

**ACADEMIC REGULATIONS (R – 14)**  
**COURSE STRUCTURE**  
**AND**  
**DETAILED SYLLABI**

**FOR**

**B. Tech Regular Four Year Degree Courses**

*(For the Batches Admitted From 2014-2015)*

**&**

**B. Tech (Lateral Entry Scheme)**

*(For the Batches Admitted From 2015-2016)*

**AUTOMOBILE ENGINEERING**



**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)**

**(Affiliated to JNTUA, Ananthapuramu, Approved by AICTE, New Delhi)**

**R.V.S. NAGAR, CHITTOOR- 517 127 (AP)**

**FOREWORD**

*The autonomy is conferred on Sri Venkateswara College of Engineering and technology by JNT University, Anantapur based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.*

*Sri Venkateswara College of Engineering and Technology is proud to win the confidence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTUA, Anantapur to frame the regulations, course structure and syllabi under autonomous status.*

*The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, to produce quality engineering graduates to the society.*

*All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.*

**Principal**

## **VISION**

Carving the youth as dynamic, competent, valued and knowledgeable professionals who shall lead the Nation to a better future.

## **MISSION**

- ✓ Providing Quality Education, student-centered teaching-learning processes and state-of-art infrastructure for professional aspirants hailing from both rural and urban areas.
- ✓ Imparting technical education that encourages independent thinking, develops strong domain of knowledge, hones contemporary skills and positive attitudes towards holistic growth of young minds.
- ✓ *Evolving the Institution into a Center of Academic and Research Excellence.*

## **QUALITY POLICY**

Sri Venkateswara College of Engineering and Technology strides towards excellence by adopting a system of quality policies and processes with continued improvements to enhance students' skills and talent for their exemplary contribution to the society, the nation and the world.

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**ACADEMIC REGULATIONS**

**B.Tech. Regular Four Year Degree Program**

**(For the batches admitted from the academic year 2014-15)**

**and**

**B.Tech. (Lateral Entry Scheme)**

**(For the batches admitted from the academic year 2015-16)**

**Applicability**

All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2014-2015 onwards. Any reference to "College" in these rules and regulations stands for Sri Venkateswara College of Engineering and Technology (Autonomous).

**Extent**

All the rules and regulations, specified herein after shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, Principal, Sri Venkateswara College of Engineering and Technology (A) shall be the Chairman of the Academic Council.

**Admission**

**Admission in to first year of Four Year B.Tech., Degree Program of study in Engineering :**

**Eligibility**

A candidate seeking admission into the first year of four year B.Tech., Degree Program should have

Passed either Intermediate Public Examination conducted by the Board of Intermediate Education, Government of Andhra Pradesh with Mathematics, Physics and Chemistry as optional subjects (or any equivalent examination recognized by the Board of Intermediate Education and JNTU Anantapur) or Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or equivalent Diploma recognized by State Board of Technical Education, Government of Andhra Pradesh and JNTU Anantapur) for admission.

**Admission  
Procedure**

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 Program as follows:

Seats under various categories are filled as per the norms prescribed by the Government of Andhra Pradesh.

**3.2 Admission into the second year of four Year B.Tech., Degree Program in Engineering:**

**Eligibility**

Candidates qualified in ECET (FDH) and / or admitted by the Convener, ECET (FDH).

In all such cases for admission, when needed, Permissions from the statutory bodies are to be obtained.

**Admission  
Procedure**

Lateral Entry seats are filled as per the norms prescribed by the Government of Andhra Pradesh from time to time.

**4. Programs of study offered leading to the award of B.Tech degree**

1. B.Tech (Civil Engineering)
2. B.Tech (Electrical & Electronics Engineering)

3. B.Tech (Mechanical Engineering)
4. B.Tech (Electronics & Communication Engineering)
5. B.Tech (Computer Science & Engineering)
6. B.Tech (Information Technology)
7. B.Tech (Automobile Engineering)
8. B.Tech (Electronics & Tele Communication Engineering)

**Academic  
Year**

The College shall follow semester pattern from first year onwards. I, II semesters of First Year of four Year B.Tech., Program shall have a minimum of 14 instructional weeks. From second year onwards each semester shall have a minimum of 16 instructional weeks.

**Course  
Structure**

Each Program of study shall consist of:

• **General subjects comprise of the following courses: (5 to 10%)**

- i. English Language /Communication Skills / Mind Skills
- ii. Humanities and Social Sciences
- iii. Principles of Management

The above courses are common to all Branches.

• **Basic science subjects comprise of the following courses: (15 to 25%)**

- i. Mathematics
- ii. Physics
- iii. Chemistry

The above courses are common to all branches.

• **Basic Engineering subjects comprise some of the following courses, depending upon the branch: (15 to 25%)**

- i. Engineering Drawing
- ii. Engineering workshop
- iii. Engineering Mechanics
- iv. Basic Mechanical Engineering
- v. Basic Electrical & Electronics Engineering
- vi. Computer Programming

- **Core Subjects: (45 to 55%)**

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

- **Elective subjects: (10 to 15%)**

Electives will be offered to the students to diversify the spectrum of knowledge.

These electives can also be chosen based on the interest of the student to broaden his individual skill and knowledge in the specialized area.

**Main Project:** Main Project shall be carried out in the institution / industry during IV year II semester for a period of one semester. The project report shall be submitted to the department after successful completion.

**Credit System** Credits are assigned based on the following norms.

Subject	Semester Pattern	
	Hours / Week	Credits
Theory	01	01
Practical	03	02
Drawing Practice	02	01
Project Work	--	<b>16</b>

- As a norm, for the theory subjects, **one credit** for one contact period per week is assigned.
  - As a norm, for practical courses **two credits** will be assigned for three contact periods per week.
  - Tutorials do not carry any credits. However, each of the analytical and problem oriented courses will have one tutorial period per week.
  - For Project work where formal contact hours are not specified, credits are assigned based on the complexity of the work to be carried out.
- The four year curriculum of any B.Tech, Program of study shall have a total of **176** credits.
  - In the case of lateral entry students, B.Tech. program of study shall have a total of **132** credits.



- The exact requirements of credits for each subject will be as recommended by the concerned Board of Studies and approved by the Academic Council.

**8. Examination System :** All components in any Program of study will be Evaluated continuously through internal evaluation and an external evaluation component conducted as semester-end examination.

**8.1 Distribution of Marks:**

S. No	Examination	Marks %	Examination and Evaluation		Scheme of examination
1	Theory	70	Semester-end examination (external Paper setting and external evaluation)		This Examination question paper in theory subjects will be for a maximum of 70 marks. The question paper shall consists of two parts <b>Part A:</b> 5 short answer questions shall be given for a maximum 20 marks with one question from each unit. No choice will be given and all questions carry equal marks. <b>Part B:</b> 5 Descriptive/ problematic questions shall be given for a maximum of 50 marks with one question from each unit with internal choice i.e either or type. All questions carry equal marks.
		30	20	Mid- Examination of 120 Min. duration (Internal evaluation). The question paper shall be of descriptive type with 5 questions	Two (02) mid-term exams, each for 20 marks are to be conducted. Better of the two shall be considered for awarding internal marks. <b>Mid-I:</b> After first spell of instructions(First 2 Units) <b>Mid-II:</b> After second spell of

				out of which 4 are to be answered and evaluated for 20 marks.	instructions (Last 3 Units.)
			10	Assignment (Internal evaluation)	Two assignments shall be given and each will be evaluated for 10 marks. Average of two Assignments shall be taken as internal marks for the assignments.  <b>Assignment-I:</b> After first spell of instructions (First 2 Units) <b>Assignment-II:</b> After second spell of instructions (Last 3 Units.)
2	Laboratory	70	Semester-end Lab Examination (External evaluation)		70 marks are allotted for laboratory examination during semester-end.
			20	Continuous evaluation	Performance in laboratory experiments and Record are considered.
		30	10	Internal test	Practical Test at the end of the semester.
					➤ Marks scored in the continuous evaluation and internal test are considered for awarding internal marks.
3	Drawing	70	Semester-end drawing Examination (External evaluation)		70 marks are allotted for drawing examination during semester-end.
			20	Continuous evaluation	Performance in Drawing classes will be considered.
		30	10	Internal test	Two tests will be conducted. Better of the two will be taken.

					➤ Marks scored in the continuous evaluation and internal test are considered for awarding internal marks.
4	Project Work	300	200	External evaluation	Semester-end Project Viva-Voce Examination by a Committee as detailed under 8.2.
			100	Internal evaluation	Continuous evaluation by the Departmental Committee

Wherever the Question paper is different from the conventional pattern, the concerned pattern of question paper will be given at the end of the syllabus of that subject.

8.2 Project Work Evaluation : The Semester-End Examination (Viva-voce) shall be conducted by a Committee consisting of External examiner (nominated by the Chief Controller of Examinations), HOD, & Supervisor. The evaluation of project work shall be conducted at the end of the IV year second semester. The Internal Evaluation shall be made by the Departmental Committee, on the basis of two project reviews of each student.

8.3 Eligibility to appear for the Semester-End examination:

8.3.1 A student shall be eligible to appear for Semester –End examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.

8.3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted on medical grounds by the College Academic Committee. A stipulated fee shall be payable towards condonation of shortage of attendance to the College.

8.3.3 Shortage of Attendance below 65% in aggregate shall in no case be condoned and the candidate will be detained.

8.3.4 Detained students are not eligible to take their end examination of that class and their registration shall stand cancelled.

8.3.5 A student detained due to shortage of attendance, will have to repeat that

semester when offered next.

- 8.4 Evaluation: Following procedure governs the evaluation.
- 8.4.1 The marks for the internal evaluation components will be added to the external evaluation marks secured in the Semester –End examinations, to arrive at total marks for any subject in that semester.
- 8.4.2 Performance in all the subjects is tabulated program-wise and will be scrutinized by the Results Committee and subject-wise marks lists are finalized. Total marks obtained in each subject are converted into letter grades.  
Results Committee comprises of Principal, Controller of Examinations, one Senior Professor nominated by the Principal and the University Nominee.
- 8.4.3 Student-wise tabulation is done and student-wise Grade Sheet is generated and issued to the students.
- 8.5 Revaluation / Recounting:  
Students shall be permitted for request for recounting/revaluation of the Semester-End 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 grade sheet. If there are no changes, the same will be intimated to the students.
- 8.6 Supplementary Examination:
- 8.6.1 In addition to the regular Semester- End examinations conducted, the College may also schedule and conduct supplementary examinations for all the subjects of other semesters when feasible for the benefit of students. Such of the candidates writing supplementary examinations may have to write more than one examination per day.
9. Academic Requirements for Promotion/ completion of regular B.Tech Program of study:  
The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/completion of regular B.Tech Program of study.
- 9.1 For students admitted in B.Tech (Regular) Program:
- i. 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 Semester End examination and

a minimum of 40% of marks in the sum total of the internal evaluation and Semester-End examination taken together.

- ii. A student shall be promoted from second year to third year only if he fulfills the academic requirement of securing 44 credits from:
  - a) Two regular and two supplementary examinations of I-year I semester.
  - b) Two regular and one supplementary examinations of I-year II semester.
  - c) One regular and one supplementary examination of second year I semester.
  - d) One regular examination of II- year II Semester.

Irrespective of whether the candidates appear for Semester-End examination or not as per the normal course of study.

- iii. A student shall be promoted from third year to fourth year Program of study only if he fulfills the academic requirements of securing 66 credits from:
  - a) Three regular and three supplementary examinations of I-year I semester.
  - b) Three regular and two supplementary examinations of I-year II Semester
  - c) Two regular and two supplementary examination of second year I semester.
  - d) Two regular and one supplementary examinations second year II semester.
  - e) One regular and one supplementary examination of third year I semester.
  - f) One Regular Examination of Third year II semester.

Irrespective of whether the candidate appears for the Semester-End examination or not as per the normal course of study and in case of getting detained for want of credits by sections 9.1(ii) and 9.1 (iii) above, the student may make up the credits through supplementary examinations before the date of commencement of class work for III year I semester or IV year I semester as the case may be.

- iv. A student shall register for all the 176 credits and earn all the 176 credits. Marks obtained in all the 176 credits shall be considered for the award of the class based on CGPA.
- v. A student who fails to earn 176 credits as indicated in the course structure within eight academic years from the year of his admission shall forfeit his seat in B. Tech., Program and his admission stands cancelled.

9.2 For Lateral Entry Students (batches admitted from 2015-2016):

- i. 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 Semester-End examination and a minimum of 40% of marks in the sum total of the internal evaluation and Semester-End examination taken together.
- ii. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of securing 44 credits from the following examinations.
  - a) Two regular and two supplementary examinations of II year I semester.
  - b) Two regular and one supplementary examination of II year II semester.
  - c) One regular and one supplementary examination of III year I semester.
  - d) One Regular Examination of Third year II semester.

Irrespective of whether the candidate appear the Semester-End examination or not as per the normal Course of study and in case of getting detained for want of credits the student may make up the credits through supplementary exams of the above exams before the date of commencement of class work for IV year I semester.

- i. A student shall register for all 132 credits and earn all the 132 credits. Marks obtained in all 132 credits shall be considered for the award of the class based on CGPA.
- ii. A student who fails to earn 132 credits as indicated in the Course structure within six academic years from the year of his admission shall forfeit his seat in B.Tech., Program and his admission stands cancelled.

9.3            Audit Courses: Any student who wishes to pursue audit course can register for the same with the concerned teacher and attend to the classes regularly. No examination will be conducted, no grade will be given for the audit courses. However such of those students who have registered and got the requisite attendance of 75% in the audit course, it will be mentioned in their grade sheet.

10.            Transitory Regulations:  
Students who got detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having

undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects are offered and they continue to be in the academic regulations of the batch they join later.

A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of eight years, and a lateral entry student within six years, for the award of B.Tech Degree.

11. Grades, Grade Point Average and Cumulative Grade Point Average

11.1 Grade System: After all the components and sub-components of any subject (including laboratory subjects) are evaluated, the final total marks obtained will be converted to letter grades on a "10 point scale" described below.

% of marks obtained	Grade	Grade Points(GP)
90 to 100	A+	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
50 to 59	D	6
40 to 49	E	5
Less than 40 in sum of Internal & External (or) Less than 35 in External	F	0
Not Appeared	N	0

- Pass Marks: A student is declared to have passed theory and/ or laboratory subject, if he secures minimum of 35% marks in external examination, and a minimum of 40% marks in the sum total of internal evaluation and external examination taken together. Otherwise he will be awarded fail grade – F in such subject irrespective of internal marks.
- F is considered as a fail grade indicating that the student has to pass the semester-end examination in that subject in future and obtain a grade other than F and N for clearing this subject.

11.2 Grade Point Average (GPA):

Grade Point Average (GPA) will be calculated as given below on a "10

Point scale" as an Index of the student's performance at the end of each semester:

$$\text{GPA} = \frac{\sum(CXGP)}{\sum C}$$

Where C denotes the credits assigned to the subjects undertaken in that semester and GP denotes the grade points earned by the student in the respective subjects.

11.3 Cumulative Grade Point Average (CGPA):

At the end of every semester, a Cumulative Grade Point Average (CGPA) on a 10 Point scale is computed considering all the subjects passed up to that point as an index of overall Performance up to that Point as given below:

$$\text{CGPA} = \frac{\sum(CXGP)}{\sum C}$$

Where C denotes the credits assigned to subjects undertaken upto the end of the current year/semester and GP denotes the grade points earned by the student in the respective courses.

11.4 Grade Sheet: A grade sheet (Marks Memorandum) will be issued to each student Indicating his performance in all subjects registered in that semester Indicating the GPA and CGPA. GPA and CGPA will be rounded off to the second place of decimal.

12. Consolidated Grade Sheet: After successful completion of the entire Program of study, a Consolidated Grade Sheet containing performance of all academic years will be issued as a final record. Transcripts will also be issued, if required, after payment of requisite fee.

13. Award of Degree : The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendation of the Principal of SVCET (Autonomous), Chittoor.

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

➤ Registered and successfully completed all the components prescribed in the



program of study for which he is admitted.

- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- Obtained CGPA greater than or equal to 5.0 (Minimum requirement for declaring as passed.)

13.2 Award of : Declaration of Class is based on CGPA.  
Class

Cumulative Grade Point Average	Class
$\geq 7.0$	First Class with Distinction
$\geq 6.0$ and $< 7.0$	First Class
$> 5.0$ and $< 6.0$	Second Class
5.0	Pass Class

14. With – Holding of Results: If the candidate has not paid dues to the university/ college or if any case of in-discipline is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

15. Additional academic regulations:

- i. A regular student has to complete all the eligibility requirements within the maximum stipulated period of eight years, and a lateral entry student within six years.
- ii. A student can appear for any number of supplementary examinations till he clears all subjects within the stipulated period.
- iii. A grade sheet (marks memorandum) will be issued to the student indicating his performance in all the courses of that semester along with the GPA and CGPA.
- iv. Any canvassing / impressing the administration, examiners, faculty or staff in any form, the candidate is liable for punishment as per the mal practice rules appended here with.
- v. When a student is absent for any examination (internal or external) he is treated as to have appeared and obtained zero marks in that component (course) and grading is done accordingly.
- vi. When a component is cancelled as a penalty, he is awarded zero marks in that component.

16. Amendments to regulations:  
The Academic Council of Sri Venkateswara College of Engineering and Technology (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.
  
17. General:  
Where the words "he", "him", "his", "himself" occur in the regulations, they include "she", "her", "herself".

Note: Failure to read and understand the regulations is not an excuse.

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)**

**(AFFILIATED TO JNTUA, ANANTAPUR)**

**RULES FOR DISCIPLINARY ACTION FOR MALPRACTICE / IMPROPER CONDUCT IN  
EXAMINATIONS**

	<b>Nature of Malpractices / Improper conduct</b>	<b>Punishment</b>
	<b>If the candidate</b>	
1. (a)	<i>Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)</i>	<i>Expulsion from the examination hall and cancellation of the performance in that subject only.</i>
(b)	<i>Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.</i>	<i>Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</i>
2.	<i>Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of</i>	<i>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the</i>

	<p><i>the examination (theory or practical) in which the candidate is appearing.</i></p>	<p><i>candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.</i></p> <p><i>The Hall Ticket of the candidate is to be cancelled.</i></p>
3.	<p><i>Comes in a drunken condition to the examination hall.</i></p>	<p><i>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.</i></p>
4.	<p><i>Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.</i></p>	<p><i>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The</i></p>

		<p><i>candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</i></p>
5.	<p><i>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</i></p>	<p><i>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</i></p>
6.	<p><i>Possess any lethal weapon or firearm in the examination hall.</i></p>	<p><i>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project</i></p>

		<p><i>work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred and forfeits of seat.</i></p>
7.	<p><i>Impersonates any other candidate in connection with the examination.</i></p>	<p><i>The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he will be handed over to the police</i></p>

		<i>and a case is registered against him.</i>
8.	<i>Refuses to obey the orders of the Chief Superintendent / Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction or property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</i>	<i>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.</i>
9.	<i>If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</i>	<i>Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the</i>

		<p><i>candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</i></p> <p><i>Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.</i></p>
10.	<i>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</i>	<i>Cancellation of the performance in that subject.</i>
11.	<i>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</i>	<i>Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.</i>
12.	<i>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Examination committee for further action to award suitable punishment.</i>	

*Malpractices identified by squad or special invigilators*

1. Punishments to the candidates as per the above guidelines.





**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY(AUTONOMOUS)**  
**R.V.S NAGAR, CHITTOOR-517 127. ANDHRA PRADESH**  
**DEPARTMENT OF AUTOMOBILE ENGINEERING**

**Scheme of Instruction and Examination under R14 Regulation**

**I B.Tech., I Semester**

S.No.	Course Code	Subject	Hours / Week			Credits	Maximum Marks		
			L	T	P/D		Internal	External	Total
1	14AHS01	Technical English - I	3	...	...	3	30	70	100
2	14AHS02	Engineering Mathematics - I	3	1	...	3	30	70	100
3	14AHS03	Engineering Chemistry	3	1	...	3	30	70	100
4	14AME01	Engineering Drawing	2	...	4	4	30	70	100
5	14ACE02	Engineering Mechanics- I	3	1	...	3	30	70	100
6	14AHS07	Technical English Lab -I	...	...	3	2	30	70	100
7	14AHS08	Engineering Chemistry Lab	...	...	3	2	30	70	100
8	14AME02	Computer Aided Drafting Lab	...	...	3	2	30	70	100
		<b>TOTAL</b>	<b>14</b>	<b>3</b>	<b>13</b>	<b>22</b>	<b>240</b>	<b>560</b>	<b>800</b>

**I B.Tech., II Semester**

S.No.	Course Code	Subject	Hours / Week			Credits	Maximum Marks		
			L	T	P		Internal	External	Total
1	14AHS04	Engineering Physics	3	1	...	3	30	70	100
2	14AHS05	Environmental Science	3	1	...	3	30	70	100
3	14AHS06	Engineering Mathematics -II	3	1	...	3	30	70	100
4	14ACS02	Programming In C and Data Structures	3	2	...	4	30	70	100
5	14ACE05	Engineering Mechanics- II	3	1	...	3	30	70	100
6	14AHS09	Engineering Physics Lab	...	...	3	2	30	70	100
7	14ACS04	C and Data Structures Lab	...	...	3	2	30	70	100
8	14AME03	Engineering Workshop	...	...	3	2	30	70	100
		<b>TOTAL</b>	<b>15</b>	<b>6</b>	<b>9</b>	<b>22</b>	<b>240</b>	<b>560</b>	<b>800</b>

**II B.Tech., I Semester**

S.No.	Course Code	Subject	Hours / Week			Credits	Maximum Marks		
			L	T	P/D		Internal	External	Total
1	14AME06	Production Technology	3	1	...	3	30	70	100
2	14ACE12	Strength of Materials	3	1	...	3	30	70	100
3	14AME04	Engineering Metallurgy	3	...	...	3	30	70	100
4	14AME05	Thermodynamics	3	1	...	3	30	70	100
5	14AEE06	Electrical and Electronics Engineering	3	1	...	3	30	70	100
6	14AME07	Machine Drawing	1	...	4	3	30	70	100
7	1ACE15	Strength of Materials and Metallurgy Lab	...	...	3	2	30	70	100
8	14AEE09	Electrical and Electronics Engineering Lab	...	...	3	2	30	70	100
		<b>TOTAL</b>	<b>16</b>	<b>4</b>	<b>10</b>	<b>22</b>	<b>240</b>	<b>560</b>	<b>800</b>

**II B.Tech., II Semester**

S.No.	Course Code	Subject	Hours / Week			Credits	Maximum Marks		
			L	T	P		Internal	External	Total
1	14ACE11	Fluid Mechanics and Hydraulic Machinery	3	1	...	3	30	70	100
2	14AAT01	Automotive Engines	3	1	...	3	30	70	100
3	14AME13	Mechanics of Machines	3	1	...	3	30	70	100
4	14AME14	Basic Metrology and Machine Tools	3	1	...	3	30	70	100
5	14AHS10	Probability and Statistics	3	1	...	3	30	70	100
6	14AHS12	Managerial Economics and Financial Analysis	3	1	...	3	30	70	100
7	14ACE23	Basic Fluid Mechanics and Hydraulic Machinery Lab	...	...	3	2	30	70	100
8	14AME16	Production Technology Lab	...	...	3	2	30	70	100
		<b>TOTAL</b>	<b>18</b>	<b>6</b>	<b>6</b>	<b>22</b>	<b>240</b>	<b>560</b>	<b>800</b>

**III B.Tech., I Semester**

S. No.	Course Code	Subject	Hours / Week			Credits	Maximum Marks		
			L	T	P		Internal	External	Total
1	14AHS13	Technical English-II	3	1	...	3	30	70	100
2	14AME17	Industrial Management	3	1	...	3	30	70	100
3	14AAT02	Automotive Transmissions	3	1	...	3	30	70	100
4	14AME21	Basic Design of Machine Elements	3	1	...	3	30	70	100
5	14AME22	Thermal Engineering and Heat Transfer	3	1	...	3	30	70	100
6	14AME23	Mechatronics	3	1	...	3	30	70	100
7	14AHS14	Technical English Lab-II	...	...	4	2	30	70	100
8	14AME15	Metrology and Machine Tools Lab	...	...	4	2	30	70	100
9	14AAT28	Comprehensive Examination Online	-	-	-	1	-	100	
		<b>TOTAL</b>	<b>18</b>	<b>6</b>	<b>8</b>	<b>23</b>	<b>240</b>	<b>660</b>	<b>900</b>
10	14AHS16	Quantitative Aptitude and Reasoning-II (Audit Course)	3	...	...	...	...	...	...

**III B.Tech., II Semester**

S. No.	Course Code	Subject	Hours / Week			Credits	Maximum Marks		
			L	T	P		Internal	External	Total
1	14AME29	Operations Research	3	1	...	3	30	70	100
2	<b>CHOICE BASED CREDIT COURSE (INTERDEPARTMENTAL)</b>		3	1	...	3	30	70	100
	14ACS31	Computer Graphics (CSE)							
	14AEE41	Sensors & Actuators (EEE)							
	14AME57	Robotics (ME)							
3	14AAT04	Vehicle Dynamics	3	1	...	3	30	70	100
4	14AAT05	Vehicle Body Engineering	3	1	...	3	30	70	100
5	14AAT06	Two and Three Wheelers	3	1	...	3	30	70	100
6	14AAT07	Vehicle Maintenance	3	1	...	3	30	70	100
7	14AAT08	Vehicle Maintenance and Re-Conditioning Lab	...	...	4	2	30	70	100
8	14AAT09	Engine Performance and Emission Testing Lab	...	...	4	2	30	70	100

9	14AAT29	Comprehensive Examination	Online	-	-	-	1	-	100	100
			<b>TOTAL</b>	<b>18</b>	<b>6</b>	<b>8</b>	<b>23</b>	<b>240</b>	<b>660</b>	<b>900</b>
10	14AME32	Total Quality Management in Mechanical Engineering (Audit Course)		3	...	...	...	...	...	...

#### IV B.Tech., I Semester

S. No.	Course Code	Subject	Hours / Week			Credits	Maximum Marks			
			L	T	P		Internal	External	Total	
1	14AAT10	Automotive Electrical Systems and Autotronics	3	1	...	3	30	70	100	
2	14AME33	Finite Element Methods	3	1	...	3	30	70	100	
3	14AAT11	New Generation and Hybrid vehicles	3	1	...	3	30	70	100	
4	14AME34	Instrumentation and Control Systems	3	1	...	3	30	70	100	
5	<b>CHOICE BASED CREDIT COURSE (DEPARTMENTAL)</b>		3	1	...	3	30	70	100	
	14AAT12	Transport Management and Automobile Industry								
	14AAT13	Automotive Safety								
	14AAT14	Automotive Engine Components Design								
6	<b>CHOICE BASED CREDIT COURSE (DEPARTMENTAL)</b>		3	1	...	3	30	70	100	
	14AAT15	Automotive Pollution and Emission Control								
	14AAT16	Automotive Air Conditioning								
	14AAT17	Alternative Fuels								
7	14AME43	CAD and Analysis Lab	...	...	4	2	30	70	100	
8	14AME44	Instrumentation and Control Systems and Dynamics of Machinery Lab	...	...	4	2	30	70	100	
			<b>TOTAL</b>	<b>18</b>	<b>6</b>	<b>8</b>	<b>22</b>	<b>240</b>	<b>560</b>	<b>800</b>
9	14AMB02	Professional Ethics (Audit Course)	3	...	...	...	...	...	...	

**IV B.Tech., II Semester**

S. No.	Course Code	Subject	Hours / Week			Credits	Maximum Marks		
			L	T	P		Internal	External	Total
1		<b>MOOCS - I</b>							
	14AAT18	Subject - I	...	...	...	3	30	70	100
	14AAT19	Subject - II							
	14AAT20	Subject - III							
	14AAT21	Subject - IV							
2		<b>MOOCS - II</b>							
	14AAT22	Subject - I							
	14AAT23	Subject - II	...	...	...	3	30	70	100
	14AAT24	Subject - III							
	14AAT25	Subject - IV							
3	14AAT26	Comprehensive Viva Voce	-	-	-	2	-	100	100
4	14AAT27	Project Work	...	...	...	12	60	140	200
		<b>TOTAL</b>	-	-	-	20	<b>120</b>	<b>380</b>	<b>500</b>

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**(AUTONOMOUS)**

**I B.Tech- I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**14AHS01**

**TECHNICAL ENGLISH-I**  
**(Common to CE, ME & AE)**

**Objectives:**

1. To improve the language proficiency of the students in English with an emphasis on LSRW Skills.
2. To strengthen the students to study academic subjects through theoretical and practical components of the syllabus.
3. To comprehend the growing demand for English in the modern world.
4. To enumerate the aims of teaching English in India.

**Outcomes:**

1. The students will learn the language by observing the rules of grammar, vocabulary and composition that are necessary.
2. Students are made to appreciate the intelligent and innovative use of rules in order to be able to generate creative output in tune with the demands of industry and the corporate world.
3. After the course, the students will improve their power of comprehension and the ability to express themselves through listening, reading, speaking and writing.
4. The students will be able to distinguish between formal English and functional English.

**UNIT-I            EMERGING TECHNOLOGIES:**

Solar Thermal Power-Cloud Computing

**UNIT-II            ENVIRONMENTAL CONSCIOUSNESS:**

Climate Change- Green cover-Pollution

**UNIT-III          ENERGY:**

Renewable and Non-Renewable sources-Alternative sources-Conservation-Nuclear Energy

**UNIT-IV          ENGINEERING ETHICS:**

Challenger Disaster-Biotechnology-Genetic Engineering-Protection From Natural Calamities

**UNIT-V            TRAVEL AND TOURSIM:**

Advantages and Disadvantages of Travel -Tourism - Atithi Devo Bhava-Tourism in India.

- **The teacher shall cover the following components which are given as exercises in the prescribed text book while teaching each of the five units listed above.**

**REMEDIAL GRAMMAR:**

1. Articles
2. Prepositions
3. Time & Tense
4. Sentence Construction-Strategies (avoiding Repetition and ambiguity)
5. Sentence Transformation (Degrees, Voice, Speech & synthesis)
6. Common Errors in English

**VOCABULARY:**

1. Roots-Prefixes-Suffixes(RPS Method)
2. Synonyms
3. Antonyms
4. Phrasal Verbs
5. Idioms

6. One-word substitutes

**WRITING PRACTICE (COMPOSITION):**

1. Paragraph-Writing(Descriptive, Narrative, Persuasive, Expository and Creative)
2. Summarizing
3. Note-Making and Note taking
4. Letter-Writing (Formal & Informal)
5. Report writing

**Texts for classroom study:**

(Prescribed Text book: *Mindscapes-English for Technologies and Engineers*, published by Orient Black Swan, 2012)

**Reference Books:**

1. M. Ashraf Rizwi, "**Technical English Communication**", Tata Mc Graw Hill, Latest Edition.
2. V.R. Narayana Swamy, "Strengthen Your Writing", 1<sup>st</sup> edition, Orient longman, 2003.
3. Thomas Elliot Berry. "The Most Common Mistakes in English Usage", 1<sup>st</sup> Edition, Tata McGraw Hill, 2004.
4. Margaret M Maison, "Examine your English", 1<sup>st</sup> edition, Orient Longman, 1999.
5. Basic communication skills for Technology, Andrea J Rutherford, Pearson Education, Asia.
6. Technical communication by MeenakshiRaman Sangeetha Sharma, Oxford
7. Cambridge International of Phrasal Verbs, Cambridge.
8. Essential English Grammar by Martin Hewings, Cambridge
9. Oxford Practice Grammar by John Eastwood , Oxford.
10. English Pronouncing Dictionary by Daniel Jones Oxford.

**Question Paper Pattern:**

From the prescribed text book without leaving any lessons:

1. Three mark questions **4 x 3 = 12M**
2. Ten Mark questions **2 x 10 = 20M**

Based on the Grammar exercises given in the prescribed Text Book.

- |                              |           |
|------------------------------|-----------|
| 3. Reading Comprehension – I | <b>5M</b> |
| 4. Synonyms & Antonyms       | <b>5M</b> |
| 5. Prefixes & Suffixes       | <b>5M</b> |
| 6. Tense Forms               | <b>4M</b> |
| 7. Compound words            | <b>2M</b> |
| 8. Prepositions & Articles   | <b>2M</b> |
| 9. Idioms                    | <b>2M</b> |
| 10. Jumbled Sentences        | <b>5M</b> |
| 11. Letter writing           | <b>8M</b> |

Total

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**70M**

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<b>I B.Tech-I Semester</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**14AHS02**

**ENGINEERING MATHEMATICS – I  
(Common to All Branches)**

**Objectives:**

The objectives of this course are to

1. Model a wide range of engineering and practical problems as ordinary differential equations.
2. Apply fundamental mathematical principles as well as computational techniques to the problems of engineering and scientific practice.
3. Formulate the engineering problems in vectorial form.

**Outcomes:**

After completion of the course the student will be able to

1. Comprehend the areas of application of differential equations.
2. Apply the principles of differential equations, functions of variables separable, integration, Laplace transforms and vector calculus to the engineering and scientific problems.
3. Obtain their solutions using various computational methods.

**UNIT-I**

**DIFFERENTIAL EQUATIONS:** Linear and Bernoulli's Equations – Non - homogenous Linear Differential equation of second and higher order with constant co-efficients. Newton's law of cooling- L-R-C circuits.

**UNIT-II**

**FUNCTIONS OF SEVERAL VARIABLES:** Maxima and Minima for functions of two variables – Lagrange's method of multipliers of 3 variables only.

**Curve Tracing:** Cartesian and polar curves. **Radius of Curvature:** Cartesian and polar curves.

**UNIT-III**

**APPLICATIONS OF INTEGRATION:** Length of an arc and area using line integral.

**Multiple Integrals:** Double and Triple integrals-Change of variables-Change of Order of integration(Cartesian and polar forms). Surface area and Volume of solid of revolution.

**UNIT-IV**

**LAPLACE TRANSFORMS:** Laplace transforms of standard functions - First Shifting Theorem - Transforms of derivatives and integrals- Unit step Function – Second Shifting Theorem – Laplace transforms of Periodic functions – Inverse Laplace transforms - Convolution theorem.

**UNIT-V**

**VECTOR CALCULUS:** Gradient, Divergence, Curl and their properties (without identities).

**Vector Integration:** Line Integrals – Potential functions - Area, Surface and Volume integrals - Green's theorem- Stoke's theorem & Gauss Divergence theorems (without proof) – Problems on Green's, Stoke's and Gauss's Theorem

**Text Books:**

1. B.V.Ramana, A Text book of Engineering Mathematics-I, Tata Mc Grawhill
2. T.K.V.Iyengar, B.Krishna Gandhi and others, A Text book of Engineering Mathematics –I, S.Chand and company.
3. C.Sankaraiah, A Text book of Engineering Mathematics, VGS book links
4. E.Rukmangadachari and Keshava Reddy, A Text book of Engineering Mathematics-I, Pearson Education



**References:**

1. C. Sankaraiah, *A Text book of Engineering Mathematics*, VGS book links
2. Thomson ,*A Text book of Engineering Mathematics*, Book Collection
3. N.Bail, M.Goyal & C.Walking, *A Text book of Advanced Engineering Mathematics-A computer approach*

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**I B.Tech - I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**14AHS03**

**ENGINEERING CHEMISTRY**  
**(Common to CE, ME & AE)**

**Objectives:**

1. To study the effect of hard water and its treatment for various purposes, corrosion and control of metallic materials,
2. To study the engineering materials such as high polymers namely plastics, rubbers and their preparation, properties and applications along with lubricants, refractories & cement with its applications.
3. To study the calorific value of fuels, combustion of fuels, working of batteries, recharging of batteries, application of different fuel cells.

**Outcomes:**

After completion of the course students will be able to understand

1. The impact of hard water and its removal, formation of corrosion, effect of corrosion and designing of corrosion resistance articles.
2. Selection of suitable engineering materials for specific applications.
3. Selection of suitable fuels, calculation of air requirements for combustion of fuel, applications of different batteries and fuel cells.

**UNIT – I: WATER TECHNOLOGY**

Hardness of Water and its unit of expression – Estimation of hardness in water by EDTA titration method – Numerical problems – Effect of different water impurities (Hardness, Dissolved Oxygen and Chlorides) on boiler troubles – Water softening methods – zeolite process – Ion Exchange process – Demineralization of Brakish Water – Electrodialysis and Reverse Osmosis.

**UNIT – II: CHEMISTRY OF CORROSION**

Dry and Wet corrosion – causes of corrosion – mechanism of corrosion – Galvanic series – Galvanic and Concentration cell corrosion – Factors influencing the corrosion – Control of corrosion – Cathodic protection – Sacrificial anodic and Impressed current cathodic protection – Electro Plating and Electroless plating (Copper and Nickel).

**UNIT – III: MATERIALS CHEMISTRY**

**Organic (High Polymers & Lubricants)**

**Plastics:** Thermosetting and thermoplastics – Engineering applications and properties of PE, PTFE, PVC, Nylon and Bakelite.

**Rubbers:** Processing of Natural Rubbers – Vulcanization – Compounding of Rubber – Synthetic Rubber – Buna S, Buna N, Silicone rubber properties and applications.

**Lubricants:** Definition – Function of Lubricants – Classification of Lubricants – Properties of Lubricants (Viscosity Index – Flash and Fire point – Cloud and Pour point – Aniline point – Neutralization number – Mechanical strength).

**Inorganic (Refractories & Cement)**

**Refractories:** Definition – Classification – Important properties of refractories (Refractoriness, RUL, Thermal stability, Porosity, Dimensional stability and Mechanical strength).

**Cement:** Definition – Composition – Classification of cements – Setting and Hardening of cement.

**UNIT – IV: FUELS AND COMBUSTION**

**Fuels:** Classification of Solid, Liquid and Gaseous fuels – Calorific value – HCV, LCV. Measurement of calorific value using Bomb calorimeter and Junkers gas calorimeter – Numerical problems – Fuel rating system – Octane and Cetane numbers and their influence on I.C. Engines.

**Combustion:** Combustion products and calculation of air requirement (numerical problems) – Flue gas analysis by Orsat's apparatus.

**UNIT – V: ELECTROCHEMICAL CELLS**

Electrochemical Cells – Standard electrode potential – Working principles and applications of different batteries – Dry cell, Lithium-ion cell, Lead-acid cell and Nickel-cadmium cell. Recharging of Batteries – Battery rating (A-h rating) – Working principles and applications of hydrogen-oxygen and methanol-oxygen fuel cells – Principle of solar cells.

**Text Books:**

1. Chemistry for Engineers by Prof. K.N.Jayaveera, Dr.G.V.Subba Reddy and Dr.C. Ramachandraiah, McGraw Hill Higher Education Hyd., 3<sup>rd</sup> edition, 2009.
2. A text book of Engineering Chemistry by S.S. Dara and S.S. Umare: S. Chand & Co. Ltd., 12<sup>th</sup> edition, 2010.
3. A text book of Engineering Chemistry by Jain & Jain: Dhanpat Rai Publishing Company, 15<sup>th</sup> edition, New Delhi, 2008.

**Reference Books:**

1. Engineering Chemistry by Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra: ScitechPublications(India) Pvt. Limited, Hyderabad, 2009.
2. Chemistry of Engineering Materials by C.V. Agarwal, C. Parameswara Murthy and Andra Naidu: BS Publications, Hyderabad, 9<sup>th</sup> edition, 2006.

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**I.B.Tech-I Semester**

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**2 0 4 4**

**14AME01**

**ENGINEERING DRAWING**  
**(Common to CE, ME & AE Branches)**  
**(First Angle Projection)**

**Objectives:**

*To understand*

1. *The importance of Engineering Drawing and get enhanced imagination capacity.*
2. *The Use of Engineering Drawing instruments and improve free hand Lettering.*
3. *The principles of orthographic projections and Preparation of pictorial drawings.*

**Out-Comes:**

*After completion of this course, the student will be able to:*

1. *Prepare pictorial drawings as per the standards.*
2. *Communicate his/her ideas effectively by using orthographic projections.*
3. *Prepare the development of surfaces of engineering objects.*

**Introduction**

*Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Geometrical constructions – construction of polygons – drawing tangents – dividing a line into number of equal divisions.*

**Unit-I**

*Principles of projection – both first and third angle – Projections of points – Projections of straight lines- lines inclined to both the principal planes, determination of true length and true inclinations.*

**Unit-II**

*Projections of planes – inclined to both the principal planes.*

*Projection of regular solids – prisms, Pyramids, cylinders, tetrahedron and cones – axis inclined to one plane.*

**Unit-III**

*Sections of solids such as prisms, pyramids, cylinders, tetrahedron and cones (solids in simple position) – True shape of the section.*

**Unit-IV**

*Principles of isometric projection – isometric scale – isometric projection of planes and solids – conversion of orthographic views into isometric views and vice- versa.*

**Unit-V**

*Development of surfaces of simple solids such as prisms, pyramids, cylinders, tetrahedron, cones and part solids.*

**Text Books:**

1. *Narayana K L and Kannaiah P, Engineering Drawing, Scitech Publications, Chennai 2012.*
2. *Bhatt N D and Panchal V M, Engineering Drawing, Revised Edition, Charotar Publications, 2010.*

**REFERENCES:**

1. *Engineering Drawing, Johle, Tata McGraw-Hill, 2008.*
2. *Engineering Drawing, Shah and Rana, 2/e, Pearson Education, 2005.*

**FINAL EXAMINATION QUESTION PAPER PATTERN**

**(External Evaluation & Paper setting)**

**Paper Setting:**

1. *Two questions to be set from each unit in either or choice (All Questions carries equal marks)*
2. *Student has to answer all questions.*

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**I-B.Tech, I-Semester.**

**L T P C  
3 1 0 3**

**14ACE02**

**ENGINEERING MECHANICS-I  
(Common to ME & AE)**

**Objectives:**

1. To learn about forces and force systems and their applications.
2. To learn about friction and to use the concept to analyze power transmission in belt drives.
3. To learn how to find centroid and Moments of Inertia of different objects using mathematical formula.

**Outcome:**

Student will be able to

1. To construct free body diagrams and develop appropriate equilibrium equations.
2. To understand the concepts of friction and to apply in real life problems.
3. To determine the centroid and Moment of Inertia for composite sections.

**UNIT – I Basic Concepts of Engineering Mechanics**

**Basics:** Fundamental Principles - Resolution and Composition of forces and equilibrium of particles - Principle of transmissibility - Free body diagram - Equilibrium of rigid bodies.

**Forces and Force Systems:** Types of force systems – Resultant of coplanar, concurrent and non concurrent force systems – Concept of moment – Varignon’s theorem.

**Equilibrium of Systems of Forces:** Equilibrium concept in mechanics – Free body diagram - Equilibrium of coplanar force systems – Types of members and supports – Support reactions.

**UNIT – II**

**Friction:** Introduction to friction - Classification of friction- Laws of Friction – Limiting Friction – Cone of limiting friction – Angle of friction – Coefficient of friction - Motion of Bodies – Wedge, Screw-jack and differential Screw-jack.

**UNIT- III**

**Power transmission by Belts and Ropes:** Introduction – Types of belt drives – Velocity ratios – Length of belt drive – Power transmitted by belt drive – Advantages and disadvantages of belt drive- Rope drive – Stepped pulley drive.

**UNIT - IV**

**Centroid and Centre of Gravity:** Introduction to centre of gravity and centroid – Centroids of simple figures – Centroids of composite figures- Centre of gravity of solid bodies – Theorems of Pappus and Guldinus

**UNIT – V**

**Area and Mass moments of Inertia:** Definition – Parallel axis and perpendicular theorems - Polar Moment of Inertia-Radius of gyration - Moments of Inertia of Basic Shapes, Composite Section and simple solids, Mass moment of inertia of composite bodies. (Simple problems only)

**TEXT BOOKS :**

1. Engineering Mechanics, by Bhavikatti and Rajasekharappa, New Age Intl. Publications, New Delhi.
2. A text book of Engineering Mechanics, by R.K. Bansal, Laxmi Publications, New Delhi.
3. Engineering Mechanics (Statics and Dynamics) by A Nelson-Tata McGraw Hill Education Private Limited, New Delhi.

**REFERENCE BOOKS:**

1. Engineering Mechanics, Strength of Materials and Elements of Structural Analysis by C.Venkatramaiah & A.V.Narasimha Rao-CBS Publishers & Distributors, New Delhi.
2. Engineering Mechanics by Timoshenko & Young
3. A Text Book of Engineering Mechanics by R.S.Khurmi-S.Chand & Company Limited, New Delhi.
4. Engineering Mechanics by Irving H. Shames – Prentice – Hall, New Delhi.
5. Engineering Mechanics by Ferdinand L. Singer Published by Row Publishers, New Yor

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**I B.Tech- I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**14AHS07**

**TECHNICAL ENGLISH LAB-I**  
**(Common to CE, ME & AE)**

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:**

1. To train students to use language effectively in everyday conversations and to participate in group discussions to help them face interviews, and sharpen public speaking skills.
2. To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning.
3. To enable them to learn better pronunciation following the principles of stress, intonation and rhythm.
4. 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 as GRE, TOEFL, GMAT etc.

**Outcomes:**

1. The students will be able to recognize English sounds- Monophthongs, diphthongs and consonant sounds.
2. The students will appreciate and use correct pronunciation in English.
3. The pupils will distinguish between Received Pronunciation and Indian variety.
4. The lab course will make the students use English with correct stress and intonation patterns because English is a rhythmic language.

**SYLLABUS:**

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

**UNIT-I**      *Organs of speech, speech mechanism, vowels, consonants, diphthongs, syllable division, word stress, intonation, phonetic transcription with support of speech solutions, dictionary practice with AHD & CALD software.*

**UNIT-II**      *Speaking of past, present & Future, Role play-Graded exercise with support of exercises from English Mastery, TOEFL Mastery & CALD Software.*

**UNIT-III**      **FUNCTIONAL ENGLISH-I**  
*Situational conversation-Grader exercises with support of Rosetta Stone Software*

**UNIT-IV**      **FUNCTIONAL ENGLISH-II**  
*Situational conversation-Grader exercises with support of Rosetta Stone Software*

- Greeting/Self-introduction
- Expressing the cause of something
- Describe a current situation
- Speaking traditions/customs/public issues
- Making plans for vacation
- Expressing of emotions
- Shopping –bargaining price and making purchases
- Making an appointment
- Naming foods and describing tastes
- Reporting other person's messages

- *Requesting*
- *Asking for directions and describing*
- *Making suggestions, agreements and refusals*

**UNIT-V      GROUP DISCUSSIONS:**

*Do's and Don'ts of a G.D, Speaking on Knowledge based, controversial or abstract topics.*

**Reference Books:**

- 1.** *English Language lab manual prepared by the Department of English*
- 2.** *A Text Book of English Phonetics for Indian students by T. Balasubramaniam, Macmillan Ltd., 2000.*
- 3.** *Sasikumar.V and P.V. Dhamija,. Spoken English: A Self-Learning Guide to Conversation Practice. 34<sup>th</sup> Reprint. Tata MCGraw Hill. New Delhi,1993.*
- 4.** *English Pronouncing Dictionary, Daniel Jones Current Edition with CD.*
- 5.** *Spoken English, R.K. Bansal and J.B. Harrison, Orient Longman 2006 Edn.*
- 6.** *Speaking English Effectively, Krishna Mohan & NP Singh (Macmillan)*
- 7.** *A Practical course in English Pronunciation, (with two Audio cassettes) by J. Sethi, Kamlesh Sadan and & D.V. Jindal, Prentice- Hall of India Pvt.Ltd., New Delhi.*
- 8.** *English Dictionary For Advanced Learners, (with CD ) international edn. Macmillan 2009.*
- 9.** *A Handbook for English Language Laboratories, E. Suresh Kumar, P. Sreehari, Foundation Books, 2009.*
- 10.** *Delta's Key to the Next Generation TOEFL Test, 6 audio CDs, New Age International Publishers, 2007.*



**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY, CHITTOOR**  
**(AUTONOMOUS)**

**I B.Tech- I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**14AHS08**

**ENGINEERING CHEMISTRY LAB**

**(Common to CE, ME & AE)**

**Objectives:**

To make the student understand the

1. Process of estimation of metal ions like Iron, Copper and Calcium by titrimetry; Evaluation of impurities like dissolved oxygen, oxidizable substances in water,
2. Process of determination of acidity and alkalinity of water sample, determination of lubricant properties like viscosity Index, Flash and Fire points,
3. Construction of simple phase diagram, determination of acid strength by conductometry and potentiometry.

**Outcomes:**

After completion of practical's student will be able to

1. use volumetric analysis for the estimation of metal ions, hardness of water, dissolve oxygen in water, chlorides in water, oxygen demand for water, alkalinity and acidity of water,
2. the importance of viscosity index, flash point and fire point of lubricants,
3. evaluation of eutectic temperature of binary system, the use of conductometer and potentiometer.

Any **TEN** of the following experiments

1. Estimation of Hardness of water by EDTA method.
2. Estimation of Dissolved Oxygen in Water.
3. Estimation of Chlorides in Water sample.
4. Determination of Chemical Oxygen Demand.
5. Determination of Acidity of Water sample.
6. Determination of Alkalinity of Water sample.
7. Estimation of Copper by EDTA method.
8. Estimation of Ferrous Ion by Potassium Dichromate method.
9. Determination of Flash and Fire point by using Pensky Marten's apparatus.
10. Determination of viscosity of oils through Redwood viscometer No.1.
11. Determination of viscosity of oils through Redwood viscometer No.2.
12. Determination of Eutectic temperature of Binary system (Urea-Benzoic acid).
13. Acid- Base titration by Conductometric method.
14. Redox titrations by Potentiometry.
15. Titration of Strong acid vs Strong base by Potentiometry.

**Text Books:**

1. Chemistry Pre-lab manual by Dr K. N. Jayaveera and K.B. Chandra Sekhar, S.M. Enterprises Ltd., 2007.
2. Vogel's Textbook of Quantitative Inorganic Analysis, ELBS Edition, 1994.

**Equipment Required:**

1. Glassware: Burettes, Pipettes, Standard Flasks, Beakers, Measuring jars, BOD bottles and Reagent bottles.
2. Analytical balance,
3. Reflux Condensers,
4. Pensky Marten's apparatus,
5. Redwood viscometer,

6. *Bomb calorimeter,*
7. *Conductometer, Potentiometer.*

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY, CHITTOOR**  
**(AUTONOMOUS)**

**I B.Tech- I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**14AME02**

**COMPUTER AIDED DRAFTING LAB**  
**(Common to ME & AE Branches)**

**Objectives:**

1. To understand the computer aided drafting software's such as Auto CAD and solid works.
2. Use of various commands like mirror, rotate etc. and draw simple mechanical components with dimensioning and hatching.
3. To draw 3D images applying material properties.

**Outcomes:**

After completion of the study of this lab a student will be able to:

1. Use Auto CAD screen, solid works software tool bars and menus, draw & modifying tools.
2. Draw the 2D & 3D simple mechanical components with dimensioning and hatching.
3. Draw the parts such as springs, Automobile wheel etc. applying material properties.

**LIST OF EXPERMENTS:**

**AUTO CAD:**

**COURSE CONTENTS**

1. Introduction to Auto cad screen, various toolbars and menus.
2. Exercise on usage of Draw and modify tool bar.
3. Exercise on mirror, rotate, Array and Move commands.
4. Exercise on Dimensioning and Hatching.
5. Render the 3D images already generated and apply materials and Lights.
6. Part drawing of simple components

**SOLIDWORKS:**

1. Introduction to solid works, save, exit, basic commands-draw, modify & translators etc.
2. 2D Sketcher practicing general components
3. Part Design
  - i) Draw the 3D Model of Camera Body.
  - ii) Draw the 3D Model of Helical Spring.
  - iii) Draw the 3D Model of Automobile Wheel.
- IV) Draw 3D Model of Three Layer Rope.

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY, CHITTOOR**  
**(AUTONOMOUS)**

**I B.Tech - II Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**14AHS04**

**ENGINEERING PHYSICS**  
**(Common to CE, ME & AE)**

**Objectives:**

1. To introduce basic physics concepts relevant to different branches of Engineering and Technology
2. To prepare graduates in understanding the basic principles of Modern Optics, Solid State Physics and their possible applications.
3. They shall also understand the role of the physics in the development of newer innovations and technologies

**Outcomes**

1. Graduates will be able to apply the knowledge of Physics in the field of Communications, Electrodynamics, Solid State Physics and Optics.
2. The acquaintance of basic physics principles would help the engineers to develop or understand the working of different tools and devices
3. It equips the students with the fundamental knowledge of physics together with the problem solving skills and understanding.

**UNIT I**

**OPTICS:** Interference- Interference in thin films by reflection – Newton Rings. Diffraction- Fraunhofer diffraction due to single slit-Diffraction Grating.

**MODERN OPTICS**

Introduction to lasers – Characteristics of lasers – Spontaneous and stimulated emission of radiation – Einstein's coefficients – population inversion – Ruby laser – He-Ne laser Applications of laser. Introduction to fiber optics – Principle of optical fiber – Acceptance angle and acceptance cone – Numerical aperture – Classification of Optical Fibers- Attenuation in optical fibers – Optical fiber communication system- Applications of optical fibers.

**UNIT II**

**CRYSTAL STRUCTURES AND X-RAY DIFFRACTION:** Introduction – Space lattice – Basis – Unit cell – Lattice parameter – Crystal systems – Bravais lattices – Structure and packing fractions of Simple cubic, body centered cubic, face centered cubic crystals-Directions and planes in crystals – Miller Indices – Separation between successive  $[h k l]$  planes – Bragg's law-X-Ray Diffraction by Powder method

**ULTRASONICS** Introduction – Production of ultrasonics by piezoelectric method – Properties and detection of Ultrasonic waves – Applications in non-destructive testing.

**UNIT III**

**PRINCIPLES OF QUANTUM MECHANICS:** Wave and particles – de Broglie hypotheses – Matter waves – Schrödinger time independent wave equation – Physical significance of wave function – Particle in one dimensional box

**FREE ELECTRON THEORY:** Classical free electron theory – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution –Kronig-Penny model (qualitative)

#### **UNIT IV**

**DIELECTRIC PROPERTIES:** Introduction – Dielectric constant – Electronic, Ionic and Oriental polarizations (qualitative) – Local Field- Clausius-Mossotti equation – Piezoelectricity - Ferroelectricity.

#### **MAGNETIC PROPERTIES**

Introduction – magnetic moment – Classification of magnetic materials – Hysteresis curve – Hard and Soft Magnetic Materials-Applications.

#### **UNIT V**

**SEMICONDUCTORS:** Introduction – Intrinsic and extrinsic Semiconductors–Fermi level–Equation of conductivity – Drift and diffusion – Einstein's equation – Hall Effect.

**SUPERCONDUCTORS:** General properties of superconductors – Meissner effect – Penetration depth – Type I and Type II superconductors – Flux quantization – Josephson effect – Application of superconductors.

**NANOMATERIALS:** Introduction– Basic principles of nanomaterials – Growth of nanomaterials: Sol-Gel method–Chemical vapor deposition–Properties of nanomaterials–Carbon Nano Tubes -Application of carbon nano tubes and nanomaterials.

#### **Text Books:**

1. Avadhanulu and Kshirasagar A Text book of Engineering Physics, Revised Edition, S.Chand, New Delhi 2014
2. Gaur and Gupta:Engineering Physics, New Delhi, DhanpatRai Publishers, 2010
3. K. Thyagarajan: Engineering Physics,Delhi, Tata Mcgraw Hill Publishers, 2013.

#### **Reference Books:**

1. Pillai.S.O: Solid State Physics, 6<sup>th</sup>edition,New Delhi:New Age International, 2005.
2. Chattopadhyay, K.K; Banerjee,A.N: Introduction to Nano Science and Technology,New Delhi: PHI,2009 .
3. Resnick, Halliday and Walker: Fundamentals of Physics, 9<sup>th</sup> Edition, New Delhi: Wiley Publishers, 2010.

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY, CHITTOOR  
(AUTONOMOUS)**

**I-B.Tech – II Semester**

**L T P C**

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**14AHS05**

**ENVIRONMENTAL SCIENCE  
(Common to CE, ME & AE)**

**Objectives:**

1. To study about conservation of natural resources, environmental monitoring & remediation, Industrial waste management and public health.
2. To develop analytical skills, critical thinking & demonstrate problem solving skills using scientific and engineering techniques.
3. To motivate the students to participate in environment protection and make man free from all sorts of environmental problems.

**Outcomes:**

After completion of the course the student will be able to

1. develop critical thinking (or) observation skills and apply them in the analysis of a problem (or) question related to the environment.
2. analyze and interpret the complex relationships between natural and human systems.
3. analyze and interpret the fundamental physical, chemical and biological principles that govern natural process.

**UNIT-I**

**ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT:** Definition, Scope and Importance of Environmental Science, Need for Public Awareness, Components of Environment (Atmosphere, Hydrosphere, Lithosphere and Biosphere) Renewable and non-renewable Natural resources and associated problems: **Forest resources:** Use and over-exploitation, deforestation, case studies – Timber extraction, Mining, Dams and other effects on forest and tribal people. **Water resources:** Use and over utilization of surface and ground water, Floods, Drought, conflicts over water, dams-benefits and problems. **Food resources:** Sources of food, impacts of overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. **Energy resources:** Renewable and Non-renewable energy resources

**UNIT-II**

**ECOSYSTEMS:** Concept of an ecosystem, Structure and function of an ecosystem (Producers, Consumers and decomposers) – Energy flow in the ecosystem – Food chains, food webs and ecological pyramids – Ecological Succession.

**TYPES OF ECOSYSTEMS:**

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

**UNIT-III**

**BIODIVERSITY AND ITS CONSERVATION:** Introduction, Definition, Types of biodiversity (genetic, species and ecosystem diversity)- Bio-geographical classification of India, Values of biodiversity(Consumptive use, Productive use, Social use, Ethical use, Aesthetic and Option values)-

*India as a mega diversity nation-Hot spots of India-Threats to biodiversity(habitat loss, Poaching of wildlife, man-wildlife conflicts)-Endangered and endemic species of India-Conservation of biodiversity(In-situ and Ex-situ conservation of biodiversity).*

#### **UNIT-IV**

**ENVIRONMENTAL POLLUTION AND ACT'S:** Definition, causes, effects and control measures of:

a. Air Pollution b. Water Pollution c. Soil Pollution d. Noise Pollution e. Thermal Pollution f. nuclear hazards.

**Solid Waste Management:** Causes, effects and control measures of urban and industrial wastes.

**ACT'S:** Environment Protection Act-Air (Prevention and Control of Pollution) Act-Water (Prevention and control of Pollution) Act-Wildlife Protection Act-Forest Conservation Act-

**Disaster management:** Floods, Earthquake, Cyclone and Landslides.

#### **UNIT-V**

**SOCIAL ISSUES AND THE ENVIRONMENT:** From unsustainable to sustainable development, Water conservation(rainwater harvesting, watershed management)-Resettlement and rehabilitation of people its problems and concerns, Environmental ethics, Global warming, Acid rain, Ozone layer depletion-Population growth, variation among nation, Population explosion-Family Welfare Programme-Environment and human health-Human Rights-Value Education-HIV/AIDS-Women and Child Welfare Programmes-Role of Information Technology in Environment and human health.

**Field Work:** Visit to local polluted site-Urban/Industrial.

#### **Text Books:**

1. Erach Bharucha, Textbook of Environmental Studies for Undergraduate courses by from UGC.
2. Dr.Raghavan Nambiar.K, Text Book of Environmental Studies,Sitech publications,2010.
3. Benny Joseph, Environmental Studies by Mc.GrawHill Publications, 2010.

#### **References:**

1. Dr. Suresh.K.Dhameja, Environmental Studies, S.K. Kataria & Sons Publishers, 2012.
2. Sharma. J.P., Comprehensive Environmental Studies, Laxmi Publications, 2010.

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY, CHITTOOR**  
**(AUTONOMOUS)**

**I B.Tech – II Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**14AHS06**

**ENGINEERING MATHEMATICS-II**  
**(Common to All Branches)**

**Objectives:**

The objectives of this course are to

1. conceptualize the basics and applications of matrices, interpolation, partial differential equations and transforms.
2. model a wide range of engineering and practical problems into any of the above suitable forms.
3. apply fundamental mathematical principles as well as computational techniques to the problems of engineering and scientific practice.

**Outcomes:**

After completion of the course the student will be able to

1. comprehend the areas of application of matrices, interpolation, partial differential equations and transforms.
2. apply the principles of matrices, curve fitting, partial differential equations, transforms etc. to the engineering and scientific problems.
3. obtain their solutions using various computational methods.

**UNIT-I**

**MATRICES:** Rank of a matrix-Echelon form, Normal form -solution of linear system of homogeneous and non-homogeneous equations -Gauss elimination method.

Eigen values and Eigen vectors - Cayley-Hamilton theorem - Linear Transformations - Orthogonal transformations -Diagonalization of a matrix. Quadratic forms- Reduction of Quadratic form to Canonical form and their nature.

**UNIT-II**

**SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS:** Introduction - The Bisection method - The method of false position - Newton - Raphson method.

**Curve Fitting:** Fitting a straight line - Second degree curve- Exponential curve - Power curve by method of least squares.

**Interpolation:** Forward Differences - backward differences-Newton's forward and backward differences formulae for interpolation - Lagrange's interpolation formula - Inverse interpolation .



### **UNIT-III**

Numerical differentiation-First and second order derivatives- . Numerical integration-Trapezoidal rule - Simpson's 1/3 rule - Numerical solutions of ordinary differential equations by Taylor's series-Picard's method of successive Approximations - Euler's Method – Runge-Kutta Methods – Predictor - corrector method - Milne's method

### **UNIT-IV**

**FOURIER SERIES:** Fourier series- Even and odd functions-Fourier series in an arbitrary interval - - Half-range Fourier sine and cosine expansions. Fourier integral theorem (statement) -Fourier sine and cosine integrals. Fourier Transforms - Fourier sine and cosine Transforms.

### **UNIT-V**

**PARTIAL DIFFERENTIAL EQUATIONS:** Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Method of separation of variables - solution of one dimensional wave equation, heat equation and two – dimensional Laplace's equation.

**Z-TRANSFORMS:** Inverse Z- transforms – Properties - Damping rule- Shifting rule - Initial and final value theorems. Convolution theorem - Solution of difference equations by Z- transforms.

### **Text Books:**

1. Iyengar T.K.V., Krishna Gandhi.B and others, *Mathematical Methods*, New Delhi, S.Chand & company,2012.
2. Sankar rao G.,Kesav Reddy.E, *Mathematical Methods*, International publishing house,Pvt.ltd
3. Sastry .S.S., *Introduction to Numerical analysis*.New Delhi,Prentice Hall of India,2003
4. Dr..Grewal .B.S, *Higher Engineering Mathematics*,New Delhi,Khanna Publishers,2004

### **References:**

1. Erwin Kreyszig ,*Advanced Engineering Mathematics*. John Wiley & Sons.
2. Jain.M.K, IyengarT.K.V,,Jain.R.K. *Numerical Methods for Scientific and Engineering Computation*. Newage International publishers.
3. Pal, *Mathematical Methods* ,Oxford University Press,2009.
4. Ranganatham.S,Prasad M.S.S.N.,Ramesh Babu.V, *Numerical Analysis*, S.Chand & company
5. Sankaraiah .C, *Mathematical Methods*, Vijayawada,V.G.S Book links,2007.

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**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY, CHITTOOR  
(AUTONOMOUS)**

**I B. Tech –II Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>2</b>	<b>-</b>	<b>4</b>

**14ACS02**

**PROGRAMMING IN C AND DATASTRUCTURES  
(Common to CE,ME & AE )**

**Course Objectives:**

The objective of this course is to:

1. Enable the students to understand problem solving techniques.
2. Understand the syntax and semantics of C programming language and other features of the language.
3. Design and develop algorithms and flowcharts for solving a problem.
4. Be familiar with the importance of basic data structures, searching and sorting techniques.

**Course Outcomes:**

Upon completion of this course, students will be able to:

1. Apply problem solving techniques in designing the solutions for a wide-range of problems.
2. Understand the basic concepts of pointers and structures.
3. Demonstrate the techniques for implementing applications using C programming.
4. Choose appropriate data structure and control statements depending on the problem to be solved.

**UNIT – I**

**Introduction to Computer Problem Solving, Algorithm/ Pseudo code, Flowchart and C Fundamentals**

**Introduction to Computer problem solving:** What is computer, Block diagram of Computer, Hardware Vs Software, Types of Programming Languages, The Problem Solving aspect, Top Down design, Implementation of algorithms.

**Algorithm, Flowchart:** Fundamental algorithms- Exchanging the values of two variables, Factorial computation, Sign function computation, Reversing the digits of an integer, Generating prime numbers.

**C Fundamentals :** Structure of a C program, A simple C program, C character set, Identifiers and keywords, Data types, Constants, Variables, Operators- Classification of operators, Expressions- Precedence and Associativity, Evaluation of expressions, Standard library functions, Statements - Input-Output statements (getchar, putchar, scanf, printf, gets and puts), Conditional statements (if, if-else, nested if, else-if ladder), Iterative Statements (for, while, do-while), Switch, Break, Continue, Goto statements with Simple C Programs , Compiling, Running and Debugging a C program.

**UNIT – II**

**Functions, Arrays, and Strings**

**Functions:** Defining a function, Accessing a function, Function prototypes, Passing arguments to a function, Parameter passing mechanisms - Call-by-value, Call-by-reference, Recursion, Storage classes (auto, static, register, extern), Macros.

**Arrays:** Declaration and Definition of an array, Processing an Array, Passing arrays to functions, Two-dimensional and Multi-dimensional arrays, Array techniques- Finding the  $k^{\text{th}}$  largest and Smallest element, Array order reversal, Removal of duplicates from an ordered array.

**Strings:** Defining and Initialization of Strings, NULL character, Reading and Writing a string , Processing the string , String handling functions, Character arithmetic.

### **UNIT – III**

#### **Pointers, Structures and Unions**

**Pointers:** Fundamentals, Pointer declarations, Passing pointer to a function, Pointers and One-dimensional array, Dynamic memory allocation, Operations on pointers, Arrays of pointers, Passing functions to other functions, More about pointer declarations.

**Structures and Unions:** Declaration, Definition and Initialization of structures, Accessing structures, User-defined data type (typedef), Nested structures, Structures and pointers, Passing structures to functions, Unions, Enumerated Data type (enum), Bit-fields.

### **UNIT – IV**

#### **Searching & Sorting, Files**

**Searching & Sorting:** Linear and Binary search methods, Bubble sort, Selection sort, Insertion sort, Quick sort.

**Files:** Significance of files, Opening and Closing a data file, Reading and Writing a data file, Processing a data file, Unformatted data files, Concept of binary files, File handling functions, Additional features – Command line parameters, Preprocessor directives.

### **UNIT – V**

#### **Data Structures**

**Data Structures:** Introduction to Data structures, Linear and Non-Linear data structures, Data abstraction, Stacks, Stacks using dynamic arrays, Queues, Circular queues using dynamic arrays, Evaluation of expressions using Stacks - Evaluating postfix expressions, Infix to Postfix conversion, Linked List - Singly linked list and chains, Representing chains in C, Doubly linked list and Circular linked list.

### **TEXT BOOKS**

1. R.G. Dromey, "How to Solve it by Computer", Low Price Edition, Pearson Education India, 2008.
2. Behrouz A. Forouzan, Richard F. Gilberg, "C Programming & Data Structures", India Edition, Course Technology, 2010.

### **REFERENCES**

1. *D.A.Godse, A.P.Godse, "C Programming and Data Structures", First Edition, Technical Publications, 2007.*
2. *Hanly, "Programming In C and Data Structures (For Jntu)", First Impression, Pearson Education India, 2009.*
3. *E Balagurusamy, "C PROG & DATA STRUCTURES-JNTU", Fourth Edition, Tata McGraw-Hill Education, 2009.*
4. *Yashavant P Kanetkar, "Let Us C (Computer science series)", 12<sup>th</sup> Edition, BPB Publications, 2010.*

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY, CHITTOOR  
(AUTONOMOUS)**

**I-B.Tech, II-Semester**

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3 1 0 3**

**14ACE05**

**ENGINEERING MECHANICS-II**

**(Common to ME and AE)**

**Objectives:**

1. To learn about rectilinear and curvilinear motions of bodies
2. To learn about the motion of connected bodies.
3. To learn about Mechanical Vibrations.
4. To know about simple stresses and strains and analysis of frames.

**Outcome:**

1. To understand the dynamic analysis of rigid body motion
2. To understand the work energy relations.
3. To analyze the oscillating motions assuming Simple Harmonic motion.
4. To understand about basic relationship between elastic constants.
5. To analyze the simple frames by using different methods.

**UNIT – I**

**Kinematics:** Introduction to Dynamics - Rectilinear and Curvilinear motion – Displacement, Velocity and Acceleration – Motion of a Rigid Body – Types of their Analysis in Planar Motion.

**UNIT – II**

**Kinetics:** Bodies in rectilinear translation – Curvilinear translation – Bodies rotating about fixed axis – D’Alemberts Principle - Principle of work energy – Principle of impulse and momentum.

**UNIT – III**

**Mechanical Vibrations:** Definitions - Concepts – Simple Harmonic motion – Free vibrations - Simple, Compound and Torsional pendulums – Simple Numerical Problems.

**UNIT – IV**

**Simple Stresses and Strains:** Introduction – Elasticity – Stress – Strain - Types of stresses and strains – Elastic limit – Hooke’s law – Young’s Modulus –Lateral Strain, Poisson’s ratio and Volumetric Strain-Relationship between Elastic constants , Deformation of bodies – Principle of superposition – Stresses in bars of varying section - Stresses in composite bars.

**UNIT – V**

**Analysis of Simple Pin Jointed Frames(Trusses):** Definition – Perfect, Deficient and Redundant frames – Methods of Analysis - Analysis of simple trusses by method of joints and method of sections.

**TEXT BOOKS :**

1. Engineering Mechanics, by Bhavikatti and Rajasekharappa, New Age Intl. Publications, New Delhi.
2. A text book of Engineering Mechanics, by R.K. Bansal, Laxmi Publications, New Delhi.
3. Engineering Mechanics (Statics and Dynamics)by A Nelson-Tata McGraw Hill Education Private Limited, New Delhi.

**REFERENCE BOOKS:**

1. Engineering Mechanics, Strength of Materials and Elements of Structural Analysis by C.Venkatramaiah & A.V.Narasimha Rao-CBS Publishers & Distributors, New Delhi.
2. Engineering Mechanics by Timoshenko & Young
3. A Text Book of Engineering Mechanics by R.S.Khurmi-S.Chand & Company Limited, New Delhi.
4. Engineering Mechanics by Irving H. Shames – Prentice – Hall, New Delhi.
5. Engineering Mechanics by Ferdinand L. Singer Published by Row Publishers, New York.

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY, CHITTOOR**  
**(AUTONOMOUS)**

**I B.Tech – II Semester**

**L T P C**  
**0 0 3 2**

**14AHS09**

**ENGINEERING PHYSICS LAB**  
**(Common to CE, ME & AE)**

**Objectives:**

1. To educate students about the basics of instrumentation, measurement, interpretation, and analysis.
2. To promote equipment/machinery handling skills and also to train the students with proper laboratory discipline.
3. To teach the behaviour of magnetic, semiconductor and optical materials/instruments and explain its properties and applications.

**Outcomes:**

1. They shall able to obtain and analyze scientific data from different physics laboratory instruments.
2. They shall develop their manipulative, observational and reporting skills.
3. The student will be able to understand many modern devices and technologies based on optics, electrostatics, semiconductors, lasers and optical fibers.

**ENGINEERING PHYSICSLAB:**

*A minimum of 10 experiments to be conducted during the academic year*

1. Determine the wavelengths of given light source - Spectrometer.
2. Dispersive power of prism
3. Determine the wavelength of given laser source – Diffraction grating.
4. Determine the particle size by using laser source
5. Determine the thickness of thin wire by Interference.
6. Determine the radius of curvature of given plano convex lens by forming Newton 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. Bending losses in Optical Fiber.
10. Determine the wavelength of Laser source by using optical fiber.
11. Determination of Hall Coefficient and Carrier concentration in the given Semiconductor.
12. Determine the energy loss of ferromagnetic sample by plotting B-H curve
13. Energy gap of a given semiconductor.
14. Determine the Dielectric constant of Barium Titanate.

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY, CHITTOOR  
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**I B. Tech –II Semester**

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**C AND DATASTRUCTURES LAB  
(Common to CE,ME & AE)**

**14ACS04**

**Lab Objectives:**

The main objective of conducting this lab is to enable the students to:

1. Understand the various concepts of C language such as branching, loops, functions, input/output, arithmetic rules, arrays, pointers and files.
2. Apply the syntaxes of control and loop statements.
3. Solve problems of repetitive nature using loop structures.
4. Distinguish user-defined data types like structures and unions.

**Lab Outcomes:**

After performing this lab, the students should be able to:

1. Confidently work on any C programming development environment.
2. Predict the behavior of variables using different types of storage classes.
3. Use file concept to read/write data in secondary storage area.
4. Develop programs in basic data structures such as linked lists, stacks and queues.

**Week 1**

- a) Sum of the individual digits means adding all the digits of a number. Ex: 123, sum of digits is  $1+2+3=6$ .

Write a C program to find the sum of individual digits of a positive integer.

- b) 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.

- c) Prime number is a number which is exactly divisible by one and itself only  
Ex: 2, 3, 5, 7,.....

Write a C program to generate all the prime numbers between 1 and  $n$ , where  $n$  is a value supplied by the user.

**Week 2**

- a) Write a C program to calculate the following:  $Sum=1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$

- b) 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).

### **Week 3**

- 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) In converting roman numeral to decimal number, we have to take the roman value as input. This value is converted into a its equivalent decimal number. Ex: X=10. Write a C program to convert a Roman numeral to its decimal equivalent.

### **Week 4**

- a) Write C programs that use both recursive and non-recursive functions
  - i) To find the factorial of a given integer. Factorial of a number is nothing but the multiplication of numbers from a given number to 1.
  - ii) To find the GCD (greatest common divisor) of two given integers. GCD means Greatest Common Divisor. i.e., the highest number which divides the given number.  
Ex: GCD (12, 24) is 12.  
Formula:  $GCD = \text{product of numbers} / LCM \text{ of numbers}$
- b) Towers of Hanoi problem means we have three towers Here source, intermediate and destination are the three towers. We have to transfer all the disks from source to destination towers. Here the restriction is not to place a big disk on smaller one. for this we use intermediate tower. Finally the arrangements in the destination tower must be as same as the disks in the source tower at first.  
Write C programs that use recursive function to solve the Towers of Hanoi problem.

### **Week 5**

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

### **Week 6**

- 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.

### **Week 7**

- 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.

### **Week 8**

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).

### **Week 9**

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

### **Week 10**

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

- i) Bubble sort
- ii) Insertion Sort
- iii) Quick Sort

### **Week 11**

- 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).

### **Week 12**

- a) Write a C program to display the contents of a file.
- b) Write a C program 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).

### **Week 13**

Write C programs that implement Stack (its operations) using Arrays.

### **Week 14**

Write C programs that implement Queue (its operations) using Arrays.

### **Week 15**

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

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

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**I B. Tech- II Semester**

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**14AME03**

**ENGINEERING WORKSHOP  
(Common to CE, ME & AE Branches)**

**Objectives:**

1. To understand the basic work shop tools and operations such as carpentry, fitting & sheet metal trades.
2. To understand the basic work tools of house wiring & house wiring connections etc.
3. To understand the basic joints and manufacturing processes such as foundry and welding.

**Outcomes:**

After completion of the study of this lab a student will be able to:

1. Distinguish between tools of various trades such as carpentry, fitting, sheet metal, welding, foundry & house wiring.
2. Explain the tools & connections pertaining to house wiring, stair case wiring etc.
3. To describe the use of carpentry & fitting joints such as lap, dovetail, mortise, tenon joint, various sheet metal models & manufacturing processes.

**1. TRADES FOR EXERCISES:**

a. Carpentry shop– Two joints (exercises) involving tenon and mortising, groove and tongue: Making T lap joint, cross lap joint, Dovetail lap Joint, mortise and tenon joint, T - Bridle 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 and dovetail joint out of 100 x 50 x 5 mm M.S. stock

c. Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper and funnel from out of 22 or 20 gauge G.I. sheet

d. House-wiring– Two jobs (exercises) from: wiring for two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for Tube Light and wiring for a water pump with single phase starter.

e. Foundry– Preparation of two moulds (exercises): for a single Piece pattern and a Two Piece pattern.

f. Welding – Preparation of two welds (exercises): single V butt joint, lap joint, Square butt Joint and fillet weld.

## **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. *Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.*
2. *Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas*
3. *Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.*

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**II B.Tech – I Sem (AE)**

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<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(14AME06) PRODUCTION TECHNOLOGY**

**Objectives:**

1. To understand the different types of competing Production processes at the disposal of Mechanical Engineer.
2. To understand the science and technology of casting, welding, forming and plastics processing.
3. To understand latest advancements in manufacturing technology and their practical importance.
4. To study the different non destructive tests for different processes.

**Outcomes:**

*After completion of the course, the student will be able to:*

1. Choose the appropriate production process to suit the production of a product with specified surface topography.
2. Identify tooling requirements/constraints in production.
3. Suggest to the management new technologies at the disposal of modern engineer and plan for shop up gradation.
4. Upgrade their selves for the future updation of the production processes and technologies.

**UNIT I**

**CASTING:** Solidification of pure metal and alloys - Solidification of castings, Steps involved in making a casting– Types of patterns, Pattern making, Materials used for patterns, pattern allowances, Types of sand moulds and molding machines.

**DESIGN OF CASTINGS:** Principles of Gating, Gating ratio and design of Gating systems, Risers and Cores - Types, functions, and design, Introduction of foundry sands, sand properties and testing.

**UNIT II**

**WELDING:** Classification of welding processes. Types of welds, welded joints, and their characteristics. Gas welding, Arc welding, Forge welding, Resistance welding, Thermit welding, Plasma Arc welding, Inert Gas welding, TIG, MIG welding, and Friction welding, simple problems, Heat affected zones, welding defects – causes and remedies.

**Soldering:** Principle, procedure, classification and applications

**Brazing:** Principle, procedure, classification and applications

**Cutting of Metals:** Oxy Acetylene Gas cutting, plasma arc cutting, Cutting of ferrous and non-ferrous metals.

**UNIT III**

Hot working, cold working, warm working, strain hardening, recovery, recrystallisation and grain growth, Rolling – theory of rolling, types of Rolling mills and products, simple problems.

**EXTRUSION OF METALS:** Basic extrusion process and its characteristics, Types of extrusion.

**UNIT IV**

**FORGING PROCESSES:** Principles of forging, Tools and Dies, Types of Forging, Drop Forging, Roll forging, simple problems, forging defects.

**SHEET METAL AND OTHER COLD WORKING PROCESSES:** Blanking and piercing, Bending and forming, Drawing and its types, wire drawing and tube drawing, coining, embossing, hot and cold spinning, HERF(High Energy Rate Forming) Methods.

## **UNIT V**

**PROCESSING OF PLASTICS:** *Molding methods-Compression & Transfer molding, Injection, Blow, Rotary and Vacuum forming methods, Calendaring operations, applications to thermosets and thermo plastics- Introduction to fiber reinforced plastics.*

**POWDER METALLURGY:** *Introduction, preparation of powder, Fundamental properties of Metal Powder, different fabrication methods.*

### **Text Books:**

1. P.N. Rao, Manufacturing Technology, Noida, 2<sup>nd</sup> Edition, Tata McGraw Hill, 2008.
2. Kalpakjain, Manufacturing Technology, Chennai, 4<sup>th</sup> Edition, Pearson Edition, 2002.
3. B.S. Raghuvanshi, Workshop Technology, Volume-I, 2<sup>nd</sup> Edition Dhanpat Rai & Co Pvt. Ltd, 2014.

### **References:**

1. R.K. Jain, Production Technology New Delhi, 2<sup>nd</sup> Edition, Kanna Publishers, 2001.
2. R.S. Parmar, Welding Process & Technology, New Delhi, 4<sup>th</sup> Edition, Kanna Publishers, 1997.
3. K.L Narayana, Production Technology, New Delhi, 2<sup>nd</sup> Edition, I.K. International Publications, 2010.

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**II B.Tech-I Sem (AE)**

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**(14ACE12) STRENGTH OF MATERIALS**

**Objectives:**

1. To study the internal effects produced and deformations of bodies caused by externally applied forces.
2. To understand the strength characteristics of different materials and structural members subjected to shear, torsion and bending.
3. To understand the basic concepts of torsion of circular shafts and springs.
4. To understand the concepts of circumferential and hoop stresses in thin and thick cylinders.

**Outcomes:**

After completion of the course the student will be able to:

1. Understand the concepts and applications of stresses and strains
2. Determine the internal forces in the beams
3. Formulate the expressions for deflection for different loading conditions
4. Formulate the expressions for longitudinal and circumferential stresses in thin and thick cylinders

**UNIT I**

**SIMPLE STRESSES AND STRAINS:** Elasticity and plasticity – Types of stresses and strains – Hooke's law – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

**STRAIN ENERGY:** Resilience – Gradual – sudden - impact and shock loadings- Simple Applications.

**UNIT II**

**SHEAR FORCE AND BENDING MOMENTS:** Types of supports – Types of beams – Shear force and bending moment diagrams for simply supported - cantilever and over hanging beams with point loads - uniformly distributed load - uniformly varying loads and couples – Relationship between shear force and bending moment.

**UNIT III**

**THEORY OF SIMPLE BENDING:** Assumptions made in the theory of simple bending – 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.

**SHEAR STRESS DISTRIBUTION:** Derivation of formula – Shear stress distribution in rectangular – triangular – circular - I and T sections.

**UNIT IV**

**DEFLECTIONS 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.

**TORSION OF CIRCULAR SHAFTS AND SPRINGS:** Theory of pure torsion - Torsional theory applied to circular shafts – Power transmission - Close and open coiled helical springs under axial loads and axial twist – Carriage springs.

**UNIT V**

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

**THICK CYLINDERS:** *Thick cylinders – Lamé's equation – Design of thick cylindrical shells – Compound cylinders – Shrink fit allowance – Initial difference of radii at the junction.*

**Text Books:**

1. B.C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, Mechanics of Materials, Mumbai, 1<sup>st</sup> Edition, Laxmi Publications, 2002.
2. R. Subramaniyan, Strength of Materials, Oxford University Press, New Delhi, Edition 2008.
3. A.R. Basu, Strength of materials, Dhanpat Rai & Company, New Delhi.

**References:**

1. Bhavikatti, Strength of materials, New Delhi, 4<sup>th</sup> Edition, S. Chand & Co., 2009
2. Timoshenko & Young, Elements of Strength of materials, New Delhi, 2<sup>nd</sup> Edition, Eastern Wiley Publications, 2011.
3. Engineering Mechanics, Irving H.Sharnes, Prentice Hall Of India.Ltd.,1998

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**II B.Tech – I Sem (AE)**

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**(14AME04) ENGINEERING METALLURGY**

**Objectives:**

1. To understand the importance of various Engineering materials used in mechanical process/industries.
2. To understand the metallurgical behavior of metals and alloys in practical applications
3. To choose appropriate metallurgical process to improve the properties of metals and alloys
4. To understand the behavior and production of products using composite materials.

**Outcomes:**

*After completion of course the student will be able to:*

1. Make a right choice of metal or alloy to suit the functional behavior of a product.
2. Can modify the required properties of materials in easy way.
3. Identify problem areas in the production and usage of metals and alloy products and take corrective measures.
4. Predict the behavior of metals and alloys and suggest modifications to the designer, for increased life and low cost of products.

**UNIT I**

**STRUCTURE OF MATERIALS:** Mechanical properties of metals, Crystallization of metals, effect of grain size and grain boundaries on the properties of metals / alloys. Imperfections in crystals.

**EQUILIBRIUM DIAGRAMS:** Definitions of terms, solid solutions–solubility and solutions, Types- Interstitial solid solutions, substitutional solid solutions, Fick's laws of diffusion, Hume Rutherly rules of solid solubility. Cooling curves, Construction of equilibrium diagrams, Phase rule, Types of phase diagrams, Lever rule, Invariant reactions, Coring and Miscibility.

**UNIT II**

**TRANSFORMATION IN SOLID STATE:** Iron-Iron carbon equilibrium diagram, Relationship between equilibrium diagrams and properties of alloys, Effect of alloying elements on Iron-Iron carbon system, TTT diagrams.

**UNIT III**

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

**UNIT IV**

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

**HEAT TREATMENT OF FERROUS AND NON-FERROUS ALLOYS:** Annealing, Normalizing, Hardening, Tempering, Hardenability, Surface hardening, Age hardening treatment.

**UNIT V**

**CERAMIC MATERIALS:** Crystalline ceramics, glasses, ceramic tools, 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.



**Text Books:**

1. V. Raghavan, *Material science and Engineering, 5<sup>th</sup> Edition, Prentice Hall of India, 2006.*
2. Sidney H. Avner, *Introduction to Physical Metallurgy, 2<sup>nd</sup> Edition, Tata McGraw Hill, New Delhi 6<sup>th</sup> reprint 2001.*
3. William D. Callister, *Materials Science & Engineering - An Introduction, Jr. Wiley India Pvt. Ltd. 6<sup>th</sup> Edition, New Delhi, 2006.*

**References:**

1. V.D. Kodgire & S.V. Kodgire, *Material Science and Metallurgy, Kolhapur, 4<sup>th</sup> Edition, Everest Edition, 2006.*
2. R.K. Rajput, *Engineering materials and metallurgy, Hyderabad, 5<sup>th</sup> Edition, S. Chand Publishers, 2006.*
3. Donald R. Askeland, *Essential of Materials Science and Engineering, USA, 2<sup>nd</sup> Edition, Thomson Publisher 2008.*

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**II B.Tech – I Sem (AE)**

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**(14AME05) THERMODYNAMICS**

**Objectives:**

1. To understand the principles of thermodynamics and to be able to use it in accounting for the bulk behaviour of the simple physical systems.
2. To provide in-depth study of mixture of perfect gases, gas laws to find the partial pressures, enthalpy, entropy etc. at different states of gases,
3. To understand Properties of pure substances, properties of steam, steam tables, mollier charts,
4. To enlighten the basic concepts of air standard cycles and vapour power cycles.

**Outcomes:**

*After completion of the course, the student will be:*

1. Familiar with principle of thermodynamics and can solve the problems related to various thermal engineering systems using the zero<sup>th</sup> law, 1<sup>st</sup> and 2<sup>nd</sup> law of thermodynamics.
2. Able to understand the behavior of ideal and real gases at different states of the system and can find partial pressures, enthalpy and entropy
3. Able to understand the properties of steam and can solve problem using steam tables and mollier charts
4. Able to understand the working of different air standard cycles and vapour power cycles and can solve the related problems

**UNIT I**

**BASIC CONCEPTS AND FIRST LAW:** Basic concepts, macroscopic and microscopic approach, Thermodynamic systems and control volume. Property, state, path, process and cycle, thermodynamic equilibrium, quasi-static process, concept of continuum, Zeroth law of thermodynamics – concept of temperature and its measurement, types. Work and heat, modes of work. Path and point function, pdv- work in various quasistatic process, First law of thermodynamics – application to closed and open systems, energy, specific heat capacities, enthalpy, PMM-1, steady flow energy equation, steady flow process with reference to nozzle, boiler and turbine.

**UNIT II**

**SECOND LAW:** Second law of thermodynamics – Kelvin’s and Clausius statements of second law. Refrigerator and Heat pump, equivalence of kelvin’s and Clausius statements, PMM2, Reversibility and irreversibility, causes of irreversibility, Carnot cycle, reversed carnot cycle, Carnot theorem, corollary of carnots theorem, efficiency, COP. Thermodynamic temperature scale, Clausius theorem. Entropy, inequality of Clausius, entropy change in irreversible process, Principle of entropy, first and second laws combined, reversible adiabatic work in steady flow system, Calculations of work done, internal energy, entropy and heat transfer in non- flow and flow processes, Introduction to availability and exergy.

**UNIT III**

**IDEAL AND REAL GASES**

Gas mixtures – properties ideal and real gases, equation state, Avagadro’s Law, Vander Waal’s equation, specific heats, internal energy, enthalpy and entropy of an ideal gas, reversible adiabatic process, isothermal process, polytropic process, simple problems, compressibility factor, compressibility chart – Dalton’s law of partial pressure, internal energy, enthalpy and entropy of gas mixtures.

#### **UNIT IV**

##### **PROPERTIES OF PURE SUBSTANCES AND STEAM POWER CYCLES:**

Properties of pure substances – Thermodynamic properties of pure substances in solid, liquid and vapour phases, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces, thermodynamic properties of steam, steam tables, mollier charts, simple problems.

**STEAM POWER CYCLE:** *Standard Rankine cycle, layout of steam power plant, Methods for increasing efficiency, reheat and regenerative cycle. related problems.*

#### **UNIT V**

##### **AIR STANDARD CYCLES**

**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 pressure, Related problems.

(Use of standard thermodynamic steam tables and Mollier diagram are permitted)

##### **Text Books:**

1. P.K. Nag., Engineering Thermodynamics, Tata McGraw Hill, New Delhi, 5<sup>th</sup> Edition, 2014.
2. Cengel, Thermodynamics – An Engineering Approach, 3<sup>rd</sup> Edition, Tata McGraw Hill, New Delhi, 2003.
3. Eastop T.D and A. McConkey, "Applied Thermodynamics", for engineering technologies 5th edition longman U.K 1993.

##### **References:**

1. J.P. Holman, Thermodynamics, 3<sup>rd</sup> Edition, Tata McGraw Hill, 1995.
2. C.P. Arora, Thermodynamics, Tata McGraw Hill, New Delhi, 12<sup>th</sup> reprint 2007.
3. C. Merala, Pother, W. Craig & Somerton, Thermodynamics for Engineers, Schaum Outline Series, Tata McGraw Hill, 3<sup>rd</sup> Edition, New Delhi, 2004.

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**II B.Tech- I Sem (AE)**

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**(14AEE06) ELECTRICAL ENGINEERING AND ELECTRONICS ENGINEERING**

**Objectives:**

1. To understand the Fundamentals of Electrical Circuits and measurements.
2. To study the construction, principle of operation and performance of DC and AC Machines and also know Principle of Measuring Instruments.
3. To understand the characteristics and applications of diode, transistor and SCR.
4. To understand the operation of CRO and regulated power supplies and function generators.

**Outcomes:**

After completion of this course the students will be able to:

1. Acquire the knowledge of construction, operation and applications of different types of electrical machines.
2. Have knowledge of instruments for measuring basic electrical quantities.
3. Know applications of PN Junction diode, Transistor and SCR.
4. Gain the knowledge about CRO, regulated power supplies and function generators.

**UNIT I**

**INTRODUCTION TO ELECTRIC CIRCUITS AND MEASUREMENTS:** Circuit elements – Sources - Ohm's Law - Kirchhoff's Laws - Network reduction Techniques , Mesh analysis and Nodal Analysis –Thevenin's , Superposition - Simple Problems - Sinusoidal Alternating Quantities – Concept of Frequency, Period, Phase, Average and RMS Values – Concept of Impedance.

**MEASURING INSTRUMENTS:** Principle of Operation Moving Coil and Moving Iron Types of Voltmeters and Ammeters - Multimeters –Measurements of resistance, inductance & capacitance. Wheat stone's bridge, Schering bridge & Anderson bridge.

**UNIT II**

**DC MACHINES & TRANSFORMER:** Construction - Principle of Operation and EMF Equation - Different Types of Generators - DC Motor Operation – Different Types – Torque Equation – Efficiency - Applications of DC Motors.

**TRANSFORMER:** Principle of Operation of Single Phase Transformer - EMF Equation – Losses – Efficiency and Regulation.

**UNIT III**

**AC MACHINES:** Concept of Three Phase Supply – Construction, Operation and types of Three Phase Induction Motors - Slip – Torque Characteristics and Application – Principle of Operation of Alternator – Concept of Regulation.

**SINGLE PHASE MOTORS:** Shaded pole type motor, Repulsion motors, stepper motor- construction and principles of operation only.

**UNIT IV**

**DIODE AND TRANSISTOR CHARACTERISTICS:** PN Junction Diode, Zener Diode – V-I Characteristics – Applications – Rectifier – Half Wave – Full Wave and Bridge Rectifiers – Simple Problems – PNP and NPN Junction Transistor – Transistor as an Amplifier – Single stage CE Amplifier – Frequency response of CE Amplifier – Junction Field Effect Transistor (JFET) operation and characteristics, SCR - characteristics and its applications

## **UNIT V**

**CATHODE RAY OSCILLOSCOPE:** *Study of CRO – Principles of CRT (Cathode Ray Tube) – Deflection sensitivity – Electrostatic and Magnetic deflection – Applications of CRO – Voltage, Current and Frequency Measurements*

**REGULATED POWER SUPPLIES:** *Functional diagram - Principle of operation – Applications functional generators – functional diagram - principle of operation.*

### **Text Books:**

1. J.P. Nagrath & D. P Kothari: Basic Electrical Engineering, PHI Publications
2. HUGHES: Electrical and Electronic Technology, Pearson Publications.
3. Mehta, V.K: Principles of Electrical & Electronics Engineering, S. Chandan & Company.

### **Reference:**

1. Helfrick and Cooper: Modern Electronic Instrumentation and Measurement Techniques, PHI Publications.
2. R.L.Boylestad and Louis Nashelsky, Electronic Devices and Circuits, 9<sup>th</sup> Edition, Printice Hall International Publishers, 2006.

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**II B.Tech – I Sem (AE)**

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**(14AME07) MACHINE DRAWING**

**Objectives:**

1. Understand the importance of Machine drawing.
2. Understand representation of conventional materials and common machine elements.
3. Add a standard title box to the drawing.
4. Understand the principles of assembling a machine part.

**Outcomes:**

*After completion of the course, the student will be able to:*

1. Represent common machine elements conventionally.
2. Dimension following the general rules.
3. Prepare sectional and additional views for the machine elements in general.
4. Assemble typical machine parts.

**PART-A**

**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) *Common abbreviations & their meaning*

**II. DRAWING OF MACHINE ELEMENTS AND SIMPLE PARTS :**

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

- a) *Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.*
- b) *Keys, cotter joints and knuckle joint.*
- c) *Riveted joints for plates*
- d) *Flanged coupling and claw coupling & cast iron pipe joints.*
- e) *Bushed journal, foot step bearing.*

**PART-B**

**III. ASSEMBLY DRAWINGS:**

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

- a) *Engine Parts – Stuffing Box, Cross Head, Eccentrics, Petrol Engine Connecting Rod and Piston Assembly.*
- b) *Other Machine Parts – Screw Jack, Machine Vices, Plummer Block, Lathe Tailstock, Milling Machine Tailstock and Square Tool Post.*
- c) *VALVES: Non Return 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. K.L. Narayana, P. Kannaiah & K. Venkata Reddy, Machine Drawing, NewAge Publishers 4<sup>th</sup> Edition, 2012.
2. R.K. Dhawan, Machine Drawing, 2<sup>nd</sup> Edition, S. Chand Publications, 1996.
3. P.S. Gill, Machine Drawing, Madurai, 12<sup>th</sup> Edition, Sk Kataria & Sons, 2009.

**References:**

1. Luzzader, Machine Drawing, Anand, 4<sup>th</sup> Edition, Charotor Publishing House, 2003.
2. Rajput, Machine Drawing, Hyderabad, 4<sup>th</sup> Edition, S.Chand Publications, 2002.
3. K.C. John, Textbook of Machine Drawing, 5<sup>th</sup> Edition, Printice Hall International Publishers learning, 2009.

**Note: THE END EXAM WILL BE FOR 3 HRS IN THE FOLLOWING PATTERN:**

1. Four questions to be set from part-A and the student should answer any three with weightage of 10 marks each-30 marks.
2. One question to be set from part-B of assembly view of any component maximum of two views (Major view 30 marks Minor view 10 marks).

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**(14ACE15) STRENGTH OF MATERIALS AND METALLURGY LAB**

**Objectives:**

1. *To understand testing procedures of mild steel by tension, direct shear, torsion, hardness tests.*
2. *To understand the concept of modulus elasticity, and to know how to measure deflection of beams.*
3. *To identify different materials and alloys structures*
4. *To understand the behavior of metals in heating and cooling*

**Outcomes:**

*After completion of the course the student will be able to*

1. *Find Young's modulus, torsional rigidity of mild steel rods.*
2. *Know the hardness of mild steel and HYSO specimens.*
3. *Use microscopes and different machinery used in metallurgy lab.*
4. *Know the behavior of metals and alloys in different heat treatment processes.*

**PART A  
STRENGTH OF MATERIALS LAB**

1. To study the stress-strain characteristics of mild steel rod using universal testing machine.
2. To find the direct shear strength of rod using compressive testing machine.
3. To find the modulus of elasticity of given material by measuring deflection in beams.
4. To find the modulus of rigidity of given material using torsion testing machine.
5. To find the modulus of rigidity of given material using spring testing machine.
6. To find Brinnell's hardness and Rock well hardness numbers of given material.

**PART B  
METALLURGYLAB**

1. Preparation and study of the Microstructure of pure metals like Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high Carbon steels.
3. Study of the Microstructures of Cast Irons.
4. Study of the Microstructures of Non-Ferrous alloys.
5. Study of the Microstructures of High speed steels.
6. Hardenability of steels by Jominy End Quench Test.
7. Hardness measurement of various heats treated and non treated steels.



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**(14AEE09) ELECTRICAL ENGINEERING AND ELECTRONICS ENGINEERING LAB**

**Objectives:**

1. To test different types of DC machines
2. To know the speed control of DC machines
3. To know the characteristics of Diode, Transistor and SCR
4. To understand the principles of CE amplifier and CRO

**Outcomes:**

*After completion of this course the student will be able to:*

1. Find Efficiency of DC machines by different methods
2. Understand the speed control of DC shunt machine
3. Gain the knowledge of Diode, Transistor and SCR Characteristics
4. Gain the knowledge about Rectifiers and CRO operation

**The following experiments are required to be conducted as compulsory experiments:**

1. Swinburne's Test on DC shunt machine and Predetermination of efficiency as motor and generator
2. Brake test on DC shunt motor. Determination of performance characteristics
3. Speed control of dc shunt motor - Armature voltage control  
- Field control
4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and Regulation at given power factors and determination of equivalent circuit)
5. Brake test on 3-phase Induction motor (performance characteristics)
6. Regulation of alternator by synchronous impedance method
7. Forward and Reverse bias characteristics of PN Junction diode
8. Full Wave Rectifier with and without filters
9. Input and Output characteristics of Transistor in CE configuration
10. Characteristics of SCR
11. Frequency response in CE Amplifier
12. VI Characteristics or Zener Diode.

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**(14ACE11) FLUID MECHANICS AND HYDRALIC MACHINERY**

**Objectives:**

1. The aim of this course is to introduce and explain basic fundamentals of Fluid Mechanics, which is used in various applications of Engineering.
2. To understand fluid properties, hydrostatic law, flow measurement and its applications in Industries and to obtain the loss of flow in a flow system.
3. To understand the dimensional analysis and boundary layer concepts.
4. To understand the working principles of hydraulic machinery.

**Outcomes:**

*After completion of this course the student will be able to:*

1. Apply how to find frictional losses in a pipe when there is a flow between two places.
2. Able to know types of flow and its measurements and applications.
3. Able to identify the suitable pump required for different purposes.
4. Able to Classify the turbines and design criteria based on water availability

**UNIT I**

**FLUID PROPERTIES AND STATICS::** Dimensions and units - Definition of a fluid – Physical properties of fluids Density – Specific weight – Specific volume – Specific gravity – Compressibility –Vapour pressure – Surface tension and capillarity –Viscosity.

Pascal's law – Pressure variation in a static fluid – Atmospheric, gauge and absolute pressures – Measurement of pressure – Piezometer – U-tube and inverted U-tube manometers – Bourdon's pressure gauge – Hydrostatic forces on plane and curved surfaces– Buoyancy-Buoyant Force and Centre of Buoyancy- Metacentre and Metacentric Height- Stability of Submerged and Floating Bodies- Determination of Metacentric Height.

**UNIT II**

**FLUID KINEMATICS AND FLUID DYNAMICS**

Types of flow, velocity field, one and two-dimensional flow analysis, circulation and vorticity, stream function and velocity potential function, potential flow, standard flow patterns, combination of flow patterns, flow net.

Continuity equation, Euler's equation of motion, Bernoulli's equation and applications (Venturimeter and orifice meter). Impulse momentum equation and applications (pipe bend).

**UNIT III**

Equations of motion for laminar flow of a Newtonian fluid – Viscous flow – Navier – Stoke's equations, simple exact solutions for Hydrodynamic lubrication.

**PIPE FLOW:** Reynold's experiment – Reynold's number - Minor losses in pipe flow - Darcy-Weisbach equation – Variation of friction Factor – Moody's chart – Pipes in series – Pipes in parallel.

**UNIT IV**

Dimensional Analysis as a tool in design of experiments, identification of non dimensional numbers and their significance, dimensional analysis methods.

Boundary Layer Theory – Formation, growth and separation of boundary layer – Integral momentum principles to compute drag and lift forces- Mathematical models for boundary layer flows.

## **UNIT V**

**HYDRAULIC TURBINES:** *Elements of hydroelectric power plants- Heads and efficiencies of turbines – Classification of turbines –Pelton wheel-Modern Francis turbine – Kaplan turbine. Main components and working principle- Expressions for work done and efficiency – Working proportions and design of each.*

**CENTRIFUGAL PUMPS:** *Classification and types of pumps – Components and working of a centrifugal pump – Work done by the impeller– Heads and efficiencies – Net positive suction head(NPSH)- Priming – Priming devices – Minimum starting speed – Multistage pumps – Pumps in series and parallel – Submersible pumps – Limiting suction head – Cavitation – Expression for specific speed.*

### **Text Books:**

1. P.N. Modi & S.M. Seth, Hydraulics and Fluid Mechanics including Hydraulic Machines, New Delhi, Standard Book House, Delhi, 14<sup>th</sup> Edition 2002.
2. R.K. Bansal, A text book of Fluid Mechanics and Hydraulic machinery, 9<sup>th</sup> Edition, Laxmi Publications (P) Ltd, 2010.
3. Jagadish Lal, Hydraulic Machines, 9<sup>th</sup> Edition, Metropolitan Book Company Pvt. Ltd, 2003.

### **References:**

1. Nachleba, Hydraulic Turbines, New Delhi, 1<sup>st</sup> Edition, Tata McGraw Hill Publishing Co. Ltd, 2012.
2. Streeter & Wylie, Fluid Mechanics, 10<sup>th</sup> Edition, Tata McGraw Hills Publications, 1997.
3. C.M. White, Fluid Mechanics, 4<sup>th</sup> Edition, Tata McGraw Hills Publications, 2008.

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**(14AAT01) AUTOMOTIVE ENGINES**

**Objectives:**

*To make the students to learn about the*

1. *Basic functional aspects of automotive engines*
2. *Working principles fuel systems & governors used in automobiles.*
3. *Principle of combustion & parameters of combustion chamber*
4. *Testing of various engine parameters and principles of different cooling and lubrication systems*

**Outcomes:**

*After completion of the course the student will be able to*

1. *Get the knowledge related to IC Engines, manufacturing service industry.*
2. *Understand sufficient knowledge about fuel systems and governors*
3. *Understand the knowledge about combustion process and construction of combustion chamber.*
4. *Understand the knowledge about testing of engines and cooling & lubrication systems of IC Engines.*

**UNIT-I:**

**CONSTRUCTION AND OPERATION:** *Constructional details of spark ignition (SI) and compression ignition (CI) engines. Working principles. Two stroke SI and CI engines – construction and working. Comparison of SI and CI engines and four stroke and two stroke engines. Engine classification, firing order. Otto, diesel and dual cycles.*

**UNIT-II:**

**FUEL SYSTEMS:** *Air fuel ratio requirements of SI engines, Air fuel ratio and emissions, Working of a simple fixed venturi carburetor, Constant vacuum carburetor. Diesel fuel injection systems-Jerk pumps, distributor pumps, pintle and multihole nozzles, Unit injector and common rail injection systems. Injection pump calibration. Need for a governor for diesel engines. Description of a simple diesel engine governor.*

**UNIT-III:**

**COMBUSTION AND COMBUSTION CHAMBERS:** *Introduction to combustion in SI and diesel engines and stages of combustion. Dependence of ignition timing on load and speed. Knock in SI and CI engines. Combustion chambers for SI and CI engines. Direct and indirect injection combustion chambers for CI engines. Importance of Swirl, squish and turbulence. Factors controlling combustion chamber design.*

**UNIT-IV:**

**SUPERCHARGING , TURBOCHARGING AND ENGINE TESTING:** *Supercharging and Turbo charging, Different methods of turbo charging, Inter cooling, Turbocharger controls including, waster gate, variable geometry, variable nozzle types. dynamometers, Indicated thermal, brake thermal and volumetric efficiencies. Measurement of friction, Cylinder pressure measurement. Engine performance maps, Engine testing standards.*

**UNIT-V:**

**COOLING AND LUBRICATION SYSTEMS:** *Need for cooling, types of cooling systems- air and liquid cooling systems. Thermo syphon and forced circulation and pressurized cooling systems. Properties of coolants. Requirements of lubrication systems. Types-mist, pressure feed, dry and wet sump systems. Properties of lubricants.*

**Text Books:**

1. Internal Combustion Engines by V. Ganesan, Tata McGraw Hill, 2007.
2. Ramalingam K.K., "Internal Combustion Engines", Sci-Tech Publications, 2005.
3. Heinz Heisler, Advanced Engine Technology SAE Publication, 1995.

**References:**

1. H.N. Gupta Fundamentals of Internal Combustion Engines by, PHI, 2013.
2. Mathur and Sharma Internal Combustion Engines Dhanpat Rai and Sons 2002.
3. John B. Heywood, Fundamentals of Internal Combustion Engines, 1988.

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**(14AME13) MECHANICS OF MACHINES**

**Objectives:**

1. To understand the Basic mechanisms, velocity and acceleration of simple mechanisms
2. To choose suitable gears and cams
3. To understand the Inertia force analysis and flywheels
4. To understand Balancing of rotating and reciprocating masses

**Outcomes:**

*After completion of the course the student will be able to:*

1. Select a mechanism for a particular application, and find the velocity and acceleration of different links
2. Construct a cam profile and select a suitable gear train
3. Analyze the effect of gyroscopic couple on a rotating body
4. Balance the rotating and reciprocating masses in automobiles

**UNIT - I**

**MECHANISMS:** Introduction-Links Pairs-Chain-Mechanism-Machine structure-Degrees of freedom-Four bar chains-Grashoff's law-Kutzback criterion-Grubler's criterion for plane mechanism. Inversion of mechanisms-Four bar, single slider crank and double slider crank mechanisms-Simple problems-Instantaneous centre-Kennedy's theorem-Velocity and Acceleration of Four bar and single slider crank mechanisms by relative velocity Method.

**UNIT - II**

**CAMS:** Types of cams and followers-Follower motion-Uniform, Parabolic, SHM and cycloidal. Cam terminology-Cam profiles construction for roller, flat faced and knife edge follower types-pressure angle-Derivatives of Follower motion-High speed cams -circular arc and tangent cams-Standard cam motion-Pressure angle and undercutting.

**UNIT - III**

**GEAR TRAINS AND CONTROL MECHANISMS:** Spur gear terminology and definition - Gear trains: simple, compound, reverted And epicyclic - Velocity ratio and torque calculation in gear trains - Automobile differential. Gyroscopes : Gyroscopic forces and couple - Forces on bearing due to gyroscopic action - Gyroscopic effect in ship, motor cycle, car and aircraft.

**UNIT - IV**

**FORCE ANALYSIS:** Inertia force and inertia torque calculations - D'Alembert's principle -The principle of super position - Dynamic analysis in reciprocating engines-Gas forces - Equivalent masses - Bearing loads- crank shaft torque. Turning moment diagrams : Fly wheels Application of flywheel-punching presses.

**UNIT - V**

**STATIC AND DYNAMIC BALANCING:** Balancing of rotating masses - Balancing of single cylinder engine - Balancing of multi cylinder engine - partial balancing in locomotive engines - Hammer blow - Swaying couple - Tractive force - Balancing machines.

**Text Books:**

1. Ratan S.S, *Theory of Machines*, Tata McGraw Hill Publishing Company Ltd., 2<sup>nd</sup> Edition, 2005.
2. R.S Khurmi & J.K Gupta, *Theory of Machines*, Hyderabad, 2<sup>nd</sup> Edition, S.Chand, 2008.
3. Thomas Bevan, *Theory of Machines*, CBS Publishers and Distrib utors, 3<sup>rd</sup> Edition, 1984.

**References:**

1. *Shigley J.E, and Uicker J.J, Theory of machines and Mechanisms, McGraw Hill, 1995.*
2. *Ghosh A, and Mallick A. K, Theory of Mechanisms and Machines, Affiliated East - West Pvt Ltd., New Delhi, 1988.*
3. *Rao J. S, and Dukki pati R.V, Mechanism and Machine Theory, Wiley - Eastern Ltd., New Delhi, 1995.*

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**(14AME14) BASIC METROLOGY AND MACHINE TOOLS**

**Objectives:**

1. To understand the different types of linear and angular measuring instruments.
2. To understand concept of tolerance system for machine components.
3. To understand the features and types of machine tools used in production floors.
4. To understand the capabilities of machine tools in meeting the product requirements.

**Outcomes:**

After completion of the course, the student will be able to:

1. Gain the basic knowledge of measuring instruments.
2. Design inspection procedure in manufacturing G systems.
3. Select the machine tool and the operations to be performed to finish the component.
4. Design the cutting tool and fixturing for economic production of a product.

**UNIT I**

**SYSTEMS OF LIMITS AND FITS:** Introduction, Definitions, fits and their types – unilateral and bilateral tolerance system, hole and shaft basis systems – interchangeability and selective assembly.

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

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

**UNIT II**

**MEASUREMENT OF ANGLES AND TAPERS:** Different methods – Bevel protractor, angle gauges, spirit level, sine bar, sine centers, rollers and spheres used to determine the tapers.

**OPTICAL MEASURING INSTRUMENTS:** Tool maker's microscope, collimators, optical projector, optical flat and their uses, Interferometers - NPL Interferometer, Gauge length interferometer.

**FLATNESS MEASUREMENT:** Measurement of flatness of surface – straight edges, optical flat and autocollimator. Surface roughness measurement, screw thread measurement

**UNIT III**

**ENGINE LATHE:** Specification of lathe, types of lathes, work holders, tool holders, Taper turning, thread turning and attachments for Lathes.

Turret and capstan lathes – work holding devices and tool holding devices, Automatic lathes – classification, Single spindle and multi-spindle automatic lathes.

**DRILLING AND BORING:** Specifications, types, operations performed, tool holding devices, twist drill and types. Boring machines – Fine boring machines, Jig Boring machines, Kinematics scheme of the drilling and boring machines.

**UNIT IV**

**SHAPING, SLOTTING AND PLANING:** Their Principles of working, Principal parts, specification, classification, Operations performed, Kinematic schemes of the shaping slotting and planning machines, machining time calculations.

**MILLING:** 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.



## **UNIT V**

**GRINDING:** *Theory of grinding, classification of grinding machines, cylindrical and surface grinding machines, Tool and cutter grinding machines, Grinding wheel- Different types of abrasives, bonds, specification, selection of a grinding wheel.*

**LAPPING, HONING AND BROACHING:** *Constructional features, comparison of grinding, lapping and honing, machining time calculations.*

### **Text Books:**

1. K.L.Narayana, Engineering Metrology, Hyderabad, 1<sup>st</sup> Edition, Sci Tech Publication, 2010.
2. Mahajan, Engineering Metrology, New Delhi, 4<sup>th</sup> Edition, Dhanpat Rai, 2009.
3. R.K. Jain and S.C. Gupta Production Technology, New Delhi, 5<sup>th</sup> Edition, Kanna Publishers, 2010.

### **References:**

1. P.N. Rao, Manufacturing Technology, II Noida, 4<sup>th</sup> Edition, Tata Mc Graw hill, 2013.
2. I.C.Gupta, A Text Book of Engineering Metrology, New Delhi, 4<sup>th</sup> Edition, Dhanpat Rai, 2009.
3. H.M.T. Production Technology, Noida-India, 2<sup>nd</sup> Edition, Tata Mcgraw Hill, 1986

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**(14AHS10) PROBABILITY AND STATISTICS**

**Objectives:**

*The main objectives of this course are to*

1. *Revise elementary concepts and techniques*
2. *Formalize the knowledge of theory of probability, random variables, probability distributions and different techniques of statistical methodologies.*
3. *Know the different estimations and hypothesis concerning proportions.*
4. *Apply the above concepts to data analysis.*

**Outcomes:**

*After completion of the course the student will be able to*

1. *The student is able to sample the data and analyse it.*
2. *Able to optimize a function with two or more variables.*
3. *Student is able to apply suitable tests and evaluate the acceptance of the hypothesis.*
4. *The student is able to apply different estimations and hypothesis to solve the problems*

**UNIT-I**

**PROBABILITY AND RANDOM VARIABLES:** *Sample space and events – Probability - The axioms of probability – Addition theorem of Probability – Conditional probability – Baye’s theorem. Discrete and Continuous random variables – Mean and Variance.*

**UNIT-II**

**DISTRIBUTIONS AND SAMPLING THEORY:** *Distribution Functions – Binomial, Poisson and Normal Distributions.*

**SAMPLING DISTRIBUTIONS** *Populations and Samples – Sampling distributions of mean.*

**UNIT-III**

**ESTIMATION & TESTING OF HYPOTHESIS**

*Populations and Samples – Point Estimation – Interval estimation – Bayesian estimation. Type I error and Type II errors, One tail, two tail tests - Hypothesis concerning one and two means Hypothesis concerning one and two proportions.*

**UNIT-IV**

**TESTING OF SIGNIFICANCE (SMALL SAMPLES)**

*Student- t-test, F-test, Chi-square [ $\chi^2$ ] test:  $\chi^2$  test goodness of fit – the analysis of RxC tables, ANOVA – I way and II way classification.*

**UNIT-V**

**QUALITY CONTROL & QUEUEING THEORY:** *Introduction to Quality Control, Construction of  $\bar{X}$ , Range chart, C chart and P charts. Pure Birth and Death process- M/M/1 Model – Problems on M/M/1 Model.*

**Text Books:**

1. Iyengar. T.K.V., Krishna Gandhi B., Probability & Statistics, New Delhi, S. Chand & Company, 2012.
2. Shahnaz Bathul, A text book of Probability and Statistics, Vijayawada, V.G.S. Books links.

**References:**

1. Miller and John Freund. E., Probability & Statistics for Engineers, New Delhi, Pearson Education, 2004.
2. Arnold O Allen, Probability & Statistics, Academic Press, 1990.

3. Ahmed Waheedullah, Ahmed Mohinuddin.M, Sulthan Ali, Probability & Statistics, Hyderabad, Hitech Publishers.

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**(14AHS12) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

**(Common to Civil, ME & AE Branches)**

**Objectives:**

1. Comprehend the fundamental concepts and theoretical principles of the Economics
2. The course equips the students to develop an economic way of thinking in dealing with practical business problems and challenges
3. Identify the basic economic events most common in business operations
4. Also enable the students by providing the basic knowledge of book keeping, accounting and make analysis of financial statements of a business organization.

**Outcomes:**

*After the completion of the course student will be able to*

1. Gain knowledge on managerial economics
2. Develop an understanding of economic principles and to enhance skills in high-level problem solving and critical thinking
3. Evaluate the economic environment and the impact of governmental economic policies on consumers and financial institutions.
4. Know the application of financial accounting in the field of Engineering.

**UNIT – I**

**INTRODUCTION TO MANAGERIAL ECONOMICS:** Managerial Economics: Definition, Nature and Scope – Demand analysis: Law of demand, Demand determinants, Elasticity of Demand: Definition, Types, Measurement and Significance – Demand forecasting methods (Survey methods, Statistical methods, Expert opinion method, Test marketing, Controlled experiments, Judgmental approach)

**UNIT – II**

**THEORY OF PRODUCTION AND COST ANALYSIS:** Firm and industry – Production function – Cobb Douglas Production function – Laws of Returns – Internal and External economies of scale **COST ANALYSIS:** Cost concepts, Fixed vs. Variable costs, Explicit vs. Implicit Costs, Out of Pocket costs Vs Imputed costs, Opportunity Cost and Sunk costs **BREAK EVEN ANALYSIS:** Concept of Break Even Point (BEP) – Break Even Chart – Assumptions underlying and Practical significance of BEP (Simple Problems).

**UNIT – III**

**INTRODUCTION TO MARKETS AND BUSINESS ORGANIZATIONS:** Market structures – Types of Competition – Features of perfect competition, Monopoly, Monopolistic competition – Price-Output Determination under perfect competition and Monopoly – Types of Business organization – Features, Merits and demerits of Sole proprietorship, Partnership and Joint stock companies – Types of companies – Public enterprises – Types and Features – Changing business environment in post – Liberalization scenario.

**UNIT – IV**

**CAPITAL AND CAPITAL BUDGETING:** Capital and its Significance – Types of capital – Estimation of fixed and working capital requirements – Methods and sources of raising

*capital – Capital Budgeting Methods: Payback Method, Accounting Rate of Return (ARR), and Net Present Value (NPV) Method (Simple Problems).*

#### **UNIT –V**

**FINANCIAL ACCOUNTING AND FINANCIAL ANALYSIS THROUGH RATIOS:** *Double entry book keeping – Journal – Ledger – Trial Balance –Trading Account and balance sheet with simple adjustments* **Ratio analysis:** *Computation of Liquidity Ratios (Current and Quick Ratio), Activity Ratios (Inventory Turnover Ratio and Debtor Turnover Ratio), Capital Structure Ratios (Debt- Equity Ratio and Interest Coverage Ratio) and Profitability Ratios (Gross Profit Ratio, Net Profit Ratio, Operating Ratio, P/E Ratio and EPS).*

#### **Text Books:**

1. R.L. Varshney & K.L. Maheswari, Managerial Economics, 19<sup>th</sup> Edition, Sultan Chand & Sons, 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international, 2009.
3. A.R. Aryasri, Managerial Economics and Financial Analysis, 4<sup>th</sup> Edition, Tata McGraw Hill, 2009.

#### **References:**

1. R.L. Gupta, Financial Accounting, Volume-I, Sultan Chand & Sons, New Delhi, 2001.
2. James C. Van Horne, Financial Management policy, 12<sup>th</sup> Edition, Printice Hall International Publishers, 2001.
3. Joel Dean, Managerial Economics, Printice Hall International Publishers, 2001.

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**(14ACE23) BASIC FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**

**Objectives:**

1. To understand the calibration of ventrimeter, orificemete and determination of closed conduit pipe losses.
2. To understand the performance of pelton, Francies turbines and centrifugal pumps.
3. To understand the performance of Single Stage Centrifugal pump, Multi Stage Centrifugal Pump.
4. To Study the flow parameters by turbine flow meter.

**Outcomes:**

*After completion of the course the student will be able to*

1. Find the co-efficient of venture meter, orifice meter and friction factor.
  2. Find efficiency of pelton, francis turbines, centrifugal pumps.
  3. Find the efficiency of centrifugal pump.
  4. Measure the flow parameters by using flow meter.
- 
1. Calibration of Venturi meter.
  2. Calibration of Orifice meter
  3. Determination of friction factor for a given pipe
  4. Determination of loss of head due to sudden contraction in a pipe line.
  5. Performance Test on Pelton Wheel Turbine.
  6. Performance Test on Francis Turbine.
  7. Performance Test on Single Stage Centrifugal Pump
  8. Performance Test on Multi Stage Centrifugal Pump.
  9. Performance Test on Reciprocating Pump.
  10. Turbine flow meter.

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**(14AME16) PRODUCTION TECHNOLOGY LAB**

**Objectives:**

1. *To understand the various types of manufacturing processes to be used in real time.*
2. *To gain the practical exposure on casting, welding, forming and plastic processing.*
3. *To be aware of the molding processes & drawing operations.*
4. *To be aware of different types of molding machines.*

**Outcomes:**

- After completion of this course the student will be able to:*
1. *Select the suitable manufacturing process to produce the desired components.*
  2. *Understand and use the best practice to overcome the defects in manufacturing process.*
  3. *Gain the knowledge & practicing of drawing & molding processes.*
  4. *Usage of different molding machines such as injection and blow molding machines.*

1. *Pattern Design and making - for one casting drawing.*
2. *Sand properties testing - strength and permeability*
3. *Molding Melting and Casting*
4. *TIG/Plasma Welding Lap & Butt Joint*
5. *Spot Welding*
6. *Blanking & Piercing operation and study of simple, compound and progressive dies.*
7. *Hydraulic Press: Deep drawing and extrusion operation.*
8. *Injection Molding and Blow Molding*

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(AUTONOMOUS)**

**II B.Tech – II Sem (AE)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>

**(14AHS15) QUANTITATIVE APTITUDE AND REASONING - I**

**Objectives:**

*The main objectives of this course are*

1. *To learn the concepts of coding and decoding of letters and numbers.*
2. *To interpretation data using the graphs.*
3. *To understand the basic concepts of probability.*
4. *To Comprehend the relation between time and distance in real life problems.*

**Outcomes:**

*After completion of the course the student will be able to*

1. *Strengthen their ability to meet the challenges in solving Time and distance problems.*
2. *Apply Data interpretation to solve the problems on Line, Bar, Pie graphs.*
3. *Develop the thinking ability and apply Venn diagram and binary logic.*
4. *Apply the number series and letter analogies in problems on verbal analogy.*

**Syllabus for Quantitative Aptitude**

**Competency 1:**

**1.1 Numbers**

*Classification of numbers - Divisibility rules - Finding the units digit - Finding remainders in divisions involving higher powers -LCM and HCF Models.*

1.2 *Decimal Fractions*

1.3 *Simplification*

1.4 *Square Roots & Cube Roots*

1.5 **Average**

*Definition of Average - Rules of Average - Problems on Average - Problems on Weighted Average - Finding Average using assumed mean method.*

1.6 *Problems on Numbers*

1.7 *Problems on Ages*

1.8 *Surds & Indices*

1.9 **Percentage**

*Introduction - Converting a percentage into decimals - Converting a Decimal into a percentage - Percentage equivalent of fractions - Problems on Percentages*

1.10 **Profit And Loss & True Discount**

*Problems on Profit and Loss percentage - Relation between Cost Price and Selling price - Discount and Marked Price -Two different articles sold at same Cost Price - Two different articles sold at same Selling Price - Gain% / Loss% on Selling.*

1.11 **Ratio and proportion**

*Definition of Ratio - Properties of Ratios - Comparison of Ratios - Problems on Ratios - Compound Ratio - Problems on Proportion, Mean proportional and Continued Proportion.*

**Competency 2:**

2.1 **Partnership**

*Introduction-Relation between capitals, Period of Investments and Shares*



- 2.2 **Chain Rule**
- 2.3 **Time & work**  
*Problems on Unitary method - Relation between Men, Days, Hours and Work - Problems on Man-Day-Hours method – Problems on alternate days - Problems on Pipes and Cisterns .*
- 2.4 **Time & Distance**  
*Relation between speed, distance and time – Converting kmph into m/s and vice versa - Problems on average speed -Problems on relative speed – Problems on trains -Problems on boats and streams - Problems on circular tracks – Problems on races .*
- 2.5 **Mixtures and Allegations**  
*Problems on mixtures - Allegation rule - Problems on Allegation*
- 2.6 **Simple Interest**  
*Definitions - Problems on interest and amount – Problems when rate of interest and time period are numerically equal.*
- 2.7 **Compound Interest**  
*Definition and formula for amount in compound interest - Difference between simple interest and compound interest for 2 years on the same principle and time period.*
- 2.8 **Logarithms**

## **Syllabus For Reasoning**

### **Competency 3:**

#### **3.1 Cubes**

*Basics of a cube - Formulae for finding volume and surface area of a cube - Finding the minimum number of cuts when the number of identical pieces are given - Finding the maximum number of pieces when cuts are given - Problems on painted cubes of same and different colors - Problems on cuboids - Problems on painted cuboids - Problems on diagonal cuts*

#### **3.2 Venn diagrams**

*Representing the given data in the form of a Venn diagram –Problems on Venn diagrams with two sets - Problems on Venn diagrams with three sets – Problems on Venn diagrams with four sets*

#### **3.3 Binary Logic**

*Definition of a truth-teller - Definition of a liar - Definition of an alternator – Solving problems using method of assumptions - Solving analytical puzzles using binary logic .*

### **Competency 4:**

#### **4.1 Number and letter series**

*Difference series - Product series - Squares series - Cubes series - Alternate series - Combination series - Miscellaneous series - Place values of letters.*

#### **4.2 Number and Letter Analogies**

*Definition of Analogy -Problems on number analogy -Problems on letter analogy - Problems on verbal analogy .*

##### **Odd man out**

*Problems on number Odd man out -Problems on letter Odd man out – Problems on verbal Odd man out .*

### **Competency 5:**

**5.1 Coding and decoding**

*Coding using same set of letters - Coding using different set of letters – Coding into a number - Problems on R-model .*

**5.2 Direction sense**

*Solving problems by drawing the paths-Finding the net distance travelled – Finding the direction - Problems on clocks - Problems on shadows – Problems on damaged compass - Problems on direction sense using symbols and notations*

**5.3 Critical Reasoning**

*Problems on assumption - Problems on conclusions –Problems on inferences – Problems on strengthening and weakening of arguments – Problems on principle -Problems on paradox*

**5.4 Lateral reasoning puzzle**

*Problems on common balance -Problems on digital balance -Problems on coins -Problems on lockers -Problems on heights -Digit puzzles using basic arithmetic operations.*

**Text Books:**

1. GL Barrons, Tata McGraw Hills, 'Thorpe's Verbal reasoning', LSAT Materials.2015.
2. R S Agarwal, 'A Modern approach to Logical reasoning', S Chand Company Ltd 2002.

**References:**

1. Abhjit Guha 'Quantitative Aptitude' Tata McGraw Hills, 4<sup>th</sup> Edition, 2011.
2. R S Agarwal, 'Quantitative Aptitude' S. Chand Company Ltd 2008.
3. G.L BARRONS 'Quantitative Aptitude'. Tata McGraw Hills,2014

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY**  
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**(14AHS13) TECHNICAL ENGLISH – II**  
**III B.Tech - I Sem (ME)**

**L T P C**  
**3 1 0 3**

**(Common to all Branches)**

**Preamble:**

*English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of Engineering and Technology. The prescribed book serve the purpose of preparing them for everyday communication and to face global competitions in future.*

*The prescribed text focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and student-centered. They should be encouraged to participate in the classroom activities keenly.*

**Objectives:**

- *To enable the students to communicate in English for academic and social purpose.*
- *To make the students to master LSRW skills to meet the challenges in the society.*
- *To strengthen the students to have good command of English Language and thereby to have good command of subject.*
- *To develop the skills in students for societal service and the love for work.*
- *To make the students to be humane.*

**UNIT – I**

**Chapter entitled ‘Humour’ from “Using English”**

*Listening - Techniques - Importance of phonetics*

*L- Meet & Greet and Leave taking, Introducing Oneself and Others (Formal and Informal situations)*

*R- Reading Strategies - Skimming and Scanning*

*W- Writing strategies- sentence structures*

*G-Parts of Speech –Noun-number, pronoun-personal pronoun, verb- analysis*

*V-Affixes-prefix and suffix, root words, derivatives*

## **UNIT –II**

### **Chapter entitled ‘Inspiration’ from “Using English”**

*L- Listening to details*

*S- Apologizing, Interrupting, Requesting and Making polite conversations*

*R- Note making strategies*

*W- Paragraph-types- topic sentences, unity, coherence, length, linking devices*

*G-Auxiliary verbs and question tags*

*V- synonyms-antonyms, homonyms, homophones, homographs, words often confused*

## **UNIT –III**

### **Chapter entitled ‘Sustainable Development’ from “Using English”**

*L- Listening to themes and note taking*

*S- Giving instructions and Directions, making suggestions, Accepting ideas, fixing a time and*

*Advising*

*R- Reading for details -1*

*W- Resume and cover letter*

*G- Tenses – Present tense, Past tense and Future tense*

*V-Word formation and One-Word Substitutes*

## **UNIT –IV**

### **Chapter entitled ‘Relationships’ from “Using English”**

*L- Listening to news*

*S- Narrating stories, Expressing ideas and opinions and telephone skills*

*R- Reading for specific details and Information*

*W- Technical Report writing-strategies, formats-types-technical report writing*

*G- Voice and Subject – Verb Agreement*

*V- Idioms and prepositional Phrases*

## **UNIT –V**

### **Chapter entitled ‘Science and Humanism’ from “Using English”**

*L- Listening to speeches*

*S- Making Presentations and Group Discussions*

*R- Reading for Information*

*W- E-mail drafting*

*G- Conditional clauses and conjunctions*

*V- Collocations and Technical Vocabulary and using words appropriately*

#### **Remedial Grammar:**

- 1. Adjectives and Adverbs.*
- 2. Use of Articles.*
- 3. Review of prepositions and conjunctions.*

4. Transformation of sentences
  - (a) Active and Positive Voice.
  - (b) Synthesis and analysis.
  - (c) Direct and indirect speech.
5. Common errors in English.

**Vocabulary:**

1. Synonyms and antonyms.
2. One word substitutions.
3. Phrasal verbs and idioms.
4. Commonly confused words
5. Verbal ability.

**Writing practice (composition):**

1. Essay writing
2. Report writing
3. Resume writing
4. Creative writing
5. Letter writing

**Outcomes:**

- The students will enrich their communication skills both in academic and social arena.
- The students will master LSRW skills.
- The students will become proficient in English language and make use of it to be good in his subject.
- The students will cultivate skills for societal service and inculcate passion for work.
- The students will understand the human values of life and work.

**Question Paper pattern:**

**Max Marks: 70**

**PART – I**

From the prescribed text book without leaving any lesson

1. 2 marks questions – 5 (Any five out of eight)

5 x 2 = 10M

2. 8 marks questions – 2 (Any two out of four) 2 x 8 = 16M

**PART – II**

3. General essay – 1 (Any one out of three) 1 x 8 = 8.M  
4. Report Writing – 1 (Any one out of two) 1 x 8 = 8.M  
5. Resume Writing – 1 (No choice) 1 x 8 = 8.M  
6. Idioms – 5 (Any five out of eight) 5 x 1 = 5.M  
7. Vocabulary - 5 (Any five out of eight) 5 x 1 = 5.M  
8. Correction of sentences - 10 (Any ten out of fifteen) 10 x 1 = 10.M

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**Total = 70Marks**

**Text Book:** “ Using English; A Coursebook for Undergraduate Learners” published by Orient Black Swan, 2013.

**Reference Books:**

1. Raymond Murphy’s English Grammar with CD, Murphy, Cambridge University Press, 2012.
2. English Conversation Practice –Grant Taylor, Tata McGraw Hill, 2009.
3. Communication SKILLS, Sanjay Kumar & Pushpalatha Oxford University Press, 2012.
4. A Course in Communication Skills- Kiranmai Dutt & co. Foundation Books, 2012.

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY**  
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**(14AME17) INDUSTRIAL MANAGEMENT**

**III B.Tech - I Sem (ME)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(Common to ME & AE)**

**Objectives:**

To make the students learn:

1. *The management, organization methods as practiced in industry and the Human Resource Management and labor laws.*
2. *The plant location, plant layout and material handling.*
3. *Thoroughly forecasting methods and material management.*
4. *The concept of work study and quality control.*
5. *The techniques of project management.*

**UNIT I**

*Administration, management and organization. Scientific management, functions of management. Contributions by Taylor and Fayol to management.*

*Organization-types of organization, Principles of organizations, designing an organization structure.*

**HUMAN RESOURCE MANAGEMENT:** *Functions of HRM, Job description, Job Evaluation and methods of evaluation, Merit Rating- Methods of merit ratings, wage incentives, types of wage incentive plans, Introduction to Industrial labor laws.*

**UNIT II**

*Plant Location-Location factors, concept of Weber theory, Choice of Rural, Suburban and Urban locations. Plant Layout-Definition, Objectives, and Salient features of product, process and fixed position layouts.*

*Material Handling-Definition, Relation between plant layout & material handling, principles of material handling.*

**UNIT III**

*Production Planning and Control-Objectives, Salient features and functions of PPC, a brief note on aggregate planning, simple problems.*

*Sales forecasting-need, Techniques – Moving Average, Exponential series and simple problems on linear regression technique, Time series.*

*Materials Management-Objectives, Inventory – classification, functions, costs associated with inventory, inventory classification techniques. Stores Management and Stores Records. Purchase management, duties of purchase department, purchase procedure.*

**UNIT IV**

*Work Study-Method study, Operation process charts, flow process charts, Man-machine charts, Principles of Motion Economy.*

*Time study: steps in making time study, Performance Rating, Computation of standard time, Work sampling.*

**INSPECTION AND QUALITY CONTROL:** *Difference between inspection & quality control. Statistical Quality Control charts. Acceptance sampling plan- single sampling and double sampling plans-OC curves.*

## **UNIT V**

**PERT & CPM :** *Project management, network modeling-probabilistic model, program evaluation and review technique, Critical Path computation, Calculation of probability of project completion time, deterministic model – Critical Path Method, crashing of simple networks.*

### **Outcomes:**

*After completion of the course, the student will be able to:*

1. *Identify the fundamentals of Administration, management, plant location & layout and operations planning & control.*
2. *Interpret basics of material handling, work-study, quality concept and project management.*
3. *Judge best suitable organization structure, HR model, plant design, mH system, manufacturing process and inventory system.*
4. *Infer the best work-study techniques, quality techniques and project management models*
5. *Solve industry problems with available sources and latest software tools with society concern.*
6. *Organize a team and play a key role in decision making with interpretation skills besides continuous learning*

### **Text Books:**

1. O.P. Khanna, Industrial Engineering and Management, 7<sup>th</sup> Edition, Dhanpat Rai & Sons, 2002.
2. Mortand Telsang, Production and Operating Management, 2<sup>nd</sup> Edition, S. Chand, 2006.

### **References:**

1. E.S. Buffa, Modern Production/Operation Management, 8<sup>th</sup> Edition, Wiley India, 2007.
2. Joseph G Monks, Operation Management, 3<sup>rd</sup> Edition, Tata McGraw Hill, 1987.

### **Mapping Of COs with POs:**

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

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*



**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY  
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**(14AAT02)AUTOMOTIVE TRANSMISSION**

**III B.Tech - I Sem (AE)**

<i>L</i>	<i>T</i>	<i>P</i>	<i>C</i>
<i>3</i>	<i>1</i>	<i>0</i>	<i>3</i>

**Objectives:**

*To make the students learn:*

- 1. Fundamentals of vehicle transmission system.*
- 2. About basic design principles of vehicle transmission system.*
- 3. About passenger car and commercial vehicle transmissions.*
- 4. About hydrodynamic clutches & torque converters in transmissions.*
- 5. About computer aided transmission development & management systems.*

**UNIT-I:**

**Vehicle Transmission System:** *Basic elements of vehicle and transmission engineering – systematic classifications of vehicle & vehicle use, why do vehicle need gear boxes, main & auxiliary functions of vehicle transmission, requirement profile, Interrelations – direction of rotation, transmission ratio, torque, road profile, load profile, typical vehicle uses & driver types, Fundamental performance features of vehicle transmissions – service life & reliability of transmission, centre distance characteristic value, gear box mass characteristic value, gear box cost characteristic value, transmission noise, gear box losses & efficiency, Transmission design trend.*

**UNIT-II:**

**Basic Design Principles Of Vehicle Transmission System:** *Arrangement of transmission in the vehicle – Passenger car, trucks & buses, 4 wheel drive passenger car, transverse & longitudinal dynamics with all wheel drive, Transmission format & design – transmission format, transmission design, Basic gearbox construction – shifting with power interruption, shifting*

*without power interruption, continuously variable transmission (CVT) without power interruption, Gear – Sets with fixed axles, counter shaft transmission & Epicyclic gears, Fundamental approach for part functions, evaluations –reverse gear.*

### **UNIT III**

**Passenger Car Transmissions:** *Manual passenger car transmissions, semi-automatic manual passenger car transmissions, fully automatic passenger car transmissions, continuously variable passenger car transmissions.*

**Commercial Vehicle Transmissions:** *Single-range transmissions, multi-range transmissions, practical design of 2 & 3 - range transmissions, semi – automatic manual commercial vehicle transmissions, fully – automatic commercial vehicle transmissions, continuously variable transmission for commercial vehicle.*

### **UNIT IV**

**Hydrodynamic Clutches & Torque Converters:** *Principles, hydrodynamic clutches & their characteristic curves, torque converters & their characteristic curves – the trilok converter, engine & torque converter working together – torque converter test diagram, interaction of engine & trilok converter, practical design of torque converter, engineering design, design principles for increasing efficiency – torque converter lock-up clutch, power split transmission.*

### **UNIT V**

**Engine & Transmission Management, Electronic & Information Networking:** *Overview of electronic systems in current use, engine management, Transmission control – automatic master/ gear shifting clutch, semi-automatic manual transmission, automatic gear selection, fully automatic transmission, adaptive gear shift strategy, continuous variable transmissions, Electrically controlled braking & traction system, safety concepts.*

**Computer-Aided Transmission Development, Driving Simulations:** *Driving simulations – extraneous factors, route data set, route data acquisition, Driving simulation programs – classifications, modular construction, Applications of driving simulation.*

## Outcomes:

*After completion of the course, the student will be able to:*

- 1. Demonstrate basic vehicle transmission systems.*
- 2. Apply basic design principles of vehicle transmission system to develop solutions for an automobile system.*
- 3. Classify driving simulation programs and develop computer aided transmission to fulfill the social obligations considering the customer satisfaction.*
- 4. Select suitable vehicle transmissions system to promote automobile system integration and synergy to attain industry long term goals and all around development by continuous learning.*
- 5. Judge proper engine and transmission management systems as a group to enhance IT skills.*

## Text Books:

- 1. Gisbert Lechner, “Automotive Transmission, Fundamentals, Selection, Design and Application”, Springer, New York.*
- 2. Newton and Steeds, “The Motor Vehicle”, Illiff Publisher.*

## References:

- 1. Design Practices, “Passenger Car Automotive Transmissions’, SAE Hand book.*
- 2. Hydrostatic transmissions for vehicle applications, I Mech E Conference.*

## Mapping of COs with POs:

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

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS), CHITTOOR.**

**(14AME21) BASIC DESIGN OF MACHINE ELEMENTS**

**III B.Tech - I Sem (AE)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**Objectives:**

To make the students learn:

1. Basics of strength and stresses in machine elements and manufacturing considerations in the design.
2. Design types of bearings, belts used in the industrial applications.
3. Design of riveted and welded joints of machine components
4. Design Principles in the cotter and bolted joints.
5. Design procedures to various springs and screws.

**UNIT I**

**STEADY STRESSES AND VARIABLE STRESSES IN MACHINE ELEMENTS:**

Introduction to the design process - factors influencing the machine design, selection of materials based on mechanical properties - Direct, Bending and torsional stress equations, Impact and shock loading, calculation of principle stresses for various load combinations, eccentric loading, Factor of safety, theories of failure, stress concentration, notch sensitivity, design for variable loading, Soderberg, Goodman and Gerber relations.

**UNIT II**

**BEARINGS:** Types of Journal bearings, Lubrication, Bearing Modulus, bearing materials, journal bearing Design, Design of Ball and roller bearings, Static loading of ball & roller bearings, bearing life, Failure of bearings, Lubricants and their properties.

**POWER TRANSMISSION:** Design of Flat belt drives, V-belt drives & rope drives. Selection of wire ropes, design of chain drives, types of gears and gear trains, simple problems.

**UNIT III**

**RIVETED JOINTS:** Types of riveted joints, design of riveted joints, boiler shell riveting, Eccentric loading of riveted joints.

**WELDED JOINTS:** Design of transverse and parallel fillet welded joints. Eccentric loading of welded joints.

**UNIT IV**

**COTTERS AND KNUCKLE JOINTS:** Design of Cotter joints, spigot and socket, sleeve and cotter, jib and cotter joints, and Knuckle joints.

**BOLTED JOINTS:**Forms of Screw threads, Stresses in Screw fasteners, Design of bolts with pre-stresses, Bolts of uniform strength, Eccentric loading of bolted joints.

## **UNIT V**

**MECHANICAL SPRINGS:** Stress and deflections of helical Springs, Energy storage capacity, Helical Torsion springs, Leaf springs, Coaxial springs.

**DESIGN OF POWER SCREWS:** Introduction, Torque required to raise and lower the load, Efficiency, overhauling and selflocking, stresses in power screws, design of screw jack.

### **Outcomes:**

After completion of the course, the student will be able to:

1. Summarize concepts of mechanics of materials to estimate the stresses in a machine element like shafts, keys, couplings, cotters, bolted, riveted, welded joints, bearing, power screws, springs and power transmission elements.
2. Choose suitable machine elements for different industry applications with model development and system approach.
3. Develop simple machine elements and analyze the impact of those on industry growth and customer satisfaction.
4. Design various machine elements with available resources, social concern and advanced technologies to attain quality standards and sustain in market.
5. Organize a project team to achieve goals and to promote higher learning & Research

### **Text Books:**

1. V.B. Bhandari, Machine Design, 3<sup>rd</sup> edition, Tata McGraw Hill, 2010.
2. R.S. Khurmi and Jk Gupta, Machine design, Hyderabad, 25<sup>th</sup> edition, S.Chand Publishers, 2014.

### **References:**

1. J. E. Shigley and C. R. Mischke, Mechanical Engineering Design, 6th ed., McGraw-Hill, New York, 2001. 5D.
2. T.V. Sundaramoorthy&N.Shanmugam, Machine Design, 6<sup>th</sup> edition, Scitech Publishers, 2010.

**Note:** Design data book is permitted to the internal and external examinations.

K. Balaveera Reddy, K. Mahadevan, Design Data Handbook for Mechanical Engineers in SI and Metric Units (English) 4th Edition CBS Publishers & Distributors, 2013.

***Mapping of Cos with POs:***

	<b><i>PO1</i></b>	<b><i>PO2</i></b>	<b><i>PO3</i></b>	<b><i>PO4</i></b>	<b><i>PO5</i></b>	<b><i>PO6</i></b>	<b><i>PO7</i></b>	<b><i>PO8</i></b>	<b><i>PO9</i></b>	<b><i>PO10</i></b>	<b><i>PO11</i></b>	<b><i>PO12</i></b>
<b><i>CO1</i></b>	2	1										
<b><i>CO2</i></b>		2	2				1	1				
<b><i>CO3</i></b>			3	2	1	2					1	
<b><i>CO4</i></b>			2		2	3	2			2		1
<b><i>CO5</i></b>								1	2	2	3	3

Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS), CHITTOOR.**

**(14AME22) THERMAL ENGINEERING AND HEAT TRANSFER**

**III B.Tech – I Sem (AE)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**Objectives:**

To make the students learn:

1. *Basic working principles of air compressors.*
2. *Different types of gas turbine operating cycles.*
3. *Basic mechanisms of heat transfer and physics of conduction.*
4. *Heat conduction in extended surfaces, fundamentals of natural and forced convection*
5. *Fundamentals of heat exchangers, condensation and boiling, basic concepts of thermal radiation heat transfer.*

**UNIT I**

**Air Compressors:** *Reciprocating Compressors, Effect of Clearance volume in Compressors, Volumetric Efficiency, Isothermal efficiency and Isentropic efficiency of reciprocating compressors Single Stage and Multi Stage Compressors, Effect of Inter cooling and Pressure Drop in Multi - Stage Compressors, Problems Related to Reciprocating Compressors, Working principles of Roots blower, Vane type Blower, Centrifugal Compressor.*

**UNIT II**

**Gas Turbines:** *Gas Turbines- general aspects, classifications, Operating Cycles-constant pressure combustion turbine-open cycle, closed cycle, and constant volume combustion turbines, gas turbine applications, advantages & disadvantages, methods for improvement of thermal efficiency of open cycle gas turbine plant.*

**UNIT III**

**Introduction:** *Basic modes and laws of heat transfer, thermal conductivity, steady state heat conduction, General conduction equation in Cartesian, Cylindrical and Spherical co-ordinates, initial and boundary conditions.*

**One- dimensional heat conduction:** *Heat flow through plane wall, cylinder and sphere with constant thermal conductivity, heat flow through composite slab and Cylinders, thermal resistance, simple problems.*

**UNIT IV**

**Extended surfaces:** *Types, applications, fin materials, heat transfer from fins with uniform cross section. Fin efficiency and Effectiveness.*

**Convection:** Dimensional analysis–Buckingham  $\pi$  Theorem and its application for developing semi – empirical non- dimensional correlations for convective heat transfer – Significance of non-dimensional numbers.

**Internal Flows:** Fully developed laminar flow in circular tubes

**Free Convection:** Development of Hydrodynamic and thermal boundary layer along a vertical plate.

## **UNIT V**

**Heat exchangers:** Classification and types of heat exchangers, Flow arrangement, Temperature distribution, and Overall heat transfer coefficient, Fouling factor, LMTD method of Heat exchanger analysis, Effectiveness –Heat transfer on flat plate and circular tubes. Simple problems

**Radiation:** Fundamentals of Radiation: Basic Concepts and definitions, Absorptivity, Reflectivity, Transmissivity, concept of Black body, Laws of Radiation- Kirchhoff's law, Planck's & Wien's law, Stefan Boltzmann's law.

### **Outcomes:**

After completion of the course, the student will be able to:

1. Classify air compressors, and gas turbines.
2. Distinguish between basic modes of heat transfer, and steady state heat transfer, free convection, types of heat exchangers, and basic laws of radiation.
3. Infer expressions for heat transfer systems and illustrate the application of heat transfer systems for real life problems related to industry.
4. Produce thermal systems which are eco-friendly by advanced technologies with optimal resources.
5. Judge the best thermal systems for attainment of long term goals with system integration and synergy to fulfill social obligations.

### **Text Books:**

2. R.S. Khurmi & J.K. Gupta, Thermal Engineering, S.Chand publications,.
3. R.K.Rajput, Heat and mass transfer, S Chand publications.

### **References:**

1. R.K.Rajput, Thermal Engineering, Lakshmi Publications (p) Ltd.
2. R.C. Sachdeva, Heat and Mass Transfer, New age publication.

**Note:** Heat transfer Data book by any author is allowed for all examinations.



***Mapping of COs with POs:***

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

Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS), CHITTOOR.**

**(14AME23) MECHATRONICS**

**III B.Tech - I Sem (AE)**

**L T P C  
3 1 0 3**

**Objectives:**

*To make the students learn:*

1. *The purpose & integration of multi-engineering systems.*
2. *Sensors and microprocessors in automobile.*
3. *Electrical, and Electronic devices and Actuators used in automobiles*
4. *Control and automation systems*
5. *Intelligent transportation and traffic routing system*

**UNIT – I**

**INTRODUCTION:** *Definition –Trends – purpose & integration of multi-engineering systems - Applications – Advantages– Control systems: Open loop, Closed loop, Automatic control, Sequential control systems.*

*Signals – Types of signals – Analog Interfacing - Digital Interfacing – Analog to Digital Conversion, Digital to analog conversion*

**UNIT – II**

**SENSORS AND MICROPROCESSORS IN AUTOMOBILE:**

*Introduction to measurements and sensors - Types of sensors – oxygen sensor, hot wire anemometer sensor, vehicle speed sensor, detonation sensor, accelerometer sensor, crank position sensor.*

*Microprocessor and Micro controller - Microcomputer controlled devices in automobiles - voice warning system, travel information system, keyless entry system, automatic transmission system, electronic steering system.*

**UNIT – III**

**ELECTRICAL AND ELECTRONICS ACTUATORS IN AUTOMOBILE:**

*Principle of operation of DC generator - EMF equation - principle of DC motor - DC brushed motor – DC brushless motors – stepper motors – DC servo motors - Relays and Solenoids, Circuit breakers.*

*Simple PN Junction Diodes, Zenor diode, Bipolar Junction transistor - Field Effect Transistors – UJT – SCR - Voltage regulator, over current sensing circuit, Electronics Ignition system, charging system and electronic fuel injection system.*

**UNIT – IV**

**FEEDBACK AND ADVANCED CONTROL FOR VEHICLE CONTROL SYSTEM:**

*Introduction- Basic Control modes- P, PI , PID Control - Control modes – Position , Velocity and Torque – Controlled Velocity Profiles – Trapezoidal – S-Curve - Electronic Gearing - Multi axis Interpolation – PTP control.*

*On-off controllers- Typical responses of feedback control systems- Digital Version of PID controllers - FeedForward control-Cascade control- Design considerations for cascade control, Time delay compensation, Inferential control- Nonlinear control- Adaptive control*

## **UNIT – V**

### **INTELLIGENT TRANSPORTATION SYSTEM:**

*Vehicle Information system- Trip Recorders- Parking systems- Analog and digital signal transmission- Automotive sound systems- Mobile and data radio- Mobile Information services- navigation system- Traffic telematics- Multimedia systems*

*Traffic routing system - Automated highway systems - Lane warning system – Driver Information System, driver assistance systems - Driver conditioning warning - Route Guidance and Navigation Systems- Hybrid / Electric and Future Cars*

### **Outcomes:**

*After completion of the course, the student will be able to:*

- 1. Describe the concept and usage of multi engineering systems.*
- 2. Summarize various sensors, actuators, microprocessors and feedback devices in automobile with realistic constraints to meet human comforts.*
- 3. Judge a better eco-friendly intelligent transportation and traffic system to attain sustainability in contemporary issues.*
- 4. Distinguish the traditional actuators, feedback and control systems with the modern technologies for developing the solutions in an automobile system.*
- 5. Formulate a project team to promote the system integration and enrichment of knowledge with continuous learning and career progress.*

### **Text Books:**

1. W. Bolton, Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering, Pearson Education Press, 3<sup>rd</sup> Edition, 2005.
2. Nadovich, C., “Synthetic Instruments Concepts and Applications”. Elsevier, 2005

### **References :**

1. Richard C. Dorf and Robert H. Bishop, Modern Control Systems, Pearson Prentice Hall, 2008.
2. Benjamin C. Kuo and Farid Golnaraghi, Automatic Control System, John Wiley & Sons,

Eight edition, 2003.

***Mapping of COs with POs:***

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

Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY**  
**(AUTONOMOUS),CHITTOOR.**

**(14AME15) METROLOGY & MACHINE TOOLS LAB**

**III B.Tech –I Sem (ME)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**(Common to ME & AE)**

**Objectives:**

1. *To understand the requirement of alignment tests on machine tools*
2. *To understand concept of tolerance system for machine components.*
3. *To understand the features and types of machine tools used in production floors.*
4. *To understand the tool movement under different operation conditions.*
5. *To understand the functional capabilities and involved economics of using the production machines.*

1. *Measurement of lengths, heights, diameters and bores by vernier calipers, micrometers and dial bore indicators etc.*
2. *Use of gear tooth vernier and checking the chordal addendum and chordal height of spur gear.*
3. *Alignment test on the lathe and milling machine, Finding the flatness of surface plate using spirit level.*
4. *Angle and taper measurements by Bevel protractor, Sine bars, etc.*
5. *Thread measurement by Two wire/ Three wire method.*
6. *Surface roughness measurement by Talysurf instrument.*
7. *Job on Step turning and taper turning on lathe machine.*
8. *Job on Thread cutting and knurling on -lathe machine.*
9. *Job on Drilling and Tapping.*
10. *Job on Shaping and Planning.*
11. *Job on Slotting.*
12. *Job on Milling.*

**Outcomes:**

After completion of the course, the student will be able to:

1. *Identify the suitable instrument to measure and inspect various mechanical elements.*

2. Judge the appropriate machine tool alignment test and trends in measuring machines.
3. Conduct an experiment which is eco-friendly to manufacture various engineering components on different machine tools with good quality and cost effectiveness.
4. Formulate a team to communicate effectively with the members to carry out the experiment in a better understanding pattern for lifelong learning and improving both the modern technicality and professional skills.

**Mapping of COs with POs:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO1	2	1		2								
CO2	1	2										
CO3		3	2			1	1	2				
CO4					1			1	2	2	2	3

Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY**  
**(AUTONOMOUS),CHITTOOR.**

**(14AHS16) Quantitative Aptitude and Reasoning -II**

**IIIB.Tech I SEMESTER**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>

**(Common to all Branches)**

**Objectives:**

The main objectives of this course are

1. To evaluate various real life situations by resorting to analysis of key issues and factors.
2. To understand various languages structures.
3. To demonstrate different principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
4. *To explore the possibilities of utilization of concepts of reasoning.*
5. *To interpret the given data graphically.*

**Syllabus for Quantitative Aptitude**

**Competency 1:**

1. **Area**
  - *Formulas for Areas*
  - *Problems on Areas*
2. **Volumes & Surface Areas**
  - *Problems on Volumes*
  - *Problems on Surface Areas*
3. **Races & Games of Skill**
4. **Calendars**
  - *Definition of a Leap Year*
  - *Finding the number of Odd days*
  - *Framing the year code for centuries*
  - *Finding the day of any random calendar date*
5. **Clocks**
  - *Finding the angle when the time is given*
  - *Finding the time when the angle is known*

- *Relation between Angle, Minutes and Hours*
- *Exceptional cases in clocks*

6. ***Stocks & Shares***

7. ***Permutation and Combinations***

- *Definition of permutation*
- *Problems on Permutations*
- *Definition of Combinations*
- *Problems on Combinations*

**Competency 2:**

8. ***Probability***

- *Definition of Probability*
- *Problems on coins*
- *Problems on dice*
- *Problems on Deck of cards*
- *Problems on Years*

9. ***True Discount***

10. ***Banker's Discount***

11. ***Heights & Distances***

12. ***Odd man out & Series***

- *Problems on number Odd man out*
- *Problems on letter Odd man out*
- *Problems on verbal Odd man out*

13. ***Data Interpretation***

- *Problems on tabular form*
- *Problems on Line Graphs*
- *Problems on Bar Graphs*
- *Problems on Pie Charts*

**Syllabus for Reasoning**

**Competency 3:**

***Deductions***

- Finding the conclusions using Venn diagram method*
- Finding the conclusions using syllogism method*

***Connectives***



- Definition of a simple statement*
- Definition of compound statement*
- Finding the Implications for compound statements*
- Finding the Negations for compound statements*

**Competency 4:**

**Analytical Reasoning puzzles**

- Problems on Linear arrangement*
- Problems on Circular arrangement*
- Problems on Double line-up*
- Problems on Selections*
- Problems on Comparisons*

**Competency 5:**

**Blood relations**

- Defining the various relations among the members of a family*
- Solving Blood Relation puzzles*
- Solving the problems on Blood Relations using symbols and notations*

**Outcomes:**

After completion of the course the student will be able to

1. *Strengthen their ability to meet the challenges in solving real life problems.*
2. *The student will preserve maturity of the mind in solving linguistic problems.*
3. *Develop the thinking ability and apply Quadratic equations.*
4. *Apply the Analytical Reasoning puzzles to solve linear and circular arrangements*
5. *Analyze the blood relation puzzles in a family tree.*

**Text Books:**

1. *GL Barrons, TataMcGraw Hills, 'Thorpe's Verbal reasoning', LSAT Materials.*
2. *R S Agarwal, 'A Modern approach to Logical reasoning' , S chand Company Ltd 2002.*

**Reference Books:**

1. *AbhjitGuha 'Quantitative Aptitude' Tata McGraw Hill, 4<sup>th</sup> Edition, 2011.*
2. *R S Agarwal, 'Quantitative Aptitude' S.Chand Company Ltd 2008.*
3. *G.L BARRONS 'Quantitative Aptitude' .TataMcGraw Hill.*

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AME29) OPERATIONS RESEARCH**

**III B.Tech - II Sem (ME)**

**L T P C**  
**3 1 0 3**

**(Common to ME& AE)**

**Objectives:**

To make the student learn:

1. *Mathematical modeling for real life situations.*
2. *A variety of qualitative and quantitative methods to solve industrial problems.*
3. *The concept of replacement and game theory.*
4. *The deterministic and stochastic behavior of systems and apply appropriate solution methodology.*
5. *Waiting line models and its application to industrial problems.*

**UNIT – I**

**Introduction to Operation Research:** Development, definition, characteristics and phases, types of Operation Research models, applications.

**Allocation methods:** Linear Programming problems formulation, graphical solution, simplex method, Big – M method, two phase technique, Duality principle.

**UNIT – II**

**Transportation and Assignment Models:** Formulation, Optimality, unbalanced transportation problems, Applications and assignment models.

**Sequencing:** flow shop sequencing - N jobs 2 machines, N jobs 3 machines, job shop sequencing - 2 jobs M machines, Traveling salesmen problem.

**UNIT – III**

**Replacement models:** Introduction, Replacement of items that deteriorate with time when money value is not considered and considered, Replacement of items that fail completely, group replacement.

**Theory of games:** minimax and maxmini criteria, evolving strategies, pure and mixed strategy, game with saddle point, dominance principle,  $2 \times n$  and  $m \times 2$  games with graphical methods.

**UNIT – IV**

**Inventory models:** Elements of inventory costs, Basic EOQ model single stage static and deterministic models, infinite production rate and uniform demand with and without shortage, and finite production rate uniform demand with and without shortages, price break models. Stochastic and single period models with no setup costs, demand random variable, both continuous and discrete, Multi period deterministic models using Dynamic Programming, simulation of inventory system

## UNIT – V

**Queuing system:** Basic elements of queuing – Kendall Lee notation, single channel Poisson arrivals, exponential service times infinite queuing models.

Multichannel, Poisson queues and exponential service time, infinite queues, simulation of queuing systems

### Outcomes:

After completion of the course, the student will be able to:

1. Summarize various LPP, TPP, AP, sequencing, replacement, game theory, inventory models, queuing models of operations Research.
2. Illustrate the application of OR models to identify solutions to industry.
3. Identify the optimum solutions with system approach to both industry and service sector.
4. Judge the advanced software tools for decision making with available sources for cost reduction and profit maximization with society concern.
5. Develop a team and play a key role in decision making with interpretation skills for all round development of organization.
6. Enrich managerial skills & knowledge to achieve goals of industry with continuous learning

### Text Books:

1. Taha, Introduction to Operations Research, New Delhi, 8<sup>th</sup> Edition, Printice Hall International Publisher.
2. Prem Kumar Gupta & D. S. Hira, Operations Research, S Chand publishes.

### References:

1. R.Panneerselvam, Operations Research, New Delhi, 2<sup>nd</sup> Edition, Printice Hall International Publisher, 2006.
2. S. D. Sharma, Himanshu Sharma, Operations Research: Theory, Methods and Applications, Kedarnath Ramnath Publishers.

### Mapping Of COs with POs:

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

Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND  
TECHNOLOGY (AUTONOMOUS), CHITTOOR**

**(14ACS31) BASIC COMPUTER GRAPHICS**

**III B.Tech-II Sem (AE)**

**L T P C**  
**0 0 4 2**

**(COMMON TO ME&AE)**

**(CHOICE BASED CREDIT COURSE, INTER-DEPARTMENTAL)**

**Objectives:**

The objective of this course is to make students to:

1. Understand basic concepts and applications of Computer graphics
2. Understand the design of algorithms for generating geometric shapes.
3. Be able to acquire the 2D geometric transformations.
4. Apply the 3D geometric transformations.
5. Understand and demonstrate computer graphics animations.

**UNIT I**

**Introduction:** Basic concepts, Application areas of Computer Graphics, overview of graphics systems - video-display devices, raster-scan systems, random scan systems, input devices, Hard copy devices.

**UNIT II**

**Output primitives:** Points and lines, line drawing algorithms – DDA, Bresenham's, mid- point circle algorithms, Filled area primitives - Scan line polygon fill algorithm, inside-outside tests, boundary-fill and flood-fill algorithms.

**UNIT III**

**2-D geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

**2-D viewing:** The viewing pipeline., window to view- port coordinate transformation, viewing functions, Cohen-Sutherland line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

**UNIT IV:**

**Three Dimensional Concepts:**3-D object representation: Polygon surfaces, Curved lines and surfaces, quadric surfaces, spline representation, Bezier curve and surfaces.

**3-D Geometric transformations:** Translation, rotation, scaling, reflection and shear transformations, composite transformations.

**UNIT V: Computer animation:** Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

**OUTCOMES:**

At the end of the course the student will be able to:

1. Understand the functions and operations of display hardware and associated devices.
2. Design an algorithms to render different geometric shapes like line, circle.
3. Perform transformations (rotation, scaling, translation, and shearing) on geometric 2D.
4. Design 3D transformations.
5. Implement animation technique using micro and media flash.

**TEXT BOOKS:**

1. Donald Hearn and M.Pauline Baker, "Computer Graphics C version", Pearson Education.
2. Foley, VanDam, Feiner and Hughes, "Computer Graphics Principles & practice", second edition in C, Pearson Education.

**REFERENCEBOOKS:**

1. Steven Harrington, "Computer Graphics", TMH
2. Zhigandxiang, Roy Plastock, Schaum's outlines, "Computer Graphics Second edition", Tata Mc- Graw hill edition.

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AEE41) SENSORS AND ACTUATORS**

**III B.Tech - II Sem (ME)**

**L T P C**  
**3 1 - 3**

**(Common to ME & AE)**

**(Choice Based Credit Course, Inter-Departmental)**

**Objectives:**

4. To Understand the fundamentals of sensors and actuators
5. To develop the knowledge in detail about the Pneumatic and Hydraulic Systems
6. To know about the various schemes of chemical and radiation sensors
7. To study the schemes suitable for Magnetic and Electromagnetic sensors and Actuators
8. To study the principle of micro level sensors and actuators with examples.

**UNIT-I**

**Introduction:** Classification of sensors and actuators, sensing and actuating strategies, general requirements for interfacing and actuation. Amplifiers: Operational amplifiers, power amplifier, Bridge circuits, Interfacing to microprocessors, data transmission, Excitation methods and circuits, Power requirements, signal translation, Isolation ,Interference & compensation.

**UNIT-II**

**Pneumatic and Hydraulic systems:** Actuators- Definition, Example, types, selection, Pneumatic Actuator. Electro- Pneumatic Actuator, Hydraulic actuators, Control Values, Valve Sizing, valve selection. Piezoelectric Actuator, Characterization, operation and fabrication, shape memory alloys.

**UNIT-III**

**Chemical and Radiation sensors:** Chemical sensors- Electrochemical, Thermo actuators, Radiation Sensors :Ionization detectors, scintillation detectors, microwave sensors (resonant, reflection, transmission),Antennas as sensors.

**UNIT-IV**

**Magnetic and Electromagnetic sensors and Actuators:** Motors as actuators (Linear, Rotational, stepping Motors), Magnetic valves, inductive sensors (Eddy current, LVDT,RVDT, Proximity), Magneto resistive sensors, magnetostrictive sensors and actuators, Magnetometers (Flux gate, search coil , squid), Bolometers (Microwaves)

**UNIT-V**

**Micro Sensors and Actuators:** Principles and examples , Force and Pressure Micro Sensors , Position and Speed Micro Sensors, Acceleration Micro sensors, Bio Sensors, Temperature Micro Sensors and Flow Micro Sensors. Micro Actuators : Actuation Principle , Shape memory Effects- One way, Two way and Pseudo Elasticity. Types of Micro Actuators , Electrostatic , Magnetic , Fluidic,Inverse Piezo Effect.

**OUTCOMES:**

After completion of the course the student will be able to

1. Apply the principles and applications of Sensors and actuators
2. Use Pneumatic and Hydraulic actuator systems
3. Select chemical and radiation sensors for various applications.
4. Design different types of Magnetic and Electromagnetic sensors and Actuators
5. Apply various Micro sensors and Actuators for different applications.

**Text Book:**

- 1.D.Patranabis “ Sensors and Transducers “ 2<sup>nd</sup> Edition, PHI publications, Newdelhi,2004
2. Mechanical Measurements: Shomar G.Beckwith,Nelsons Lewis Buck, Roy D.Marangoni,Addison-Wesley Publications Co 1982-Technology and Engineering

**Reference Book:**

1. A.k.Sawhney “Electrical and Electronic Measurements and Instrumentation” Danapat Rai and Co, 19<sup>th</sup> Revised Edition-2011.
2. H.Meixnev,R.Kobler “ Introduction to Pneumatics: Text book for Festo Basic Training course”

**Mapping Of COs with POs:**

COURSES	PROGRAM OUTCOMES											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1				✓			✓		✓			✓
CO2		✓		✓		✓	✓		✓	✓		✓

<i>C03</i>				✓								✓
<i>C04</i>				✓			✓	✓	✓			✓
<i>C05</i>				✓			✓	✓	✓			✓



**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)**

**(14AME57) ROBOTICS**

**III B.Tech- II Sem (ME)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(Common to CSE, EEE & AE)  
(Choice Based Credit Course, Inter-Departmental)**

**Objectives:**

To make the students learn:

1. *The basic concepts of robots.*
2. *The various robot drives and power transmission systems.*
3. *The fundamentals of robot sensors and its vision system.*
4. *The concept of arm kinematics and Programming Languages.*
5. *The applications of robot in various fields.*

**UNIT I**

**INTRODUCTION TO ROBOTICS:** Automation versus Robotic technology, Laws of robot, Progressive advancements in Robots, Robot Anatomy, Classification of robots-coordinate method, control method; Specification of robots.End Effectors: Classification of End effectors – Tools as end effectors, Mechanical-adhesive-vacuum-magnetic-grippers.

**UNIT II**

**ROBOT ACTUATORS AND MOTION CONVERSION SYSTEMS:** Robot Actuators-hydraulic,pneumatic and electric, its comparison, Motion Conversion: Rotary-to-Rotary motion conversion- Gears, Harmonic Drives, Belt-and- pulley systems, Rotary-to-Linear motion conversion- Lead screws, Rack and Pinion systems, cams.

**UNIT III**

**ROBOTIC SENSORS:** Meaning of sensing, selection of sensor for a robot, types of sensors - Position sensors, range sensors, velocity sensors, touch sensors, force and torque sensors.  
**ROBOT VISION-** Block diagram of vision system, lighting techniques and devices, analog to digital conversion, Image storage, Image processing and Analysis, Object recognition, Feature extraction.

**UNIT IV**

**ROBOT ARM KINEMATICS:** Homogeneous transformations, Basics of forward kinematics, Inverse kinematics.

**ROBOT PROGRAMMING:** Requirements of good programming language,Types of Robot programming,Robot programming languages and features- AL, AML, RPL, and VAL.

**UNIT V**

**ROBOTIC APPLICATIONS:** Present applications-Material Transfer, Material handling, loading and unloading, processing, welding, spray painting, Assembly and Inspection; Future applications.

**Outcomes:**

*After completion of the course, the student will be able to:*

1. Describe the basic concepts of robotics.
2. Summarize the perception about robot components and programme in industry.
3. Select the type of robot eco-friendly for typical manufacturing industry and service sector.
4. Analyze the manipulator kinematics, dynamics and trajectory planning for typical robot with the usage of computer aided technology to develop automotive components
5. Choose a program that the robot can integrate with the manufacturing system to produce quality products with minimum cost with optimum usage of resources.
6. Formulate a project team to promote the system integration and enrichment of knowledge with continuous learning and career progress.

### **Text Books**

1. Richard D.Klafter, *Robotics Engineering, Bangalore, New Delhi, Prentice Hall, Eastern Economy Edition, 1989.*
2. R.K. Mittal & I.J.Nagrath, *Robotics and Control, New Delhi, 3<sup>rd</sup> Edition, Tata McGraw Hill, 2007.*

### **References:**

1. Ganesh S. Hegde, *Industrial Robotics, Lakshmi Publications (P), LTD*
2. M.P. Groover, *Industrial Robotics, New Delhi, Tata McGraw Hill, 2008.*

### **Mapping Of COs with POs:**

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

Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AAT04) VEHICLE DYNAMICS**

**III B.Tech-II Sem (AE)**

**L T P C  
3 1 0 3**

**Objectives:**

To make the students learn:

1. *About forward vehicle dynamics principles.*
2. *About the tire dynamics.*
3. *About driveline dynamics.*
4. *About steering dynamics.*
5. *About suspension mechanisms.*

**UNIT I**

**FORWARD VEHICLE DYNAMICS:**

*Parked car on a level road, Parked car on an inclined road, accelerating car on a level road, accelerating car on an inclined road, parked car on a banked road, optimal drive and brake force distribution, vehicles with more than two axles, vehicles on a crest and dip.*

**UNIT II**

**TIRE DYNAMICS:**

*Tire coordinate frame and tire force system, tire stiffness, effective radius, tire print forces of a static tire – static tire, normal stress, static tire, tangential stresses, rolling resistance – effect of speed on the rolling friction coefficient, effect of inflation pressure and load on the rolling friction coefficient, effect of sideslip angle on rolling resistance, effect of camber angle on rolling resistance.*

**UNIT III**

**DRIVELINE DYNAMICS:**

*Engine dynamics, driveline and efficiency, gear box and clutch dynamics, gear box design-geometric ratio gear box design, progressive ratio gear box design.*

**UNIT IV**

**STEERING DYNAMICS:**

*Kinematic steering, vehicles with more than two axles, vehicle with trailer, steering mechanisms, four wheel steering, road design, steering mechanisms optimization, trailer-truck kinematics.*

**UNIT V**

**SUSPENSION MECHANISMS:**

*Solid axle suspension, independent suspension, roll center and roll axis, car tire relative angles – toe, caster angle, camber, thrust angle, suspension requirements and coordinate frames – kinematic requirements, dynamic requirements, wheel, wheel-body, and tire coordinate frames.*

**Outcomes:**

After completion of the course the student will be able to:

1. Use forward vehicle dynamics principles.
2. Apply tire dynamics efficiently.
3. Implement the driveline dynamics.
4. Use steering dynamics.
5. Develop suspension mechanisms.

**Text Books:**

1. Reza N. Jazar, *Vehicle Dynamics*, Springer publications.
2. Rao V. Dukkipati, *Vehicle Dynamics*, CRC press, London.

**References:**

1. Gillespie T.D, "Fundamentals of Vehicle Dynamics", SAE USA.
2. Ellis. J.R - "Vehicle Dynamics"- Business Books Ltd., London.

**Mapping Of COs with POs:**

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

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY**  
**(Autonomous), Chittoor**

**(14AAT05) VEHICLE BODY ENGINEERING**

**III B.Tech-II Sem (AE)**

**L T P C**  
**3 1 0 3**

**Objectives:**

To make the student learn:

1. The basic design and material utilization of vehicle body.
2. Details of alternative body architecture.
3. About the materials for consideration.
4. About the ergonomics and packing of vehicle body.
5. About the corrosion and protection of the automotive structure.

**UNIT- I**

**DESIGN AND MATERIAL UTILIZATION:**

*Body zones and terminology, distinction between body-on-chassis and unitary architecture, early materials and subsequent changes, finite element analysis – materials for auto bodies, one manufacturers approach to current design – product requirements, structural dynamics, design for static stiffness, crashworthiness, weight efficiency. Brief treatment of Aerodynamics.*

**UNIT-II**

**ALTERNATIVE BODY ARCHITECTURE:** *The unitary aluminum body, the pressed super frame concept-steel, pressed aluminum super frames & associated designs, the ASF aluminum super frames utilizing castings and profiles, examples of hybrid material designs, design based on carbon fiber or CFRP, magnesium, integration of materials into designs – general, other materials used in body design, engineering requirements for plastic and composite components.*

**UNIT- III**

**MATERIALS:**

*Material candidates and selection criteria, steel – steel reduction and finishing processes, surface topography, effects in processing ,higher strength steels, aluminum-production process, alloys for use in body structures, polymers and composites-thermoplastics, thermosets, polymer and composite processing, advanced composites for competition cars, repair.*

**UNIT- IV**

**ERGONOMICS AND PACKING:**

*Hints on physiology-backbone, joints, effects of the vibrations on the comfort, manikins for interior pacing-two dimensional manikins, three dimensional manikins, pedals functionally and postponing-wheels arch dimensions, pedals, interior pacing-front row driver's position, steering wheel, seat and steering wheel adjustment, rear rows, seat characteristics-static comfort, comfort under dynamic loads, loading and un loading.*

## **UNIT- V**

### **CORROSION AND PROTECTION OF THE AUTOMOTIVE STRUCTURE:**

*Introduction, relevant corrosion processes-corrosion of aluminum and other non ferrous body materials, mechanism of paint degradation, effective design principles-styling, sub assemblies, panels, materials used for protection of the body structure-zinc coated steels-types and use for automotive construction, painting of the automotive body structure, environmental improvements in the automotive paint process, supplementary protective systems, Introduction to electrochemical methods.*

### **Outcomes:**

After completion of the course, the student will be able to:

- 1. Determine alternative body architectures to solve industry problems.*
- 2. Design the vehicle bodies with optimum material utilization.*
- 3. Select best suitable materials for vehicle bodies to satisfy the customer.*
- 4. Devise vehicle bodies ergonomically in teams to overcome social issues.*
- 5. Produce automotive structures which are anticorrosive to promote research in a group.*

### **Text Books:**

- 1. Geoffrey Davies, Materials for Automobile Bodies, Butterworth–Heinemann is an imprint of Elsevier.*
- 2. Lorenzo Morello, Lorenzo Rosti Rossini, Giuseppe Pia, Andrea Tonoli, The Automotive Body, Volume II : system design, Springer Publication.*

### **References:**

- 1. J.Powloski - Vehicle Body Engineering - Business Books Ltd, London.*
- 2. Heinz Heisler, Advanced Vehicle Technology, 2nd edition, Butterworth–Heinemann.*

### **Mapping Of COs with POs:**

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

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS), Chittoor**

**(14AAT06) TWO AND THREE WHEELER**

**III B.Tech – II Sem (AE)**

**L T P C  
3 1 0 3**

**Objectives:**

*To make the students learn:*

1. *Basic systems & engine of two wheelers.*
2. *The functioning of transmission, steering and suspension systems.*
3. *Brake, wheel, tyre, frame and body for two wheelers.*
4. *Electrical systems, instruments & two wheeler dynamics.*
5. *Three wheeler layouts, types, chassis details with body.*

**UNIT-I**

**Introduction to Two Wheeler:**

*Classification & layouts of two wheelers (motorcycles, scooters, mopeds), Basic Systems – The frame, wheels & brakes, suspensions, engine, drive train, fuel system, ignition, electrical system.*

**Two Wheeler Engine:**

*Selection criteria for engine – Type of vehicle, Load carrying capacity, required power output, maximum speed, space availability, location of engine, BSFC of engine, number & diameter of cylinders, power per liter. Design considerations for engine – piston, piston rings, pin, connecting rods, crank shaft, poppet valve, cylinder head, cylinder block, camshaft, rocker arms, and crankcase.*

**UNIT - II**

**Transmission Systems:**

*Primary reduction, Clutch – different types, Gear box – constant mesh gearbox, sequential gearbox, gear shift mechanism – hand operated, foot operated, Continuous Variable Transmission - CVT, final drive – belt, chain and shaft drive.*

**Steering & Suspension:**

*Steering geometry, steering column construction, Suspension requirements, design considerations, spring & shock absorber, trailing & leading link, telescopic suspension, single link, double link type front suspension, hardtail, swing arm type rear suspension.*

**UNIT-III**

**Brake, Wheel & Tyres:**

*Design considerations for brake, types of brakes – drum, disc, mechanical brake control system, hydraulic brake control system, master cylinder, Anti-lock braking system (ABS). Wheel – spoked, pressed steel, alloy. Tyres - requirements & designation of tyres, types – cross ply, radial ply, with tube & tubeless tyres.*





<i>C03</i>		2	3	3	2	2	3	2				2
<i>C04</i>			2	2			3	2	3	2	3	
<i>C05</i>					2	2			2	3	3	3

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS), Chittoor**

**(14AAT07) VEHICLE MAINTENANCE**

**III B.Tech – II Sem (AE)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**Objectives:**

To make the students learn:

1. The basics of the various maintenance schedules and work shop records.
2. The repair and overhauling of engine.
3. The repair and maintenance of chassis of vehicles.
4. The maintenance of electrical system.
5. The trouble shooting of various systems of vehicles such as fuel, cooling systems.

**UNIT I**

**MAINTENANCE OF RECORDS AND SCHEDULES:** Importance of maintenance, preventive (scheduled) and break down (unscheduled) maintenance, requirements of maintenance, and preparation of check lists. Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

**UNIT II**

**ENGINE MAINTENANCE – REPAIR AND OVERHAULING:** Dismantling of engine components and cleaning, cleaning methods, visual and dimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance, overhauling, engine tune up.

**UNIT III**

**CHASSIS MAINTENANCE – REPAIR AND OVERHAULING:** Mechanical and automobile clutch and gear box, servicing and maintenance servicing of propeller shaft and differential system. Maintenance, servicing of suspension system. Brake systems, types and servicing techniques. Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

**UNIT IV**

**ELECTRICAL SYSTEM MAINTENANCE – SERVICING AND REPAIRS:** Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generators and alternators, ignition system, lighting system. Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments

**UNIT V**

**MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VEHICLE BODY:** Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply. Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives. Lubrication maintenance,

*lubricating oil changing, greasing of parts. Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.*

**Outcomes:**

After completion of the course the student will be able to:

1. *Summarize the basic concepts of records of work shop, engine, chassis, electrical, fuel, lubrication, and cooling systems.*
2. *Illustrate the functioning of major parts of the vehicle to solve the problems in the automotive industry.*
3. *Examine the functioning of automobile system to identify errors in given criteria in an optimal way using innovative design.*
4. *Select the suitable engine, chassis, electrical, fuel, lubrication, and cooling systems to meet desired specifications and requirements of society.*
5. *Validate and execute the projects as a team on vehicle systems to promote research.*

**Text Books:**

1. *Jigar A Doshi, Dhruv U. Panchal, Jayesh P. Maniar, Vehicle Maintenance and Garage Practice, PHI.*
2. *Ramalingam K. K, Automobile Engineering, SciTech Publications Pvt. Ltd.*

**References:**

1. *Joseph Heitner, Automotive Mechanics Principle and Practice East west press.*
2. *Amitosh De Automobile Engineering, Galgotia Publishers Pvt Ltd.*

**Mapping Of COs with POs:**

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

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING &  
TECHNOLOGY  
(AUTONOMOUS), Chittoor**

**(14AAT08) VEHICLE MAINTENANCE AND RECONDITIONING LAB**

**III B.Tech – II Sem (AE)**

**L T P C  
0 0 4 2**

**Objectives:**

To make the students learn:

1. *The types of layouts and records to be maintained for maintenance works of automobiles.*
2. *The concept and need of re-boring and tuning of IC engines.*
3. *The features of valves and their functioning.*
4. *The brake adjustment and brake bleeding*
5. *The concept of wheel alignment with toe-in and toe-out and battery maintenance.*

**LIST OF EXPERIMENTS**

1. Study the layouts of an automobile repair, service and maintenance shops.
2. Study and preparation of statements/records required for the repair and maintenance works.
3. Cylinder re-boring – Tooling, Method of machining and inspection.
4. Valve grinding, valve lapping - checking for valve leakage
5. Calibration of fuel injection pump.
6. Minor and major tune up of gasoline and diesel engines.
7. Study and checking of wheel alignment - testing of camber, caster.
8. Testing kingpin inclination, toe-in and toe-out
9. Brake adjustment and Brake bleeding.
10. Tinkering, soldering works of body panels, Study of door lock and window glass rising mechanisms.
11. Battery testing and maintenance.

**Outcomes:**

After completion of the course, the student will be able to:

1. *Use appropriate layout and records to be maintained for maintenance works of all automobiles.*
2. *Design inspection procedures of re-boring and reconditioning of automobiles.*
3. *Select the appropriate valve angle settings and arrest valve leakage.*
4. *Know how to do the brake adjustment and brake bleeding for an automobile.*
5. *Recommended wheel alignment and maintenance of battery for trouble free service.*

**Mapping Of COs with POs:**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	✓	✓		✓			✓				✓	

CO2			✓					✓				✓
CO3		✓	✓			✓	✓	✓				✓
CO4		✓		✓				✓			✓	✓
CO5	✓			✓		✓	✓				✓	

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR  
(14AAT09) ENGINE PERFORMANCE AND EMISSION TESTING LAB**

**III B.Tech-II Sem (AE)**

**L T P C  
0 0 4 2**

**Objectives:**

*To make the students learn:*

5. *The properties of fuels which are used in I.C. engines.*
6. *The working principle, components of different types of engines, compressors, refrigeration and air conditioning systems.*
7. *The frictional power of an I.C. engine and experimental procedures to determine the frictional power.*
8. *Calculation of the various efficiencies of engine and compressor.*
9. *Experimental procedures to determine the COP of refrigeration and air conditioning systems.*

**List of Experiments:**

1. Determination of Flash point and Fire point of petrol/diesel using Abel's/Pensky Marten's apparatus.
2. Determination of Viscosity of lubricating oil using Redwood Viscometer and Say bolt Viscometer.
3. Study of Bomb and Junker's gas calorimeter to determine the Calorific value of fuels.
4. Study of the constructional details & working principles of two-stroke/ four stroke petrol/diesel engine and to draw Port and Valve Timing Diagram of an I.C. Engine
5. Performance test and Preparation of Heat balance sheet on 4-stroke, single cylinder diesel engine test rig
6. Retardation test on 4-stroke, single cylinder diesel engine test rig
7. Morse test on 4-stroke, 4- cylinder petrol engine test rig
8. Performance and emission test on 2- stroke, single cylinder petrol engine test rig
9. Economical speed test on 4-stroke, single cylinder petrol engine
10. Performance test on refrigeration test rig
11. Performance test on computerized air condition test rig.
12. Performance test on two stage reciprocating Air compressor
13. Determination of air fuel ratio & volumetric efficiency with variable compression ratio engine on 4-stroke, single cylinder petrol engine test rig
14. Performance, combustion and Emission test on computerized 4-stroke, single cylinder diesel engine test rig.

**Note:** *Minimum of 12 Experiments need to be performed*

**Outcomes:**

*After completion of the course, the student will be able to:*

1. *Demonstrate the working with different equipment to test the properties of fuels like flash point, fire point and calorific values and components of different types of*

- engines, compressors, refrigeration and air conditioning systems to analyze industry related problems.*
2. *Conduct experiments on flash point, fire point apparatus, calorimeters, different types of engines, compressors, refrigeration & air-conditioning systems to develop innovative solutions and produce quality products.*
  3. *Operate flash point, fire point apparatus, calorimeters, different types of engines, compressors, refrigeration & air-conditioning systems to enhance research.*
  4. *Construct flash point, fire point apparatus, calorimeters, different types of engines, compressors, refrigeration & air-conditioning systems to promote system integration & synergy in order to execute small & large scale projects.*

***Mapping Of COs with POs:***

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

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AME32) TOTAL QUALITY MANAGEMENT IN MECHANICAL  
ENGINEERING**

**III B.Tech - II Sem (ME)**

**L T P C**  
**3 - - -**

**(COMMON TO AE & ME)**  
**(Audit course)**

**Objectives:**

To make the students learn:

1. The developments in tools of quality and their impact on production.
2. Comprehending the ISO 9000 and ISO 14000 series of quality standards.
3. Recognize the use of non statistical and statistical tools in real life situations.
4. The application of value improvement elements and six sigma.
5. The reliability concepts associated with the quality management system

**UNIT I**

**TQM:** Overview, concepts, elements, History-Quality management philosophies-Juran, Deming, Crosby, Feigenbaum, Ishikawa, Stages of Evolution, continuous improvement, objectives, internal and external customers.

**QUALITY STANDARDS:** Need of standardization, Institutions, bodies of standardization, ISO 9000 series – ISO 14000 series, ISO certification process, Third party audit.

**UNIT II**

**PROCESS MANAGEMENT:** Quality Measurement Systems (QMS), developing and implementing QMS, TQM tools & techniques- 7 QC tools, 7 New QC tools.

**PROBLEM SOLVING TECHNIQUES:** Problem Solving process, corrective action, order of precedence, fault tree analysis, failure mode assessment and assignment matrix.

**UNIT III**

**QUALITY CIRCLES:** Organization, statistical process control, process chart, Ishikawa diagram, preparing and using control charts.

**QUALITY FUNCTION DEVELOPMENT (QFD):** Elements of QFD, benchmarking-Types, Advantages & limitations of benchmarking, loss function, Taguchi design of experiments, Poka-yoke, Kaizen, Deming cycle.

**UNIT IV**

**VALUE IMPROVEMENT ELEMENTS:** Value improvement assault, supplier teaming, Business process reengineering, elements of supply chain management.

**SIX SIGMA APPROACH:** Application of six sigma approach to various industrial situations.



## **UNIT V**

**Fundamental concepts of Reliability:** Reliability definitions, failure, failure density, failure Rate, hazard rate, Mean Time To Failure (MTTF), Mean Time Between Failure (MTBF), maintainability, availability, pdf, cdf, safety and reliability, quality, cost and system effectiveness, life characteristic phases, modes of failure, areas of reliability, quality and reliability assurance rules, product liability, importance of reliability.

### **Outcomes:**

*After completion of the course, the student will be able to*

1. Summarize TQM concepts with quality standards, tools, value addition and reliability concept.
2. Select the best solution for problem solving in QC tools, QFD model and in reliability.
3. Solve industry problems with available sources, software tools, modern TQM techniques with system approach.
4. Judge the solutions to sustain customer trust-worth-ship besides industry growth.
5. Organize a team and play a key role in decision making with interpretation skills besides continuous learning

### **Text Books:**

1. Dale H. Besterfield, C.Besterfield Michno & et.al., *Total Quality Management, New Jersey, 3<sup>rd</sup> Edition, Pearson Edition, 2010.*
2. Senthil Arasu & J. Praveen Paul, *Total Quality Management, Chennai, 4<sup>th</sup> Edition, SciTech Publishers, 2007.*

### **References:**

1. *Hand Book, John Hradesky, Total Quality Management, 1<sup>st</sup> Edition, Tata McGraw Hill Professional, 1994.*
2. *A Road map to quality, WWW.unido.org. Australia, 2012.*

### **Mapping Of COs with POs:**

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

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND  
TECHNOLOGY (AUTONOMOUS), CHITTOOR**

**(14AAT10) AUTOMOTIVE ELECTRICAL SYSTEMS AND AUTOTRONICS**

**IV B.Tech - I Sem (AE)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**Objectives:**

To make the students learn:

1. *The basic electrical and electronic principles.*
2. *The basic knowledge of microprocessor systems & sensors.*
3. *About electrical systems & circuits.*
4. *Various engine management systems.*
5. *About vehicle instrumentation systems.*

**UNIT – I**

**ELECTRICAL AND ELECTRONIC PRINCIPLES:**

*Electronic components and circuits – introduction, components, integrated circuits, amplifiers, bridge circuits, timers, filters, darlington pair, stepper motor driver, digital to analog conversion, analog to digital conversion, Digital electronics –introduction to digital circuits, logic gates, memory circuits. Safe working practices, - introduction, risk assessment and reduction.*

**UNIT – II**

**MICROPROCESSOR SYSTEMS& SENSORS:**

*Introduction, port, central processing unit (CPU), memory, buses, fetch-execute sequence, a typical microprocessor, microcontrollers, testing microcontroller systems, programming, Measurement – measurement system, sources of error in measurement, Sensors – thermistors, thermocouples, inductive sensors, hall effect, strain gauges, variable capacitance, variable resistance, accelerometer, LVDT, hot wire air flow sensor, thin film air flow sensor, vortex flow sensor, turbine flow sensor, optical sensor, oxygen sensor, light sensor, methanol sensor, oil sensor, dynamic vehicle position sensor.*

## **UNIT – III**

**ELECTRICAL SYSTEMS & CIRCUITS:** *Electrical wiring, terminals & switching – cables, colour codes and terminal designations, printed circuits, fuses and circuit breakers, terminations, switches, Multiplexing – limits of the conventional wiring system, multiplex data bus, controller area network (CAN), CAN data signal, local interconnect network (LIN), Media oriented systems transport (MOST) – MOST network, protocol, MOST applications, consumer device gateway, automotive ethernet, Circuit diagrams and symbols – symbols, conventional circuit diagrams, layout or wiring diagrams, terminal diagrams, current flow diagrams.*

## **UNIT – IV**

**ENGINE MANAGEMENT:** *Combined ignition and fuel introduction – variable inlet tract, combustion flame and pressure sensing, wide range lambda sensors, injectors with air shrouding, Engine management systems – motronic M3, Di-motronic, ME-motronic principles, variable valve timing, lean burn engines, 2 stroke engines, combustion control system, active cooling, engine trends- SI, transonic combustion, formula1 engine technology, diagnosing engine management systems.*

## **UNIT – V**

### **INSTRUMENTATION:**

*A digital instrumentation system, Visual displays –Choosing the best display, LED displays, liquid crystal displays, vacuum fluorescent displays, head-up displays, instrumentation system faults, Global positioning systems (GPS) – Introduction, calculating position, sensors, data input & output, accuracy, Driver information – vehicle condition monitoring, trip computer, Seats, mirrors & sun-roofs – introduction electric seat adjustment, electric mirrors, electric sun roof operation, seat control circuit, door locking circuit, electric window operation, electric window example circuit.*

### **Outcomes:**

After completion of the course, students will able to:

1. *Apply the electrical and electronic principles.*
2. *Utilize different microprocessor systems & sensors in an automobile.*
3. *Install the electrical systems & circuits in an automobile.*
4. *Use the engine management systems in automobiles.*

5. Use vehicle instrumentation systems in automobiles.

**Text Books:**

1. Tom Denton, Automobile Electrical and Electronic Systems, British Library Publication.
2. Barry Hollembeak, Jack Erjavec, Automotive Electricity and Electronics - Today's Technician, Edition 2, Delmar Publishers.

**References:**

1. William Harry Crouse, Automotive Electronics and Electrical Equipment, McGraw-Hill.
2. Frank C. Derato, Automotive Electrical and Electronic Systems, Edition 2, Glencoe.

**Mapping Of COs with POs:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓		✓				✓
CO2			✓	✓			✓	✓				✓
CO3		✓				✓						
CO4	✓		✓	✓	✓		✓				✓	
CO5	✓	✓	✓		✓						✓	✓

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AME33) FINITE ELEMENT METHOD**

**IV B.Tech - I Sem (ME)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(Common to ME & AE)**

**Objectives:**

To make the students learn:

1. *General steps of finite element methods*
2. *Fundamental concepts of the theory of the finite element method.*
3. *Beam and truss finite element formulation.*
4. *Importance of numerical methods and how it will helpful to solve engineering problems*
5. *Application of the finite element method (heat,fluid and dynamic) to realistic engineering problems.*

**UNIT – I**

**FUNDAMENTAL CONCEPTS:** *Introduction, Stresses and Equilibrium, Boundary Conditions, strain-Displacement Relations, Stress-Strain Finite element modeling, Coordinates and shape functions.*

**UNIT – II**

**ONE-DIMENSIONAL PROBLEMS:** *The Potential-Energy Approach, Galerkin approach. Assemble of the Global Stiffness Matrix and Load Vector, Properties of K, The Finite Element Equations; Treatment of Boundary Conditions, Types of Boundary Conditions, Elimination Approach, quadratic shape functions, Temperature effect, problems for bar element.*

**UNIT – III**

**TRUSSES & BEAMS, FRAMES:** *Introduction, Plane Trusses, Local and Global Coordinate Systems, Formulas for Calculating Element stiffness matrix, Stress Calculations. Introduction of Beam, potential-Energy Approach, Galerkin Approach, Finite element formulation, load vector, Boundary conditions simple problems. Plane frames simple problems.*

**UNIT –IV**

**TWO-DIMENSIONAL PROBLEMS USING CONSTANT STRAIN TRIANGLES:** *Introduction, Finite Element Modeling, Constant-Strain Triangle (CST), Problem Modeling and Boundary Conditions. Ax symmetric solids subjected to ax symmetric loading. Ax symmetric formulation, Triangular element.,*

**ISOPARAMETRIC REPRESENTATION:** *4 noded quadrilateral element, numerical integration.*

**UNIT – V**

**DYNAMIC, HEAT AND FLUID PROBLEMS:** *Introduction, Element mass matrices equation of eigen values and eigenvectors. Derivation of the Basic Differential Equation, Heat Transfer with Convection, One-Dimensional Finite Element Formulation Using a Variational Method.*

*Fluid Derivation of the Basic Differential Equations. One-Dimensional Finite Element Formulation.*

**Outcomes:**

After the completion of the course, the student will be able to:

1. Express equations in finite element methods for 1D, 2D and 3D problems
2. Develop element matrix equation by different methods with available resources.
3. Solve ordinary and partial differential equations using the Galerkin method by system approach.
4. Formulate and solve basic problems in heat transfer, solid mechanics and fluid mechanics.
5. Use Eco-Friendly FEM software's for the practical problems related to industries.
6. Construct a Team to Enrich knowledge, Analyzing and computational skills to achieve goals of industry with continuous learning

**Text Books:**

1. Tirupathi R. Chandrupatla, *Introduction to Finite Elements in Engineering*, Prentice Hall of India Pvt. Ltd, New Delhi-1, 2011.
2. Daryl L Logan, *A first course in Finite Element Method*, Stanford, US, 5<sup>th</sup> Edition, Cengage Learning, Publication, 2007.

**References:**

1. O.C. Zienkiewicz, *Finite Element Method, its basis and fundamentals*, 6<sup>th</sup> Edition, ELSCVIER, 2005.
2. Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smith & Ted G. Byrom, *The Finite Element Method for Engineers*, New York, 4<sup>th</sup> Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2001.

**Mapping Of COs with POs:**

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

Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantiall

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY**  
**(AUTONOMOUS), CHITTOOR**

**(14AAT11) NEW GENERATION AND HYBRID VEHICLES**

**IVB.Tech - I Sem (AE)**

**L T P C**  
**3 1 0 3**

**Objectives:**

To make the students learn:

1. *About the new generation electric vehicles.*
2. *Basic elements of electronic automatic transmissions.*
3. *Operation and control in modern vehicles.*
4. *Different restraint systems.*
5. *About the various hybrid vehicles.*

**UNIT I**

**ELECTRIC VEHICLES:**

*Zero-emissions vehicles, major parts, battery charging, accessories, driving a BEV, Ford Focus, Nissan Leaf, Mitsubishi i-MiEV, Tesla, Honda Fit EV, Other possibilities, basic diagnosis, fuel cell vehicles, fuel cells, prototype FCEVs.*

**UNIT II**

**ELECTRONIC AUTOMATIC TRANSMISSIONS:** *Objectives, transmission control module, hybrid transmissions, basic EAT testing, converter clutch control diagnostics, detailed testing of inputs, and detailed testing of actuators.*

**UNIT III**

**ANTILOCK BRAKE, TRACTION CONTROL, AND STABILITY CONTROL SYSTEMS:**

*Objectives, antilock brakes, types of antilock brake systems, ABS operation, automatic traction control, automatic stability control, ABS service, diagnosis and testing, testing traction and stability control systems, new trends.*

**UNIT IV**

**RESTRAINT SYSTEMS:** *Objectives, seat belts, seat belt service, air bags, electrical system components, diagnosis, servicing the air bag system, other protection systems.*

**UNIT V**

**HYBRID VEHICLES:** *Objectives, hybrid vehicles, hybrid technology, accessories, HVAC, GM's series hybrids, GM's parallel hybrids, Honda's IMA system, IMA, Toyota's power-split hybrids, Ford hybrids, 4WD, Porsche and Volkswagen hybrids, Hyundai and Kia hybrids, Nissan/Infiniti hybrids, BMW hybrids, Mercedes-Benz hybrids, maintenance and service.*

**Outcomes:**

After completion of the course, the student will be able to:

1. *Select new generation electric vehicles based on application.*
2. *Use elements of electronic automatic transmissions.*
3. *Operate and control modern vehicles effectively.*
4. *Use different restraint systems.*
5. *Suggest hybrid vehicles based requirement.*

**Text Books:**

1. *Jack Erjavec, Robert Scharff, Automotive Technology - Delmar publications Inc.*
2. *Modern Vehicle Technology by Heinz.*

**References:**

1. *Ron Hodkinson, John Fenton, Light Weight Electric/Hybrid Vehicle Design -Read Educational and Professional Publications Ltd. 2001.*
2. *Advance hybrid vehicle power transmission, SAE.*

**Mapping Of COs with POs:**

	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>	<i>PO7</i>	<i>PO8</i>	<i>PO9</i>	<i>PO10</i>	<i>PO11</i>	<i>PO12</i>
<i>CO1</i>				✓			✓				✓	✓
<i>CO2</i>			✓	✓	✓	✓		✓				
<i>CO3</i>	✓	✓									✓	
<i>CO4</i>		✓	✓		✓	✓						✓
<i>CO5</i>	✓	✓		✓			✓	✓			✓	✓

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*



**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AME34) INSTRUMENTATION AND CONTROL SYSTEMS**

**IV B.Tech-I Sem (ME)**

**L T P C  
3 1 0 3**

**(Common to ME & AE)**

**Objectives:**

To make the students learn:

1. Various mechanical and electrical measuring systems used in the research labs and manufacturing industries.
2. Basic principles of various types of temperature and humidity measuring system.
3. Fundamentals of pressure and flow measuring systems.
4. Basic principles of force, torque, stress and strain measuring systems.
5. Different dynamic bodies' measurement such as speed, acceleration vibration and control system.

**UNIT I**

**DEFINITION:** Basic principles of measurement - Measurement systems, generalized configuration and functional descriptions of measuring instruments - examples. Dynamic performance characteristics, sources of errors, Classification and elimination of errors.

**MEASUREMENT OF DISPLACEMENT:** Theory and construction of various transducers to measure displacement – Piezoelectric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.

**UNIT II**

**MEASUREMENT OF TEMPERATURE:** Classification - Ranges - Various Principles of measurement - Expansion, Electrical Resistance - Thermistor - Thermocouple - Pyrometers - Temperature Indicators.

**MEASUREMENT OF HUMIDITY:** Moisture content in the gases, sling psychrometer, Absorption psychrometer, Dew point meter.

**UNIT III**

**MEASUREMENT OF LEVEL:** Direct method, Indirect methods, capacitative, ultrasonic, magnetic, cryogenic fuel level indicators, Bubbler level indicators.

**MEASUREMENT OF PRESSURE:** Units - classification - different principles used- Manometers, Piston, Bourdon pressure gauges, Low pressure measurement, Thermal conductivity gauges, ionization pressure gauges, McLeod pressure gauge.

**FLOW MEASUREMENT:** Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot - wire anemometer Laser Doppler Anemometer (LDA).

**UNIT IV**

**STRESS & STRAIN MEASUREMENTS:** Various types - electrical strain gauge - gauge factor

- method of usage of resistance strain gauge for bending, compressive and tensile strains - usage for measuring torque, Strain gauge Rosettes.

**MEASUREMENT OF FORCE, TORQUE AND POWER:** Elastic force meters, load cells, Torsion meters, Dynamometers.

## UNIT V

**MEASUREMENT OF SPEED, ACCELERATION AND VIBRATION:** Mechanical Tachometers - Electrical tachometers - Stroboscope, Non contact type of tachometer, Different simple instruments, Principles of Seismic instruments, Vibrometer and accelerometer.

**ELEMENTS OF CONTROL SYSTEMS:** Introduction, Importance – Classification, Open and closed systems Servomechanisms-Examples with block diagrams, Temperature, speed & position control systems

### Outcomes:

After completion of the course, the student will be able to:

1. Explain mechanical, electrical and electronic measuring systems for various applications in the industry.
2. Analyze mechanical, electrical and electronic instruments to promote advanced technologies to find innovative solutions.
3. Compare measuring systems to utilize resources like machines and materials to achieve short & long term objectives.
4. Produce simple eco friendly measuring systems as a group and capable to work in the organization.
5. Classify elements of control systems in real life service industries to promote research.

### Text Books:

1. S.Bhaskar, Instrumentation and Control Systems, Wiley Publications, 4<sup>th</sup> Edition, Anuradha Agencies, 2008.
2. D.S. Kumar, Measurement Systems, Applications & design, New Delhi, 8<sup>th</sup> Edition, Lakshmi Publication, 2010.

### References:

1. R.K. Jain, Mechanical and Industrial Measurements, New Delhi, 11<sup>th</sup> Edition, Khanna Publishers, 2011.
2. Beckwith, Marangoni & Linehard, Mechanical Measurements, 6<sup>th</sup> Edition, Printice Hall International Publishers, 2006

### Mapping Of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO 1	3	1								1		
CO 2		3			2	2						
CO 3							2	1			3	

<i>CO</i> <i>4</i>			<i>2</i>				<i>3</i>		<i>2</i>	<i>1</i>		
<i>CO</i> <i>5</i>		<i>3</i>		<i>2</i>								<i>1</i>

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AAT12) TRANSPORT MANAGEMENT AND AUTOMOBILE INDUSTRY**

**IV B.TECH- I SEM (AE)**

**L T P C  
3 1 0 3**

**(CHOICE BASED CREDIT COURSE, DEPARTMENTAL)**

**Objectives:**

To make the students learn:

1. Basics of transportation planning.
2. Importance of travel demand forecasting techniques.
3. About traffic assignment.
4. About long-term transportation planning.
5. Principles of transit planning, design and scheduling.

**UNIT-I**

**INTRODUCTION TO TRANSPORTATION PLANNING:**

*Introduction-What is Transportation Planning?-Aims and Objectives of Transportation Planning-Interdependence of Land use Transport-Transportation Problems and Issues in Indian Cities-Policies for Urban Transport Planning-what is the Transportation Planning Process?-Technology Applications for Planning-Levels of Planning-Citizen Participation.*

**UNIT-II**

**TRAVEL DEMAND FORECASTING TECHNIQUES:**

*Introduction-Demand Forecasting Techniques: Sequential Models-Simultaneous Models or Direct Demand Model; Other Forecasting Models: Aggregate Models-Disaggregate Models-Land-Use transport Models-UMOT Models-Quick Response Techniques; Household Activity Travel System Analysis.*

**UNIT-III**

**TRAFFIC ASSIGNMENT:**

*Introduction-Earlier Models-Traffic Assignment Techniques: Tree Building Techniques; Assignment of Vehicle Trip Interchanges between Routes: All –or-Nothing Assignment-Capacity Restraint Assignment-Incremental Traffic Assignment-Diversion curve Techniques-Multipath Assignment-User Equilibrium (UE) Assignment-Dynamic Assignment-Probabilistic Assignments-*

**UNIT-IV**

**LONG-TERM TRANSPORTATION PLANNING:**

*Introduction-Long-term Urban Transportation Planning-Planning for Public Transport-Forecast of Planning Parameters: Population-Employment-Car Ownership-Income; Implementation: Plan*

for Implementation-Availability and Arrangement of Financial Resources-Organization and Management- Prioritization-Monitoring and Review.

**UNIT-V:**

**TRANSIT PLANNING, DESIGN AND SCHEDULING:**

*Introduction-Transit Terminologies, Classifications of Transit Mode: Right of Way Category-based Classification-Technology-based Classification-Service Type-based Classification; Transit Capacity and Level off Service: Factors Affecting Transit Capacity-Terms Related to Transit Capacity-Capacity Headway and Optimum Headway-Transit Level of Service; Transit Operations Design- Transit Planning: Phases in Transit Planning; Data Requirement and surveys: Inventory Survey-Travel Behavior Survey; Transit Demand-Transit Route Network: Route Planning Principles- Route Classification,-Network Configurations-Timed Transfer Networks- Transit Stop Location; Transit Scheduling-Transit Fare Structure.*

**Outcomes:**

After completion of the course, the students will be able to:

1. Illustrate about the transportation planning.
2. Explain the importance of travel demand forecasting techniques.
3. Manage the traffic assignments.
4. Plan for the long-term transportation.
5. Implement the principles of transit planning, design and scheduling.

**Text Books:**

1. Pradip kumar Sarkar,Vinay Maitri, G.J.Joshi, Transporatation Planning, PHI Learning Private Limited, New Delhi.
2. S.L. Bhandarkar, Vehicle Transport Management, Dhanpat Rai & Co. (Pvt.) Ltd.

**References:**

1. Government Publication, The Motor vehicle Act.
2. Kadiyali, L.R., Traffic engineering and Transport Planning.

**Mapping Of COs with POs:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				✓			✓	✓				
CO2	✓		✓									✓
CO3		✓		✓	✓	✓						✓
CO4	✓		✓	✓		✓	✓				✓	✓
CO5		✓	✓			✓		✓			✓	

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AAT13) AUTOMOTIVE SAFETY**

**IV B.TECH – I SEM (AE)**

**L T P C  
3 1 0 3**

**(CHOICE BASED CREDIT COURSE, DEPARTMENTAL)**

**Objectives:**

To make the students learn:

1. *The importance of vehicle body design for safety.*
2. *The various automotive safety concepts.*
3. *A variety of safety equipments used in automotives.*
4. *The concepts of Collision warning and avoidance system.*
5. *The essentials of comfort & convenience system.*

**UNIT I**

**INTRODUCTION:** *Design of the body for safety, energy equation, engine location, deceleration of vehicle inside passenger compartment, deceleration on impact with stationary and movable obstacle, concept of crumple zone, safety sandwich construction.*

**UNIT II**

**SAFETY CONCEPTS:** *Active safety: driving safety, conditional safety, perceptibility safety, operating safety. Passive safety: exterior safety, interior safety, deformation behavior of vehicle body, speed, and acceleration characteristics of passenger compartment on impact.*

**UNIT III**

**SAFETY EQUIPMENTS:** *Seat belt, regulations, automatic seat belt tightener system, collapsible steering column, tiltable steering wheel, air bags, electronic system for activating air bags, bumper design for safety.*

**UNIT IV**

**COLLISION WARNING AND AVOIDANCE:** *Collision warning system, causes of rear end collision, frontal object detection, rear vehicle object detection system, object detection system with braking system interactions.*

**UNIT V**

**COMFORT AND CONVENIENCE SYSTEM:** *Steering and mirror adjustment, central locking system, Garage door opening system, pressure control system, rain sensor system, environment information system.*

**Outcomes:**

After completion of the course, the student will be able to:

1. *Illustrate the functions of vehicle body design, vehicle safety equipments and measures of safety, comfort of the passengers.*
2. *Distinguish the active & passive safety systems, & design vehicle safety systems which attains the desired realistic constrains of safety, sustainable and eco-friendly.*
3. *Identify typical vehicle safety problems to develop suitable alternates so as to meet the requirements of industrial and global.*
4. *Team up & generalize the collision warring, collision avoidance & braking systems to overcome manmade disasters and engineering responsibilities towards the society.*
5. *Formulate the new advancements in automobile safety to improve the quality and enhance their opportunities in building a successful career.*
6. *Plan various accessories for comfort and convenience in automotive system to promote research.*

**TEXT BOOKS**

1. *Bosch, “Automotive Handbook”, 8th Edition, SAE publication, 2011.*
2. *Powloski. J., “Vehicle Body Engineering”, Business books limited, London, 1969.*
2. *Watts, A. J., et al "Low speed Automobile Accidents" Lawyers and Judges 1996*

**REFERENCES:**

1. *Ronald.K.Jurgen, “Automotive Electronics Handbook”, Second Edition, McGraw-Hill Inc.,1999.*
2. *JullianHappian-Smith ‘An Introduction to Modern Vehicle Design’s AE, 2002*

**Mapping Of COs with POs:**

	P O 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO1	2											
CO2		2	2				1	1				
CO3			3		1	2						
CO4				1		2	2		3			

CO5										2	2	
CO6												3

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*



**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AAT14) AUTOMOTIVE ENGINE COMPONENTS DESIGN**

**IV B.Tech-I Sem (AE)**

**L T P C  
3 1 0 3**

**(CHOICE BASED CREDIT COURSE, DEPARTMENTAL)**

**Objectives:**

To make the students learn:

1. Behavior of stress and strain on engine components and understand, identify and quantify failure modes for engine parts.
2. Functions, materials used, constructional details, methods of manufacturing of automobile components.
3. Stress distribution for axial and shear forces, bending moments and torques in objects with simple shapes using the "strength of materials" approach.
4. Design procedure to design the engine components like Connecting rod, Crank shaft.
5. Design principles involve in designing the various types of gears.

**UNIT I**

**INTRODUCTION:** Engineering materials and their physical properties applied to design, selection of materials, principles of design optimization, future trends, computer aided drafting, design considerations for fits.

**UNIT II**

**SHAFTS & KEYS:** Design of solid and hollow shafts for strength and rigidity, Design of shafts for combined bending and axial loads, Design of keys.

**DESIGN OF VALVES AND FLYWHEEL:** Design aspects of intake and exhaust manifolds, inlet and Exhaust valves, valve springs, tappets, valve train, Materials and design of flywheel.

**UNIT III**

**DESIGN OF CYLINDER AND PISTON:** Choice of material for cylinder and piston, piston friction, piston slap, design of cylinder, piston, piston pin, piston rings, piston failures, lubrication of piston assembly.

**UNIT IV**

**DESIGN OF CONNECTING ROD AND CRANKSHAFT:** Material for connecting rod, determining minimum length of connecting rod, small end and big end design, shank design, design of big end cap bolts, connecting rod failures, material for crankshaft, design of crankshaft under bending and twisting, balancing weight calculations.

**UNIT V**

**SPUR AND 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.*

**Outcomes:**

*After completion of this course, students will be able to:*

- 1. Understand the properties of engineering materials, factor of safety, endurance limit and future trends in engines encountered in professional carrier in automotive industry.*
- 2. Apply the importance of limits, fits and tolerance related to design.*
- 3. Develop the Design of Cylinder and Piston assembly with help of team work.*
- 4. Design concepts of Connecting Rod, Crankshaft and gears.*
- 5. Use the knowledge of selection of spur gear and helical Gears for lifelong learning and improve the quality of products.*

**Text Books:**

- 1. R.S. Khurmi and Jk Gupta, Machine design, Hyderabad, 25<sup>th</sup> edition, S.Chand Publishers, 2014.*
- 2. V.B. Bhandari, Machine Design, 3<sup>rd</sup> edition, Tata McGraw Hill, 2010.*

**References:**

*Kolchin, A and demidov. v "Design of Automotive Engines", MR publishers mosow 1984.*

- 1. T.V. Sundaramoorthy&N.Shanmugam, Machine Design, 6<sup>th</sup> edition, Scitech Publishers, 2010.*

**Note:** *Use of Design Data Book is permitted in the examination.*

**Mapping Of COs with POs:**

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

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AAT15) AUTOMOTIVE POLLUTION & EMISSION CONTROL**

**IV B.TECH - I SEM (AE)**

**L T P C  
3 1 0 3**

**(CHOICE BASED CREDIT COURSE, DEPARTMENTAL)**

**Objectives:**

To make the students learn:

1. *Automotive pollutants formation & emission standards.*
2. *About the emissions from SI engine.*
3. *About the emissions from CI engine.*
4. *Automotive pollution control techniques.*
5. *Test procedures & about instruments for measurement of emission.*

**UNIT-I**

**INTRODUCTION:** *Air Pollution due to IC engines – formation – effects of pollution on environment - human – transient operational effects on pollution – Regulated – Unregulated emissions - Emission Standards – International, country and other standards, Compliance with standards – certification, assembly line testing, in-use surveillance and recall, warranty, on-board diagnostic systems.*

**UNIT-II**

**EMISSIONS IN SI ENGINE:** *Chemistry of SI engine combustion – HC and CO formation in SI engines – NO formation in SI engines – Smoke emissions from SI engines – Effect of operating variables on emission formation.*

**UNIT-III**

**EMISSIONS IN CI ENGINE:** *Basics of diesel combustion – Smoke emission and its types in diesel engines – NO<sub>x</sub> emission and its types from diesel engines – Particulate emission in diesel engines. Odor, sulfur and Aldehydes emissions from diesel engines – effect of operating variables on emission formation.*

**UNIT-IV**

**CONTROL TECHNIQUES FOR REDUCTION OF EMISSION:** *Design modifications – Optimization of operating factors – Fuel modification – Evaporative emission control - Exhaust gas recirculation – SCR – Fumigation – Secondary Air injection – PCV system – Particulate Trap – CCS – Exhaust treatment in SI engines – Thermal reactors – Catalytic converters – Catalysts – Use of unleaded petrol.*

**UNIT-V:**

**TEST PROCEDURE, INSTRUMENTATION & EMISSION MEASUREMENT:** *Test procedures CVS1, CVS3 – Test cycles – IDC – ECE Test cycle – FTP Test cycle - NDIR analyzer*

– Flame ionization detectors – Chemiluminescent analyzer – Dilution tunnel - Gas chromatograph – Smoke meters –SHED test. *Emission Control Options and Costs: Gasoline-Fueled passenger cars and light-duty trucks, heavy-duty gasoline-fueled vehicles, motorcycles, diesel-fueled vehicles.*

**Outcomes:**

After completion of the course, the student will be able to:

1. Identify the sources of automotive pollutants & Emission Standards.
2. Summarize corrective measures from the formation of pollutants in IC engines used in the industries.
3. Use different instrumentation to measure emissions in engines to meet social, legal, and economical requirements.
4. Test the automotive pollution with latest instruments by an organized team.
5. Apply the optimization techniques in designing of engines to control the emissions.

**Text Books:**

1. Pundir. B.P., “IC Engines Combustion and Emissions”, Narosa Publishers.
2. Asif Faiz, Christopher S. Weaver, Michael P. Walsh, Air Pollution from Motor Vehicles, USA.

**References:**

1. John B. Heywood, Internal Combustion Engine Fundamentals, Tata McGraw Hill.
2. Ganesan V, Internal Combustion Engines, Tata McGraw -Hill Publishing Co., New Delhi.

**Mapping Of COs with POs:**

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

Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AAT16) AUTOMOTIVE AIR-CONDITIONING**

**IV B. TECH - I SEM (AE)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(CHOICE BASED CREDIT COURSE, DEPARTMENTAL)**

**Objectives:**

*To make the students learn:*

1. *Aware of the various refrigeration systems.*
2. *Familiar with the refrigerants and equipments.*
3. *Aware of the various Psychometric properties & processes*
4. *Requirement of the human comfort Air Conditioning and Air Conditioning Equipments.*
5. *Aware Air-Conditioning equipments in Transportation.*

**UNIT-I**

**Introduction to Refrigeration:** *Necessity and applications – Unit of refrigeration and C.O.P. Different refrigeration methods.*

**Introduction:** *Air Refrigeration, refrigeration in aircrafts, Vapour Compression Refrigeration– Refrigeration cycle on T-S and P-H charts – Simple Problems.*

**UNIT- II**

**Refrigerants:** *Desirable properties – classification of refrigerants – nomenclature – secondary refrigerants – lubricants.*

**Refrigeration Equipment:** *Compressors- Types of compressors. Condensers – Types of condensers. Evaporators – Types of Evaporators. Expansion Devices – Types of expansion devices. Leak detection– VCR Vaccumization and recharging the refrigerant.*

**UNIT – III**

**Introduction to Air- Conditioning:** *Psychometric Properties & Processes– Relations– Characterization of Sensible heat and latent heat loads – Heat load concepts: RSHF, GSHF – Problems.*

**A/C Systems:** *Summer A/C – Winter A/C – Year round A/C– Central A/C– Unitary A/C systems.*

**UNIT – IV**

**Fundamentals of Air-Conditioning:** *Requirement of the human comfort – Concept of Effective Temperature – Comfort Chart – Comfort Air-Conditioning, Need for ventilation, Consideration of Infiltrated air.*

**Air-Conditioning Equipment and Applications:** *Humidifiers–Dehumidifiers – Air filters–fans and blowers, grills and registers, ducts–supply ducts–outlets–return outlets.*

**UNIT V**

**Introduction to Transport Air-Conditioning:** *Automobile air conditioning, basic components in Bus air conditioning–Railway air conditioning–Marine air conditioning–Air craft air conditioning.*

## **Outcomes:**

*After completion of the course, the student will be able to:*

- 1. Illustrate different refrigeration and air-conditioning methods that can be applied to automobile.*
- 2. Classify various refrigerants and installation of the refrigeration equipment in an automobile industry.*
- 3. Compare the traditional air-conditioning units with the modern systems to satisfy the comforts of human.*
- 4. Judge the suitable systems and service mankind in order to meet social, legal, and economical requirements.*
- 5. Construct a team to execute projects related to refrigeration and air-conditioning unit.*

## **Text Books:**

- 1. S.C. Arora & Domkudwar, A Course in Refrigeration and Air Conditioning, Dhanapat Rai Publications, New Delhi.*
- 2. A Text book of Refrigeration and air Conditioning by R S Khurmi, S C Chand Publications.*

## **References:**

- 1. C.P. Arora, Refrigeration and Air Conditioning, Tata McGraw Hill*
- 2. Manohar Prasad, Refrigeration and Air Conditioning, New Age Publishers.*

## **Mapping Of COs with POs:**

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

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AAT17) ALTERNATIVE FUELS**

**IVB.TECH -I SEM (AE)**

**L T P C**  
**3 1 0 3**

**(CHOICE BASED CREDIT COURSE, DEPARTMENTAL)**

**Objectives:**

To make the students learn:

1. Role of alternative fuels.
2. Use of alternative liquid fuels in IC engines.
3. Feasibility of alternative gaseous fuels in vehicles.
4. About the fuel-cell electric hybrid vehicles.
5. About advanced fuel additives for modern IC engines.

**UNIT-I**

*Need for Alternative fuels : Introduction - competing fuels and energy carriers, market penetration of bio diesel, market penetration of alcohol fuels, future provision of alternative liquid fuels - the biomass limit, beyond the biomass limit - sustainable organic fuel for transport, renewable fuels within an integrated renewable energy system.*

**UNIT II**

*Engine Performance with alternative liquid fuels : Introduction - The use of biodiesel in internal combustion engines - fatty acid methyl esters (FAMES) and hydrogenated vegetable oil (HVO), Alcohol fuels - physico-chemical properties, Alcohol fuels for SI engines - pollutant emissions, deposits and lubricant dilution, Alcohol fuels for CI engines, Vehicle and blending technologies for alternative liquid fuels – flexible-fuel vehicles, Vehicle and blending technologies for alternative liquid fuels – ethanol-gasoline and methanol-gasoline bi-fuel vehicles, Vehicle and blending technologies for alternative liquid fuels – tri-flex-fuel vehicles and iso- stoichiometric ternary blends.*

**UNIT III**

*Engine performance with alternative gaseous fuels : Introduction – Fossil natural gas, fossil natural gas production, transmission and distribution, natural gas engines and vehicles, biomethane/biogas, biogas production, distribution, storage and use in vehicles, hydrogen, hydrogen production, distribution, storage and use in vehicles, life-cycle analysis of alternative gaseous fuels, future trends.*

**UNIT IV**

**Fuel-Cell or Hydrogen as fuel or Electric Hybrid Vehicles:**

*Introduction, energy storage devices (ESDs) for transport sector, batteries, hydrogen and fuel cells, electrochemical capacitors (ECs), current status of low-carbon vehicle technologies, battery electric vehicles (BEVs), fuel cell electric vehicles (FCEVs), improving the safety of hydrogen-powered vehicles.*

## **UNIT V**

***Fuel Additives Engines :*** *Introduction, additive types and their impact on conventional and advanced fuels, impacts of additives on combustion characteristics, diesel performance and deposit control additives, gasoline performance and deposit control additives, conclusions and future trends.*

### **Outcomes:**

After completion of the course, the student will be able to:

1. *Identify the need of alternative fuels, types of fuels and its performance in the engines*
2. *Distinguish the alternative liquid fuels with the gaseous fuels for the IC engines to meet the realistic constrains of the resource availability, manufacturability and socio economic needs.*
3. *Select the best suitable alternative fuels as per the requirements of the vehicle by an organized team.*
4. *Develop advanced eco-friendly fuel cells which are compatible with hybrid vehicles.*
5. *Predict appropriate fuel additives for fuels which could improve the performance & sustainability of the IC engines.*

### **Text Books:**

1. *Richard Folkson, Alternative Fuels And Advanced Vehicle Technologies For Improved Environmental Performance, Woodhead Publishing Series in Energy.*
2. *Bechtold R.L, Alternate fuels guide book, SAE.*

### **References:**

1. *Ganesan V, Internal Combustion Engines, Tata McGraw -Hill Publishing Co., New Delhi.*
2. *S.S.Thipse "Alternative Fuels". JAICO Publishing House.*

### **Mapping Of COs with POs:**

	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>	<i>PO7</i>	<i>PO8</i>	<i>PO9</i>	<i>PO10</i>	<i>PO11</i>	<i>PO12</i>
<i>CO1</i>	3			2						1		
<i>CO2</i>		2	3			1						
<i>CO3</i>			2						3		1	



<i>C04</i>				<i>1</i>	<i>2</i>		<i>1</i>	<i>1</i>				<i>3</i>
<i>C05</i>			<i>2</i>				<i>3</i>					

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AME43) CAD AND ANALYSIS LAB**

**IV B.Tech- I Sem (ME)**

**L T P C**  
**0 0 4 2**

**(Common to ME & AE)**

**Objectives:**

To Make the students learn:

1. Skill to use software to create 2D models
2. Skill to use software to create and 3D models.
3. The importance of Geometric Tolerances.
4. Finite Element methods using Ansys Software & CFD.
5. To understand the structural, Thermal and Fluid flow Analysis.

**LIST OF EXPERIMENTS**

**MODELING AND DETAILING**

1. Details and modeling of Internal and External thread of bolt and nut using solid works
2. Details and assembly of Eccentric using solidworks software
3. Details and assembly of Screw jack using solidworks software
4. Details and assembly of Stuffing Box using solidworks software.
5. Details and modeling of Tail stock using solidwork

**ANALYSIS**

6. Structural Analysis of BEAM using in ANSYS Workbench and APDL Using 1D,3D Method.
7. Structural Analysis of Truss Using in ANSYS Workbench and APDL Using 1D,3D Method
8. Thermal Analysis using ANSYS Workbench in ANSYS Workbench and APDL Using 1D,3D Method.
9. Coupled Field Analysis using ANSYS APDL.
10. Modal Analysis using ANSYS APDL
11. Fluid Flow Analysis using ANSYS CFD.

**NOTE:**

*Minimum of 10 Exercises need to be performed*

**Outcomes:**

After the completion of the course, the student will be able to:

1. Create 2D models of Engineering Components.
2. Create 3D models of Engineering Components
3. Decide the relation between various surfaces of a machine component.
4. Understand the concept of FEM.
5. Apply the FEM technology for Structural, Thermal & Fluid flow Analysis.

**MAPPING OF COs with POs:**

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

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AME44) Instrumentation and control systems & Dynamics of Machinery Lab**

**IVB.Tech- I Sem (ME)**

**L T P C  
0 0 4 2**

**(Common to ME & AE)**

**Objectives:**

*To make the students learn:*

1. The calibration of various measurement systems.
2. Transducers of different measurement systems.
3. Temperature measuring systems.
4. Speed control using different governors.
5. The principle of gyroscope, dynamic balancing and braking systems.

**List of Experiments:**

1. Calibration of LVDT transducer for displacement measurement.
2. Study and calibration of force cell with Force Indicator.
3. Digital Speed Measurement by using Photo/Magnetic Pickup.
4. Temperature measurement by Thermocouple, RTD and Thermistor.
5. Capacitive transducer for angular displacement.
6. Calibration of Rotameter using rotameter setup.
7. To perform experiment on watt and Porter Governors to prepare the performance characteristic Curves.
8. To perform experiment on Proell Governors to prepare the performance characteristic Curves.
9. To determine gyroscopic couple acting on a rotating disc by Motorized Gyroscope.
10. To determine the angular orientation of given masses for dynamic balancing by dynamic balancing machine.
11. To determine the radius of gyration of connecting rod by compound pendulum method and Determine the moment of inertia of disc & ring by tri-flair suspension method.
12. To determine the power of a rope brake dynamometer.

**Outcomes:**

*After completion of the course, the student will be able to*

1. Calibrate different measurement systems in the industry.
2. Use different types of transducers for signal conversions.
3. Construct various types of measuring systems to promote research
4. Experiment speed controllers in the engine, gyroscope, dynamic balancing & braking systems to solve industry problems.
5. Infer speed controllers in the engine, gyroscope, dynamic balancing & braking systems to solve various societal and environmental issues.

**Mapping Of COs with POs:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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<i>C01</i>	2											
<i>C02</i>	1											
<i>C03</i>		<i>1</i>		1							<i>1</i>	2
<i>C04</i>		2	2					<i>1</i>				
<i>C05</i>			2			1	2					

*Competency addresses outcome: - 1 = slightly; 2 = moderately; 3 = substantially*

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS), CHITTOOR**

**(14AMB02) PROFESSIONAL ETHICS  
(Audit Course)**

**L T P C**  
**3 - - -**

**Objectives:**

1. To understand the fundamental concepts of professional ethics.
2. To impart and inculcate ethical decision making.
3. To apply ethical and human values in engineering profession.
4. To prepare engineering students to meet global demands on human values.
5. To explain the importance of environmental protection in engineering activities.

**Unit-I Introduction**

7

*Professionalism-models of professionalism-Ethics-Types of ethics and morality-Engineering ethics-Positive and negative faces of ethics-Responsibility for safety-Technology pessimism and perils of technological optimism.*

**Unit-II Ethical Concepts**

12

*Human Values – morals-integrity-work ethics-Respect for others-respect for authority-conflicts of interests-moral dilemmas-honesty- courage-cooperation-valuing time-commitment-collegiality-loyalty-self -interest-Professional accountability-royalty-Problem of bribery, extortion and grease payments-problem of nepotism, excessive gifts-confidentiality-uses of ethical theories-Kohlberg's Theory- Gilligan's Theory-Ethical codes of IEEE and Institution of Engineers –*

**Unit III Engineers Role in Safety**

10

*Safety and risks-risk and costs-risk benefit analysis-Testing methods for safety-The promise of technology-Computer Technology Privacy-Social policy-Engineering standards-the standards care-Social and value dimensions of technology-communicating risk and public policy-occupational crime-professional rights and employee rights-whistle blowing`*

**Unit IV Roles of Engineers**

10

*Engineers as managers, Advisors, Consultants, Experts and witnesses- Engineers role in industry and society- models of professional roles-Theories about right action-paternalism-different*

*business practices-Moral leadership- Cases - Bhopal gas tragedy, Nuclear power plant disasters-*

**Unit V Environmental Ethics**

11

*Global Issues-Multinational corporations-Living in harmony with NATURE-Holistic technology- Eco friendly production system-sustainable technology and development-weapon development- Four orders of living, their interconnectedness-Eco system-Ozone depletion, pollution*

**Outcomes:**

After the completion of the course the students shall be able to

1. *Understand human values and ethical standards to lead career accordingly.*
2. *Able to incorporate appropriate safety measures in designing systems.*
3. *Play the role of “responsible engineer” in the society.*
4. *Use natural resources in a sustainable manner and be conscious of environment.*
5. *Incorporate safety measures in engineering and product design aspects.*

**Text Books**

1. *Subramanian R, Professional Ethics,1<sup>st</sup> Edition, Oxford University Press. 2013.*
2. *Naagarazan , R.S., A Textbook on Professional Ethics and Human Values,1<sup>st</sup> edition, New Age International (P) Limited, Publishers New Delhi..2014*

**Reference Books**

1. *Fundamentals of Ethics for scientists and Engineers, Edmond G Seebauer and Robert L. Barry, 1<sup>st</sup> edition Oxford University Press, 2008.*
2. *R. R. Gaur, R. Sangal and G. P. Bagaria, Human Values and Professional Ethics:,Eecel Books,New Delhi.2010.*
3. *Professional Ethics and Human Values – M.Govindrajan, S.Natarajan and V.S. Senthil Kumar, PHI Learning Pvt. Ltd. Delhi.*
4. *Professional Ethics and Human Values: Prof. D.R. Kiran, TATA McGraw Hill Education.2007*
5. *Charles D Fleddermann, “Engineering Ethics”, Prentice Hall.*
6. *Charles E Harris, Micheal J Rabins, “Engineering Ethics, Cengage Learning*

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