements including keys, cotter joints and bearings. These drawings can be easily understood by the people in a manufacturing industry and the consumers too.
3. Draw the machine elements including riveted joints and shaft couplings. These drawings can be easily understood by the people in a manufacturing industry and the consumers too.
4. Construct assembly drawings using part drawings of machine components. So that he/she will be able to produce the final product by procuring the units from various sources/suppliers and still to produce any useful product serving effectively.
5. Draw the part drawings of the machine components.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	-	3	-	-	-	-	-	-	3	-	-
2	3	-	3	-	-	-	-	-	-	3	-	-
3	3	-	3	-	-	-	-	-	-	3	-	-
4	3	-	3	-	-	-	-	-	-	3	-	-
5	3	-	3	-	-	-	-	-	-	3	-	-

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II Year B. Tech. I Semester

7G538 – MANUFACTURING TECHNOLOGY LAB

L	T	P
0	--	3

List of Experiments:

I. METAL CASTING LAB:

1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - Exercise -for strengths, and permeability – 1 Experiment.
3. Moulding Melting and Casting - 1 Experiment.

II. WELDING LAB:

1. ARC Welding Lap & Butt Joint - 2 Experiments.
2. Spot Welding - 1 Experiment.
3. TIG Welding - 1 Experiment.
4. Plasma welding and Brazing - 2 Exercises (Water Plasma Device).

III. MECHANICAL PRESS WORKING:

1. Blanking & Piercing operation and study of simple, compound and progressive press tool.
2. Hydraulic Press: Deep drawing and extrusion operation.
3. Bending and other operations.

IV. PROCESSING OF PLASTICS

1. Injection Moulding.
2. Blow Moulding.

Note: Minimum of 10 Experiments need to be performed.

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II Year B. Tech. I Semester

7G539 – MATERIAL SCIENCE LAB

L	T	P
0	--	2

List of Experiments:

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high carbon steels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys.
5. Study of the Micro structures of Heat treated steels.
6. Hardeneability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

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II Year B. Tech. I Semester

7G53A – MECHANICS OF SOLIDS LAB

L	T	P
0	--	2

List of Experiments:

1. Direct tension test
2. Bending test on
 - a. Simple supported beam
 - b. Cantilever beam
3. Torsion test
4. Hardness test
 - a. Brinell hardness test
 - b. Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

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II Year B. Tech. II Semester

7GC42 – PROBABILITY AND STATISTICS

(Common to CE, CSE and ME)

L	T	P
3	1	0

Course Objectives:

- The course shall enable the students quantify the measure of uncertainty
- The course explains the concepts of probability distributions.
- The course elaborates on sampling distribution and estimation.
- The course provides the students with statistical techniques in testing the hypothesis.

UNIT I

PROBABILITY: Sample space and events – Probability – The axioms of probability – Some Elementary theorems - Conditional probability – Baye’s theorem.

RANDOM VARIABLES: – Discrete and continuous – Distribution functions - mean and variance.

UNIT II

Binomial distribution –Poison distribution- Uniform distribution - Normal distribution. Fitting of Binomial distribution –Poison distribution.

UNIT III

SAMPLING DISTRIBUTION: Population and sample - Sampling distributions of means (σ known and unknown).

ESTIMATION: Point estimation – interval estimation - one mean & one proportions for small samples –two means two proportions for large sample.

UNIT IV

TEST OF HYPOTHESIS – LARGE SAMPLES: hypothesis concerning one and two means. Test of proportions (one and two).

SMALL SAMPLES: t- test.

UNIT V

X2–TESTS: goodness of fit, rxc contingency tables, F-test for two variances.

Text Books:

3. Fundamentals of Mathematical Statistics, S C Gupta and V K Kapoor, Sultan schand& sons.
4. A text book of Probability & Statistics, B. V. Ramana, Tata McGraw Hill.

References:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 8th edition, New Age International (Pvt) Limited.
2. Probability & Statistics, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
3. Probability & Statistics for Engineers, Miller and John E. Freund, Prentice Hall of India.
4. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-43rd Edition (2014)
5. Probability and statistics for engineers and scientists, 8th edition, Ronal E.Walpole, Raymond H.Myers, Sharon L.Myers, Keying Ye, Pearson Education.

Course Outcomes: Students will be able to,

1. Understand the basic concepts of probability and random variables.
2. Gain the knowledge on probability distributions.
3. Understand the concepts of sampling distributions and theory of estimation.
4. Able to test various hypothetical statements for large and small samples.
5. Provide the knowledge in testing the goodness of fit and decision-making process.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	-	2	-	-	-	-	-	-	-	3
2	3	2	-	2	-	-	-	-	-	-	-	3
3	3	3	-	2	-	-	-	-	-	-	-	3
4	3	3	-	2	2	-	-	-	-	-	-	3
5	3	3	-	2	2	-	-	-	-	-	-	3

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II Year B. Tech. II Semester

7GC41 – ENVIRONMENTAL SCIENCE

(Common to CE and ME)

L	T	P
3	1	0

Course Objectives:

- To enable student to know about the importance of environment.
- To train the student to use different methods to conserve natural resources.
- To enable the student to learn about the concept of ecosystem and biodiversity and its conservation.
- To make student to study about different types of pollutions.
- To enable the student to understand the social issues and human population issues related to environment.

UNIT I

INTRODUCTION TO ENVIRONMENT: Definition, Multidisciplinary nature of environmental studies, Scope & Importance of environmental studies, Need for public awareness, People in environment, Institutions in environment.

UNIT II

RENEWABLE & NON-RENEWABLE NATURAL RESOURCES: Forest resources: Use, deforestation, dams & their effects on forest & tribal people, Water resources: Use, Water cycle, floods, drought, conflicts over water. Mineral resources: Use, environmental effects of extracting mineral resources. Food resources: Impacts of over grazing, traditional agriculture and modern agriculture Energy resources: Renewable and non – renewable energy resources, use of alternate energy resources Land resources: Land degradation, soil erosion, Role of an individual in the conservation of natural resources.

UNIT III

ECOSYSTEMS: Producers, consumers & decomposers, Food chains, food webs & ecological pyramids, Biogeochemical cycles-Oxygen cycle, Carbon cycle and Nitrogen cycle. Types, characteristic features, structure and function of the following ecosystems: (a) Forest ecosystems (b) Grass land ecosystems (c) Desert ecosystems (d) Aquatic ecosystems (lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION: Definition, Values of biodiversity: consumptive value, productive value, social value, ethical value, aesthetic value & option value, Hot spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wild life, Conservation of biodiversity: In-situ & Ex-situ conservation

UNIT IV

ENVIRONMENTAL POLLUTION: Definition, causes, effects & control measures of: Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Marine pollution, Nuclear hazards.

UNIT V

SOCIAL ISSUES AND THE ENVIRONMENT: Rain water harvesting, Environmental ethics: Issues & possible solutions, Global warming, Acid rain, Ozone layer depletion, Environment protection Act, Air (Prevention & Control of Pollution) Act, Water (Prevention & Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

HUMAN POPULATION AND THE ENVIRONMENT: Population explosion, Family Welfare Program, Environment & human health - Human Rights (in relation to environment) - Value Education (environmental values), HIV/AIDS, Field work-Visit to a local area to document environmental assets.

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses by ErachBharucha, University Grants Commission, University press, New Delhi, 2004.
2. Perspectives in Environmental Studies, Anubha Kaushik and C.P. kaushik, Fifthedition, New Age International Publishers, 2016.

References:

1. Environmental Studies, Benny Joseph, Second edition, McGraw Hill Education (India) Private Limited, 2013.
2. Environmental Studies from Crisis to Cure, R. Rajagopalan, Oxford University Press, 2015.
3. Environmental studies: A Text Book for Undergraduates, Dr.K. Mukkanti, S. Chand and Company Ltd, 2010.
4. Ecology, Environmental Science and Conservation, J.S. Singh, S.P. Singh and S.R. Gupta, S. Chand and Company Ltd, 2014.
5. A textbook of Environmental Studies, Shashi Chawla, Tata McGraw Hill Education India, 2012.

Course Outcomes: Students will be able to,

1. Understand the importance of environment.
2. Develop critical thinking to conserve natural resources.
3. Understand the concept of ecosystem and biodiversity and its conservation.
4. Know about different types of pollutions, their sources, effects and control measures.
5. Apply the knowledge to solve the social issues and human population issues related to environment.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	-	-	-	1	3	-	-	-	-	3
2	1	1	-	-	-	3	3	-	-	-	-	3
3	1	1	-	-	-	-	3	-	-	-	-	3
4	2	2	-	-	-	3	3	-	-	-	-	3
5	3	3	-	-	-	3	3	-	-	-	-	3

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II Year B. Tech. II Semester

7G245 – ELECTRICAL AND ELECTRONICS ENGINEERING

L	T	P
3	1	0

Course Objectives:

- To impart the basic knowledge about the Electric circuits.
- To understand the working of various Electrical Machines.
- To know about various electronic devices.
- To understand the various parts of CRO.

UNIT I

ELECTRICAL CIRCUITS: Basic definitions, types of elements, ohms law, resistive, inductive, capacitive networks, Series- parallel circuits, star and delta transformations, and Kirchhoff's laws.

UNIT II

DC MACHINES: DC Generator: Constructional Details of DC machine, Principle of operation, emf equation, types of generators, applications.

DC MOTOR: principle of operation, torque equation, types, losses and efficiency, applications.

TESTING: brake test, Swinburne's test, and Speed control methods.

UNIT III

AC MACHINES: 1- Φ TRANSFORMERS: Principle of operation, emf equation, losses, efficiency and regulation. OC and SC tests.

ALTERNATOR: Principle of operation of alternators-Regulation by synchronous impedance method.

3- Φ INDUCTION MOTOR: Principle of operation of induction motor.

TEST: Brake Test on 3- ϕ induction motor.

UNIT IV

DIODE AND TRANSISTORS: DIODE: PN junction diode, symbol, V-I characteristics, applications, Half wave, full wave and bridge rectifiers.

TRANSISTORS: PNP and NPN junction transistors, Characteristics of CE configuration, Transistor as an amplifier.

UNIT V

ELECTRIC HEATING AND CRO: INDUCTION HEATING: Theory of induction heating, applications in industries.

DIELECTRIC HEATING: Theory of dielectric heating and its industrial application

CRO: Block diagram of CRO, Principle of CRT (cathode ray tube), applications of CRO, voltage, current and frequency measurements.

Text Books:

1. K. Mehta, Principles of Electrical and Electronics Engineering. S. Chand & Co.
2. T. Thyagarajan, Fundamentals of Electrical and Electronics Engineering. SciTech publications, 2007, 5th Ed.

References:

1. M.S Naidu and S.Kamakshaiah, *Introduction to Electrical Engineering*. TMH Publications.
2. Kothari and Nagrath, *Basic Electrical Engineering*, TMH, 2ndEd.
3. Mill man and Halkias, *Electronics devices and circuits*.

Course Outcomes: Students will be able to,

1. Apply fundamental concepts to find response of electrical circuits.
2. Identify the types of DC-Machines and their applications.
3. Explain the principle operation of Transformer, Induction Motor.
4. Identify the semi-conductor devices.
5. Explain the types of heating and working principle of CRO.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	2	-	2	-	-	-	-	2	-	2	-
2	2	3	2	2	-	-	-	-	2	-	2	-
3	2	3	2	2	-	-	-	-	2	-	2	-
4	2	2	-	3	-	-	-	-	2	-	2	-
5	2	2	-	3	-	-	-	-	2	-	2	-

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II Year B. Tech. II Semester

7G541 – APPLIED THERMODYNAMICS - I

L	T	P
4	1	0

Course Objectives:

- Able to learn the concept of various air standard cycles with the help of P-V and T-S Diagrams.
- An ability to solve common engineering problems in the field of thermal sciences, including problems involving application of the first and second laws of thermodynamics in the analysis of energy (availability).
- Awareness of actual cycles and their analysis.
- An ability to understand the working and combustion phenomenon in internal combustion engines.
- An ability to solve and evaluate performance parameters of internal combustion engines.
- An ability to learn the concept of compressors and to solve engineering problems of compressors including: Reciprocating compressors, Rotary (positive displacement type) compressors.

UNIT I

POWER CYCLES: Otto, Diesel, Dual Combustion cycles, Stirling Cycle – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles.

ACTUAL CYCLES AND THEIR ANALYSIS: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down - Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines.

UNIT II

I.C. ENGINES: Classification - Working principles, Valve and Port Timing Diagrams, Engine systems – Fuel, Simple Carburetor, Fuel Injection System – Air Injection system, Solid Injection system and Electronic Injection system. Ignition – Battery ignition system and Magneto ignition system, Cooling – Air cooling (Cooling Fins) and liquid cooling system – Thermosyphon system and Forced Circulation system and Lubrication - Importance - Mist Lubrication System, Wet sump Lubrication system and Dry sump Lubrication system.

UNIT III

COMBUSTION IN S.I. ENGINES: Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

COMBUSTION IN C.I. ENGINES: Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT IV

TESTING AND PERFORMANCE OF ENGINES: Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet.

UNIT V

COMPRESSORS: Classification –positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor.

RECIPROCATING: Principle of operation, work required, Isothermal efficiency, volumetric efficiency and effect of clearance, stage compression, under cooling, saving of work, minimum work condition for stage compression.

ROTARY (POSITIVE DISPLACEMENT TYPE): Roots Blower, vane sealed compressor – mechanical details and principle of operation. Working of Centrifugal compressors and axial flow compressors (Elementary treatment only).

Text books:

1. V. Ganesan, *I.C. Engines*. TMH.4th edition, 2012
2. Thermal engineering, Rathore. TMH, 2010
3. Heywood,*I.C. Engines*. McGrawHill. 1st edition,2017

References:

1. Mathur & Sharma, *IC Engines*. DhanpathRai & Sons, 2013
2. Pulkrabek, *Engineering fundamentals of IC Engines*. Pearson, PHI, 2nd edition, 1994
3. Rudramoorthy, *Thermal Engineering*. TMH, 2003
4. Rajput, *Thermal Engineering*. Lakshmi Publications. 8th edition, 2010
5. R.S. Khurmi & J.K.Gupta, *Thermal Engineering*. S.Chand, 14th edition, 1997
6. B.Srinivasulu Reddy, *Thermal engineering data book*. JK International Pub, 2007
7. Applied thermodynamics by Omkar Singh, 4th edition, New age Int.pub, 2015

Course outcomes: Students will be able to,

1. Explain the power cycles used in I.C engines.
2. Understand various engine systems used in I.C engines.
3. Understand the concept of combustion in SI and CI engines.
4. Conduct the performance test & estimating the performance of an I.C engine.
5. Understand the concept of different air compressors and evaluate performance of reciprocating compressor.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	3	3	-	-	-	-	-	-	-	-
2	3	3	3	3	-	3	-	-	-	1	-	-
3	3	3	3		-	3	-	-	-	-	-	3
4	3	3	3	3	-	3	-	1	-	-	-	3
5	3	3	3	3	-	3	-	-	-	-	-	3

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II Year B. Tech. II Semester

7G542 – FLUID MECHANICS AND HYDRAULIC MACHINERY

L	T	P
4	1	0

Course Objective:

- To give insight knowledge on fluid statics and kinematics
- To gain knowledge on fluid dynamics
- To give basic understanding of Hydro Electric power plant and importance of impact of jets.
- To become familiar about different types of turbines and able to analyze the performance characteristics of various turbines.
- To be able to understand the working of power absorbing devices like pumps and able to analyze their performance characteristics

UNIT I

FLUID STATICS: Dimensions and units: physical properties of fluids-specific gravity, viscosity, surface tension- vapour pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers – Buoyancy, meta-centre, meta-centre height, condition of equilibrium height of a floating and submerged bodies.

FLUID KINEMATICS: Stream line, path line, streak lines and stream tube, classification of flows-steady & unsteady, uniform & non uniform, laminar & turbulent, rotational & irrotational flows. Equation of continuity for one dimensional flow.

UNIT II

FLUID DYNAMICS: Surface and body forces –Euler’s and Bernoulli’s equations for flow along a stream line, momentum equation and its application on force on pipe bend. **CLOSED CONDUIT FLOW:** Reynold’s experiment-Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: Pitot tube, venture meter and orifice meter.

UNIT III

HYDROELECTRIC POWER STATIONS: Elements of hydro electric power station-types. Concept of pumped storage plants- storage requirements.

BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

UNIT IV

HYDRAULIC TURBINES: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube theory- functions and efficiency.

PERFORMANCE OF HYDRAULIC TURBINES: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT V

CENTRIFUGAL PUMPS: Classification, working, work done – manometric head- losses and efficiencies specific speed- pumps in series and parallel-performance - characteristic curves, NPSH.

RECIPROCATING PUMPS: Working, Discharge, slip, indicator diagrams.

Text Books:

1. Modi and Seth, *Hydraulics, fluid mechanics and Hydraulic machinery*, Standard Book house, 19th edition - 2017
2. R. K. Bansal, *Fluid Mechanics and Hydraulic Machines*, 9th edition – 2017.

References:

1. D.S. Kumar, *Fluid Mechanics and Fluid Power Engineering*.Kotaria& Sons – 2013 edition.
2. D. Rama Durgaiyah, *Fluid Mechanics and Machinery*. New Age International, 1st edition – 2002.
3. Banga& Sharma, *Hydraulic Machines*.Khanna Publishers.
4. James W. Dally, William E. Riley, *Instrumentation for Engineering Measurements*. John Wiley & Sons Inc, 2nd edition – 2010.
5. Raj put, *Fluid Mechanics and Hydraulic Machines*, 6th edition – 2016.

Course Outcomes: Students will be to,

1. Gain the knowledge on fluid mechanics fundamentals like fluid statics and fluid kinematics
2. Have basic idea about the fundamental equations used in Fluid Dynamics and are able to apply these concepts in real working environment
3. Study the fundamentals of turbo machinery and elements of hydro electric power plant.
4. Measure the performance of the different types of Hydraulic Turbines
5. Calculate the performance of the different types of Hydraulic Pumps.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	3	-	3	-	3	-	-	-	-	-
2	3	3	3	-	3	-	3	-	-	-	-	-
3	3	3	3	3	-	3	3	-	-	1	-	-
4	3	3	3	3	3	3	3	-	2	-	-	-
5	3	3	3	3	3	3	3	-	2	-	-	-

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II Year B. Tech. II Semester

7G543 – KINEMATICS OF MACHINERY

L	T	P
4	1	0

Course Objective:

- To enable the students in selection of appropriate mechanisms.
- To impart the clear idea in constructing velocities & acceleration diagrams for given mechanisms.
- To provide an overview of straight line motion mechanisms, Steering mechanism and Hooke's Joint
- To understand the kinematic analysis of gears & gear trains.
- To develop the knowledge of kinematic analysis of cams

UNIT I

MECHANISMS: Element or Link – Classification – Rigid Link, flexible and fluid link – Kinematic pair- Types– sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained motion.

MECHANISM, MACHINE AND STRUCTURE – kinematic chain – Degree of freedom of planar mechanisms– inversion of mechanism – inversions of quadric cycle chain, single and double slider crank chains.

UNIT II

VELOCITY AND ACCELERATION ANALYSIS OF MECHANISMS

Velocity Analysis– Relative velocity method- Motion of link– construction of Velocity diagrams –determination of angular velocity of points & links- four bar chain, single slider crank chain and other simple mechanisms.

INSTANTANEOUS CENTER METHOD: Instantaneous center of rotation - Three Centre in line theorem – Graphical determination of instantaneous Centre, diagrams for simple mechanisms and determination of angular velocity of points and links

ACCELERATION ANALYSIS: Acceleration diagram for simple mechanisms –determination of acceleration of points and angular acceleration of links- Coriolis acceleration- Klein's construction.

UNIT III

STRAIGHT LINE MOTION MECHANISMS: Exact and approximate copiers and generated types –Peaucellier, Hart and Scott Russel – Grasshopper, Watt, T-Chebicheff, Robert Mechanisms.

STEERING MECHANISMS: Condition for correct steering – Davis Steering gear, Ackerman’s steering gear.

HOOKE’S JOINT: Single and double Hooke’s joint – velocity ratio – simple problems.

UNIT IV

GEARS: Friction wheels and toothed gears – types – law of gearing - condition for constant velocity ratio for transmission of motion - forms of teeth - cycloidal and involute profiles - velocity of sliding, path of contact, arc of contact and contact ratio– phenomena of interference – methods to avoid interference - condition for minimum number of teeth to avoid interference.

GEAR TRAINS: Introduction – Train value – Types – Simple, Compound, Reverted and Epicyclic gear Train - Methods of finding train value or velocity ratio of Epicyclic gear trains- sun & planetary gear systems- Differential gear for an automobile.

UNIT V

CAMS: Definitions of cam and follower – their uses – Types of followers and cams – Radial cam Terminology – Types of follower motion - Uniform velocity, Simple harmonic motion, uniform acceleration and retardation motion- Maximum velocity and maximum acceleration during outward and return strokes in the above cases.

Text Books:

1. S.S.Rattan, *Theory of Machines*, Tata McGraw Hill Education (India) Pvt.Ltd, Fourth edition, July 2017.
2. R.S Khurmi& J.K Gupta, *Theory of Machines*, S.Chand Publications, 2005 edition.

References:

1. Jagdish Lal, *Theory of Mechanisms and Machines*, Metropolitan Company Pvt. Ltd.
2. R.K Bansal, *Theory of Machines*, Lakshmi publications, 2004 edition
3. Thomas Bevan, *Theory of Machines*, CBS.
4. PL. Ballaney, *Theory of machines*, Khanna Publishers.

Course Outcomes: Students will be able to,

1. Identify different mechanisms, inversions of different kinematic chains and also to find mobility of mechanisms.
2. Draw velocity and acceleration diagrams of simple plane mechanisms by using relative velocity method and instantaneous center method.
3. Understand the mechanism of straight line motion mechanisms, steering mechanisms and Hooke's joint and also solve numerical problems on steering mechanisms, Hooke's joint.
4. Know gear terminology, types of gears, length of path of contact, contact ratio, interference in gears and application of bevel gears in differential gear and design the gears to avoid interference and to calculate train value for different gear trains.
5. Draw displacement diagram and cam profile for different types of motions of the follower. And also to find the displacement, velocity and acceleration of the follower at different positions of cam with specified contours.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	-	-	-	-	-	-	3	-	3	-
2	3	3	-	-	-	-	-	-	3	-	3	-
3	3	3	-	-	-	-	-	-	3	-	3	-
4	3	3	-	-	-	-	-	-	3	-	3	-
5	3	3	-	-	-	-	-	-	3	-	3	-

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II Year B. Tech. II Semester

7G248 – ELECTRICAL AND ELECTRONICS ENGINEERING LAB

L	T	P
0	--	2

ELECTRICAL ENGINEERING LAB

1. Swinburne's test on D.C shunt machine (pre determination of efficiency of a given D.C shunt machine working as generator and motor).
2. OC and SC tests on single phase transformer (pre determination of efficiency and regulation at a given power factors).
3. Brake test on three phase induction motor (determination of performance characteristics).
4. Regulation of alternator by synchronous impedance method.
5. Speed control of D.C shunt motor by
(a) Armature control method (b) field flux control method.
6. Brake test on D.C shunt motor (determination of performance characteristics).

ELECTRONICS ENGINEERING LAB

1. Study of CRO (Measurement of voltage frequency and phase of periodic signals).
2. V-I Characteristics of PN junction diode.
3. Full wave rectifier with and without capacitive filter.
4. Input and output characteristics of Common Emitter (CE) Configuration.
5. Frequency response of a single stage CE amplifier.
6. Sinusoidal signal generation using RC phase shift oscillator circuit.

Note: Minimum of 10 Experiments need to be performed.

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II Year B. Tech. II Semester

7G544 – FLUID MECHANICS AND HYDRAULIC MACHINES LAB

L	T	P
0	--	2

List of Experiments:

1. Impact of jet on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.
13. Verification of Bernoulli's theorem.

Note: Any 10 of the above 13 experiments are to be conducted.

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II Year B. Tech. II Semester

7G545 – KINEMATICS OF MACHINERY LAB

L	T	P
0	--	2

List of Experiments:

1. To study various types of Links, Pairs, Chain and Mechanism
2. To study inversion of Four Bar Mechanism, Single Slider Crank Chain Mechanism and Double Slider Crank Chain Mechanism.
3. To study velocity diagram for Slider Crank Mechanism.
4. To study various kinds of belt drives.
5. To study and find coefficient of friction between belt and pulley.
6. To study various types of Cam and Follower arrangement.
7. To plot follower displacement Vs cam rotation graph for various cam follower arrangement.
8. To study the working of Screw Jack and determine its efficiency.
9. To study Different types of Gears.
10. To study Different types of Gear Trains.
11. To study various types of steering mechanisms

Note: Any 10 of the above 11 experiments are to be conducted.

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II Year B. Tech. II Semester

7GC44 – APTITUDE AND REASONING SKILLS

(Common to EEE, ECE & ME)

L	T	P
0	2	--

Course Objectives:

- To equip students with aptitude and reasoning skills in order to help them succeed in competitive exams.
- To help students improve their knowledge of quantitative and reasoning skills, which in turn helps them comprehend and solve various mathematical problems in professional life.

UNIT I

QUANTITATIVE APTITUDE 1: Number Systems- HCF and LCM -Square Roots and Cube Roots-Averages-Problems on ages-Allegations-Percentages-Profit and loss - Mensuration-Area, Volume and Surface Areas- Permutation and Combination-Decimal Fractions-Simplification.

UNIT II

REASONING 1: Directions-Blood Relations-Problems on Cubes-Series and Sequences- Odd man out- Coding and Decoding.

UNIT III

QUANTITATIVE APTITUDE 2: Ratio and Proposition and variation-Inequalities- Time and Work-Time and Distance-Pipes and Cisterns -Simple interest and Compound-interest-Calendar-Clocks-True Discount, Banker's Discounts-Data Interpretation, Tabulation, Bar Graphs, Pie charts, Line Graphs.

UNIT IV

REASONING 2: Data Sufficiency-Logical deductions-Arrangements and Combinations-Groups and Teams-Puzzles.

Text Books:

1. R.S. Agarwal, Quantitative Aptitude, S. Chand Publishers, New Delhi, 2005.
2. R.S. Agarwal, Verbal and Non-Verbal Reasoning, S.Chand Publishers, New Delhi, 1998.
3. Shakuntala Devi, Puzzles to Puzzle you, Orient Paper Backs Publishers(OPB), New Delhi, 2005.

References:

1. Arun Sharma, How to Prepare for Quantitative Aptitude, TMH Publishers, New Delhi, 2003.
2. Sharon Weiner-Green, IrnK.Wolf, Barron's GRE, Galgotia Publications, New Delhi, 2006.
3. Shakuntala Devi, More Puzzles, OPB, New Delhi, 2006.
4. Ravi Narula, Brain Teasers, Jaico Publishing House, New Delhi, 2005.
5. George J Summers, Puzzles and Teasers, Jaico Publishing House, Mumbai, 2005

Course Outcomes: Students will be able to,

1. Apply the knowledge of general mathematical models discussed to solve a variety of problems pertaining to Quantitative functions
2. Read between the lines and understand various mathematical and reasoning concepts, puzzles, charts and interpret their logic

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	-	-	-	-	-	-	-	-	-	-	2
2	2	-	-	-	-	3	-	-	-	-	-	1