

ACADEMIC REGULATIONS
B.Tech. Regular Four Year Degree Programme

(For the batches admitted from the academic year 2013-14)
and
B.Tech. Lateral Entry Scheme
(For the batches admitted from the academic year 2014-15)

The following rules and regulations will be applicable for the batches of 4year B.Tech. degree admitted from the academic year 2013-14 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 A.P 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, 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 A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh.

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

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

1. B.Tech (Computer Science & Engineering)
2. B.Tech (Electrical & Electronics Engineering)
3. B.Tech (Electronics & Communication Engineering)
4. B.Tech (Information Technology)
5. B.Tech (Mechanical Engineering)
6. B.Tech (Civil Engineering)

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

3. ACADEMIC YEAR:

The institute shall follow Year-wise pattern for First year course and Semester pattern for II, III and IV years. An academic year shall consist of a first semester and a second semester from second year onwards.

The first year of four year B.Tech programme shall have duration to accommodate a minimum of 180 instruction days. From second year onwards each semester shall have a minimum of 90 instruction days.

4. COURSE STRUCTURE:

Each programme of study shall consist of:

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

- i. Language / Communication Skills
- ii. Humanities and Social Sciences: Environmental Science
- iii. Economics and Accounting
- iv. Principles of Management

4.2 Basic Science Courses comprising of the following: (15 to 25%)

- i. Computer Literacy with Numerical Analysis
- ii. Mathematics
- iii. Physics
- iv. Chemistry

4.3 Basic Engineering Courses comprising of the following (depending on the branch): (15 to 25%)

- i. Engineering Drawing
- ii. Engineering and IT Workshop
- iii. Engineering Mechanics
- iv. Basic Mechanical Engineering
- v. Electrical and Electronics Engineering
- vi. Basic civil Engineering
- vii. Computer Programming

4.4 Compulsory Discipline Courses: (45 to 55%)

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 Elective Courses: (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 In the final year first semester subject like comprehensive Mechanical Engineering, with 2 hours / week is to be introduced.

4.7 Every programme of study shall be designed to have 42-44 theory courses and 19-22 laboratory/seminar/comprehensive courses.

4.8 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.

	Year Pattern		Semester Pattern	
	Period(s)/ Week	Credits	Period(s)/ Week	Credit(s)
Theory	01	02	01	01
Practical	03	04	03	02
Comprehensive Mechanical Engineering	--	--	02	02
Seminar	--	--	01	01
Final Year Project	--	-	12	12

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

6.1 Distribution of Marks:

S. No		Marks	Examination and Evaluation		Scheme of Evaluation
1.	Theory	70	Year-end / Semester-end examination.		The question paper shall be of descriptive type with 8 questions out of which 5 are to be answered in 3 hours duration of the examination.
		30	Mid - Examination of 120 Min. duration - Internal evaluation- 20 marks . 5 questions - 1 st question compulsory – having short answer questions, 4 descriptive out of which 3 are to be answered.		<p>For I B Tech: Three (03) mid exams, each for 20 marks are to be conducted. Average of best two performances to be considered.</p> <p>Mid-I: After first spell of instructions (II Units).</p> <p>Mid-II: After second spell of instructions (III to V Units)</p> <p>Mid-III: After third spell of instructions (VI to VIII Units)</p>
			Remaining 10 marks for Assignments, 3-5 in number will be given and each assignment will be evaluated for 10 marks and average considered.		<p>For a Semester: Two mid-exams, 20 marks each, are to be conducted. Better one to be considered.</p> <p>Mid-I: After first spell of instructions (IV Units).</p> <p>Mid-II: After second spell of instructions (V to VIII Units).</p>
2	Laboratory, Design and / or drawing	70	Year-end / Semester-end Lab Examination.		<p>For laboratory courses:</p> <p>3 hours duration – two examiners. For drawing and/ or Design: like for the theory examination.</p>
		30	20	Day to Day evaluation.	Performance in laboratory experiments.
			10	Internal evaluation.	Practical Tests (For first year average of best two out of three tests and for semester better one out of two tests)

S. No		Marks	Examination and Evaluation		Scheme of Evaluation
3	Soft Skills – I and II	70	External Evaluation		The question paper shall be of objective type with 100 questions to be answered in 3 hours duration.
		30	20	Day to Day evaluation.	Performance in tests conducted at the end of every topic.
			10	Internal Evaluation.	Two mid-exams, 10 marks each, are to be conducted. Better one to be considered.
4	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).
5	Comprehensive Mechanical Engineering	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.		
6	Project Work	100	70	External evaluation	Semester-end Project Viva-Voce Examination by Committee as detailed under 6.2
			30	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 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.

6.3. Eligibility to appear for the year-end / 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 year/ semester.
- 6.3.2** Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in first year or 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.
- 6.3.5** Students whose shortage of attendance is not condoned in First year/any semester are not eligible to take their End examination of that class and their registration for that semester / year 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 year/semester, as applicable.
- 6.3.7** A student detained due to shortage of attendance, will have to repeat that year/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.

6.5 Supplementary Examination:

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. For seminar, a seminar will be given by the supplementary candidate as per the separate schedule given by the exam section.

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

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

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

- 7.1.1** A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, design, drawing subject or project 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. For the seminar he should secure a minimum of 40% marks.
- 7.1.2** For promotion from I B.Tech to II B.Tech a student must satisfy the attendance requirements in I year.
- 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 56 credits from I year, II year I-Semester and II year II-Semester examinations conducted till that time.
- 7.1.4** A student shall be promoted from III year to IV year if he fulfills the academic requirements of securing a minimum of 86 credits from I year, 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 236 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 236 credits as indicated in the course structure within **eight** academic years from the year of his admission shall forfeit his seat in B.Tech. Programme and his admission stands cancelled.
- 7.1.7** **For Lateral Entry Students (batches admitted from 2014-2015):**
- 7.1.8** Academic requirements for pass in a subject are the same as in 7.1.1 and attendance requirements as in 6.3.
- 7.1.9** A student shall be promoted from II year to III year if he fulfills the academic requirements of securing a minimum of 28 credits from II year I and II-Semesters examinations conducted till that time.
- 7.1.10** A student shall be promoted from III year to IV year if he fulfills the academic requirements of securing a minimum of 58 credits from II year I and II-Semesters and the III year I and II-Semester examinations conducted till that time.

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

7.1.12 A student who fails to earn all the 180 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/year 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/year:

$$CPA = \frac{1}{10} \frac{\sum_i (C_i M_i)}{\left(\sum_i C_{ri}\right)}$$

C_i – Credits obtained in the Course i .
 M_i –Marks obtained in the Course i .
 C_{ri} –Credits registered for Course i .

9.2 For the entire programme:

$$CCPA = \frac{1}{10} \frac{\sum_n \left(\sum_i (C_{ni} M_{ni}) \right)}{\sum_n \left(\sum_i C_{rni} \right)}$$

n - Semester/Year number
 C_{ni} – Credits obtained in the Course i of semester/year n .
 M_{ni} –Marks obtained in the Course i of semester/year n .
 C_{rni} – Credits registered for Course i of semester/year n .

9.3 Overall Performance:

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

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 **236 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:

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

13. AMENDMENTS TO REGULATIONS:

The chairman, Academic Council of Annamacharya Institute of Technology and Sciences, Rajampet (Autonomous) 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. GENERAL:

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

15. All legal matters are subjected to Rajampet Jurisdiction only.

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2013
Department	Department of Mechanical Engineering
Programme Code & Name	G5, B.Tech Mechanical Engineering

I Year B.Tech

Subject Code	Subject Name	Hours/ Week			C	Maximum marks		
		L	T	P		Internal	External	Total
1GC11	English	2	0	0	4	30	70	100
1GC12	Engineering Physics	2	0	0	4	30	70	100
1GC13	Engineering Chemistry	2	0	0	4	30	70	100
1GC14	Mathematics – I	3	1	0	6	30	70	100
1G112	C Programming and Introduction to Data Structures	3	1	0	6	30	70	100
1G511	Engineering Mechanics	3	1	0	6	30	70	100
1G512	Engineering Graphics	1	1	6	10	30	70	100
1GC16	Engineering Physics and Chemistry Lab#	0	0	3	4	30	70	100
1GC17	English Language and Communication Skills Lab	0	0	3	4	30	70	100
1G114	C Programming and Data Structures Lab	0	0	3	4	30	70	100
1G411	Engineering and IT workshop**	0	0	3	4	30	70	100
Total		16	4	18	56	330	770	1100

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

The students attend the Engineering Physics and Engineering Chemistry lab in alternate week i.e. 3/2 per week. The end exam shall be conducted separately and average of two exams will be recorded by examiners.

** The students attend the Engineering and IT Work Shop in alternate week i.e. 3/2 per week. The end exam shall be conducted separately and average of two exams will be recorded by examiners.

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2013
Department	Department of Mechanical Engineering
Programme Code & Name	G5, B.Tech Mechanical Engineering

II Year B.Tech I Semester

Subject Code	Subject	Hours/ Week			Maximum marks		
		L	P	C	Internal	External	Total
1GC31	Mathematics -II	4	0	4	30	70	100
1G531	Mechanics of Solids	4	0	4	30	70	100
1G237	Electrical Engineering and Electronics Engineering*	4	0	4	30	70	100
1G532	Metallurgy & Material Science	4	0	4	30	70	100
1G533	Thermodynamics	4	0	4	30	70	100
1G534	Machine Drawing [#]	2	6	4	30	70	100
1GC35	Soft Skills – I	2	0	2	30	70	100
1G239	Electrical Engineering Lab and Electronics Engineering Lab ^{**}	0	3/2 (each)	2	30	70	100
1G535	Material Science Lab and Mechanics of Solids Lab ^{***}	0	3/2 (each)	2	30	70	100
Total		24	12	30	270	630	900

NOTE:

*In Electrical Engineering and Electronics Engineering two questions from each part should be chosen to answer five questions in the End semester examination.

**The Students attend the Electrical Engineering lab and Electronics Engineering lab in alternate week that is 3/2 per week.

***The Students attend the Material Science lab and Mechanics of Solids lab in alternate week that is 3/2 per week.

[#]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.

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2013
Department	Department of Mechanical Engineering
Programme Code & Name	G5, B.Tech Mechanical Engineering

II Year B.Tech II Semester

Subject Code	Subject	Hours/Week		C	Maximum marks		
		L	P		Internal	External	Total
1GC42	Probability and Statistics	4	0	4	30	70	100
1GC43	Environmental Science	4	0	4	30	70	100
1G541	Kinematics of Machinery	4	0	4	30	70	100
1G542	Thermal Engineering -I	4	0	4	30	70	100
1G543	Fluid Mechanics and Hydraulic Machines	4	0	4	30	70	100
1G544	Manufacturing Technology	4	0	4	30	70	100
1G545	Fluid Mechanics and Hydraulic Machines Lab	0	3	2	30	70	100
1G546	Manufacturing Technology Lab	0	3	2	30	70	100
1G547	Seminar - I	0	2	2	100	00	100
Total		24	8	30	340	560	900

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2013
Department	Department of Mechanical Engineering
Programme Code & Name	G5, B.Tech Mechanical Engineering

III Year B.Tech I Semester

Subject Code	Subject	Hours/Week		C	Maximum marks		
		L	P		Internal	External	Total
1GA51	Managerial Economics and Financial Analysis	4	0	4	30	70	100
1G551	Thermal Engineering II	4	0	4	30	70	100
1G552	Dynamics of Machinery	4	0	4	30	70	100
1G553	Machine tools	4	0	4	30	70	100
1G554	Design of Machine Elements-I	4	0	4	30	70	100
1G555	Heat Transfer	4	0	4	30	70	100
1GC53	Soft Skills – II	2	0	2	30	70	100
1G556	Heat Transfer Lab	0	3	2	30	70	100
1G557	Thermal Engineering Lab	0	3	2	30	70	100
Total		26	6	30	270	630	900

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2013
Department	Department of Mechanical Engineering
Programme Code & Name	G5, B.Tech Mechanical Engineering

III Year B.Tech II Semester

Subject Code	Subject	Hours/Week		C	Maximum marks		
		L	P		Internal	External	Total
1G561	Instrumentation and control systems	4	0	4	30	70	100
1G562	CAD/CAM	4	0	4	30	70	100
1G563	Metrology and Surface Engineering	4	0	4	30	70	100
1G564	Thermal Engineering-III	4	0	4	30	70	100
1G565	Design of Machine Elements-II	4	0	4	30	70	100
1G566	Industrial Management	4	0	4	30	70	100
1G567	Metrology Lab and Machine Tools Lab	0	3/2 (each)	2	30	70	100
1GC61	Advanced English Communication Skills Lab	0	3	2	30	70	100
1G568	Seminar - II	0	2	2	100	00	100
Total		24	8	30	340	560	900

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2013
Department	Department of Mechanical Engineering
Programme Code & Name	G5, B.Tech Mechanical Engineering

IV Year B.Tech I Semester

Subject Code	Subject	Hours/Week		C	Maximum marks		
		L	P		Internal	External	Total
1G571	Operations Research	4	0	4	30	70	100
1G572	Automobile Engineering	4	0	4	30	70	100
1G573	Finite Element Methods	4	0	4	30	70	100
1G574	Automation and Robotics	4	0	4	30	70	100
ELECTIVE –I							
1G575	Tribology	4	0	4	30	70	100
1G576	Advanced Manufacturing Systems						
1G577	Mechatronics						
ELECTIVE –II							
1G578	Un conventional Machining process	4	0	4	30	70	100
1G579	Tool Design						
1G57A	Rapid Prototyping						
1G57B	Instrumentation lab and optimization lab with MATLAB software	0	3	2	30	70	100
1G57C	CAD/CAM Lab	0	3	2	30	70	100
1G57D	Comprehensive Mechanical Engg	0	2	2	30	70	100
Total		24	8	30	270	630	900

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2013
Department	Department of Mechanical Engineering
Programme Code & Name	G5, B.Tech Mechanical Engineering

IV Year B.Tech II Semester

Subject Code	Subject	Hours/Week		C	Maximum marks		
		L	P		Internal	External	Total
1G581	Production & Operations Management	4	0	4	30	70	100
1G582	Power Plant Engineering	4	0	4	30	70	100
ELECTIVE III							
1G583	Refrigeration and Air conditioning	4	0	4	30	70	100
1G584	Computational Fluid Dynamics						
1G585	Non Conventional sources of Energy						
ELECTIVE IV							
1G586	Nano technology	4	0	4	30	70	100
1G48B	Neural Networks and Fuzzy Logic						
1G587	Supply Chain Management						
1G588	Seminar - III	0	2	2	100	00	100
1G589	Project Work	0	12	12	100	00	100
Total		16	14	30	320	280	600

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)
B.Tech. I Year**

(1GC11)ENGLISH

INTRODUCTION

The sweeping changes in the world have elevated English to the status of a tool of global communication and transformed it into e-English. The syllabus has been drafted to improve the competence of students in communication in general and language skills in particular. The books prescribed serve as students' handbooks.

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 also to write short paragraphs and essays. The main aim is to encourage two-way communication in place of one-sided lecture.

The text for non-detailed study is meant for extensive reading by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements etc.

OBJECTIVES

- To improve the language proficiency of the students in English with an emphasis on LSRW skills.
- To equip the students to study academic subjects with greater facility through theoretical and practical components of the syllabus.
- To develop study skills as well as communication skills in formal and informal situations.

SYLLABUS

Listening Skills:

Objectives

- To enable students to develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
- To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and dialects.

Students should be given practice in listening and identifying the sounds of English language and to mark stress, right intonation in connected speech.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives

- To make students aware of the role of ability to speak fluent English and its contribution to their success.
- To enable students to express themselves fluently and appropriately in social and professional contexts.
 - Oral practice
 - Describing objects/situations/people
 - Role play - Individual/Group activities
 - Just A Minute (JAM) Sessions(Using exercises from all units of the prescribed text)

Reading Skills:

Objectives

- To develop an awareness in the students about the significance of silent reading and comprehension.
- To develop the ability to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.
 - Skimming the text

- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Recognizing coherence/sequencing of sentences

The students shall be trained in reading skills using the prescribed text for detailed study. They shall be examined in reading and answering questions using ‘unseen’ passages which may be taken from the non-detailed text or other authentic texts, such as articles from magazines/newspaper

Writing Skills:

Objectives

- To develop an awareness in the students the skill to write exact and formal writing
- To equip them with the components of different forms of writing
 - Writing sentences
 - Use of appropriate vocabulary
 - Paragraph writing
 - Coherence and cohesiveness
 - Narration / description
 - Note Making
 - Formal and informal letter writing
 - Editing a passage

TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content are prescribed and divided into Eight Units:

For Detailed study: ENJOYING EVERYDAY ENGLISH, Sangam Books (India) Pvt Ltd Hyderabad, 2009

For Non-detailed study: INSPIRING LIVES, Maruti Publications, Guntur, 2009

Unit -I

- a) “Heaven’s Gate” from **ENJOYING EVERYDAY ENGLISH**
- b) “Mokshagundam Visvesaraya” from **INSPIRING LIVES**
- c) **Parts of Speech (apart from the Language Work from prescribed text)**

Unit -II

- a) “Sir C.V.Raman” from **ENJOYING EVERYDAY ENGLISH**
- b) “Mother Teresa” from **INSPIRING LIVES**
- c) **Articles and Prepositions (apart from the Language Work from prescribed text)**

Unit -III

- a) “The Connoisseur” from **ENJOYING EVERYDAY ENGLISH**
- b) “Vikram Sarabhai” from **INSPIRING LIVES**
- c) **Tenses (apart from the Language Work from prescribed text)**

Unit -IV

- a) “The Cuddalore Experience” from **ENJOYING EVERYDAY ENGLISH**
- b) “Sam Pitroda” from **INSPIRING LIVES**
- c) **Active and Passive Voice (apart from the Language Work from prescribed text)**

Unit -V

- a) Bubbling Well Road from **ENJOYING EVERYDAY ENGLISH**
- b) VishwanathanAnand from **INSPIRING LIVES**
- c) **Transformation of Sentences (apart from the Language Work from prescribed text)**

Unit -VI

- a) Odds Against Us from **ENJOYING EVERYDAY ENGLISH**
- b) Charlie Chaplin from **INSPIRING LIVES**
- c) **Common Errors in English (apart from the Language Work from prescribed text)**

Unit -VII Exercises on

Reading Comprehension, Note-taking and Note-making, Paragraph Writing, Letter Writing, Précis Writing and Technical Report Writing

Unit -VIII Exercises on

Spelling and Punctuation, Synonyms and Antonyms, One-word substitutes, Prefixes and Suffixes, Idioms and Phrases, Words often confused

REFERENCES:

1. Technical Communication, Principles and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2011, 2nd edition
2. Essential Grammar in Use, (with CD), Raymond Murphy, 3/e, Cambridge University Press, 2009
3. Basic Communication Skills for Technology, Andrea J Ruthurford, Pearson Education, Asia.
4. English for Technical Communication, AyshaViswamohan, Tata McGraw Hill
5. English Grammar and Composition, David Green, McMillan India Ltd.
6. Murphy's English Grammar, Raymond Murphy, CAMBRIDGE
7. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
8. Communication Skills for Technical Students, Farhathullah, T.M., Orient Blackswan, 2008
9. Developing Communication Skills, 2/e. by Krishna Mohan &MeeraBanerji , Macmillan, 2009
- 10.English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
- 11.Longman Dictionary of Contemporary English with DVD, Pearson Longman

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B.Tech I Year

(1GC12)ENGINEERING PHYSICS

UNIT -I OPTICS: Interference - Interference in thin films by reflection - Newton's rings - Diffraction -Fraunhofer diffraction at a single slit - Fraunhofer diffraction at a double slit - Diffraction grating -Grating spectrum - polarization – Double refraction - Nicol prism -Theory of circular and elliptical polarized light - Quarter and half wave plates.

UNIT -II CRYSTAL STRUCTURES AND X-RAY DIFFRACTION: Introduction -Space lattice -Basis - Unit cell - Lattice parameter - Crystal systems - Bravais lattices - Structure Simple cubic - Body Centered Cubic - Face Centered Cubic crystals - Miller indices of planes and directions in crystals -Separation between successive (h k l) planes - X-ray diffraction by crystal planes - Bragg's law - Laue and Powder methods.

UNIT -III PRINCIPLES OF QUANTUM MECHANICS: Waves and Particles - deBroglie's hypothesis - Heisenberg's uncertainty principle - Schrödinger's one dimensional wave equation (Time Independent) - Particle in a one dimensional potential box .

THE ELECTRON THEORY OF METALS & BAND THEORY: Postulates of Classical and Quantum free electron theory-Fermi-Dirac distribution and effect of Temperature (qualitative treatment only) - Source of electrical resistance - Kronig-Penney model (qualitative treatment only) - energy bands - metals, semi conductors & insulators.

UNIT -IV SEMICONDUCTORS: Intrinsic and extrinsic semiconductors - Law of mass action - Drift & diffusion - Einstein's relation - Hall effect - Direct & indirect band gap semiconductors - p-n junction - Band diagram of p-n junction diode - Diode Equation-LED, LCD & Photo diode.

UNIT -V MAGNETIC PROPERTIES: Introduction - Origin of magnetic moment - Classification of magnetic materials - Dia, Para , Ferro, anti-Ferro and Ferri magnetism - Hysteresis - Soft and hard magnetic materials.

DIELECTRIC PROPERTIES: Introduction - Dielectric constant - Electronic, Ionic and Orientation polarizations (qualitative treatment only) - Local field - Clausius-Mossotti equation -Frequency dependence of polarisability (qualitative treatment only) - Ferro electricity- BaTiO₃.

UNIT -VI SUPERCONDUCTIVITY: General properties - Meissner effect - Type I and Type II superconductors - Penetration depth - BCS theory - Flux quantization - Josephson effects - Applications of superconductors.

LASERS: Introduction - Characteristics of laser - Spontaneous and stimulated emission of radiation -Einstein's coefficients - Population inversion - Ruby

Laser - Helium-Neon Laser - GaAs Laser -Applications of Lasers in Industry, Scientific and Medical fields.

UNIT -VII FIBER OPTICS: Introduction - Principle of optical fiber - Acceptance angle and Acceptance cone - Numerical aperture - Types of Optical fibers and refractive index profiles - Optical fiber communication systems - Application of optical fibers. **Holography:-**Introduction-construction and reconstruction of hologram-Applications.

UNIT -VIII NANOMATERIALS: Introduction - Basic principles of nano materials - Fabrication of nanomaterials - ball milling -plasma arching - Chemical vapour deposition method - sol-gel methods -properties of nanomaterials - carbon nanotubes - properties and applications of carbon nanotubes -Applications of nanomaterials.

TEXT BOOKS:

1. V. Rajendran&K.Thyagarajan, Engineering Physics, Tata McGraw-Hill Co. Ltd.
2. P.K.Palanisamy, Engineering Physics, Scitech Publications.
3. M.R.Srinivasan, Engineering Physics, New Age Publications.

REFERENCES:

1. Halliday, Resnick and Krane, Physics Volume 2, John Wiley India.
2. S.O. Pillai, Applied physics, New Age International
3. R. K. Gaur & S.L. Gupta, Engineering Physics, Dhanpatrai publications
4. M. N. Avadhanulu, & P.G. Kshirasagar, Engineering Physics, S. Chand publications
5. C.Kittel, Solid State Physics, John Wiley India
6. P.K. Mittal, Engineering Physics, I.K.International
7. K.K Chattopadhyay& A.N. Banarjee, Introduction to Nanoscience& Nano Technology, Prentice - Hall of India Pvt. Ltd

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B.Tech I Year

(1GC13)ENGINEERING CHEMISTRY

UNIT -I Water Technology: Sources of water, Hardness of water-Temporary and Permanent hardness. Units. Estimation of hardness by EDTA Method. Analysis of Water - Dissolved Oxygen. Disadvantages of Hard Water.Problems on hardness of water. Methods of Treatment of Water for Domestic Purpose - Disinfection: Chlorination, Ozonisation.

Water for Industrial purpose - Water for Steam Making, Boiler Troubles - Carry Over (Priming and Foaming), Boiler Corrosion, Scales and Sludge, Caustic Embrittlement. Water Treatment: - Internal Treatment - Colloidal, Phosphate, Calgon, Carbonate, Sodium aluminates Conditioning of Water. External Treatment - Ion- Exchange Process.

UNIT -II Electro Chemistry: Conductance - Equivalent Conductance - Molecular Conductance, Conductometric Titrations - Applications of Conductivity Measurements. **Electrochemical Cells:** Measurement of EMF, Standard electrode potential, concentration cells, batteries (Ni-Cd cell). Fuel cell: hydrogen oxygen fuel cell and methanol fuel cell.

Insulators - Definition, Properties and Characteristics of Insulating Materials; Engineering Applications.

UNIT -III Science of Corrosion: Definition, Types of corrosion: Dry Corrosion, (Direct Chemical attack), Wet Corrosion, Theories of Corrosion and Mechanism, Electro Chemical Theory of Corrosion. Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion, Oxygen absorption type.Factors Influencing Corrosion.Control of Corrosion - Cathodic Protection - Sacrificial anode and Impressed Current. Uses of Inhibitors. Electro Plating, and Electro less plating (copper and nickel).

UNIT -IV Polymers: Definition & Classification of polymers, Functionality. Types of Polymerization - Addition and Condensation Polymerization.Plastics-Thermoplastics and Thermosetting plastics. Properties and Engineering Uses of the Following: Teflon, Bakelite, Nylon. Rubber - Processing of Natural Rubber and Compounding of rubber. Elastomers - Buna S, Buna-N, Silicone Rubber.

UNIT -V Explosives and Propellants: Explosives, Classification, precautions during storage, blasting fuses, important explosives. Rocket propellants, classification of propellants.

Lubricants :Principles and function of lubricants - Classification and properties of lubricants -Viscosity, flash and fire points, cloud and pour points, aniline point, Neutralization Number and Mechanical Strength.

UNIT -VI Phase rule: Definition, Terms involved in Phase Rule and Phase rule equation. Phase diagrams - one component system (water system), two component system (lead- silver system) Eutectics.

UNIT -VII Fuels and Combustion: Definition and Classification of fuels. Solid, liquid & gaseous fuels, Characteristics of a good fuel.Metallurgical Coke - Characteristics & Manufacture (Otto-Hoffmann).Petroleum - Refining - Synthetic Petrol.Calorific Value &its determination (Bomb Calorimeter). Combustion: Flue gas analysis by Orsat's apparatus. Combustion calculations.

UNIT -VIII Inorganic Engineering Materials: Cement: composition of Portland cement, analysis, setting and hardening of cement (reactions).

Refractory Materials: Definition, Classification with Examples; Criteria of a Good Refractory Material; Causes for the failure of a Refractory Material.

TEXT BOOKS:

- 1.K.N.Jayaveera, Dr.G.V.Subba Reddy and Dr.C. Ramachandraiah, Chemistry for Engineers, McGraw Hill Higher Education Hyd., 2009
- 2.S.S. Dara, A textbook of Engineering Chemistry S.Chand& Co, New Delhi (2008)
- 3.Jain & Jain, Text book of Engineering Chemistry, DhanpatRai Publishing Company, 15th edition New Delhi (2008).

REFERENCES:

1. Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Engineering Chemistry ScitechPublications(India) Pvt. Limited, Hyderabad. 2009
2. B.Viswanath, M.AuliceScibioh, Fuel Cells principles and applications - Universities press
3. C.V. Agarwal, Chemistry of Engineering Materials Tara Publication, Varanasi.2008
4. J C Kuriacose and J. Rajaram, Engineering Chemistry (Vol.1&2) Tata McGraw-Hill Co,New Delhi (2004)
5. G.D. Gesser, Applied Chemistry: A Text Book for chemistry for Engineers & Technologists, Springer, 2000
6. Glasston& Lewis, Physical Chemistry

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B.Tech I Year

(1GC14)MATHEMATICS – I

UNIT -I Differential equations of first order and first degree – Exact, linear and Bernoulli equations.-Applications -Newton’s law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT -II 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 , $e^{ax} V(x)$, $xV(x)$, method of variation of parameters.

UNIT -III Rolle’s Theorem – Lagrange’s Mean Value Theorem (excluding proof). Simple examples of Taylor’s and Maclaurin’s Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

UNIT -IV Curve tracing – Cartesian, polar and parametric curves. Applications of integration to lengths, volume and surface area of solids of revolution, in Cartesian and polar coordinates.

UNIT -V Multiple integral: –Double integral– Evaluation-Change of Variables and Change of order of integration. Triple integral -Evaluation.

UNIT -VI Laplace transform of standard functions – Inverse transform – First shifting Theorem,–Second shifting theorem – Convolution theorem – Laplace transform of Periodic function.

UNIT -VII Transforms of derivatives and integrals-Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT -VIII Vector Calculus: Gradient – Divergence – Curl - Vector integration –Line integral - Area, Surface and volume integrals. Vector integral theorems: Verification of Green’s theorem – Stoke’s theorem and Gauss’s Divergence Theorem (excluding their proof).

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi and others, A Text Book of Engineering Mathematics, Vol – 1, S. Chand & Company.
2. E. Rukmangadachari, E. KeshavaReddy, A Text Book of Engineering Mathematics-1, Pearson Education.

REFERENCES:

1. B.V. Ramana, A Text Book of Engineering Mathematics, Tata McGraw Hill.
2. B.S.Grewal, Higher Engineering Mathematics, 40thed, Khanna publishers.

**(1G112)C PROGRAMMING AND INTRODUCTION TO DATA
STRUCTURES**

Unit -I Overview of Computers and Programming - Electronic Computers then and Now, Computer Hardware, Computer Software, Algorithm, Flowcharts, Software Development Method, Applying the Software Development Method, Number Systems.

Unit -II Introduction to C Language - C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Expressions, Precedence and Associativity, Expression Evaluation, Operators and Expressions, Type Conversions, Decision Statements - If and Switch Statements, Loop Control Statements - while, for, do-while Statements, Nested for Loops, Other Related Statements -break, continue, goto.

Unit -III Arrays - Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Using Array Elements as Function Arguments, Arrays Arguments, Multidimensional Arrays.

Functions - Library Functions, Functions with and without Arguments, Communications Among Functions, Scope, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type Qualifiers, Recursion - Recursive Functions, Preprocessor Commands.

Unit -IV Strings - String Basics, String Library Functions, Longer Strings, String Comparison, Character operations, String-To-Number and Number-To-String Conversions,

Pointers - Introduction, Features of Pointers, Pointer Declaration, Arithmetic Operations With Pointers, Pointers and Arrays, Pointers and Two-Dimensional Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Dynamic Memory Allocation, Programming Applications, Pointer to Functions, Pointers and Strings.

Unit -V Structures and Unions – Introduction, Features of Structures. Declaration and Initialization of Structures, Structure within Structure, Array of Structures, Pointer to Structure, Structure and Functions, typedef, Bit Fields, Enumerated Data Type, Union, Union of Structures.

Unit -VI Files - Introduction, Streams and File Types, Steps for File Operations, File I/O Structures, Read and Write, Other File function, Searching Errors in Reading/Writing of Files, Low Level Disk I/O, Command Line Arguments, Application of Command Line Arguments, File Status functions (error handling).

Unit -VII Data Structures - Overview of Data Structure, Representation of a Stack, Stack Related Terms, Operation on a Stack, Implementation of a Stack, Representation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Conversion of Expression from Infix to Postfix, Recursion, Queues - Various Positions of Queue, Representation of Queue, Insertion, Deletion, Searching Operations.

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

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

TEXT BOOKS:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education
2. C and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill
3. C and Data Structures, A snapshot oriented treatise with live engineering examples, Dr. N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand

REFERENCES

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. LETUS C, Yeswanth Kanitkar, Ninth Edition, BPB Publication
3. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI, Eighth Edition.

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B.Tech I Year

(1G511)ENGINEERING MECHANICS

UNIT -I Basic concepts - System of forces–Resultant of a force system, Moment of forces and its Application & Couples, Equilibrium system of forces, Free body diagrams

UNIT -II Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

Spatial Forces-Components in space, Resultant.

UNIT -III Analysis of Frames(analytical Method)- Types of Frames – Assumptions for forces in members of a perfect frame. Method of Joints, Method of Sections, Cantilever trusses and simply supported trusses.

UNIT -IV FRICTION: Types of friction– Static and Dynamic Frictions, laws of Friction–Limiting friction–Cone of limiting friction– Motion of bodies – Wedge friction

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

UNIT -VI Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures, Product of Inertia.

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

UNIT -VII KINEMATICS: Rectilinear and Curvilinear motion – Velocity and Acceleration – Motion of a Rigid Body – Types and their Analysis in Planar Motion.

UNIT -VIII KINETICS : Analysis as particles and Analysis as a Rigid Body in Translation –Equations of Plane Motion – Fixed axis of Rotation –Work Energy Method – Equation for Translation – Work – Energy application to Particle Motion.

Impulse momentum-linear impulse moment, impact of jets on plates, conservation of momentum.

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

REFERENCES:

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

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B.Tech I Year**

(1G512)ENGINEERING GRAPHICS

UNIT -I INTRODUCTION TO ENGINEERING GRAPHICS:

Engineering Graphics and its Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions. Curves used in Engineering Practice:

- a) Conic Sections including the Rectangular Hyperbola – General method and special methods
- b) Cycloid, Epicycloids and Hypocycloid
- c) Involute.

UNIT -II PROJECTION OF POINTS AND LINES: Principles of Orthographic Projection – Conventions – First and Third Angle Projections. Projections of Points, Lines inclined to both planes, Finding True lengths & traces .

UNIT -III PROJECTIONS OF PLANES: Projections of regular Plane surfaces/figures, Projection of lines and planes using auxiliary planes.

UNIT -IV PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to both planes – Auxiliary Views.

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

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

UNIT –VI ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric projections of spherical parts. Conversion of Isometric views

to Orthographic Views – Conversion of Orthographic views to Isometric views.

UNIT -VII INTERPENETRATION OF RIGHT REGULAR SOLIDS:

Projections of curves of Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Square Prism Vs Square Prism.

UNIT -VIII PERSPECTIVE PROJECTIONS: Perspective View of Plane Figures and Simple Solids by Vanishing Point Method.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, Johle, Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education

REFERENCES:

1. Engineering Drawing and Graphics, Venugopal/ New age
2. Engineering Drawing, K.L. Narayana, P. Kanniah, Scitech Pub.
3. Engineering Drawing, Venkata Reddy, B.S.Publishers.

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B.Tech I Year

(1GC16)ENGINEERING PHYSICS AND CHEMISTRY LAB

PART A: ENGINEERING PHYSICS LAB

Any TEN of the following experiments are to be performed during the Academic year.

List of Experiments

1. Determination of wavelength of given source - spectrometer - normal incidence method.
2. Dispersive power of the prism - Spectrometer.
3. Determination of wavelength of a laser source - Diffraction Grating.
4. Determination of Frequency of AC source by Sonometer.
5. Determination of thickness of a thin wire using parallel fringes.
6. Newton's Rings.
7. Magnetic field along the axis of a current carrying coil - Stewart and Gee's method.
8. Numerical aperture of an optical fiber.
9. Hall effect.
10. B - H Curve.
11. Energy gap of a material of p-n junction
12. Determination of rigidity modulus of a wire material - Torsional pendulum
13. Determination of dielectric constant.
14. Verification of laws of stretched string - Sonometer.
15. Melde's experiment - Transverse & Longitudinal modes.

Equipment required:

Spectrometer, Grating, Prism, Mercury vapour lamp, Sodium vapour lamp, Travelling Microscope, Wedge arrangement, Newton rings setup, Stewart-Gee's apparatus, He-Ne laser source, Optical fiber, Hall effect kit, B-H loop kit, Energy gap kit (four probe method), Torsional pendulum, Dielectric constant kit, Sonometer, Melde's apparatus

References:

1. Laboratory manual of ENGINEERING PHYSICS by Dr. Y. Aparna, Dr. K. VenkateswaraRao.
2. Laboratory Engineering Physics by Dr. K. Palanisamy, Scitech Publications.

PART B: ENGINEERING CHEMISTRY LAB

1. Estimation of Hardness of Water by EDTA method.
2. Estimation of Copper by EDTA method.
3. Estimation of Ferrous ion by dichrometry.
4. Estimation of Copper, by Iodometry.
5. Estimation of dissolved oxygen by Winkler's method.
6. Determination of strength of the given Hydrochloric acid against standard sodium hydroxide solution by Conductometric titration
7. Determination of eutectic composition and temperature of simple eutectic system (Urea-Benzoic acid).
8. Determination of viscosity of the oils through Redwood viscometer I & II
9. Determination of calorific value of fuel using Bomb calorimeter
10. Determination of Iron in Cement by colorimetric method.

BOOKS:

1. Chemistry-lab manual by Dr. K.N.Jayaveera and K.B. Chandra Sekhar, S.M. Enterprises Ltd.
2. Vogel's Book of Quantitative Inorganic Analysis, ELBS Edition.

Equipment Required:

1. Glass ware: Pipettes, Burettes, Volumetric Flasks, Beakers, Standard flasks, Measuring jars, Boiling Test tubes, reagent bottles, (Borosil)
2. Analytical balance (keroy) (15 Nos)
3. Calorimeter
4. Bomb Calorimeter
5. Redwood viscometer No. 1 & No.2

6. Conductometer/ Conductivity bridge
7. Potentiometer
8. Wash bottles, test tube stands, burette stands
9. Gas cylinders with Bunsen burners
10. Chemicals: Hydrochloric acid, sodiumhydroxide, EDTA, EBT indicator, FSB-F indicator, methanol, Mohr's salt, copper sulphate, magnesium sulphate, ammonia, ammonium sulphate, calcium sulphate, etc.,

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B.Tech I Year

(1GC17)ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

The **Language Lab** focuses on the production and practice of sounds of language and equips students with the use of English in everyday situations and contexts.

Objectives:

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm
- To initiate them into greater use of the computer in resume preparation, report- writing, format-making etc.
- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required ability to face computer-based competitive exams such GRE, TOEFL, GMAT etc.

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 and Role-play**
- 4. Telephone Skills**
- 5. 'Just A Minute' (JAM)**
- 6. Oral Presentations**
- 7. Describing Objects / Situation / People**

8. Information Transfer

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.

System Requirement (Hardware component):

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

- i) P – IV Processor
 - a) Speed – 2.8 GHZ
 - b) RAM – 512 MB Minimum
 - c) Hard Disk – 80 GB
- ii) Headphones of High quality

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

Suggested Software:

Sky Pronunciation Suite

Connected Speech from Clarity

Clarity Pronunciation Power – Part I

The Rosetta Stone English Library

Mastering English in Vocabulary, Grammar, Spellings, Composition

English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Dorling Kindersley - Series of Grammar, Punctuation, Composition etc.

Language in Use, Foundation Books Pvt Ltd with CD

Learning to Speak English - 4 CDs

Microsoft Encarta with CD

Cambridge Advanced Learners' English Dictionary with CD.

Murphy's English Grammar, Cambridge with CD

Books Suggested for English Language Lab Library (to be located within the lab in addition to the

CDs of the text book which are loaded on the systems):

- **English Pronouncing Dictionary**, Daniel Jones Current Edition with CD.
- **Spoken English**, R. K. Bansal and J. B. Harrison, Orient Longman 2006 Edn.
- **Speaking English Effectively**, Krishna Mohan & NP Singh (Macmillan)
- **A Practical Course in English Pronunciation**, (with two Audio cassettes) by J. Sethi, Kamlesh
- Sadanand & D.V. Jindal, Prentice-Hall of India Pvt. Ltd., New Delhi.
- **Body Language- Your Success Mantra** ,DrShaliniVerma, S.Chand & Co, 2008
- **English Dictionary for Advanced Learners**, (with CD) International edn. Macmillan 2009
- **A Handbook for English language Laboratories**, E.Sureshkumar, P.Sreehari, Foundation Books, 2009
- **DELTA's key to the Next Generation TOEFL Test**, 6 audio CDS, New Age International Publishers, 2007

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B.Tech I Year

(1G114)C PROGRAMMING AND DATA STRUCTURES LAB

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 Compiler and Supporting Editors

Exercise 1.

- Write a C program to calculate Simple Interest by accepting principle amount, rate of interest and time.
- Write a C program to find the roots of a quadratic equation.
- Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 2.

- Write a C program to find the sum of individual digits of a positive integer.
- A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 3.

- Write a C program to find the given number is Armstrong number or not.
($153 = 1^3 + 5^3 + 3^3$)
- Write a C program to find the given number is Strong number or not.
($145 = 1! + 4! + 5!$)
- Write a C program to generate all the Armstrong numbers between 1 and n, and Strong number between 1 and n where n is a value supplied by the user

Exercise 4.

- Write a C program to calculate the following Sum:

$$Sum = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} - \frac{x^{10}}{10!}$$

- Write a C program to read in two numbers, x and n, and then compute the sum of the geometric progression: $1 + x + x^2 + x^3 + \dots + x^n$ For example: if n is 3 and x is 5, then the program computes $1+5+25+125$. Print x, n, the sum Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if

$n < 0$, then go back and read in the next pair of numbers of without computing the sum. Find if any values of x are also illegal? If so, test for them too.

Exercise 5.

- a) Write a C program to generate Pascal's triangle.
- b) Write a C program to construct a pyramid of numbers.

Exercise 6.

- a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
- b) Write a C program to convert a Roman numeral to its decimal equivalent.

Exercise 7.

- a) Write a C program to find both the largest and smallest number in a list of integers.
- b) Write a C program that uses functions to perform the following:
 - i) Addition of Two Matrices
 - ii) Multiplication of Two Matrices

Exercise 8.

Write C programs that use both recursive and non-recursive functions

- i) To find the factorial of a given integer.
- ii) To find the GCD (greatest common divisor) of two given integers.
- iii) To solve Towers of Hanoi problem.

Exercise 9.

- a) Write a C program that uses functions to perform the following operations:
 - i) To insert a sub-string in to a given main string from a given position.
 - ii) To delete n Characters from a given position in a given string.
- b) Write a C program to determine if the given string is a palindrome or not

Exercise 10.

- a) Write a C program that displays the position or index in the string S where the string T begins, or - 1 if S doesn't contain T.
- b) Write a C program to count the lines, words and characters in a given text.

Exercise 11.

Write a C program that uses functions to perform the following operations:

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Exercise 12

- a) Write a C program which copies one file to another.
- b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

Exercise 13

- a) Write a C programme to display the contents of a file.
- b) Write a C programme to merge two files into a third file
(i.e., the contents of the first file followed by those of the second are put in the third file)

Exercise 14

Write a C program that uses functions to perform the following operations on singly linked list.:

- i) Creation
- ii) Insertion
- iii) Deletion
- iv) Traversal

Exercise 16

Write C programs that implement stack (its operations) using

- i) Arrays
- ii) Pointers

Exercise 17

Write C programs that implement Queue (its operations) using

- i) Arrays
- ii) Pointers

Exercise 18

Write a C program that uses Stack operations to perform the following:

- i) Converting infix expression into postfix expression
- ii) Evaluating the postfix expression

Exercise 19

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

- i) Bubble sort
- ii) Selection sort
- iii) Insertion sort

Exercise 20

Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:

- i) Linear search
- ii) Binary search

Exercise 21

Write C program that implements the Quick sort method to sort a given list of integers in ascending order.

Exercise 22

Write C program that implement the Merge sort method to sort a given list of integers in ascending order.

REFERENCE BOOKS

1. The Spirit of C, an introduction to modern programming, M.Cooper, Jaico Publishing House.
2. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.
3. Computer Basics and C Programming, V. Rajaraman, PHI Publications.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)
B.Tech I Year
(1G411)ENGINEERING & I.T. WORKSHOP

ENGINEERING WORKSHOP

Objectives:

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 he should 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 40 x 25 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 guage 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.

IT WORKSHOP

Objectives:

The IT Workshop for engineers is a training lab course. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. The students should work on a working PC (PIV or higher) to disassemble and assemble back to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace for usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and databases using the Microsoft suite of office tools and LaTeX. (It is recommended to use Microsoft office 2007 in place of MS Office 2003)

PC Hardware

Exercise 1 – Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Exercise 2 – Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content.

Exercise 3 – Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Exercise 4 – Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Exercise 5 – Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

Exercise 6 – Task 6: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

OFFICE TOOLS:

LaTeX and Word:

Exercise 7 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task1:Using LaTeX and Word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task2: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task3: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs

Task4: Creating a Feedback form - Features to be covered- Forms, Text Fields, Inserting objects, Mail Merge in Word.

Excel

Exercise 8 - Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1:Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task2: Calculating GPA - Features to be covered:- Cell Referencing, Formulae in excel – average, std.deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task3: Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

LaTeX and MS/equivalent (FOSS) tool Power Point

Exercise 9 - Task1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power

point presentation which needs to be replicated (exactly how it's asked).

Exercise 10 - Task2: Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes : Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

Access

Exercise11 – Task1:Help students in preparing database using Microsoft/ equivalent (FOSS) access tool. Topic covered during this week includes - Access Orientation, Using Templates, Layouts, Inserting data, Editing data, Inserting Tables, Working with menu objects, Renaming, deleting, modifying data and tables.

Internet & World Wide Web

Exercise 12 - Task 1:Orientation & Connectivity Boot Camp : Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.

Exercise 13 - Task 2:Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of instructors.

Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer.

REFERENCES :

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. LaTeX Companion – Leslie Lamport, PHI/Pearson.
3. Introduction to Computers, Peter Norton, 6/e Mc Graw Hill
4. Upgrading and Repairing, PC's 18th e, Scott Muller QUE, Pearson Education
5. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech
6. IT Essentials PC Hardware and Software Companion Guide, Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.

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

(1GC31) MATHEMATICS – II

UNIT -I Eigen values-Eigen vectors-properties, Cayley -Hamilton theorem-inverse and powers of a matrix by Cayley Hamilton theorem- Diagonalization of matrix- Calculation of powers of matrix.

UNIT -II Fourier series-Determination of Fourier coefficients-Fourier series-Even and Odd functions-Fourier series in an arbitrary interval-even and odd periodic continuation- Half –range Fourier sine and cosine expansions.

UNIT -III PARTIAL DIFFERENTIAL EQUATIONS: Formation of partial differential equations by eliminating arbitrary constants and functions--Method of separation of variables-Solutions of one dimensional heat and wave equations-Laplace equation (three zero boundary conditions).

UNIT -IV Solution of algebraic and Transcendental equations-Bisection method-Method of false position-Newton-Raphson method-Interpolation-Forward differences-Backward differences-Newton's forward and backward difference formulae – Lagrange's interpolation formula.

UNIT -V Numerical solutions of ordinary differential equations-Taylor's series-Euler's method-Picard's method- Runge-kutta fourth order method-Milne's predictor-corrector method (Without proofs).

UNIT -VI Numerical Differentiation-Numerical integration-Trapezoidal Rule-Simpson's one third Rule-Simpson's $3/8^{\text{th}}$ Rule (without proofs).

UNIT -VII Functions of complex variable –continuity-differentiability-Analyticity-Properties-Cauchy Riemann equations in Cartesian and polar coordinates(without proofs).Harmonic and conjugate harmonic functions-Milne-Thomson's method.

UNIT -VIII COMPLEX INTEGRATION: Cauchy's integral theorem-Cauchy's integral formula-Generalized integral formula (without proofs) - Power series: Expansion in Taylor's series & Laurent series (without proofs).

TEXT BOOKS:

1. B. S. Grewal, *Higher Engineering Mathematics*. Khanna Publishers, New Delhi, 40th Ed.
2. E. Keshava Reddy, and G. SankaraRao, *A text book of Mathematical Methods*. I. K. International.

REFERENCE BOOKS:

1. Erwin Kreyszig, *Advanced Engineering Mathematics*. New Age International (Pvt) Limited, 8th Ed.
2. B. V. Ramana, *A text book of Engineering Mathematics*. Tata McGraw Hill.
3. T. K. V. Iyengar, B. Krishna Gandhi and Others, *Mathematics – II*. S. Chand & Company.
4. E. Keshav Reddy and Rukmangadachari, *Mathematics – III*. Pearson Education.

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

(1G531)MECHANICS OF SOLIDS

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 between them – Bars of varying section – composite bars – Temperature stresses.Strain energy – Resilience – Gradual, sudden, impact and shock loadings. Mohr’s circle for plane stress and plain strain.

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 of these loads – 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 bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

UNIT -IV SHEAR STRESSES:Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.

UNIT -V TORSION OF CIRCULAR SHAFTS: Theory of pure torsion- Derivation of torsion equations; $T/J=q/r=N /l$ – Assumptions made in the theory of pure torsion- torsional moment of resistance- polar section modulus.

UNIT -VI 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. Mohr’s theorems – Moment area method

– application to simple cases including overhanging beams.

UNIT -VII 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

UNIT -VIII 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 – Riveted boiler shells – Thin spherical shells.

Thick cylinders–lame’s equation – cylinders subjected to inside & out side pressures – compound cylinders.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Jindal, *Strength of Materials*. Umesh Publications.
2. Vazirani and Ratwani , *Analysis of structures*.
3. S.B.Junnarkar , *Mechanics of Structures Vol-III*.
4. S.Timshenko, *Strength of Materials*.
5. Andrew Pytel and Ferdinond L. *Strength of Materials*. Singer Longman.
6. Popov, *Solid Mechanics*.

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

**(1G237) ELECTRICAL ENGINEERING AND
ELECTRONICS ENGINEERING**

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

UNIT -II DC MACHINES: Principle of operation of DC generator-emf equation-types-DC motor types-torque equations-three point starter.

UNIT -III TRANSFORMERS: Principle of operation of single phase transformers- emf equation-losses-efficiency and regulation.

UNIT -IV AC MACHINES: Principle of operation of alternators-Regulation by synchronous impedance method .Principle of operation of induction motor-slip-torque characteristics-applications.

UNIT -V DIODE AND IT'S CHARACTERISTICS: PN junction diode, symbol, V-I characteristics, Diode applications, Half wave ,full wave and bridge rectifiers(simple problems).

UNIT -VI TRANSISTORS: PNP and NPN junction transistors, Transistor as an amplifier, single stage CE amplifier, Frequency response of CE amplifier, concepts of feedback amplifier, necessary conditions for oscillators, SCR Characteristics and applications.

UNIT -VII INDUCTION & DIELECTRIC HEATING:Theory of induction heating, applications in industries Theory of dielectric heating and it's industrial applications.

Ultrasonics: generation, flow detection and other applications.

UNIT –VIII CATHODE RAY OSCILLOSCOPE: Principle of CRT (cathode ray tube), Deflection sensitivity, electronic and magnetic deflection, applications of CRO-voltage, current and frequency measurements.

TEXT BOOKS:

1. T.Thyagarajan, *Fundamentals of Electrical and Electrical Engineering*. Scitech publications, 2007, 5th Ed.
2. William D Stanley, John R. Hackworth, Richard L Jones, *Fundamentals of Electrical engineering and technology*. Thomson Learning.
3. V.K.Mehta, *Principles of Electrical and Electronics Engineering*. S.Chand&Co.
4. R.L Boyelstad and Louis nashelsky, *Electronic Devices and circuits*. PEI/PHI, 2006, 9th Ed.
5. G.K Mittal, *Industrial Electronics*. PHI.

REFERENCE BOOKS:

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

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

(1G532)METALLURGY AND MATERIAL SCIENCE

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

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

UNIT -III EQUILIBRIUM OF DIAGRAMS: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, 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 important binary phase diagrams of Cu-Ni-, Al-Cu, and Fe-Fe₃C.

UNIT -IV 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.

UNIT -V 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 treatment, Cryogenic treatment of alloys.

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

UNIT -VII CERAMIC MATERIALS: Crystalline ceramics, glasses, cermets.

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.

UNIT -VIII Metallurgy: Steel Making - Introduction, Methods of steel making – crucible process, Bessemer converter process, Open Hearth Process, Electric Furnace Process.

TEXT BOOKS:

1. Sidney H. Avener, *Introduction to Physical Metallurgy*.
2. Donald R. Askeland, *Essential of Materials Science and Engineering*. Thomson.

REFERENCE BOOKS:

1. Kodgire, *Material Science and Metallurgy*.
2. Agarwal, *Science of Engineering Materials*.
3. William and collister, *Materials Science and Engineering*.
4. V. Rahghavan, *Elements of Material science*.
5. R. A Flinn and P K Trojan, *Engineering Materials and Their Applications*. Jaico Books.
6. R.K.Rajput, *Engineering materials and metallurgy*. S.Chand.
7. O.P. Khanna, *Material Science and Metallurgy*. Dhanpat rai Publications.

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II Year B. Tech. ME – I Semester

(1G533)THERMODYNAMICS

UNIT –I INTRODUCTION: BASIC CONCEPTS: System, Control Volume, Surrounding, Boundaries, 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.

UNIT -II Zeroth Law of Thermodynamics – Concept of quality of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, 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 -III 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.

UNIT -IV 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 –V 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 -VI 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 -VII MIXTURES OF PERFECT GASES:– Mole Fraction, Mass friction 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 const. And Molecular Internal Energy, Enthalpy, specific heats and Entropy of Mixture of perfect Gases and Vapour.

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

TEXT BOOKS:

1. PK Nag, *Engineering Thermodynamics*. TMH, 3rdEd.
2. A. Venkatesh, *Basic Engineering Thermodynamics*. Orient Longman.

REFERENCE BOOKS :

1. Sonntag, Borgnakke and Van wylen, *Fundamentals of Thermodynamics*. John Wiley & sons (ASIA) Pt Ltd.
2. Yunus Cengel & Boles, *Thermodynamics – An Engineering Approach*. TMH.
3. J.P.Holman, *Thermodynamics*. McGrawHill.
4. YVC Rao, *An introduction to Thermodynamics*. New Age.
5. Jones & Dugan, *Engineering Thermodynamics*.

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

(1G534) MACHINE DRAWING

I. MACHINE DRAWING CONVENTIONS:

Need for drawing conventions – introduction to IS conventions

- a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
- b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
- d) Title boxes, their size, location and details – common abbreviations & their liberal usage
- e) Types of Drawings – working drawings for machine parts.

II. DRAWING OF MACHINE ELEMENTS AND SIMPLE PARTS:

Selection of Views, additional views for the following machine elements and parts with every drawing proportions.

- a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
- b) Keys, cottred joints and knuckle joint.
- c) Rivetted joints for plates
- d) Shaft coupling, spigot and socket pipe joint.
- e) Journal, pivot and collar and foot step bearings.

III. ASSEMBLY DRAWINGS:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

- a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.
- b) Other machine parts – Screws jacks, Machine Vices Plummer block, Tailstock.
- c) Valves : Steam stop valve, spring loaded safety valve, feed check valve and air cock.

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.

REFERENCE BOOKS :

1. P.S.Gill, *Machine Drawing*.
2. Luzzader, *Machine Drawing*.
3. Rajput, *Machine Drawing*.
4. K.C.John, *Textbook of Machine Drawing*. PHI learning, 2009.

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II Year B. Tech. ME – I Semester

**(1GC35) SOFT SKILLS-I
(Common to CSE and ME)**

APTITUDE AND REASONING SKILLS

QUANTITATIVE APTITUDE:

- Number Systems, Averages, Problems on ages, Allegations, Percentages, Profit and Loss, Simple interest and Compound Interest, Ratio and Proportions and Variation, Time and Work, Time and Distance, Mensuration, Functions, Set Theory, Permutation and Combinations, Probability, Progressions, Inequalities, Coordinate Geometry, Quadratic Equations, Logarithms.
- HCF and LCM, Decimal Fractions, Simplification, Square Roots and Cube Roots, Surds and Indices, Pipes and cisterns, Area, Volume and Surface Areas, Races and Games, Calendar, Clocks, Stocks and Shares, True Discount, Banker's Discounts.
- Data Interpretation, Tabulation, Bar Graphs, Pie Charts, Line Graphs.

REASONING:

- Directions, Blood Relations, Problems on cubes, Series and sequences, odd man out, Coding and decoding, Data Sufficiency, logical deductions, Arrangements and Combinations, Groups and Teams, General Mental Ability, Puzzles to puzzle you, More Puzzles, Brain Teasers, Puzzles and Teasers.

REFERENCE BOOKS:

1. Arun Sharma, *How to Prepare for Quantitative Aptitude*, TMH Publishers, New Delhi, 2003.
2. R.S. Agarwal, *Quantitative Aptitude*, S.Chand Publishers, New Delhi, 2005.
3. Sharon Weiner-Green, Ira K. Wolf, *Barron's GRE*, Galgotia Publications, New Delhi, 2006.
4. R.S Agarwal, *Verbal and Non-Verbal Reasoning*, S. Chand Publishers, New Delhi, 1998.
5. Shakuntala Devi, *Puzzles to Puzzle You*, Orient Paper Backs Publishers (OPB), New Delhi, 2005.
6. Shakuntala Devi, *More Puzzles*, OPB, New Delhi, 2006.
7. Ravi Narula, *Brain Teasers*, Jaico Publishing House, New Delhi, 2005.

8. George J Summers, Puzzles and Teasers, Jaico Publishing House, Mumbai, 2005.

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

**(1G239) ELECTRICAL ENGINEERING AND
ELECTRONICS ENGINEERING LAB**

Any ten Experiments to be conducted.

ELECTRICAL ENGINEERING LAB

- | | | |
|----|------------------------------------------------------------------------------------------------------------------------------------|---|
| 1. | winburne's test on D.C shunt machine (pre determination of efficiency of a given D.C shunt machine working as motor and generator) | S |
| 2. | C and SC tests on single phase transformer (pre determination of efficiency and regulation at a given power factors) | O |
| 3. | brake test on three phase induction motor (determination of performance characteristics) | B |
| 4. | regulation of alternator by synchronous impedance method | R |
| 5. | speed control of D.C shunt motor by
a) Armature voltage control b) field flux control method | S |
| 6. | brake test on D.C shunt motor | B |

ELECTRONICS ENGINEERING LAB

- | | | |
|----|-------------------------------------------------------------------------------|---|
| 1. | study of CRO (Measurement of voltage frequency and phase of periodic signals) | S |
| 2. | -I Characteristics of PN junction diode | V |
| 3. | full wave rectifier with and without capacitive filter | F |
| 4. | input and output characteristics of Common Emitter (CE) Configuration | I |

5. frequency response of a single stage CE amplifier F
6. sinusoidal signal generation using RC phase shift oscillator circuit S

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II YEAR B. TECH. ME – I SEMESTER

**(1G535) MATERIAL SCIENCE LAB AND
MECHANICS OF SOLIDS LAB**

(A) MATERIAL SCIENCE LAB:

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 – C 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.

(B) MECHNICS OF SOLIDS LAB:

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

Note: Internal and End examinations evaluation will be done separately and the average will recorded.

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II Year B. Tech. ME – II Semester

**(1GC42) PROBABILITY AND STATISTICS
(Common to ME and IT)**

UNIT -I Statistics - introduction – Mean, Median, Mode, Range and Standard Deviation (ungrouped data) – Correlation – Rank correlation.

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

UNIT -III Random variables – Discrete and continuous – Distribution functions - mean and variance.

UNIT-IV Binomial distribution –Poison distribution- Uniform distribution(Discrete) - Normal distribution.

UNIT -V Sampling distribution: Population and sample - Sampling distributions of means (known and unknown) & proportions.

UNIT -VI Estimation: Point estimation – interval estimation - one mean –two means (large sample) and one proportion – two proportions (large sample).

UNIT -VII Test of Hypothesis – Hypothesis concerning one and two means– large and small samples

UNIT -VIII Tests of significance – one proportion (large sample) – two proportions – several proportions – rxc contingency tables – goodness of fit.

TEXT BOOKS:

1. S C Gupta and V K Kapoor, *Fundamentals of Mathematical Statistics*.S.Chand & sons.
2. B. V. Ramana, *A text book of Probability & Statistics*. Tata McGraw Hill.

REFERENCE BOOKS:

1. Erwin Kreyszig, *Advanced Engineering Mathematics*. New Age International (Pvt) Limited, 8th Ed.
2. T. K. V. Iyengar, B. Krishna Gandhi and Others, *Probability & Statistics*. S. Chand & Company.

3. Miller and John E. Freund, *Probability & Statistics for Engineers*. Prentice Hall of India.

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II Year B. Tech. ME – II Semester

**(1GC43) ENVIRONMENTAL SCIENCE
(Common to CSE and ME)**

UNIT -I THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: Definition, multidisciplinary nature, Scope & Importance- Need for public awareness -Global environmental crisis-People in Environment –Institutions in Environment.

UNIT -II FOREST, WATER AND ENERGY RESOURCES:

Natural resources: definition .Renewable & non-renewable natural resources. Natural resources & their associated problems.

Forest resources: Use & over –exploitation- deforestation , case studies- Timber extraction –Mining-dams & their effects on forest & tribal people.**Water resources:** Use and over utilization of surface and ground water - floods, drought- conflicts over water, dams – benefits & problems.

Energy resources: Growing energy needs- renewable and non – renewable energy resources- use of alternate energy resources, case studies.

UNIT -III MINERAL, FOOD & LAND RESOURCES:

Mineral resources: Use and exploitation, environmental effects of extracting & using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizer – pesticide problems, water – logging, salinity, case studies.

Land resources: Land as a resource, land degradation, man – induced landslides, soil erosion and desertification.

- Role of an individual in the conservation of natural resources.
- Equitable use of resources for sustainable life styles.

UNIT -IV ENVIRONMENTAL POLLUTION:

Definition, causes, effects & control measures of: Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Marine pollution, Nuclear hazards - Pollution case studies- Role of an individual in prevention of pollution.

Solid waste management: Causes, effects and control measures of urban and industrial wastes.

Disaster management: floods, drought, earthquake, cyclone and landslides.

UNIT -V ECOSYSTEMS: Concept of an ecosystem. Structure and functions of an ecosystem-Producers, consumers & decomposers - Food chains, food webs & ecological pyramids - Energy flow in the ecosystem - Cycling of nutrients (Bio geo chemical cycles) -Energy production - Ecosystem development & regulation -Ecological succession. Introduction, types, characteristic features, structure and functions of the following ecosystem: (a) Forest ecosystem (b) Grass land ecosystem (c) Desert ecosystem (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT –VI BIODIVERSITY & ITS CONSERVATION: Introduction, Definition: genetic, species and ecosystem diversity.

Value of Biodiversity: consumptive value, productive value, social value, ethical value, aesthetic value & option values - Bio-geographical classification of India - Biodiversity at global, national and local levels - India as a mega – diversity nation- Hot spots of biodiversity.

Threats To Biodiversity: habitat loss, poaching of wild life, man-wild life conflicts - Endangered and endemic species of India.

Conservation of biodiversity: In –situ & Ex-situ conservation

UNIT -VII SOCIAL ISSUES & THE ENVIRONMENT: From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, watershed management - Resettlement and rehabilitation of people; its problems & concerns, case studies.

Environmental Ethics: Issues & possible solutions-Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents & holocaust, case studies - Wasteland reclamation - Consumerism & waste products - Environment protection Act - Air (Prevention & Control of Pollution) Act.- Water (Prevention & Control of Pollution) Act.-Wildlife Protection Act-Forest Conservation Act-Issues involved in enforcement of environmental legislation-Public awareness.

UNIT –VIII HUMAN POPULATION & ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Program - Environment & human health-Human Rights-Value Education - HIV/AIDS-Women & Child Welfare-Role of Information Technology in Environment and human health-Case studies.

TEXTBOOKS:

1. Erach Bharucha, *Text book of Environmental Studies for Undergraduate Courses* for University Grants Commission, University press.
2. R. Rajagopalan, *Environmental Studies* Oxford University Press.
3. Anubha Kaushik and C. P. Kaushik, *Perspectives In Environmental Studies*. New Age International Publishers.

REFERENCE BOOKS:

1. J. P. Sharma, *Comprehensive Environmental Studies*. Laxmi Publications.
2. Anindita Basak, *Environmental Studies*. Pearson education.
3. Benny Joseph, *Environmental Studies*. Mc. Graw Hill Publications.

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II Year B. Tech. ME – II Semester

(1G541)KINEMATICS OF MACHINERY

UNIT –I MECHANISMS: Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – 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.

Machines: Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism – inversions of quadric cycle, chain – single and double slider crank chains.

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

Steering Mechanisms: Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio.

Hooke's Joint: Single and double Hooke's joint – Universal coupling – application – problems.

UNIT -III KINEMATICS: Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain.

Plane motion of body: Instantaneous center of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links

UNIT -IV ANALYSIS OF MECHANISMS: Analysis of slider crank chain for displacement, velocity and acceleration of slider – Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

UNIT -V CAMS: Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Types of follower motion - Uniform velocity – Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

Analysis of motion of followers: Roller follower – circular cam with straight, concave and convex flanks.

UNIT –VI Higher pairs, friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

UNIT -VII BELT, ROPE AND CHAIN DRIVES: Introduction, Belt and rope drives, selection of belt drive- types of belt drives, V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

UNIT -VIII GEAR TRAINS: Introduction – Train value – Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box-Differential gear for an automobile.

TEXT BOOKS:

1. S.S.Rattan, *Theory of Machines and Mechanisms*. Tata McGraw Hill Publishers.
2. R.S Khurmi & J.K Gupta, *Theory of Machines*.

REFERENCE BOOKS:

1. Thomas Bevan, *Theory of Machines*. CBS.
2. R.K Bansal, *Theory of Machines*.
3. Sadhu Singh, *Theory of Machines*. Pearson Edn.
4. JS Rao and RV Dukkipati, *Mechanism and Machine Theory*. New Age
5. The theory of Machines, Shiegley, Oxford.
6. PL. Ballaney, *Theory of machines*. Khanna Publishers.

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II Year B. Tech. ME – II Semester

(1G542) THERMAL ENGINEERING - I

UNIT -I ACTUAL CYCLES AND THEIR ANALYSIS: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blowdown - 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, Air – Standard, air-fuel and actual cycles - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication.

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 of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

UNIT -IV 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 -V TESTING AND PERFORMANCE: 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 and chart.

UNIT -VI COMPRESSORS: Classification –positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

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

UNIT -VII ROTARY (POSITIVE DISPLACEMENT TYPE): Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.

Dynamic Compressors: Centrifugal compressors: Mechanical details and principle of operation – velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

UNIT -VIII AXIAL FLOW COMPRESSORS: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency.

TEXT BOOKS:

1. V. Ganesan, *I.C. Engines*. TMH.
2. Rajput, *Thermal Engineering*. Lakshmi Publications.

REFERENCE BOOKS:

1. Mathur & Sharma, *IC Engines*. Dhanpath Rai & Sons.
2. Pulkrabek, *Engineering fundamentals of IC Engines*. Pearson, PHI
3. Rudramoorthy, *Thermal Engineering*. TMH.
4. B. Yadav, *Thermodynamics & Heat Engines*. Central Book Depot., Allahabad
5. Heywood, *I.C. Engines*. McGrawHill.
6. R.S. Khurmi & J.K.Gupta, *Thermal Engineering*. S.Chand
7. B.Srinivasulu Reddy, *Thermal engineering data book*. JK International Pub.

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II Year B. Tech. ME – II Semester

(1G543) FLUID MECHANICS AND HYDRAULIC MACHINES

UNIT –I FLUID STATICS: Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers – Buoyancy.

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

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. – Fluid acceleration differential equations of continuity. Viscous flow of incompressible fluids.

UNIT –III 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, venturimeter, and orifice meter, Flow nozzle, Turbine flow meter, Boundary Layer.

UNIT –IV 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 –V HYDROELECTRIC POWER STATIONS: Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

UNIT –VI 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.

UNIT –VII 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 –VIII 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*.
2. Rajput, *Fluid Mechanics and Hydraulic Machines*.

REFERENCE BOOKS:

1. D.S. Kumar, *Fluid Mechanics and Fluid Power Engineering*. Kotaria & Sons.
2. D. Rama Durgaiyah, *Fluid Mechanics and Machinery*. New Age International.
3. Banga & Sharma, *Hydraulic Machines*. Khanna Publishers.
4. James W. Dally, William E. Riley, *Instrumentation for Engineering Measurements*. John Wiley & Sons Inc. 2004.

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II Year B. Tech. ME – II Semester

(1G544)MANUFACTURING TECHNOLOGY

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 & Design of cores.

UNIT –II 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 –III A) Welding: Classification of welding process types of welds and welded joints and their characteristics, design of welded joints & considerations, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding.**B) Cutting of Metals:** Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, non-ferrous metals.

UNIT –IV Inert Gas welding, TIG & MIG welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies – destructive nondestructive testing of welds.

UNIT –V Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth, Comparison of 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.

UNIT –VI 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. Force and Power calculations.

UNIT -VII 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. Force and Power Calculations.

UNIT -VIII ADVANCED MANUFACTURING PROCESS:Unconventional machining process: Introduction Classification – mechanical, thermal, chemical and hybrid process.

Mechanical: Ultrasonic machining, Water jet machining: -Abrasive jet machining.

Thermal: Electro discharge machining. Laser beam machining, Electro beam machining.

Chemical: Chemical and Electro chemical machining.

Hybrid: Laser assisted Machining. Introduction to UCM.

TEXT BOOKS:

1. P.N. Rao, *Manufacturing Technology*. TMH.
2. Kalpak Jain, *Manufacturing Technology*. Pearson education.

REFERENCE BOOKS:

1. R.K. Jain, *Production Technology*.
2. Lindberg, PE, *Process and materials of manufacturing*.
3. Rosenthal, *Principles of Metal Castings*.
4. Parmar, *Welding Process*.
5. R.K. Rajput, *Manufacturing Technology*. Laxmi Pub.
6. Rafiq Noorani, *Rapid Prototyping Principles and Applications*. Wiely Pub.
7. V.K. Jain, *Unconventional Machining Processes*. Allied Pub.
8. K.L Narayana, *Production Technology*. I.K. International Pub.

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II Year B. Tech. ME – II Semester

(1G545)FLUID MECHANICS AND HYDRAULIC MACHINES LAB

1. Impact of jets 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.

Note: Any 10 of the above 12 experiments are to be conducted.

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II Year B. Tech. ME – II Semester

(1G546) MANUFACTURING TECHNOLOGY LAB

Minimum of 10 Exercises need to be performed.

I. METAL CASTING LAB:

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

II. WELDING LAB:

1. ARC Welding Lap & Butt Joint - 2 Exercises.
2. Spot Welding - 1 Exercise.
3. TIG Welding - 1 Exercise.
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.

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III Year B. Tech. ME – I Semester

**(1GA51) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to ECE and ME)**

UNIT –I INTRODUCTION TO MANAGERIAL ECONOMICS:

Definition, Nature and Scope of Managerial Economics – Relationship with other functional areas (Accounting, Marketing, HR, Production and Operations) of decision making - Basic Economic Principles - Opportunity Cost, Incremental Concept, scarcity, Marginalism, Equi-marginalism, Time perspective, Discounting principle, Risk and Uncertainty.

UNIT -II DEMAND ANALYSIS: Meaning and types of demand – Determinants of demand - Law of Demand and its exceptions. Definition, types and measurement of elasticity of demand – Supply function and Elasticity of Supply - Demand Forecasting methods: Survey Methods - Consumers Survey Method, Sales force opinion method, experts opinion method - Statistical Methods: Trend Projection, Barometric, Regression, Simultaneous Equation method.

UNIT –III PRODUCTION AND COST ANALYSIS: Production Function, Cobb - Douglas Production function - Isoquants and Isocosts curves – MRTS - Least Cost Combination of Inputs - Laws of Returns, Internal and External Economies of Scale - Cost concepts, Determinants of cost, cost-output relationship in short run and Long run - Break-even Analysis (BEA): Objectives, Assumptions, Importance, Graphical representation, Limitations (Simple Numerical Problems).

UNIT –IV MARKET STRUCTURE AND PRICING METHODS:

Competitive structure of markets – Perfect competition - Monopoly, Monopolistic and Oligopoly Markets - Price-output determination under perfect competition and monopoly in Long run and short run.

Pricing Methods: Cost Plus Pricing - Marginal Cost Pricing - Sealed Bid Pricing - Going Rate Pricing - Limit Pricing - Market Skimming Pricing - Penetration Pricing - Two-Part Pricing - Block Pricing - Bundling Pricing - Peak Load Pricing.

UNIT –V TYPES OF BUSINESS ORGANIZATIONS: Forms of Business Organizations – Need and role of public and private sector business organization - Types, Features, Merits and Demerits of public and private sector business organizations – Problems and remedies of public sector business organizations.

UNIT –VI CAPITAL AND CAPITAL BUDGETING: Capital and its significance - Types of Capital - Sources of Raising Capital – Features of Capital budgeting - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), Net Present Value Method, Profitability index and Internal rate of return method (Simple problems).

UNIT –VII FINANCIAL ACCOUNTING: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts - Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments.

UNIT –VIII FINANCIAL ANALYSIS THROUGH RATIOS: Financial Ratios and its significance - Liquidity Ratios: Current Ratio, quick ratio and Absolute quick ratio - Turnover Ratios: Inventory turnover ratio, Debtors Turnover ratio, Working Capital Turnover ratio, Creditors Turnover ratio, Fixed Assets Turnover ratio - Solvency Ratios: Debt- Equity ratio, Interest Coverage ratio and Debt to total funds ratio -Profitability ratios: Gross Profit Ratio, Net Profit ratio and Proprietary ratio.

TEXT BOOKS:

1. Mehta P.L., *Managerial Economics-Analysis, Problems, Cases*, S Chand and Sons, New Delhi, 2001.
2. Dwivedi, *Managerial Economics*, Vikas , 6th Ed.
3. S.N.Maheswari & S.K. Maheswari, *Financial Accounting*, Vikas.
4. M.E.Thukaram Rao., *Accounting for Managers*, New Age International Publishers.

REFERENCE BOOKS:

1. Varshney & Maheswari, *Managerial Economics*, Sultan Chand, 2003.
2. T.S. Reddy and Y.Hari Prasad Reddy, *Accounting and Financial Management*, Margham Publications.
3. Ambrish Gupta, *Financial Accounting for Management*, Pearson Education, New Delhi.
4. S. A. Siddiqui & A. S. Siddiqui, *Managerial Economics & Financial Analysis*, New age International Space Publications ess.
5. Narayanaswamy, *Financial Accounting—A Managerial Perspective*, PHI

6. Truet and Truet, *Managerial Economics: Analysis, Problems and Cases*, Wiley.

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III Year B. Tech. ME – I Semester

(1G551) THERMAL ENGINEERING – II

UNIT –I BASIC CONCEPTS: Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration – reheating- combined-cycles.

UNIT –II BOILERS:Classification based on Working principles - Fire tube boilers, water tube boilers – High pressure Boilers, boiler Mountings & Accessories.

UNIT –III Performance of Boilers - Boilers horse power, equivalent evaporation, efficiency and heat balance – Draught: classification – Height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney – artificial draught, induced and forced draught.

UNIT –IV STEAM NOZZLES: Function of nozzle – applications - types, Flow through nozzles, thermodynamic analysis – assumptions -velocity of nozzle at exit-Ideal and actual expansion in nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio.Criteria for design of nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line –Shock at the exit.

UNIT –V IMPULSE TURBINE: Mechanical details – Velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency. De-Laval Turbine - its features. Methods to reduce rotor speed-Velocity compounding and pressure compounding, Velocity and Pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine. Governing of impulse turbine.

UNIT –VI REACTION TURBINE: Mechanical details – principle of operation, thermodynamic analysis of a stage, degree of reaction –velocity diagram – Parson’s reaction turbine – condition for maximum efficiency. Governing of reaction turbine.

UNIT –VII STEAM CONDENSERS: Requirements of steam condensing plant, rare fraction – Classification of condensers – working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its effects, air pump- cooling water requirement. Cooling towers – Types.

UNIT –VIII STEAM ENGINES: Classification – working – parts of steam engine – indicator diagrams – theoretical, actual, Diagram factor, Performance of steam engines, Willian’s laws, Governing of simple steam engines.

TEXT BOOKS:

1. R.K. Rajput, *Thermal Engineering*. Lakshmi Publications, 2009, 7th Ed.
2. P.K. Nag, *Basic and Applied Thermodynamics*.TMH.

REFERENCE BOOKS:

1. R.Yadav, *Thermodynamics and Heat Engines*. Central Book Depot.
2. R.S Khurmi & JS Gupta, *Thermal Engineering*. S.Chand.
3. M.L.Mathur & Mehta, *Thermal Engineering*. Jain bros.
4. B.S. Reddy and K.H. Reddy, *Thermal Engineering Data Book*. I.K. International.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. ME – I Semester

(1G552) DYNAMICS OF MACHINERY

UNIT –I PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

UNIT –II FRICTION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, Friction circle and friction axis : lubricated surfaces, boundary friction, film lubrication.

UNIT –III CLUTCHES: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.

Brakes and Dynamometers: Simple block brakes, internal expanding brake, band brake of vehicle. Dynamometers – absorption and transmission types. General description and methods of Operation.

UNIT –IV TURNING MOMENT DIAGRAM AND FLY WHEELS: Turning moment diagrams for steam engine, I.C. Engine and multi cylinder engine. Crank effort - coefficient of Fluctuation of energy, coefficient of Fluctuation of speed – Fly wheels and their design.

UNIT –V GOVERNORS: Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung governors with auxiliary springs. Sensitiveness, isochronism and hunting –effort and power of a governor.

UNIT –VI BALANCING: Balancing of rotating masses - single and multiple – single and different planes.

UNIT –VII BALANCING OF RECIPROCATING MASSES: Primary, Secondary and higher balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples – V, multi cylinder, in -line and radial engines for primary and secondary balancing, locomotive balancing – Hammer blow, Swaying couple, variation of tractive force.

UNIT –VIII VIBRATION: Free Vibration of mass attached to vertical spring – Simple harmonic motion of pendulums, centers of oscillation and suspension. Transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly's method, Raleigh's method. Whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems. Simple problems on forced, damped vibration, Vibration Isolation & Transmissibility

TEXT BOOKS:

1. S.S Ratan, *Theory of Machines*. MGH.
2. R.S. Khurmi, *Theory of machines*. S.Chand.

REFERENCE BOOKS:

1. JS Rao and RV Dukkipati, *Mechanism and Machine Theory*. New Age Publ.
2. Ballaney, *Dynamics of Machinery*. Dhanpat Rai.
3. Thomas Bevan, *Theory of Machines*. CBS Publishers.
4. Jagadish Lal & J.M.Shah, *Theory of Machines*. Metropolitan.

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III Year B. Tech. ME – I Semester

(1G553) MACHINE TOOLS

UNIT –I Elementary treatment of metal cutting theory – Elements of cutting process – Geometry of single point tool and angles chip formation and types of chips – built up edge and its effects, chip breakers. Mechanics of Orthogonal cutting – Merchant's Force diagram, cutting forces – cutting speeds, feed, depth of cut, tool life, coolants, machinability – economics- Tool materials.

UNIT –II ENGINE LATHE: Principle of working, specification of lathe – types of lathes – work holders, tool holders – Box Tools, Taper turning, thread turning and attachments for Lathes.

Turret and Capstan Lathes: collet chucks – other work holders – tool holding devices – box and tool layout.

Automatic Lathes: Principal features – classification – Single spindle and multi-spindle automatic lathes– tool layout and cam design.

UNIT –III SHAPING, SLOTTING AND PLANING MACHINES: Their Principles of working – Principal parts – specification, classification, Operations performed. Kinematic scheme of the shaping slotting and planing machines, machining time calculations.

UNIT –IV DRILLING AND BORING MACHINES: Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring machines – Fine boring machines – Jig Boring machine. Deep hole drilling machine. Kinematics scheme of the drilling and boring machines.

UNIT –V MILLING MACHINE: Principles of working – specifications – classifications of milling machines – Principal features of horizontal, vertical and universal milling machines – machining operations, Types and geometry of milling cutters– methods of indexing – Accessories to milling machines.

UNIT –VI GRINDING MACHINE: Theory of grinding – classification of grinding machine – cylindrical and surface grinding machine – Tool and cutter grinding machine – special types of grinding machines – Grinding wheel: Different types of abrasives – bonds, specification and selection of a

grinding wheel.

UNIT –VII LAPPING, HONING AND BROACHING MACHINES: comparison of grinding, lapping and honing. Lapping, Honing and Broaching machines: Constructional features, speed and feed Units, machining time calculations.

UNIT –VIII JIGS AND FIXTURES:Principles of design of Jigs and fixtures and uses. Classification of Jigs & Fixtures – Principles of location and clamping – Types of clamping & work holding devices. Typical examples of jigs and fixtures.

TEXT BOOKS:

1. R.K. Jain and S.C. Gupta, *Production Technology*.
2. B.S. Raghuvamshi, *Workshop Technology – Vol II*.

REFERENCE BOOKS :

1. C.Elanhezhian and M. Vijayan, *Machine Tools*. Anuradha Agencies Publishers.
2. Kalpakzian, *Manufacturing Technology*. Pearson
3. Date, *Introduction to Manufacturing Technology*. Jaico Publ. House.
4. *Production Technology*. H.M.T. (Hindustan Machine Tools).

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III Year B. Tech. ME – I Semester

(1G554)DESIGN OF MACHINE ELEMENTS – I

UNIT –I INTRODUCTION: General considerations of design, design process. Selection of Engineering Materials - properties –Manufacturing considerations in the design. BIS codes of materials. Preferred numbers.

UNIT –I ISTRESSES IN MACHINE MEMBERS:Simple stresses – Combined stresses – Torsional and bending Stresses – impact stresses – stress - strain relation – Various theories of failure – factor of safety – Design for strength and rigidity. Concept of stiffness in tension, bending, torsion and Combined cases.

UNIT –III STRENGTH OF MACHINE ELEMENTS:Stress concentration – notch sensitivity – Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength – Goodman’s line – Soderberg’s line.

UNIT –IV RIVETED JOINTS: Types of riveted joints, design of riveted joints. Boiler shell riveting, eccentric loading.

Bolted Joints– Forms of Screw threads. Stresses in Screw fasteners. Design of bolts with pre-stresses – Design of joints under eccentric loading– Bolts of uniform strength.

UNIT –V WELDED JOINTS: Types - strength of butt weld, parallel fillet weld and transverse fillet weld – stresses for welded joints – axially loaded unsymmetrical welded sections – eccentrically loaded joints – strength of welded joints.

UNIT –VI COTTERS AND KNUCKLE JOINTS: Design of Cotter joints: spigot and socket, sleeve and cotter, jib and cotter joints- Knuckle joints.

UNIT –VII SHAFTS: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code.

UNIT –VIII KEYS AND COUPLINGS:Design of Rigid couplings: Muff, Split muff and Flange couplings-Flexible couplings: bushed pin type.

TEXT BOOKS:

1. Pandya AND Shah, *Machine design*. Charotar Publ.
2. V B Bhandari, *Design of machine elements*.

REFERENCE BOOKS:

1. J.E. Shigley, *Machine design*.
2. T. Krishna Rao, *Design of Machine Elements-I*. I.K. International.
3. M.F. Spotts, *Design of Machine Elements*. PHI.
4. Kannaiah, *Machine Design*. Sciotech.
5. RS Khurmi and Jk Gupta, *Machine design*.
6. *Machine design*, Schaum Series.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. ME – I Semester

(1G555) HEAT TRANSFER

UNIT –I INTRODUCTION: Modes and mechanisms of heat transfer – Basic laws of heat transfer –General applications of heat transfer.

Conduction Heat Transfer: Fourier rate equation – General heat conduction equation in Cartesian, Cylindrical and Spherical coordinates.

UNIT –II Simplification and forms of the field equation – steady, unsteady and periodic heat transfer – boundary and Initial conditions.

One Dimensional Steady State Heat Conduction: in Homogeneous slabs, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – Critical radius/thickness of insulation-with Variable Thermal conductivity –with internal heat sources or Heat generation. Extended surface (fins) Heat Transfer – Long Fin, Fin with insulated tip and Short Fin, Application to errors in Temperature measurement.

UNIT –III ONE DIMENSIONAL TRANSIENT HEAT CONDUCTION: in Systems with negligible internal resistance – Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems- Problems on semi-infinite body.

UNIT –IV CONVECTIVE HEAT TRANSFER: Dimensional analysis– Buckingham Theorem and its application for developing semi – empirical non- dimensional correlations for convective heat transfer – Significance of non-dimensional numbers – Concepts of Continuity, Momentum and Energy Equations.

UNIT –V FORCED CONVECTION: External Flows: Concepts of hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer for flow over-Flat plates, Effect of Turbulence, Cylinders and spheres..

Internal Flows: Division of internal flow through Concepts of Hydrodynamic and Thermal Entry Lengths – Use of empirical relations for convective heat transfer in Horizontal Pipe Flow, annular flow.

Free Convection: Development of Hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for convective heat transfer on plates and cylinders in horizontal and vertical orientation.

UNIT –VI HEAT TRANSFER WITH PHASE CHANGE:

Boiling: Pool boiling – Regimes, determination of heat transfer coefficient in Nucleate boiling, Critical Heat flux and Film boiling.

Condensation: Film wise and drop wise condensation –Nusselt’s Theory of Condensation on a vertical plate - Film condensation on vertical and horizontal cylinders using empirical correlations.

UNIT –VII HEAT EXCHANGERS:Classification of heat exchangers – overall heat transfer Coefficient and fouling factor – Concepts of LMTD and NTU methods - Problems using LMTD and NTU methods.

UNIT –VIII RADIATION HEAT TRANSFER: Emission characteristics and laws of black-body radiation – Irradiation – total and monochromatic quantities– laws of Planck, Wien, Kirchoff, Lambert, Stefan and Boltzmann– heat exchange between two black bodies – concepts of shape factor – Emissivity – heat exchange between gray bodies – radiation shields– electrical analogy for radiation networks.

TEXT BOOKS:

1. R.C. Sachdeva, *Fundamentals of Engg. Heat and Mass Transfer*. New Age International, 3rd Ed.
2. M.Thirumaleswar, *Fundamentals of Heat and Mass Transfer*. Pearson Edu.

REFERENCE BOOKS:

1. P.K.Nag, *Heat Transfer*. TMH, 2010, 2nd Ed.
2. Holman.J.P, *Heat Transfer*. TMH, 2010, 9th Ed.
3. R.K.Rajput, *Heat and Mass Transfer*. S.Chand & Company Ltd.
4. Kondandaraman, C.P., *Fundamentals of Heat and Mass Transfer*. New Age Publ., 3rd Ed.
5. Incropera, *Fundamentals of Heat Transfer*. Wiley India, 5th Ed.
6. Ghoshdastidar, *Heat Transfer*. Oxford Univ. Press, 2004
7. B.S.Reddy and K.H.Reddy, *Thermal Engineering Data Book*. I.K. International, Revised Ed.

Codes/Tables: Thermal Engineering Data Book to be supplied in Exams.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. ME – I Semester

**(1GC53) SOFT SKILLS – II
(Common to CSE, IT and ME)**

ENGLISH FOR COMPETITIVE EXAMINATIONS

CORRECT ENGLISH USAGE: Articles – Prepositions – Tenses – Voice – Error spotting and correcting – Sentence improvement.

VOCABULARY: Synonyms – Antonyms – Analogy – Confusable Words.

ENGLISH PROFICIENCY: One-word substitutions – Idioms and Phrases – Homonyms – Spellings.

LOGIC-BASED ENGLISH LANGUAGE: Rearrangement of jumbled words and jumbled sentences – word pairs – sentence completion.

COMPREHENSION ABILITY: Reading comprehension – Cloze tests.

REFERENCE BOOKS:

1. R. S. Agarwal, *Objective English*. S. Chand Publishers.
2. Hari Prasad, *Objective English for Competitive Exams*. TMH.
3. Collins Cobuild, *English Guides: Confusable Words*.

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III Year B. Tech. ME – I Semester

(1G556)HEAT TRANSFER LAB

1. Thermal conductivity of insulating powder material through Concentric Sphere apparatus.
2. Thermal conductivity of insulating material through lagged pipe apparatus
3. Overall heat transfer co-efficient through Composite Slab Apparatus
4. Thermal Conductivity of metal (conductor).
5. Heat transfer in pin-fin
6. Experiment on Transient Heat Conduction
7. Heat transfer coefficient in forced convection.
8. Heat transfer coefficient in natural convection
9. Experiment on Parallel and counter flow heat exchanger.
10. Emissivity of a gray body through Emissivity apparatus.
11. Experiment on Stefan Boltzman Apparatus.
12. Heat transfer in drop and film wise condensation.
13. Experiment on Critical Heat flux apparatus.
14. Study of heat pipe and its demonstration.
15. Study of Two – Phase flow.

NOTE: Thermal Engineering data books are permitted in the examinations.

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III Year B. Tech. ME – I Semester

(1G557) THERMAL ENGINEERING LAB

1. Flash and Fire point of a Fuel and Calorific Value of fuel using Junker's gas calorimeter
2. Viscosity using Saybolt viscometer
3. Carbon residue calculation of a given sample and Exhaust gas analysis using ORSAT apparatus
4. Valve / Port Timing Diagrams of an I.C. Engines
5. Performance Test on a 4 -Stroke Diesel Engines
6. Performance Test on 2-Stroke Petrol engine
7. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Engine
8. Heat Balance of an I.C. Engine.
9. Performance Test on Variable Compression Ratio Engines, economical speed test.
10. Performance Test on Reciprocating Air – Compressor Unit
11. Study of Boilers
12. Dismantling / Assembly of Engines to identify the parts and their position in an engine.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. ME – II Semester

(1G561) INSTRUMENTATION AND CONTROL SYSTEMS

UNIT –I MEASUREMENT AND INSTRUMENTATION: Measurement, measurement methods, generalized measurement system and its functional elements, classification of instruments, error and its classification, static and dynamic characteristics, Sensors and Transducers: Introduction, mechanical detector transducer elements, electrical transducers, transducers classification and description, transducer sensitivity, variable resistance transducers, variable inductance transducers, capacitive transducers, LVDT, piezo electric and photo electric transducers.

UNIT –II MEASUREMENT OF PRESSURE, FLOW AND TEMPERATURE: Pressure measurement terms, measurements of low pressure gauges such as McLeod gauge, thermal conductivity gauge, Ionization gauge, measurement of high pressure such as Bourdon gauge, resistance gauge, CRO for varying pressure measurement.

UNIT –III Classification of flow measurement techniques, special flow meters such as Turbine flow meter, Magnetic flow meter, Hot wire anemometer, Ultrasonic flow meter. Temperature measurement instruments, thermocouples, resistance thermometers and thermistors, radiation and optical Pyrometers.

UNIT –IV MEASUREMENT OF FORCE, TORQUE, ACCELERATION: Basic force measurement methods such as elastic load cells, elastic strain gauge load cells, hydraulic and pneumatic load cells, Torque measurement, different types of torsion meters, piezo electric accelerometer, seismic accelerometer, strain gauge accelerometer.

UNIT –V STRAIN GAUGES AND MEASUREMENT: Strain measuring techniques, requirement of strain gauges, resistance strain gauges, strain gauges alloys and material, bonded and unbonded strain gauges, bonding techniques, temperature compensation in strain gauges.

UNIT –VI CONTROL SYSTEMS, MATHEMATICAL MODELS AND TRANSFER FUNCTION: Introduction, examples of control systems, classification of control systems, open loop and closed loop control systems, control system terminology, servomechanism. Physical system and mathematical models, mechanical systems, thermal systems, electrical systems, hydraulic and pneumatic systems, linear control system, transfer function, block diagram and its reduction process, signal flow graphs, mason's rule.

UNIT –VII PERFORMANCE OF CONTROL SYSTEMS: Standard test inputs, response of first order control systems, performance of second order control systems, properties of transient response, steady state error and error constants

UNIT -VIII Concept of stability, necessary conditions for stability, relative stability, Routh-Hurwitz stability criterion, bode plots, gain and phase margin.

TEXT BOOKS:

1. Beckwith and Buck, *Mechanical Measurements*. Narosa Publication, New Delhi, 1997.
2. S. Ghosh, *Control Systems – Theory & Applications*. Pearson Education, New Delhi, 2005.

REFERENCE BOOKS:

1. D.S. Kumar, *Mechanical Measurements and Control*. Metropolitan Books, New Delhi, 2002.
2. B.S.Manke, *Linear Control Systems*. Khanna Publishers, New Delhi, 2004.
3. Doebelin.E.O., *Measurement Systems*. TMH Publishers, New Delhi, 2004.
4. Nagarathan and Gopal, *Control System Engineering*, Narosa Publishers, New Delhi, 2003.
5. Naresh K. Sinha, *Control Systems*, NAI Publishers, New Delhi, 1998.

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III Year B. Tech. ME – II Semester

(1G562) CAD / CAM

UNIT –I Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, storage devices.

UNIT –II COMPUTER GRAPHICS & DRAFTING: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, Geometric commands, layers, display control commands, editing, dimensioning.

UNIT –III GEOMETRIC MODELING: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

UNIT –IV NUMERICAL CONTROL: NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming: fundamentals, manual part programming methods, Computer Aided Part Programming.

UNIT -V GROUP TECHNOLOGY: Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

UNIT –VI TYPES OF MANUFACTURING SYSTEMS: FMS, Material handling systems, computer control systems, JIT, Human labor in manufacturing systems.

UNIT –VII COMPUTER INTEGRATED PRODUCTION PLANNING: Capacity planning, shop floor control, MRP-I, MRP-II, CIMS benefits.

UNIT –VIII COMPUTER AIDED QUALITY CONTROL: Terminology in quality control, the computer in QC, contact inspection methods, non-contact inspection methods-optical non-contact inspection methods-non-optical computer aided testing, integration of CAQC with CAD/CAM.

TEXT BOOKS:

1. A Zimmers & P.Groover, *CAD/CAM*. PE, PHI.
2. P.N. Rao, *CAD/CAM-Principles and applications*. TMH.

REFERENCE BOOKS:

1. Groover, P.E, *Automation, Production systems & Computer integrated Manufacturing*.
2. Radhakrishnan and Subramaniah, *CAD/CAM/CIM*. New Age.
3. Farid Amirouche, *Principles of Computer Aided Design and Manufacturing*. Pearson.
4. R. Sivasubramaniam, *CAD/CAM Theory and Practice*. TMH.
5. Lalit Narayan, *Computer Aided Design and Manufacturing*. PHI.
6. T.C. Chang, *Computer Aided Manufacturing*. Pearson.
7. CSP Rao, *A text book of CAD/CAM*, Hitech Publ.

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III Year B. Tech. ME – II Semester

(1G563) METROLOGY AND SURFACE ENGINEERING

UNIT –I SYSTEMS OF LIMITS AND FITS: Introduction, Definitions, fits and their types – unilateral and bilateral tolerance system, Tolerance analysis. Hole and shaft basis systems – interchangeability and selective assembly. Indian standard Institution system – International Standard system for plain and screwed work.

UNIT –II LINEAR MEASUREMENT: Length standard, line, end & wavelength standards, slip gauges – calibration of the slip gauges, Dial indicator, micrometers.

Measurement Of Angles and Tapers: Different methods – Bevel protractor – angle gauges – spirit levels – sine bar – Sine plate, rollers and spheres used to determine the tapers.

Limit Gauges: Plug, Ring, Snap, Gap, Taper, Profile and Position gauges. Taylor's principle. Design of Go and No Go gauges.

UNIT –III OPTICAL MEASURING INSTRUMENTS: Tool maker's microscope – collimators, optical projector – optical flats and their uses, interferometer.

Flatness Measurement: Measurement of flatness of surfaces – straight edges– surface plates – optical flat and auto collimator.

UNIT –IV SURFACE ROUGHNESS MEASUREMENT: Differences between surface roughness and surface waviness- Numerical assessment of surface finish – CLA, R.M.S Values – R_a , R_z values, Methods of measurement of surface finish-profilograph, Talysurf, BIS symbols for indication of surface finish.

Measurement Through Comparators: Comparators – Mechanical, Optical, Electrical, Electronic, Pneumatic comparators and their uses.

UNIT –V SCREW THREAD MEASUREMENT: Elements of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch- profile thread gauges.

UNIT –VI MACHINE TOOL ALIGNMENT TESTS: Requirements of Machine Tool Alignment Tests, Alignment tests on lathe, milling, drilling

machine tools. Preparation of acceptance charts.

UNIT –VII GEAR MEASUREMENT: Gear measuring instruments, Gear tooth profile measurement. Measurement of diameter, pitch, pressure angle and tooth thickness.

Coordinate Measuring Machines: Types of CMM and Applications of CMM.

UNIT –VIII SURFACE ENGINEERING: Surface treatment processes and their characteristics and applications. (a) Overlay coatings (b) Diffusion coatings (c) Thermal or mechanical modification of Surfaces.

TEXT BOOKS:

1. Mahajan, *Engineering Metrology*. Dhanpat Rai.
2. R.K. Jain, *Engineering Metrology*. Khanna Publ.

REFERENCE BOOKS:

1. BIS standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Connie Dotson, *Fundamentals of Dimensional Metrology*. Thomson, 4th Ed.
3. Bharat Bhushan and B.K.Gupta, *Handbook of Tribology: Materials, Coatings, and Surface Treatments*.
4. Dehosson J.T., *Surface Engineering with Lasers*.
5. JR Davis, *Surface Engineering for corrosion and wear resistance*. Woodhead Publ.

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III Year B. Tech. ME – II Semester

(1G564) THERMAL ENGINEERING - III

UNIT –I GAS TURBINES: Simple gas turbine plant – Ideal cycle, essential components – parameters of performance – actual cycle – regeneration, inter cooling and reheating –Closed and Semi-closed cycles – merits and demerits, Brief concepts about compressors, combustion chambers and turbines of Gas Turbine Plant.

UNIT –II JET PROPULSION: Principle of Operation –Classification of jet propulsive engines – Working Principles with schematic diagrams and representation on T-S diagram - Thrust, Thrust Power and Propulsion Efficiency – Turbo jet engines –Turbo jet, Turbo prop, Pulse jet – Schematic Diagram, Thermodynamic Cycle, Performance Evaluation Thrust Augmentation – Methods. Introduction to Rocket propulsion.

UNIT –III INTRODUCTION TO REFRIGERATION: Necessity and applications – Unit of refrigeration and C.O.P. – Different refrigeration methods - Air Refrigeration: Ideal and Actual cycles, Open and Dense air systems -- problems – Refrigeration needs of Air crafts.

UNIT –IV VAPOUR COMPRESSION REFRIGERATION: Basic cycle - working principle and essential components of the plant – COP – Representation of cycle on T-S and P-h charts – Expander vs. Throttling, effect of sub cooling and super heating – cycle analysis – Actual cycle- Influence of various parameters on system performance – Construction and Use of P-h charts – numerical Problems.

UNIT –V VAPOR ABSORPTION REFRIGERATION SYSTEM: description and working of NH_3 – water system and Li Br –water (Two shell & Four shell) System -Calculation of max COP. Principle of operation of three Fluid absorption system.

UNIT -VI INTRODUCTION TO AIR CONDITIONING: Psychometric Properties & Processes – Characterization of Sensible and latent heat loads — Need for Ventilation, Consideration of Infiltrated air – Heat Load concepts: RSHF, GSHF- Problems.

UNIT –VII AIR CONDITIONING EQUIPMENT: humidifiers – dehumidifiers – air filters, fans and blowers.

Heat Pump – Heat sources – different heat pump circuits.

UNIT –VIII Requirements of human comfort and concept of Effective Temperature- Comfort chart –Comfort Air Conditioning- Summer, Winter & year round air conditioning- simple problems.

TEXT BOOKS:

1. Rajput, *Thermal Engineering*. Lakshmi Publications.
2. CP Arora, *Refrigeration and Air Conditioning*. TMH, 2008, 3rd Ed.
3. SC Arora & Domkundwar, *A Course in Refrigeration and Air conditioning*. Dhanpatrai.

REFERENCE BOOKS:

1. Manohar Prasad, *Refrigeration and Air Conditioning*. New Age, 2nd Ed.
2. Dossat, *Principles of Refrigeration*. Pearson Edu., 4th Ed.
3. P.L.Ballaney, *Refrigeration and Air Conditioning*. Khanna Publ.
4. R.C.Arora, *Refrigeration and Air Conditioning*. PHI, 2010.
5. V. Ganesan, *Gas Turbines*. TMH.
6. P. Khajuria & S. P Dubey, *Gas Turbines and Propulsive Systems*. Dhanpatrai.

Tables/Codes: Thermal Engineering Data Book containing Refrigerant and Psychrometric property Tables and charts

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III Year B. Tech. ME – II Semester

(1G565) DESIGN OF MACHINE ELEMENTS– II

UNIT –I BEARINGS: Types of Journal bearings – Lubrication – Bearing Modulus–bearing materials – journal bearing design – Ball and roller bearings – Static loading of ball & roller bearings, bearing life –Failure of bearings, Dynamic loading, selection of bearings.

UNIT –II ENGINE PARTS: Pistons, Forces acting on piston – Construction Design and proportions of piston. Cylinder, Cylinder liners.

UNIT –III CONNECTING ROD: Thrust in connecting rod – stress due to whipping action on Connecting rod ends – Cranks and Crank shafts, strength and proportions of Over hung cranks

UNIT –IV DESIGN OF CURVED BEAMS: Introduction, stresses in curved beams, Expression for radius of neutral axis for rectangular, circular, trapezoidal and T-Section. Design of crane hooks, C –clamps.

UNIT –V POWER TRANSMISSIONS SYSTEMS: Design of Flat belt drives, V-belt drives & rope drives. Selection of wire ropes, design procedure for chain drives.

UNIT –VI SPUR & HELICAL GEARS: Spur gears- Helical gears – Load concentration factor – Dynamic load factor. Surface compressive strength – Bending strength – Design analysis of spur gears – Estimation of centre distance, module and face width, check for plastic deformation. Check for dynamic and wear considerations.

UNIT –VII MECHANICAL SPRINGS: SPRINGS:Introduction- types of Springs – Stress and deflection of closed and open coil helical springs under axial pull and axial couple. Springs for fatigue loading – Natural frequency of helical springs- Coaxial springs, Energy storage capacity- Helical Torsion springs- Leaf springs.

UNIT –VIII DESIGN OF POWER SCREWS: Design of screw, Square ACME, Buttress screws- Efficiency of the screw. Design of nut, compound screw, differential screw, ball screw- possible failures.

TEXT BOOK:

1. V.B.Bhandari, *Machine Design*. TMH.
2. R.S. Khurmi & J.S.Gupta, *Machine Design*. S.Chand Publ.

REFERENCE BOOKS:

1. JE Shingley, *Mech. Engg. Design*.
2. T. Krishna Rao, *Design of Machine Elements-II*. I.K. International
3. T.V. Sundaramoorthy & N.Shanmugam, *Machine Design*.
4. Kanniah, *Machine Design*. Scitech Publishers
5. Data Books: (i) P.S.G. College of Technology (ii) Balaveer Swamy and Mahadevan

Tables/Codes: Design data books to be supplied in exam.

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III Year B. Tech. ME – II Semester

(1G566) INDUSTRIAL MANAGEMENT

UNIT –I Concepts of Management and Organization – Functions of Management – Evolution of Management Thought : Taylor’s Scientific Management, Fayol’s Principles of Management, Douglas Mc-Gregor’s Theory X and Theory Y, Mayo’s Hawthorne Experiments, Hertzberg’s Two Factor Theory of Motivation, Maslow’s Hierarchy of Human Needs – Systems Approach to Management.

UNIT –II DESIGNING ORGANIZATIONAL STRUCTURES: Basic concepts related to Organization - Departmentation and Decentralisation, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundary less organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.

UNIT –III Plant location, definition, factors affecting the plant location, comparison of rural and urban sites-methods for selection of plant- Matrix approach. Plant Layout – definition, objectives, types of production, types of plant layout – various data analyzing forms-travel chart.

UNIT –IV WORK STUDY: Definition, objectives, Method study - definition, objectives, steps involved- various types of associated charts-difference between micro-motion and memo-motion studies. Work measurement- definition, time study, steps involved-equipment, different methods of performance rating-allowances, standard time calculation. Work Sampling – definition, steps involved, standard time calculations, differences with time study- Applications.

UNIT –V MATERIALS MANAGEMENT: Objectives, Inventory – functions, types, associated costs, inventory classification techniques. Stores Management and Stores Records. Purchase management, duties of purchase manager, associated forms.

UNIT –VI PERT & CPM: Project management, network modeling-probabilistic model, various types of activity times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method -critical path calculation-crashing of simple of networks.

UNIT –VII INSPECTION AND QUALITY CONTROL: types of inspections – Difference between inspection & quality control. Statistical Quality Control-techniques-variables and attributes-assignable and non assignable causes- variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan- single sampling and double sampling plans-OC curves. Introduction to TQM- Quality Circles, ISO 9000 series procedures.

UNIT –VIII HUMAN RESOURCE MANAGEMENT: Functions of HRM, Job Evaluation, different types of evaluation methods. Job description, Merit Rating.- difference with job evaluation, different methods of merit ratings, wage incentives, different types of wage incentive schemes. Marketing, marketing vs selling, marketing mix, product life cycle.

TEXT BOOKS:

1. Amrine, *Manufacturing Organization and Management*. Pearson, 2004, 2nd Ed.
2. O.P. Khanna, *Industrial Engineering and Management*. Dhanpat Rai.

REFERENCE BOOKS:

1. Stoner, Freeman, Gilbert, *Management*, Pearson Edu., 2005, 6th Ed.
2. Panneer Selvam, *Production and Operations Management*. PHI, 2004.
3. Dr.C. Nadhamuni Reddy and Dr. K. Vijaya Kumar Reddy, *Reliability Engineering & Quality Engineering*. Galgotia Publ. Pvt. Ltd.
4. Ralph M Barnes, *Motion and Time Studies*. John Wiley and Sons, 2004.
5. Chase, Jacobs, Aquilano, *Operations Management*. TMH, 2003, 10th Ed.
6. L.S. Srinath, *PERT/CPM*. East-West Press, 2000.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. ME – II Semester

(1G567) METROLOGY AND MACHINE TOOLS LAB

SECTION A:

1. Measurement of lengths, heights, diameters by vernier calipers, micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth, vernier calipers and checking the chordal addendum and chordal height of spur gear.
4. Alignment test on the lathe.
5. Alignment test on milling machine.
6. Study of Tool makers microscope and its application
7. Angle and taper measurements by Bevel protractor, Sine bars, etc.
8. Use of spirit level in finding the flatness of surface plate.
9. Thread measurement by Two wire/ Three wire method.
10. Surface roughness measurement by Talysurf instrument.
11. Surface Wear Resistances Test using Electro Spark Coating Device.

SECTION B:

1. Demonstration of construction & operations of general purpose machines: Lathe, Drilling machine, Milling machine, Shaper, Planning machine, Slotting machine, Cylindrical Grinder, Surface grinder and Tool & cutter grinder.
2. Job on Step turning and taper turning on lathe machine
3. Job on Thread cutting and knurling on -lathe machine.
4. Job on Drilling and Tapping
5. Job on Shaping and Planning
6. Job on Slotting
7. Job on Milling Job on Cylindrical Surface Grinding
8. Job on Grinding of Tool angles.

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III Year B. Tech. ME – II Semester

**(1GC61) ADVANCED ENGLISH COMMUNICATION SKILLS LAB
(Common to CSE, IT and ME)**

RESUME PREPARATION

Structure, formats and styles – planning - defining career objective - projecting one's strengths and skills - creative self marketing–sample resumes - cover letter.

INTERVIEW SKILLS

Concept and process - pre-interview planning – preparation - body language - answering strategies – frequently asked questions

GROUP DISCUSSION

Communicating views and opinions – discussing – intervening – agreeing and disagreeing –asking for and giving clarification - substantiating - providing solution on any given topic across a cross-section of individuals - modulation of voice and clarity - body language – case study.

ORAL PRESENTATIONS (INDIVIDUAL)

Collection of data from various sources –planning, preparation and practice – attention gathering strategies -transition – handling questions from audience.

ORAL PRESENTATIONS (TEAM)

Appropriate use of visual aids – Using PowerPoint for presentation.

READING COMPREHENSION

Reading for facts – scanning – skimming - guessing meanings from context– speed reading.

LISTENING COMPREHENSION

Listening for understanding - responding relevantly.

MINIMUM REQUIREMENTS:

Advanced English Language Communication Skills Lab is conducted at two places:

- Computer-aided Language Lab with 60 computer machines, one teacher console, LAN facility and Language Learning software for self-study.
- Communication Skills Lab with movable chairs, a discussion room, Public Address System, a Television, a DVD Player, a camcorder, an LCD Projector and a computer machine.
- Manual cum Record, prepared by Faculty Members of English of the college will be used by students.

SUGGESTED SOFTWARE:

- It's your Job published by Clarity.
- Business Writing published by Clarity.
- Active Listening published by Clarity.
- Active Reading published by Clarity.
- Software published by Globberana.
- Cambridge Advanced Learner's Dictionary.
- Oxford Advanced Learner's Dictionary.

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IV Year B. Tech. ME – I Semester

(1G571) OPERATIONS RESEARCH

UNIT –I Development – Definition– Characteristics and Phases – Types of models – operation Research models– applications.

Allocation: Linear Programming Problem Formulation – Graphical solution – Simplex method –Artificial variables techniques -Two–phase method, Big-M method – Duality Principle-Economic interpretation of duality.

UNIT –II TRANSPORTATION PROBLEM:Formulation – Optimal solution, unbalanced transportation problem –Degeneracy. Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem-Traveling Salesman problem.

UNIT –III REPLACEMENT: Introduction – Replacement of items that deteriorate with time – when money value is not considered and considered – Replacement of items that fail completely, group replacement.

Integer Linear Programming: illustrative Applications, Branch – and – Bound (B&B) Algorithm, Cutting plane Algorithm.

UNIT –IV THEORY OF GAMES: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle– m X 2 & 2 X n games -graphical method.

UNIT –V WAITING LINES: Introduction – Single Channel – Poisson arrivals – exponential service times – with finite queue length and non finite queue length models– Multichannel – Poisson arrivals – exponential service times with finite queue length and queue length and non finite queue length models.

UNIT –VI INVENTORY: Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

UNIT –VII DYNAMIC PROGRAMMING: Introduction – Bellman’s Principle of optimality – Applications of dynamic programming- capital budgeting problem – shortest path problem – linear programming problem.

UNIT -VIII SIMULATION: Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages.

TEXT BOOKS:

1. Taha, *Introduction to Operations Research*. PHI
2. Hiller & Libermann, *Introduction to Operations Research*. TMH.

REFERENCE BOOKS:

1. A.M. Natarajan, P.Balasubramani, A. Tamilarasi, *Operations Research*. Pearson Edu.
2. Maurice Saseini, Arthur Yaspan & Lawrence Friedman, *Operations Research: Methods & Problems*.
3. R.Panneerselvam, *Operations Research*. PHI Publ.
4. Wagner, *Operations Research*. PHI Publ.
5. J.K. Sharma, *Operations Research*. Mac Milan.
6. Wayne L. Winston, *Operations Research*. Thomson Brooks/Cole.
7. R. Veerachari and V. Ravi Kumar, *Operations Research*. I.K. International

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IV Year B. Tech. ME – I Semester

(1G572) AUTOMOBILE ENGINEERING

UNIT –I INTRODUCTION: Components of a four wheeler automobile – chassis and body – power unit –power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, turbo charging and super charging – oil filters, oil pumps – crank case ventilation.

UNIT –II FUEL SYSTEM: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pump – filters– carburetor – types – air filters – Gasoline injection.

C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle spray formation, injection timing, testing of fuel pumps.

UNIT -III COOLING SYSTEM: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporative cooling – pressure sealed cooling – antifreeze solutions.

Ignition System: Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker– spark advance and retard mechanism.

UNIT –IV ALTERNATE FUELS & EMMISIONS – Alternative Fuels- Biogas, Biofuels, Alcohols, Hydrogen, LPG, CNG and emissions from alternative energy sources-Merits and Demerits.

Pollution standards National and international – Pollution Control– Techniques.

UNIT -V ELECTRICAL SYSTEM : Charging circuit, generator, current – voltage regulator – starting system, Bendix drive, mechanism of Solenoid switch, Lighting systems, Horn, wiper, Fuel gauge – oil pressure gauge, Engine temperature indicator.

UNIT -VI TRANSMISSION SYSTEM: Clutches- Principle- types: cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear box- types: sliding mesh, constant mesh, synchromesh, epi-cyclic, over drive, torque converter. Propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential, rear axles.

UNIT -VII STEERING SYSTEM: Steering geometry – camber, castor, king pin rake, combined angle toe-in, center point steering. Types of steering gear mechanism,– types, steering linkages.

UNIT –VIII SUSPENSION SYSTEM: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.

Braking System: Mechanical brake system, Hydraulic brake system, Pneumatic and vacuum brake systems.

TEXT BOOKS:

1. Kirpal Singh, *Automotive Mechanics –Vol.1 &Vol.2.*
2. William Crouse, *Automobile Engineering.*

REFERENCE BOOKS:

1. R.K.Rajput, *Automobile Engineering.* Lakshmi Publ.
2. K.K. Ramalingam, *Automobile Engineering.* scitech Publ.
3. Newton, Steeds & Garret, *Automotive Engines.*
4. Thipse, *Alternate Fuels.* Jaico Publ. House

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IV Year B. Tech. ME – I Semester

(1G573) FINITE ELEMENT METHODS

UNIT –I Introduction to Finite Element Method for solving field problems. Stress and Equilibrium. Strain - Displacement relations. Stress - strain relations.

UNIT –II ONE-DIMENSIONAL FINITE ELEMENT METHODS: Bar elements, temperature effects. Element matrices, assembling of global stiffness matrix, Application of boundary conditions, Elimination and penalty approaches, solution for displacements, reaction, stresses, temperature effects, Quadratic Element.

UNIT –III TRUSSES: Element matrices, assembling of global stiffness matrix, solution for displacements, reaction, stresses, and temperature effects.

UNIT –IV BEAMS: Element matrices, assembling of global stiffness matrix, solution for displacements, reaction, stresses.

UNIT –V TWO DIMENSIONAL PROBLEMS: Basic concepts of plane stress and plane strain, stiffness matrix of CST element, finite element solution of plane stress problems.

UNIT –VII SO-PARAMETRIC FORMULATION: Concepts, sub parametric, super parametric elements, 2 dimensional 4 noded iso-parametric elements, and numerical integration.

UNIT –VII AXI-SYMMETRIC MODEL: Finite element modeling of axi-symmetric solids subjected to axi-symmetric loading with triangular elements.

Heat transfer problems: Heat transfer with conduction, convection, Heat transfer through fins

UNIT –VIII DYNAMIC ANALYSIS: Dynamic equations, eigen value problems and their solution methods, simple problems

TEXT BOOKS:

1. Tirupathi.R. Chandrapatla and Ashok D. Belagondlu, *Introduction to Finite elements in Engineering*. PHI.
2. S Senthil, *Introduction of Finite Element Analysis*. Laxmi Publications.
3. SMD Jalaluddin, *Introduction of Finite Element Analysis*. Anuradha Publications.

REFERENCE BOOKS:

1. K. J. Bathe, *Finite element procedures*. PHI.
2. SS Rao, *The finite element method in engineering*. Butterworth Heinemann.
3. J.N. Reddy, *An introduction to the Finite element method*. TMH.
4. Chennakesava, R Alavala, *Finite element methods: Basic concepts and applications*. PHI.

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IV Year B. Tech. ME – I Semester

(1G574) AUTOMATION AND ROBOTICS

UNIT –I INTRODUCTION TO AUTOMATION: Need ,Types,Basic elements of an automated system, levels of automation, hardware components for automation and process control, mechanical feeders, hoppers, orienters, high speed automatic insertion devices.

UNIT –II AUTOMATED FLOW LINES: Part transfer methods and mechanisms, types of Flow lines, flow line with/without buffer storage, qualitative analysis.

UNIT –III ASSEMBLY LINE BALANCING: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT –IV INTRODUCTION TO INDUSTRIAL ROBOTS: Classification. Robot configurations, Functional line diagram, Degrees of Freedom. Components, common types of arms, joints, grippers.

UNIT –V MANIPULATOR KINEMATICS:Homogeneous transformations as applicable to rotation and translation - D-H notation, Forward and inverse kinematics.

Manipulator Dynamics: Differential transformation, Jacobians. Lagrange – Euler and Newton – Euler formations.

UNIT –VI TRAJECTORY PLANNING: Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion.

Robot programming: Types – features of languages and software packages.

UNIT –VII ROBOT ACTUATORS AND FEEDBACK COMPONENTS: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors, comparison Position sensors – potentiometers, resolvers, encoders – Velocity sensors, Tactile sensors, Proximity sensors.

UNIT –VIII ROBOT APPLICATION IN MANUFACTURING: Material Transfer - Material handling, loading and unloading- Processing - spot and

continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS:

1. M.P.Groover, *Automation, Production systems and CIM*. Pearson Edu.
2. M.P. Groover, *Industrial Robotics*. TMH.

REFERENCE BOOKS:

1. Fu KS, *Robotics*. McGraw Hill.
2. P. Coiffet and M.Chaironze, *An Introduction to Robot Technology*. Kogam Page Ltd. London, 1983.
3. Richard D.Klafter, *Robotics Engineering*. Prentice Hall.
4. Ashitave Ghosal, *Robotics, fundamental Concepts and analysis*. Oxford Press, 2006.
5. Mittal RK & Nagrath IJ, *Robotics and Control*. TMH.
6. John J. Craig, *Introduction to Robotics*. Pearson Edu.

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IV Year B. Tech. ME – I Semester

**(1G575) TRIBOLOGY
(ELECTIVE – I)**

UNIT – I STUDY OF VARIOUS PARAMETERS: Viscosity, flow of fluids, viscosity and its variation -absolute and kinematic viscosity, temperature variation, viscosity index determination of viscosity, different viscometers used.

UNIT –II HYDROSTATIC LUBRICATION: Hydrostatic step bearing, application to pivoted pad thrust bearing and other applications, hydrostatic lifts, hydrostatic squeeze films and its application to journal bearing.

UNIT –III HYDRODYNAMIC THEORY OF LUBRICATION: Various theories of lubrication, petroffs equation, Reynold's equation in two dimensions -Effects of side leakage - Reynolds equation in three dimensions, Friction in sliding bearing, hydro dynamic theory applied to journal bearing, minimum oil film thickness, oil whip and whirl anti - friction bearing

UNIT –IV FRICTION AND POWER LOSSES IN JOURNAL BEARINGS:Calibration of friction loss friction in concentric bearings, bearing modulus, Sommerfield number, heat balance, practical consideration of journal bearing design considerations.

UNIT –V AIR LUBRICATED BEARING: Advantages and disadvantages application to Hydrodynamic journal bearings, hydrodynamic thrust bearings. Hydrostatic thrust bearings. Hydrostatic bearing Analysis including compressibility effect.

UNIT –VI Study of current concepts of boundary friction and dry friction. Columb's laws of friction, theories of friction

UNIT –VII TYPES OF BEARING OIL PADS: Hydrostatic bearing wick oiled bearings, oil rings, pressure feed bearing, partial bearings - externally pressurized bearings.

UNIT –VIII BEARING MATERIALS: General requirements of bearing materials, types of bearing materials, Selection of Bearing materials for various applications, Applications of Bearing materials.

TEXT BOOK:

1. Suhas V. Patankar, *Numerical heat transfer and fluid flow*. Butter-Worth Publ.
2. John. D. Anderson, *Computational fluid dynamics, Basics with applications*. Mc Graw Hill.

REFERENCE BOOKS:

1. Niyogi, *Computational Fluid Flow and Heat Transfer*. Pearson Publ.
2. Tapan K. Sengupta, *Fundamentals of Computational Fluid Dynamics*. Universities Press.
3. Jiyuan and Others, *Computational Fluid Dynamics*. Elsevier, 2008.

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IV Year B. Tech. ME – I Semester

**(1G576) ADVANCED MANUFACTURING SYSTEMS
(ELECTIVE – I)**

UNIT –I Definition and broad characteristics of Flexible Manufacturing Cells, Systems, Islands and Flexible transfer lines - Place of flexible manufacturing systems in CIM - The FMS relational: Economics and technological justification for FMS.

UNIT –II DESIGN AND PLANNING: the role of associated technologies such as GT, JIT and simulation - Installation, Operation and evaluation - Scheduling problems.

UNIT –III FMS hardware CNC machines tools, robots, AGVs, ASRs, Inspection and cleaning stations - Control aspects of FMS.

UNIT –IV DNC of machine tools, cutting tools, robots, quality control and inventories - Personnel and infrastructural aspects - Flexible machining cells and islands.

UNIT –V Flexible assembly Systems; structure, control and applications - FMS in action: Understanding Flexibility, Types of Flexibility in FMS, Flexible and Dynamic Manufacturing Systems, IT facilitated flexibility, integration and automation.

UNIT –VI Role of Integrated and automated material handling systems, Typical FMS operation, IT based Tools: Computer simulation and AI for FMS.

UNIT –VII Group technology, Decision Support Systems, Design, Planning, Scheduling and Control Issues in FMS, Real time control strategies, Various FMS configurations, Computer configurations, FMS as mini-CIM, Benefits and Justification for FMS

UNIT –VIII Role of Information Technology, Overview of Multi model and mixed model flexible lines, Typical case studies. Future prospects.

TEXT BOOKS:

1. M.P. Groover, *Automation, Production systems & Computer Integrated Manufacturing*, PHI.
2. P. Radhakrishna and V. Raju, *CAD, CAM & CIM*, New Age, International Publisher.

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IV Year B. Tech. ME – I Semester

**(1G577)MECHATRONICS
(ELECTIVE – I)**

UNIT –I INTRODUCTION: Definition – Trends - Control Methods: Stand alone , PC Based (Real Time Operating Systems, Graphical User Interface , Simulation) - Applications: SPM, Robot, CNC, FMS, CIM.

UNIT –II SIGNAL CONDITIONING: Introduction – Hardware - Digital I/O , Analog input – ADC , resolution , speed channels Filtering Noise using passive components – Resistors, capacitors - Amplifying signals using OP amps –Software - Digital Signal Processing – Low pass , high pass , notch filtering

UNIT –III PRECISION MECHANICAL SYSTEMS: Pneumatic Actuation Systems - Electro-pneumatic Actuation Systems - Hydraulic Actuation Systems - Electro-hydraulic Actuation Systems - Timing Belts – Ball Screw and Nut - Linear Motion Guides - Linear Bearings - Harmonic Transmission - Bearings-Motor / Drive Selection.

UNIT –IV ELECTRONIC INTERFACE SUBSYSTEMS: TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids , motors Isoation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers , over current sensing , resetable fuses , thermal dissipation - Power Supply - Bipolar transistors/ mosfets.

UNIT –V ELECTROMECHANICAL DRIVES: Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives , PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.

UNIT –VI MICROCONTROLLERS OVERVIEW: 8051 Microcontroller , micro processor structure – DigitalInterfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications. Programming –Assembly, C (LED Blinking , Voltage measurement using ADC).

UNIT –VII PROGRAMMABLE LOGIC CONTROLLERS: Basic Structure - Programming: Ladder diagram -Timers, Internal Relays and Counters - Shift Registers - Master and Jump Controls - Data Handling -Analog input / output -

PLC Selection -Applications.

UNIT –VIII PROGRAMMABLE MOTION CONTROLLERS:

Introduction - System Transfer Function – Laplacetransform and its application in analysing differential equation of a control system - Feedback Devices :Position , Velocity Sensors - Optical Incremental encoders - Proximity Sensors : Inductive , Capacitive ,Infrared - Continuous and discrete processes - Control System Performance & tuning - Digital Controllers- P , PI , PID Control - Control modes – Position , Velocity and Torque - Velocity Profiles – Trapezoidal- S. Curve - Electronic Gearing - Controlled Velocity Profile - Multi axis Interpolation , PTP , Linear ,Circular - Core functionalities – Home, Record position , Go to Position - Applications : SPM, Robotics.

TEXT BOOKS:

1. W Bolton, *Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering*. Pearson Edu. Press, 2005, 3rd Ed.
2. Mechatronics, M.D.Singh, J.G.Joshi, PHI.

REFERENCE BOOKS:

1. Newton C Braga,*Mechatronics Source Book*. Thomson Publ.
2. N. Shanmugam, *Mechatronics*.Anuradha Agencies Publi.
3. Devdas Shetty, Richard, *Mechatronics System Design*. Thomson.
4. A. Smaili & F. Mrad, *Mechatronics*. Oxford H.E., 2008.
5. Ramachandran, *Mechatronics: Integrated Mechanical Electronic Systems*.Wiley India.

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IV Year B. Tech. ME – I Semester

**(1G578)UNCONVENTIONAL MACHINING PROCESS
(ELECTIVE – II)**

UNIT –I INTRODUCTION: Need for non-traditional machining methods- Classification of modern machining processes – considerations in process selection. Materials. Applications.

UNIT –II ULTRASONIC MACHINING: Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.

UNIT –III Abrasive jet machining, Water jet machining and abrasive water jet machine: Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations.

UNIT –IV ELECTRO – CHEMICAL PROCESSES: Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tools, Surface finish and accuracy economic aspects of ECM – Simple problems for estimation of metal removal rate.

UNIT –V THERMAL METAL REMOVAL PROCESSES: General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications.

UNIT –VI ELECTRON BEAM MACHINING: Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes.

Laser Beam Machining: General Principle and application of laser beam machining – thermal features, cutting speed and accuracy of cut.

UNIT –VII PLASMA MACHINING: Principle, metal removal mechanism, process parameters, accuracy and surface finish, applications.

Chemical Machining: Fundamentals of chemical machining- Principle-

maskants –etchants- advantages and applications.

UNIT –VIII Magnetic abrasive finishing, Abrasive flow finishing, Electrostream drilling, Shaped tube electrolytic machining.

Rapid Prototyping: Classification – Stereo lithography, Selective Laser Sintering, applications.

TEXT BOOKS:

1. VK Jain, *Advanced machining processes*. Allied publishers.

REFERENCE BOOKS:

1. Pandey, P.C. and Shah H.S., *Modern Machining Process*. TMH.
2. Bhattacharya A, *New Technology*. The Institution of Engineers, India 1984.
3. Kalpakzian, *Manufacturing Technology*. Pearson.

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IV Year B. Tech. ME – I Semester

**(1G579)TOOL DESIGN
(ELECTIVE-II)**

UNIT –I TOOLING MATERIALS AND HEAT TREATMENT: Properties of materials, ferrous, nonferrous, non metallic, tooling materials, heat treating, Limits, tolerances; and FITS, Gauges and gauge design coated tools, ceramic tools.

UNIT –II DESIGN OF SINGLE POINT CUTTING TOOLS: Single point, cutting tools-various systems of specifications, geometry and their inter, relation, theories of formation of chip and their effect, design of broach.

UNIT –III DESIGN OFMULTIPOINT CUTTING TOOLS: Drill geometry, Design of Drills, Rake & Relief angles of twist drill, speed, feed and depth of cut, machining time, forces, Milling cutters, cutting speeds and feed-machining times-design-form cutters, combination tools, reamers etc.

UNIT –IV DESIGN OF JIGS AND FIXTURES: Basic principles of location and clamping, locating, methods and devices, jigs, definitions, types, general consideration in the design of jigs, drills bushing, methods of construction, fixtures-vice fixtures milling, boring, and lathe grinding fixtures.

UNIT –V DESIGN OF SHEET METAL BLANKING AND PIERCING: Fundamentals of die cutting operating, power press types, General press information, Material handling equipment, cutting action in punch and die operation. Die clearance, and types of Die construction. Die design fundamentals-blanking and piercing die construction, pilots, stripper and pressure pads presswork material, strip layout, short run tooling for piercing.

UNIT –VI DESIGN OF SHEET METAL BENDING, FORMING AND DRAWINGS DIE: Bending dies, drawing dies, forming dies, drawing operations, variables that effect metal flow during drawing. Determination of blank size, drawing force, single and double action draw dies.

UNIT –VII TOOL LIFE AND TOOL WEAR: theories of tool wear-adhesion, abrasive and diffusion wear mechanisms forms of wear, tool life criteria and Mach inability index, tool wear criterion, measurement of tool wear.

UNIT –VIII Using plastics as tooling materials: introduction, plastics commonly used as tooling material application of epoxy plastic tools construction methods of plastic tooling metal forming operations with Urethane dies. Calculating forces for urethane pressure pads, and economics of tooling.

TEXT BOOKS:

1. Donaldson, Lecain and Goold, *Tool Design*. TMH.
2. A Bhattacharya, *Principles of Metal cutting*. New Central Book Agency, Calcutta.

REFERENCE BOOKS:

1. Surendra Kenav and Umesh Chandra, *Production Engineering Design (Tool Design)*. Satyaprakashan, New Delhi 1994.
2. Amitabh Battacharya and Inyong Ham, *Design of Cutting Tools. Use of Metal Cutting Theory*. ASTME publication Michigan USA, 1969.
3. RK Singal and Others, *Fundamentals of Machining and Machine Tools*. I.K. International, 2008.
4. Shaw, *Metal Cutting Principles*. Oxford Univ. Press.

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IV Year B. Tech. ME – I Semester

**(1G57A) RAPID PROTOTYPING
(ELECTIVE II)**

UNIT –I INTRODUCTION: Need for the compression in product development, History of RP system, Applications, Growth of RP industry and classification of RP system.

UNIT –II STEREO LITHOGRAPHY SYSTEM: Principle, Process details, machine details, Applications.

UNIT –III FUSION DECOMPOSITION MODELING: Principle, Process details, Applications.

UNIT –IV SOLID GROUND CURING: Principle of operation, Machine details, Applications.

UNIT –V LAMINATED OBJECT MANUFACTURING: Principle of Operation, LOM materials, Process details, Applications.

UNIT –VI LASER SINTERING: Introduction to LASER, LASER Sintering process, process details, Applications.

UNIT –VII CONCEPTS MODELERS: Principle, Thermal jet printer, Sander's model maker, 3-D printer.

UNIT –VIII LASER ENGINEERING NET SHAPING (LENS):

Rapid Tooling: Indirect Rapid tooling, Silicon rubber tooling, Direct Rapid Tooling

TEXT BOOKS:

1. Rapid Prototyping Technology, Kenneth G. Cooper, Marcel Dekker, INC.
2. Rapid Manufacturing, Flham D.T & Dinjoy S.S, Verlog London 2001.
3. Peter D. Hilton and Paul F. Jacobs (Editors), *Rapid Tooling: Technologies and Industrial Applications*. Marcel Dekker, 2000.

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IV Year B. Tech. ME – I Semester

**(1G57B) INSTRUMENTATION LAB AND
OPTIMIZATION LAB WITH MATLAB SOFTWARE**

INSTRUMENTATION LAB

1. Calibration of Pressure Gauges.
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermocouple for temperature measurement.
6. Calibration of capacitive transducer for angular displacement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of a rotometer for flow measurement.
10. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of Mcleod gauge for low pressure.
12. Study of anemometer

OPTIMIZATION LAB WITH MAT LAB SOFTWARE

Ex 1. Consider the two matrices

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 4 \\ -1 & 6 & 7 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 13 & -15 & 8 \\ 1 & 51 & 9 \\ 8 & 70 & 6 \end{bmatrix}$$

Using MATLAB, determine

- a) $A+B$ b) A^2 c) $A^2 + B^2 - 2AB$

Ex 2. Write M file and Solve following Linear Programming Problem

$$\text{Minimize } y = 2x_1^2 + 2x_1x_2 + x_2^2 - 20x_1 - 14x_2$$

$$\text{Sub to: } x_1^2 + x_2^2 \leq 25;$$

$$x_1^2 - x_2^2 \leq 7$$

$$\text{Range } 0 \leq x_1 \leq 10, 0 \leq x_2 \leq 5,$$

Ex 3. Rastrigin's function has many local minima, with a global minimum at (0,0):

$$\text{Ras}(x) = 20 + x_1^2 + x_2^2 - 10(\cos(2\pi x_1) + \cos(2\pi x_2))$$

Use "fminunc" and "patternsearch" and solve the problem by taking starting point as [20,30], which is far from the global minimum.

Ex 4. Rastrigin's function has many local minima, with a global minimum at (0,0):

$$\text{Ras}(x) = 20 + x_1^2 + x_2^2 - 10(\cos(2\pi x_1) + \cos(2\pi x_2))$$

Use "GA" and solve the problem by taking starting point as [20,30], which is far from the global minimum.

Ex 5. Solve the following problem and find the optimum value using simulated annealing on MATLAB.

$$\text{Minimize } y = (x_1^2 + x_2 - 11)^2 + (x_1 + x_2^2 - 7)^2$$

$$\text{Range } 0 \leq x_1 \leq 6; 0 \leq x_2 \leq 6$$

Ex 6. Solve the above problem using Neural Networks on MATLAB.

Ex 7. Using fuzzy membership functions (at least two) solve a data set (e.g: Selection of a customer, selection of a ROBOT, and selection of a supplier, etc.) problem to find the best?

Note: Use Matlab online Help Manual to solve the above problems.

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IV Year B. Tech. ME – I Semester

(1G57C)CAD / CAM LAB

1. **DRAFTING:** Development of part drawings for various components in the form of orthographic and isometric. Representation of Dimensioning and tolerances scanning and plotting. Study of script, DXE AND IGES FILES.
2. **PART MODELING:** Generation of various 3D Models through Protrusion, revolve, and shell sweep. Creation of various features. Study of parent child relation. Feature based and Boolean based modeling surface and Assembly Modeling. Study of various standard Translators. Design simple components.
3.
 - a) Determination of deflection and stresses in 2D and 3D trusses and beams.
 - b) Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axisymmetric components.
 - c) Determination of stresses in 3D and shell structures (at least one example in each case)
 - d) Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.
 - e) Steady state heat transfer Analysis of plane and Axisymmetric components.
4.
 - a) Development of process sheets for various components based on tooling Machines.
 - b) Development of manufacturing and tool management systems.
 - c) Study of various post processors used in NC Machines.
 - d) Development of NC code for free form and sculptured surfaces using CAM packages.
 - e) Machining of simple components on NC lathe and Mill by transferring NC Code / from a CAM package. Through RS 232.
 - f) Quality Control and inspection.

Any Six Software Packages from the following:

Use of Auto CAD, Micro Station, CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc.

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IV Year B. Tech. ME – II Semester

(1G581)PRODUCTION AND OPERATIONS MANAGEMENT

UNIT –I Functions of production planning & controls operations & productivity, productivity measurement, goods and services, Design of goods and services: selection, generating new products, product development, issues in product design.

UNIT –II Forecasting – Importance of forecasting – Types of forecasting, their uses – General Principles of forecasting – Forecasting techniques – qualitative methods and quantitative methods – accuracy of forecasting methods.

UNIT –III Factors affecting facilities location, mathematical models for facilities, location, Types of facilities- layout: product layout, process layout, group technology layout, Assembly line balancing, computerised layout: ALDEP, CRAFT, CORELAP.

UNIT –IV Strategies for aggregates planning, aggregate planning using O.R. Models, Chase planning, Expediting, controlling aspects.

UNIT –V Inventory management – Functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P-Systems and Q-Systems-(S, s) Policy.

UNIT –VI Scheduling Policies – Techniques, flow shop and job shop Scheduling techniques.

UNIT –VII MRP, –lot sizing techniques in MRP, introduction to ERP, LOB (Line of Balance).

UNIT –VIII Lean Management, philosophy and creation of lean enterprise, JIT concepts-Kanban System-Elements of total quality management, Six Sigma Quality Control.

TEXT BOOKS:

1. Baffa & Rakesh Sarin, *Modern Production, Operations Management*.
2. B. Mahadevan, *Operation Management*. Pearson Edu.
3. Adam & Ebert, *Production & Operations Management: Concepts, Models and Behavior*. PHI, 5th Ed.

REFERENCE BOOKS:

1. S.N. Chary, *Operations Management*. TMH.
2. Martin K. Starr and David W. Miller. *Inventory Control Theory and Practice*.
3. John E. Biegel, *Production Control A Quantitative Approach*.
4. Kanishka Bedi, *Production & Operations Management*. Oxford Univ Press.

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IV Year B. Tech. ME – II Semester

(1G582) POWER PLANT ENGINEERING

UNIT –I Introduction to the Sources of Energy – Resources and Development of Power in India.

Steam Power Plant: Plant Layout, Working of different Circuits, Fuel and handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, Ash handling systems.

UNIT –II STEAM POWER PLANT -COMBUSTION PROCESS:

Properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, Dust collectors, cooling towers and heat rejection. Corrosion and feed water treatment.

UNIT –III INTERNAL COMBUSTION ENGINE PLANT-DIESEL

POWER PLANT: Introduction – IC Engines, types, construction– Plant layout with auxiliaries – fuel supply system, air starting equipment, lubrication and cooling system – super charging.

UNIT –IV GAS TURBINE PLANT: Introduction – classification - construction – Layout with auxiliaries – Principles of working of closed and open cycle gas turbines. Combined Cycle Power Plants and comparison.

UNIT –V HYDRO ELECTRIC POWER PLANT: Water power – Hydrological cycle / flow measurement – drainage area characteristics – Hydrographs – storage and Pondage – classification of dams and spill ways.

Hydro Projects and Plant: Classification – Typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT –VI POWER FROM NON-CONVENTIONAL SOURCES:

Utilization of Solar- Collectors- Principle of Working, Wind Energy – types – HAWT, VAWT -Tidal Energy.

Direct Energy Conversion: Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation.

UNIT –VII NUCLEAR POWER STATION: Nuclear fuel – breeding and fertile materials – Nuclear reactor – reactor operation.

Types of Reactors: Pressurized water reactor, Boiling water reactor, sodium-graphite reactor, fastBreeder Reactor, Homogeneous Reactor, Gas cooled Reactor, Radiation hazards and shielding – radioactive waste disposal.

UNIT –VIII POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, Load curves, load duration curve. Definitions of connected load, Maximum demand, demand factor, average load, load factor, diversity factor – related exercises. Effluents from power plants and Impact on environment – pollutants and pollution standards – Methods of Pollution control.

TEXT BOOK:

1. Rajput. R.K., *A Text Book of Power Plant Engineering*. Laxmi Publ, 2007, 4th Ed.
2. P.C.Sharma , *Power Plant Engineering*. S.K.Kataria Publ.

REFERENCE BOOKS:

1. P.K.Nag, *Power Plant Engineering*. TMH, 2nd Ed.
2. Ramalingam, *Power plant Engineering*. Scietech Publ.
3. Arora and S. Domkundwar. *A Course in Power Plant Engineering*.
4. C. Elanchezian and others, *Power Plant Engineering*. I.K. International, 2010.

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IV Year B. Tech. ME – II Semester

**(1G583) REFRIGERATION AND AIR CONDITIONING
(ELECTIVE –III)**

UNIT –I INTRODUCTION TO REFRIGERATION: Necessity and applications – Unit of refrigeration and C.O.P. – Different refrigeration methods - Air Refrigeration: Ideal and Actual cycles, Open and Dense air systems – problems – Refrigeration needs of Air crafts.

UNIT –II VAPOUR COMPRESSION REFRIGERATION:Basic cycle - working principle and essential components of the plant – COP - Representation of cycle on T-S and P-h charts – Expander vs. Throttling, effect of sub cooling and super heating – cycle analysis – Actual cycle- Influence of various parameters on system performance – Construction and Use of P-h charts – numerical Problems.

UNIT –III REFRIGERANTS: Desirable properties – classification of refrigerants used – Nomenclature- secondary refrigerants- lubricants – Ozone Depletion – Global Warming- newer refrigerants. Condensers – Classification, Evaporators – classification and Expansion devices – classification.

UNIT –IV VAPOR ABSORPTION REFRIGERATION SYSTEM: description and working of NH_3 – water system and Li Br –water (Two shell & Four shell) System -Calculation of max COP. Principle of operation of three Fluid absorption system.

UNIT –V STEAM JET REFRIGERATION SYSTEM: Working Principle and Basic Components-estimation of motive steam required. Principle and operation of: (i) Thermo-electric refrigerator (ii) Vortex tube or Hilsch tube.

UNIT –VI INTRODUCTION TO AIR CONDITIONING: Psychrometric Properties & Processes – Characterization of Sensible and latent heat loads — Need for Ventilation, Consideration of Infiltrated air – Heat Load concepts: RSHF, GSHF- Problems.

UNIT –VII AIR CONDITIONING EQUIPMENT:humidifiers – dehumidifiers – air filters, fans and blowers.

Heat Pump – Heat sources – different heat pump circuits.

UNIT –VIII Requirements of human comfort and concept of Effective Temperature- Comfort chart –Comfort Air Conditioning- Summer, Winter & year round air conditioning- simple problems.

TEXT BOOKS:

1. CP Arora, *Refrigeration and Air Conditioning*. TMH, 2008, 3rd Ed
2. SC Arora & Domkundwar, *A Course in Refrigeration and Air conditioning*. Dhanpatrai.

REFERENCE BOOKS:

1. Manohar Prasad, *Refrigeration and Air Conditioning*. New Age, 2nd Ed.
2. Dossat, *Principles of Refrigeration*. Pearson Edu, 4th Ed.
3. P.L.Ballaney, *Refrigeration and Air Conditioning*. Khanna Publ.
4. R.C.Arora, *Refrigeration and Air Conditioning*. PHI, 2010.
5. Ananthanarayanan, *Basic Refrigeration and Air-Conditioning*. TMH.

Tables/Codes: Thermal Engineering Data Book containing Refrigerant and Psychrometric property Tables and charts

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IV Year B. Tech. ME – II Semester

**(1G584) COMPUTATIONAL FLUID DYNAMICS
(ELECTIVE – III)**

UNIT –I Elementary details in numerical Techniques: Number system and errors, Representation of integers, Fractions, Floating point Arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, Convergence of Sequences.

UNIT –II Applied Numerical Methods: Solution of a system of simultaneous Linear Algebraic Equations, iterative schemes. Of Matrix Inversion, Direct Methods for Matrix inversion, Direct Methods for banded matrices.

UNIT –III Finite Difference Applications in Heat conduction and Convection - Heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer.

UNIT –IV Finite Differences, discretization, consistency, stability, and Fundamentals of fluid flow modeling: Introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT –V Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling. conservative property, the upwind scheme.

UNIT –VI Review of Equations Governing Fluid Flow and Heat Transfer: Introduction, conservation of mass, Newton's second law of motion, expanded forms of Navier-stokes equations, conservation of energy principle, special forms of the Navier-stokes equations.

UNIT –VII Steady flow, dimensionless form of Momentum and Energy equations, Stokes equation, conservative body force fields, stream function - Vorticity formulation.

UNIT –VIII Finite Volume Method: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, Upwind interpolation, Linear interpolation and Quadratic interpolation.

TEXT BOOK:

1. Suhas V. Patankar, *Numerical heat transfer and fluid flow*. Butter-Worth Publ.
2. John. D. Anderson, *Computational fluid dynamics, Basics with applications*, Mc Graw Hill.

REFERENCE BOOKS:

1. Niyogi, *Computational Fluid Flow and Heat Transfer*. Pearson Publ.
2. Tapan K. Sengupta, *Fundamentals of Computational Fluid Dynamics*. Universities Press.
3. Jiyuan and Others, *Computational Fluid Dynamics*. Elsevier, 2008.

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IV Year B. Tech. ME – II Semester

**(1G585) NON CONVENTIONAL SOURCES OF ENERGY
(ELECTIVE –III)**

UNIT –I PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT –II SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT –III SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT –IV WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

UNIT –V BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT –VI GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT –VII OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT –VIII DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's,

thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

1. Tiwari and Ghosal, *Renewable energy resources*. Narosa.
2. G.D. Rai, *Non-Conventional Energy Sources*.

REFERENCE BOOKS:

1. Twidell & Weir, *Renewable Energy Sources*.
2. Khan, B.H., *Non-Conventional Sources*. TMH, 2009, 2nd Ed.
3. B.S.Magal Frank Kreith & J.F.Kreith, *Solar Power Engineering*.
4. Solanki, *Renewable energy sources and emerging Technologies*. PHI.
5. Ashok V Desai, *Non-Conventional Energy*. Wiley Eastern
6. K.M. Mittal, *Non-Conventional Energy Systems*. Wheeler publishers, New Delhi.

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IV Year B. Tech. ME – II Semester

**(1G586) NANO TECHNOLOGY
(ELECTIVE-IV)**

UNIT –I INTRODUCTION TO PHYSICS OF THE SOLID STATES: Structure, energy bands, localized particles. Methods of Measuring Properties - microscopy, spectroscopy

UNIT –II PROPERTIES OF INDIVIDUAL NANOPARTICLES: Introduction, metal nanoclusters, semiconducting nanoparticles, rare gas and molecular clusters, methods of synthesis

UNIT –III MECHANICAL AND MAGNETIC PROPERTIES: Strength of nano crystalline SiC, mechanical properties, magnetic properties. Super-paramagnetism, magnetization of nano particles of magnetite, ESR spectroscopy, small angle neutron scattering

UNIT –IV ELECTRICAL AND OPTICAL PROPERTIES: Switching glasses with nanoparticles, Electronic conduction with nano particles. Optical properties, special properties and the coloured glasses.

UNIT –V INVESTIGATING AND MANIPULATING MATERIALS IN THE NANOSCALE: Electron microscopies, scanning probe microscopies, optical microscopies for nano science and technology, X-ray diffraction.

UNIT –VI MICROELECTRONICS: Introduction, nano manufacturing product strategy considering future impacts, identifying potential synergies, existing technologies, future nano electronic device technologies, photonics.

UNIT –VII SMARTER COMPUTERS, FASTER INTERNET AND CHEAPER ENERGY: Building a better Digital brain, routing information at the speed of light, nano flying electronics, getting energy and a cleaner environment with nanotech.

UNIT –VIII NANOTECHNOLOGY AND YOU: Developing of Nanomedicines, Nanotechnology in Diagnostics applications. Nanotechnology - the nature of ethics, ethics of individual behaviour, promise of nanotechnology

TEXT BOOKS:

1. C. P. Poole and F. J. Owens, *Introduction to Nanotechnology*. Wiley.
2. K. Bandyopadhyay, *Nano Materials*. New Age International Publishers.
3. Nano Essentials., T. Pradeep, TMH.
4. M. Ratner and D. Ratner, *Nanotechnology: A Gentle Introduction to the Next Big Idea*. Pearson Education.
5. L. E. Foster, *Nanotechnology Science, Innovation, and Opportunity*. Pearson Education.
6. Richard Booker and Earl Boysen, *Nanotechnology the fun and easy way to explore the science of mater's smallest particles*. Wiley.
7. Christopher Kelty and Kristen Kulinowski, *Nanotechnology: Content and Context*.

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IV Year B. Tech. ME – II Semester

**(1G48B) NEURAL NETWORKS AND FUZZY LOGIC
(Common to ECE and andME)**

UNIT –I INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS:

Introduction, Biological Neuron, Model of Artificial, Neural network architectures, Characteristics of neural networks, McCulloch-Pitts Model, Types of neuron activation functions learning methods(supervised, unsupervised, Reinforcement), Historical Developments, Applications of Neural Networks.

UNIT –II SINGLE LAYER FEED FORWARD NEURAL NETWORKS:

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.

UNIT –III MULTILAYER FEED FORWARD NEURAL NETWORKS:

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT –IV ASSOCIATIVE MEMORIES:

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem.

UNIT –V HOPFIELD NETWORKS: Architecture, Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network.

Adaptive Resonance Theory: Introduction, ART1, ART2, Applications

UNIT –VI CLASSICAL & FUZZY SETS: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT –VII FUZZY LOGIC SYSTEM COMPONENTS: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT –VIII APPLICATIONS: Neural network applications: Process identification, control, fault diagnosis and load forecasting.

Fuzzy Logic Applications:Fuzzy logic control and Fuzzy classification.

TEXT BOOK:

1. Rajasekharan and Rai, *Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications*. PHI Publication.
2. S. N. Sivanandam, S. Sumathi, S. N. Deepa, *Introduction to Neural Networks using MATLAB 6.0*. TMH, 2006.

REFERENCE BOOKS:

1. James A Freeman and Davis Skapura, *Neural Networks*. Pearson Education, 2002.
2. Simon Hakens, *Neural Networks*. Pearson Education
3. C.Eliasmith and CH.Anderson, *Neural Engineering*. PHI.

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IV Year B. Tech. ME – II Semester

**(1G587) SUPPLY CHAIN MANAGEMENT
(ELECTIVE-IV)**

UNIT –I BUILDING A STRATEGIC FRAME WORK TO ANALYSE SUPPLY CHAINS:Supply chain stages and decision phases process view of a supply chain. Supply chain flows. Examples of supply chains. Competitive and supply chain strategies

UNIT –II DESIGNING THE SUPPLY CHAIN NETWORK:Distribution Networking – Role, Design. Supply Chain Network (SCN) – Role, Factors, Framework for Design Decisions.

UNIT –III FACILITY LOCATION AND CAPACITY ALLOCATION:Models for facility location and capacity allocation. Analytical problems

UNIT –IV PLANNING AND MANAGING INVENTORIES IN A SUPPLY CHAIN:Managing multi-echelon cycle inventory, safety inventory determination. Optimum level of product availability. Managerial levers to improve supply chain profitability.

UNIT –V SOURCING:Role of sourcing, supplier – scoring & assessment, selection and contracts. Design collaboration.

UNIT –VI TRANSPORTATION AND PRICING PRODUCTS:Role of transportation, Factors affecting transportation decisions. Modes of transportation and their performance characteristics. International transportation. Analytical problems. Role Revenue Management in the supply chain

UNIT –VII MANAGING BULLWHIP EFFECT:Co-ordination in a supply chain - Bullwhip effect. Obstacles to coordination. Managerial levers to achieve co-ordination.

UNIT –VIII TECHNOLOGY IN THE SUPPLY CHAIN:The role of IT supply Chain, The Supply Chain IT framework, CRM, Internal SCM, SRM. The role of E-business in a supply chain

TEXT BOOKS:

1. Sunil Chopra & Peter Meindl; *Supply Chain Management-Strategy, Planning & Operation*. Pearson Edu. Asia, 2001, ISBN: 81-7808-272-1.

REFERENCE BOOKS:

1. Robert B Handfield, Ernest L Nichols, Jr., *Supply Chain Redesign—Transforming Supply Chains into Integrated Value Systems*. Pearson Edu. Inc, 2002, ISBN: 81-297-0113-8.
2. Jeremy F Shapiro, Duxbury; *Modelling the Supply Chain*. Thomson Learning, 2002, ISBN 0-534-37363.
3. David Simchi Levi, Philip Kaminsky & Edith Simchi Levi; *Designing & Managing the Supply Chain*. Mc Graw Hill.
4. Dr. Dale S. Rogers, Dr. Ronald S. Tibben-Lembke, *Going Backwards Reverse Logistics Trends and Practices*. University of Nevada, Reno, Center for Logistics Management.