ACADEMIC REGULATIONS (R20)
COURSE STRUCTURE
AND
DETAILED SYLLABI

FOR

B. Tech Regular Four Year Degree Courses

(For the Batches Admitted From 2020-2021)

&

B. Tech (Lateral Entry Scheme)

(For the Batches Admitted From 2021-2022)

MECHANICAL 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 conferred Sri Venkateswara College Engineering and technology by JNT University, Ananthapuramu based on 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 the monitoring bodies 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 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 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, Ananthapuramu 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 and Mission of the Institute

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 and management education to encourage independent thinking, develop strong domain of knowledge, own contemporary skills and positive attitudes towards holistic growth of young minds.
- Evolving Institution into a Center of Excellence and Research.

Quality policies

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

Vision of Mechanical Engineering

Providing excellent technical education in Mechanical Engineering with the help of state of art infrastructure and carve the youth to suit the global needs.

Mission of Mechanical Engineering

Provide excellent Teaching-Learning process using state of art facilities to help a holistic growth in the disciplines of Thermal, Design, Manufacturing, Management and Quality areas with an emphasis on practical applications. Stimulate innovative thinking leading to higher learning.

Programme Educational Objectives(PEO's) of UG:

PEO1	Pursue higher education in the varied fields of mechanical engineering and management.
PEO2	Secure a career placement in core and allied areas
PEO3	Develop skills to undertake entrepreneurship and lifelong learning

PROGRAMME SPECIFIC OUTCOMES (PSOs) of UG

PSO1	Apply the knowledge of manufacturing, thermal and industrial engineering to formulate, analyze and provide solutions to the problems related to mechanical systems
PSO2	Apply the design concepts and modern engineering software tools to model mechanical systems in various fields such as machine elements, thermal, manufacturing, industrial and inter-disciplinary fields.

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

ACADEMIC REGULATIONS-R20

COURSE STRUCTURE AND DETAILED SYLLABI

B. TECH REGULAR (FULL-TIME) FOUR YEAR DEGREE PROGRAMME

(*FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2020-21*)

BACHELOR OF TECHNOLOGY

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

Accredited by NBA, New Delhi & NAAC, Bengaluru │Affiliated to JNTUA, Ananthapuramu, Recognized by the UGC under Section 12(B) and 12(F)│ Approved by AICTE, New Delhi

R.V.S. NAGAR, TIRUPATI ROAD, CHITTOOR – 517127 (A.P) – INDIA

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SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

R.V.S. Nagar, CHITTOOR – 517 127, A.P

www.svcetedu.org E-mail : principal@svcetedu.org

(**Affiliated to J.N.T. University Anantapur, Ananthapuramu).**

ACADEMIC REGULATIONS (R20) for

B.Tech Regular (Full - Time) Four Year Degree Program

(For the batches admitted from the academic year 2020-21)

and

B.Tech. (Lateral Entry Scheme)

(For the batches admitted from the academic year 2021-22)

1. Applicability : All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2020-2021 onwards. Any reference to "College" inthese rules and regulations stands for Sri Venkateswara College of Engineering and Technology (Autonomous).

2. 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.

3. Admission :

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

3.1.1 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 JNTUA, Ananthapuramu) or Diploma in Engineering in the relevant branch conductedby the Board of Technical Education, Andhra Pradesh (or equivalent Diploma recognized by State Board of Technical Education, Government of Andhra Pradesh and JNTUA, Ananthapuramu) for admission.

3.1.2 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 (Lateral Entry Scheme) in Engineering:

3.2.1 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.

3.2.2 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 and Electronics Engineering)
3. B.Tech (Mechanical Engineering)
4. B.Tech (Electronics and Communication Engineering)
5. B.Tech (Computer Science and Engineering)
6. B.Tech (Information Technology)
7. B.Tech (Computer Science and Engineering (Artificial Intelligence and Machine Learning))
8. B.Tech (Computer Science and Engineering (Data Science))

5. Choice Based Credit System:

The Indian Higher Education Institutions (HEI's) are changing from the conventional course structure to Choice Based Credit System (CBCS) along with introduction to semester system at first year itself. The semester system helps in accelerating the teaching-learning process and enables vertical and horizontal mobility in learning.

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and adopt an interdisciplinary approach to learning.

Choice Based Credit System (CBCS) is a flexible system of learning and provides choice for students to select from the prescribed elective courses. A course defines learning objectives and learning outcomes and comprises of Lectures / Tutorials / Laboratory Work / Field Work / Project Work / MOOCS / Internship / Comprehensive Examination / Seminars / Presentations / self-study etc. or a combination of some of these.

Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students.

The CBCS permits students to:

1. Choose electives from a wide range of elective courses offered by the departments.
2. Undergo additional courses of interest.
3. Adopt an interdisciplinary approach in learning.
4. Make the best use of expertise of the available faculty.

6. Medium of instruction:

The medium of instruction shall be English for all courses, examinations, seminar presentations and project work. The curriculum will comprise courses of study as given in course structure, in accordance with the prescribed syllabi.

7. Types of Courses:

Courses in a programme may be of five kinds: **Foundation, Skill, Core, Elective and Mandatory.**

7.1 Foundation / Skill Course:

Foundation courses are the courses based upon the content leads to enhancement of skill and knowledge. Skill subjects are those areas in which one needs to develop a set of skillsto learn anything at all. They are fundamental to learn any subject.

7.2 Core Course:

There may be a core course in every semester. This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

7.3 Elective Course:

Electives provide breadth of experience in respective branch and applications areas. Elective course is a course which can be chosen from a pool of courses. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline / domain
- Nurturing student's proficiency / skill.

An elective may be discipline centric (Professional Elective) focusing on those courses which add generic proficiency to the students or may be chosen from an interdisciplinary area called as "Open Elective".

There are five professional elective groups. Students can choose not more than one elective from each of the five groups. Also there are four open elective groups, students can choose not more than one elective from each of the four groups.

8. Academic Year:

8.1 Course Duration:

8.1.1 Course duration for B. Tech program of study is 4 years and the maximum duration to complete the program is 8 years excluding the gap year.

8.1.2 For lateral entry students the course duration is 3 years and the maximum duration to complete the program is 6 years excluding the gap year.

8.2 Each academic year is divided into two semesters and each semester shall have a minimum of 16 Instructional Weeks.

9. Unique course identification code:

Every course of the B. Tech program will be placed in one of the eleven groups of courses as listed in the table 1. The various courses and their two-letter codes are given below.

Table 1: Group of Courses

S.No.	Branch	Code
1	Civil Engineering	CE
2	Electrical and Electronics Engineering	EE
3	Mechanical Engineering	ME
4	Electronics and Communication Engineering	EC
5	Computer Science and Engineering	CS
6	Information Technology	IT
7	Computer Science and Engineering(Artificial Intelligence and Machine Learning)	CM

8	Computer Science and Engineering(Data Science)	CD
9	Humanities and Basic Sciences	HS
10	MBA	MB
11	MCA	MC

10. Curriculum and Course Structure:

The curriculum shall comprise Foundation / Skill Courses, Core Courses, Elective Courses, Laboratory Courses, Audit Courses, Mandatory Courses, Comprehensive Examination / Mini Project, Internship and Project work. The list of elective courses may include subjects from allied disciplines also.

Assigning of Credits: Depending on the complexity and volume of the course, the number of contact hours per week will be assigned. Each Theory and Laboratory course carries credits based on the number of hours / week as follows.

- **Contact classes (Theory):** 1 credit per lecture hour per week.
- **Laboratory Hours (Practical):** 1 credit for 2 Practical hours, per week.

10.1 Course Structure:

Every program of study shall be designed to have 38-42 theory courses and 17-22 laboratory courses. Every course of the B.Tech program will be placed in one of the eight categories with average credits as listed in the Table 2. In this, a student has to carry out a mini project, project work and comprehensive Examination also.

Table 2: Category-wise Distribution of Credits

S.No.	Category	Subject Area and % of Credits	Average No. of Credits
1	Humanities and Social Sciences (HS), including Management courses	HS (05% to 10%)	10.5
2	Basic Sciences (BS) including Mathematics, Physics and Chemistry.	BS (15% to 20%)	21
3	Engineering Sciences (ES), including Workshop, Drawing, Basics of Electrical / Electronics / Mechanical / Computer Engineering.	ES (15% to 20%)	24
4	Professional Subjects-Core (PC), relevant to the chosen specialization / branch.	PC (30% to 40%)	51

5	Professional Elective Courses (PE), relevant to the chosen specialization / branch.	PE (10% to 15%)	15
6	Open Elective Courses (OE), from other technical and / or emerging subject area.	OE (05% to 10%)	12
7	Project Work, Internship Mini Project / Comprehensive Examination.	10% to 15%	16.5
8	Mandatory Courses	MC	Non-credit
9	Skill Oriented Courses	SC	10
TOTAL			**160**

10.2 There shall be mandatory student induction program for freshers, with a three-week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., as per the guidelines issued by AICTE.

10.3 All undergraduate students shall register for NCC / NSS activities. A student will be required to participate in an activity for two hours in a week during second and third semesters. Grade shall be awarded as Satisfactory or Unsatisfactory in the grade sheet on the basis of participation, attendance, performance and behavior. If a student gets an unsatisfactory Grade, he shall repeat the above activity in the subsequent semesters, in order to complete the degree requirements.

10.4 Courses like Environmental Science, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc., are included in the curriculum as non-credit mandatory courses. Environmental Science is offered as mandatory course for all branches. A student has to secure 40% of the marks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.

10.5 There shall be 05 Professional Elective courses and 04 Open Elective courses. All the Professional & Open Elective courses shall be offered for 03 credits. All Open Electives are offered to students of all branches in general. However, a student shall choose an open Electivefrom the list in such a manner that he has not studied the same course in any form during the Programme.

10.6 A student shall be permitted to pursue up to a maximum of two open elective courses under MOOCs during the Programme as mentioned in course structure. Each of the courses must be of minimum 8 - 12 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to pursue and acquire a certificate for a MOOC course only from the organizations/agencies approved by the BoS in order to earn the 3 credits. The Head of the department shall notify the list of such courses at the beginning of the semester.

10.6.1 In case a student fails to complete the MOOC / MOOCs in the stipulated semester he has to re-register and complete the same. In case any provider discontinues the course, Institution shall allow the student to opt for any other course from the list provided by the department from time to time.

10.6.2 Students have to acquire a certificate from the agencies approved by the BOS with grading or percentage of marks in order to earn 3 credits.

10.6.3 The certificate submitted by the student will be duly verified and attested by the concerned BOS chairman, and the same will be forwarded to examination branch before the end of the stipulated semester.

10.7 The department shall invite registration forms from the students at the beginning of the semester for offering professional and open elective courses. Elective course shall be offered by the Department only if a minimum of 20 percent of students in the class / section strength register for that course.

10.8 Students shall undergo mandatory summer internships for a minimum of six weeks duration at the end of second and third year of the Programme. There shall also be mandatory full internship in the final semester of the Programme along with the project work.

10.9 There shall be 05 skill-oriented courses offered during II B.Tech I Semester to IV B.Tech I Semester. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain courses and the remaining one shall be a soft skills course.

10.10 Under graduate Degree with Honors/Minor shall be issued by the University, upon the recommendation of the college, to the students who fulfill all the academic eligibility requirements for the B.Tech program and Honors/Minor program. The objective is to provide additional learning opportunities to academically motivated students.

11. Evaluation Methodology:

11.1 Theory Course:

Each theory course will be evaluated for a total of 100 Marks, with 40 Marks for Continuous Internal Assessment (CIA) and 60 Marks for Semester End Examination (SEE).

11.2 Continuous Internal Assessment (CIA):

The distribution of marks for Continuous Internal Assessment is as follows:

Two Sessional Examinations : 30 Marks

Five Assignments	: 10 Marks
	40 Marks

11.3 Question Paper Pattern for Sessional Examinations:

11.3.1 Each sessional exam question paper consists of two parts, namely Part A and Part B. Part A is compulsory which carries 10 marks and consists of five short answer type questions with each carrying 2 marks. In Part B, 4 essay type questions with internal choice (either or type) each carrying 5 marks may be given. The questions may be set as per Bloom'sTaxonomy. Time duration for each sessional exam is 2 hours. Internal marks for sessional examinations shall be arrived at by considering the marks secured by the student in both the sessional examinations with 80% weightage to the better sessional exam and 20% to the other.

11.3.2 Five assignments, each one for 10 marks shall be given to the students at the end of each unit. Internal marks for the assignments shall be awarded by considering the average of the five assignments.

11.4 Semester End Examination (SEE):

The SEE is conducted for 60 marks of 3 hours duration. The syllabus for the theory course is divided into FIVE units. SEE Question Paper consists of two parts, Part A and Part B.

Part A consists of 05 short answer type questions, each carries 2 marks for a total of 10 marks with no choice.

Part B Consists of 5 questions with one question from each of the 5 units with internal choice with 10 marks for each question.

The emphasis on the questions is broadly based on objective skill, analytical skill and application skill following the outcome based education.

11.5 Laboratory Course:

Each Laboratory Course will be evaluated for a total of 100 marks, consisting of 40 marks for internal assessment (CIA) and 60 marks for semester end lab examination. Out of 40marks of CIA, continuous lab assessment (SEE) for day to day performance will be done for 20 marks, final internal lab examination carries 15 marks and Viva-Voce carries 5 marks. The semester end lab examination for 60 marks shall be conducted by two examiners, one of thembeing internal examiner (subject teacher) and the other being external examiner (other than the teacher handled) to be nominated by the Principal from the panel of experts as recommended by the Chairman, BOS. The scheme of valuation for the 60 Marks will be informed to the students in advance by the concerned Chairman, BOS and displayed in the laboratory during the beginning of the semester.

11.6. Drawing Courses:

All the **drawing** related courses are evaluated in line with laboratory courses. The distribution shall be 40 marks for internal evaluation (20 marks for day to day work and 20 marks for final internal test) and 60 marks for semester end examinations.

- **Question paper pattern for drawing courses will be followed as mentioned in the syllabus.**

  The following course is considered as theory subject, but for all practical purposes examination will be conducted like practical.

  i. Computer Aided Engineering Drawing

11.7 Mandatory Courses:

Mandatory courses will not carry any credits; but, a pass in the examination during the programme shall be necessary requirement for student to qualify for the award of Degree. The student is declared pass in each such course after securing 40% of the marks in internal examination. Evaluation will be done by conducting descriptive examination at the end of the semester for 100 marks, internally.Its result shall be declared with "satisfactory" (Pass) or Not Satisfactory (Fail) performance.Attendance is mandatory for these courses**.**

The examination will be conducted for 100 marks of 3 hours duration. The syllabus for the course is divided into FIVE units. The Question Paper consists of two parts, Part A and Part B. Part A consists of 5 short answer type questions, each carries 5 marks for a total of 25 marks with no choice.Part B Consists of 5 questions with one question from each of the 5 units with internal choice with 15 marks for each question.

The emphasis on the questions is broadly based on objective skill, analytical skill and application skill following the outcome based education.

11.8 Community Service Project: Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships.

11.9 Project Work:

There shall be a Project Work in the IV year second semester which carries 12 credits. Out of 100 marks allotted for the project work, 40 marks shall be for Internal Evaluation and 60 marks for the End Semester Examination (Viva – Voce). The Viva – Voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the

Principal from the panel of examiners recommended by Chairman, BOS. The Evaluation of project work shall be conducted at the end of the IV year – II semester. The Internal Evaluation shall be made by the departmental committee, on the basis of two seminars given by each student on the topic of his project.

11.10 Framework for Mandatory Internships:

11.10.1 Two summer internships each with a minimum of six weeks duration, done at the end ofsecond and third years, respectively are mandatory. The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industries, Hydel andthermal power projects and also in software MNCs.

11.10.2 Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned departmentand appear for an oral presentation before the departmental committee. The report and theoral presentation shall carry 40% and 60% weightages respectively.

11.10.3 In the final semester, the student should mandatorily undergo internship and parallelly he should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carriedout during the internship. The project report shall be evaluated with an external examiner.

11.10.4 The College shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he will not be eligible for the award of degree. In such cases, the student shall repeat and completethe internship.

11.11 Framework for Skill Oriented Courses:

11.11.1 For skill oriented/skill advanced courses, one theory and 2 practical hours or two theory hours may be allotted as per the decision of concerned BOS.

11.11.2 Out of the five skill courses two shall be skill-oriented courses from the same domain and shall be completed in second year. Of the remaining 3 skill courses, one shall be necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature.

11.11.3 A pool of interdisciplinary job-oriented skill courses shall be designed by a Common Board of studies by the participating departments / disciplines and the syllabus along with the prerequisites shall be prepared for each of the laboratory infrastructure requirements. The list of such courses shall be included in the curriculum structure of each branch of Engineering, so as to enable the student to choose from the list.

11.11.4 The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries / Professional bodies / APSSDC or any other accredited bodies as approved by the concerned BoS.

11.11.5 The Board of studies of the concerned discipline of Engineering shall review the skill advanced courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest courses based on industrial demand.

11.11.6 If a student chooses to take a Certificate Course offered by industries / Professional bodies / APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the Department, the credits shall be awarded to the student upon producingthe Course Completion Certificate from the agency / professional bodies as approved bythe Board of studies.

11.11.7 If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the concerned Board of Studies, the student is deemed to have fulfilled the attendance requirement of the course and acquire the credits assigned to the course.

11.11.8 A committee shall be formed at the level of the college to evaluate the grades / marks given for a course by external agencies and convert to the equivalent marks / grades. There commended conversions and appropriate grades/marks are to be approved by the Academic Council.

11.12 Gap Year:

Gap Year – concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after II year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. The HOD of the respective department shall forward such proposals submitted by the students to the Principal. An evaluation committee shall be constituted by the Principal to evaluate the proposal submitted by the student and the committee shall decide whether or not to permit student (s) to avail the Gap Year.

11.13 Frame work for Minor Degree in a Discipline (Minor Degree / Programme):

The concept of Minor degree is introduced in the curriculum of all B. Tech. programs offering a Major degree. The main objective of Minor degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B.Tech Program. In order to earn a Minor degree in a discipline, a student has to earn 20 extra credits, by studying FIVE courses each carrying four credits (in each course, three credits for theory and one credit for lab).

a) Students who are desires of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, if Mechanical Engineering student selects subjects from Civil Engineering under this scheme, he will get Major degree of Mechanical Engineering with minor degree of Civil Engineering.

b) Student can also opt for industry relevant tracks of any branch to obtain the minor degree. For example, a B.Tech Mechanical Engineering student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track, etc.

11.13.1 Students having a CGPA of 8.0 or above up to II B.Tech I-Semester without any backlogs shall be permitted to register for Minor degree.

11.13.2 An SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor discipline registration live or else it shall be cancelled.

11.13.3 Students aspiring for a Minor degree must register from II B.Tech II-Semester onwards and must opt for a Minor in a discipline other than the discipline he is registered in or any industry relevant track of any branch.

11.13.4 The Evaluation pattern of the courses shall be similar to the regular program courses evaluation.

11.13.5 Minimum strength required for offering a Minor in a discipline is considered as 20% of the class size and Maximum should be 80% of the class size.

11.13.6 Minor degree program should be completed by the end of IV B. Tech I-Semester.

11.13.7 A student registered for Minor degree shall pass in all subjects that constitute the requirement for the Minor degree program. No class / division (i.e., second class, firstclass and distinction, etc.) shall be awarded for Minor degree program.

11.13.8 The Minor degree shall be mentioned in the degree certificate as Bachelor of Technology in XXX with Minor in YYY. For example, Bachelor of Technology in Computer Science & Engineering with Minor in Electronics & Communication Engineering or the chosen industry relevant track. This shall also be reflected in the transcripts, along with the list of courses taken for Minor degree program with CGPA mentioned separately.

11.13.9 Separate course/class work and time table shall be arranged for the various Minor degree programs. Attendance regulations for these Minor discipline programs shall be as per regular courses.

NOTE: Interested meritorious students shall be permitted to register either for Minor degree in a discipline or industry relevant track of any branch (or) Honors Degree in a discipline only, but not both.

11.14 Framework for Honors Degree in a Discipline:

11.14.1 This concept is introduced in the curriculum for all conventional B. Tech. programmes.

The main objective of Honors degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme. In order to earn a Honors degree in his/her discipline, a student has to earn 20 extra credits by studying five advanced courses each carrying four credits for 20 credits in the concerned branch of Engineering. In place of advanced courses, he can study equivalent MOOCcourses available under SWAYAM / Other platform, as decided by the institution from time to time. The Evaluation pattern of theory subjects will be similar to the regular programme evaluation. Students aspiring for Honors degree must register from II B.Tech, II Semester onwards. However, Honors degree registrations are not allowed before II B.Tech, II Semester and after III B.Tech, I Semester.

11.14.2 Students having a CGPA of 8.0 or above up to II year-I semester and without any backlog subjects will be permitted to register for degree with Honors. The SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the degree with Honors registration live or else it will be cancelled.

NOTE: Interested meritorious students shall be permitted to register either for Honors degree or Minor degree in a discipline or industry relevant track of any branch but not both.

12. Attendance Requirements and Detention Policy:

12.1 A student shall be eligible to appear for Semester – End examinations if he acquires a minimum of 40% in each subject and 75% of attendance in aggregate of all the subjects in a semester.

12.2 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.

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

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

12.5 A student detained due to shortage of attendance, will have to repeat that semester when offered next.

13. Conduct of Semester End Examination and Evaluation:

13.1 Semester end examination shall be conducted by the Controller of Examination (COE) by inviting 50% Question Papers from the External and 50% Question papers from the Internal Subject Experts. Principal will decide the External and Internal subject experts.

13.2 The answer papers of semester end examination should be evaluated externally / internally.

13.3 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.

13.4 Performance in all the subjects is tabulated program-wise and will be scrutinized by the office of the Controller of Examinations. Total marks obtained in each subject areconverted into letter grades. Finally subject-wise marks and grades details, subject-wise and branch-wise pass percentages are calculated through software.

13.5 Results Committee:

Results Committee comprising of Principal, Controller of Examinations, Additional Controller of Examinations (Confidential), One Senior Professor nominated by the Principaland the University Nominee will oversee the details of marks, grades and pass percentages of all the subjects and branch-wise pass percentages.

13.6 Office of the Controller of Examinations will generate student-wise result sheets and the same will be published through college website.

13.7 Student-wise Grade Sheets are generated and issued to the students.

14. Academic Requirements for Promotion / Completion of Regular B.Tech Programme of Study:

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

14.1 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 **33** 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 II-Year I semester.
d) One Regular Examination of II-Year II Semester.

Irrespective of whether the candidate 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 **50** 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 II-Year I Semester.

d) Two Regular and One Supplementary Examinations II-Year II Semester.

e) One Regular and One Supplementary examination of III-Year I Semester.

f) One Regular Examination of III-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 14.1 (ii) and 14.1 (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 **160** credits and earn all the **160** credits. Marks obtained in all the **160** credits shall be considered for the award of the class based on CGPA.

v. A student who fails to earn **160** 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.

vi. A student will be eligible to get under graduate degree with Honours or additional Minor Engineering, if he completes an additional **20** credits.

vii. A student will be permitted to register either for Honours degree or additional Minor Engineering but not both.

14.2 For Lateral Entry Students:

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 thesum 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 **34** 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 III-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.

iii. A student shall register for all **121** credits and earn all the **121** credits. Marks obtained in all **121** credits shall be considered for the award of the class based on CGPA.

iv. A student who fails to earn **121** 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.

v. A student will be eligible to get under graduate degree with Honours or additional Minor Engineering, if he completes an additional **20** credits.

vi. A student will be permitted to register either for Honours degree or additional Minor Engineering but not both.

15. Letter Grades and Grade Points:

15.1 Performances of students in each course are expressed in Letter Grades based on absolute grading system. The UGC recommends a 10-point grading system with the following letter grades as given in the Table 3.

Table 3: Grade Points Scale (Absolute Grading)

Percentage of Marks	Grade Point	Letter Grade
90-100	10	S (Outstanding)
80-89	9	A+ (Excellent)
70-79	8	A (Very Good)
60-69	7	B+ (Good)
50-59	6	B (Above Average)
45-49	5	C (Average)
40-44	4	D (Pass)
Below 40	0	F (Fail)
Absent	0	N (Absent)

15.2 A student obtaining Grade F shall be considered Failed and will be required to re-appear in the examination.

15.3 For non credit courses, 'P' for 'Satisfactory' or 'F' for 'Not Satisfactory' is indicated and this will not be counted for the computation of SGPA / CGPA.

15.4 At the end of each semester, the institute issues grade sheet indicating the SGPA and CGPA of the student. However, grade sheet will not be issued to the student if he has any outstanding dues.

16.0 Computation of SGPA and CGPA:

16.1 The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$SGPA = \Sigma (C_i \times G_i) / \Sigma C_i$$

where, Ci is the number of credits of the ith subject and Gi is the grade point scored by the student in the ith course

16.2 The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$CGPA = \Sigma (C_i \times S_i) / \Sigma C_i$$

where 'Si' is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester

16.3 Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the Grade Sheets.

16.4 While computing the SGPA/CGPA, the subjects in which the student is awarded Zero grade points will also be included.

16.5 Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

16.6 Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters S, A+, A, B+, B, C, D, F and N.

16.7 As per AICTE regulations, conversion of CGPA into equivalent percentage is as follows:

Equivalent Percentage to SGPA = (SGPA – 0.50) x 10

Equivalent Percentage to CGPA = (CGPA – 0.50) x 10

17. Grade Sheet:

A grade sheet will be issued to each student indicating his performance in all subjects registered in that semester indicating the SGPA and CGPA. SGPA and CGPA will be rounded off to the second place of decimal.

18. 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.

19. 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

19.1 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 4.0 (Minimum requirement for declaring as passed.)

19.2. Award of Class:

Declaration of Class is based on CGPA

Cumulative Grade Point Average	Class
≥7.5	First Class with Distinction
≥6.5 and<7.5	First Class
≥5.5 and <6.5	Second Class
≥4.0 and<5.5	Pass Class

20. Personal Verification /Recounting / Revaluation / Final Valuation

20.1 Personal Verification of Answer Scripts:

Candidates appear in a particular semester end examinations may appeal for verification of their answer script(s) for arithmetic correction in totaling of marks and any omission / deletion in evaluation as per the notifications issued from time to time in the prescribed proforma and by paying the prescribed fee per answer script.

It is clarified that personal verification of answer script shall not tantamount to revaluation of answer script. This is only a process of reverification by the candidate. Any mistake / deficiency with regard to arithmetic correction in totaling of marks and any omission / deletion in evaluation if found, the institution will correct the same.

20.2 Recounting / Revaluation:

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.

20.3 Final Valuation:

Students shall be permitted for request for final valuation of the Semester–End Examination answer scripts within a stipulated period after the publication of the revaluation results by paying the necessary fee. The final valuation shall be carried out by an expert not less than Associate Professor as per the scheme of valuation supplied by the examination branch in the presence of the student, Controller of Examinations and Principal. However students are not permitted to discuss / argue with the examiner. If the increase in marks after final valuation is equal to or more than 15% of the previous valuation marks, the marks obtained after final valuation shall be treated as final. If the variation of marks after final valuation is less than 15% of the previous valuation marks, then the earlier valuation marks shall be treated as the final marks.

21. Supplementary Examinations:

In addition to the regular semester-end examinations conducted, the college may also schedule and conduct supplementary examinations for all the courses 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.

22. Termination from the Program:

The admission of a student to the program may be terminated and the student is asked to leave the institute in the following circumstances:

a. The student fails to satisfy the requirements of the program within the maximum period stipulated for the program.
b. The student fails to satisfy the norms of discipline specified by the institute from time to time.

23. With-Holding of Results:

If the candidate has not paid any dues to the institute / if any case of indiscipline / malpractice is pending against him, the results of the candidate will be withheld. The issue of the degree is liable to be withheld in such cases.

24. Graduation Day:

The institute shall have its own annual Graduation Day for the award of Provisional Certificates to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute. The college shall institute prizes and medals to meritorious students and award them annually at the Graduation Day. This will greatly encourage the students to strive for excellence in their academic work.

25. Discipline:

Every student is required to observe discipline and decorum both inside and outside the institute and not to indulge in any activity which will tend to bring down the honor of the institute. If a student indulges in malpractice in any of the theory / practical examination, continuous assessment examinations he shall be liable for punitive action as prescribed by the Institute from time to time.

26. Grievance Redressal Committee:

The institute shall form a Grievance Redressal Committee for each course in each department with the Course Teacher and the HOD as the members. This Committee shall solve all grievances related to the course under consideration.

27. 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.

28. Mode of Learning:

Preferably 50% course work for the Theory courses in every semester shall be conducted in the blended mode of learning. If the blended learning is carried out in online mode, then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

29. Student Transfers:

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh and the University from time to time.

Students admitted on transfer from JNTU affiliated institutes, Universities and other institutes are required to pass all the subjects studied in the previous institution. Further, the students who have passed some of the subjects at the earlier institution, if the same subjects are prescribed in different semesters in the transferred institutions, the student has to study the substitute subjects as prescribed by concerned 'Board of Studies'.

30. General Instructions:

i. The academic regulations should be read as a whole for purpose of any interpretation.

ii. Disciplinary action for Malpractice/improper conduct in examinations is appended.

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

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

v. The Principal may change or amend the academic regulations of common BOS or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Principal.

vi. The above rules and regulations are to be approved/ratified by the College Academic Council as and when any modification is to be done.

FAILURE TO READ AND UNDERSTAND THE REGULATIONS IS NOT AN EXCUSE

ANNEXURE – I

COMMUNITY SERVICE PROJECT

Allocation of Community Service Project for the students will be done as per the decision of the concerned BOS Chairman

Introduction:

Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.

Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.

Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

Objective:

Community Service Project should be an integral part of the curriculum, as an alternative to the 2months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of the society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability.
- To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.

- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project:

- Every student should put in a minimum of 180 hours for the Community Service Project during the summer vacation.

- Each class/section should be assigned with a mentor.

- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, house-wives, etc

- A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded.
- The log book has to be countersigned by the concerned mentor/faculty in-charge.

- Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.

- The final evaluation to be reflected in the grade memo of the student.

- The Community Service Project should be different from the regular programmes of NSS / NCC / Green Corps / Red Ribbon Club etc.,

- Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.

- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training

Procedure:

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.

• The Community Service Project is a twofold one –

- First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the village or ward volunteers, rather, it could be another primary source of data.

- *Secondly, the student/s could take up a social activity, concerning their domain or* subject area. The different areas, could be like –

  - *Agriculture*
  - *Health*
  - *Marketing and Cooperation*
  - *Animal Husbandry*
  - *Horticulture*
  - *Fisheries*
  - *Sericulture*
  - *Revenue and Survey*
  - *Natural Disaster Management*
  - *Irrigation*
  - *Law & Order*
  - *Excise and Prohibition*
  - *Mines and Geology*
  - *Energy*
  - *Internet*
  - *Free Electricity*
  - *Drinking Water*

EXPECTED OUTCOMES:

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS:

Learning Outcomes:

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
- Improved ability to understand complexity and ambiguity Personal Outcomes
- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills Social Outcomes
- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation Career Development
- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater Opportunity Relationship with the Institution
- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS:

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research

BENEFITS OF COMMUNITY SERVICE PROJECT TO THE INSTITUTION:

- Improved institutional commitment
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY:

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals
- New energy, enthusiasm and perspectives applied to community work
- Enhanced community-university relations.

RULES FOR DISCIPLINARY ACTION FOR MALPRACTICE / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices / Improper Conduct	Punishment
	If the candidate	
1.(a)	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)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	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.	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.
2.	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 the examination (theory or practical) in which the candidate is appearing.	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. The Hall Ticket of the candidate is to be cancelled.
3.	Comes in a drunken condition to the examination hall.	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.
4.	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.	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.

5.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	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.
6.	Possess any lethal weapon or firearm in the examination hall.	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 and forfeits of seat.
7.	Impersonates any other candidate in connection with the examination.	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 isan outsider, he will be handed over to the police and a case is registered against him.
8.	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 towalk 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 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

	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.	them.
9.	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.	Student of the colleges 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 and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	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.	Cancellation of the performance in that subject.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	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.
12.	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.	

Induction Program: 3 weeks

(Common for All Branches of Engineering)

Semester-0 **Regulations: R20**

S.No	Category	Course code	Course title	Hours per week			Credits
				L	T	P	
1	MC		Physical Activities -- Sports, Yoga and Meditation, Plantation	0	0	6	0
2	MC		Career Counselling	2	0	2	0
3	MC		Orientation to all branches -- career options, tools, etc.	3	0	0	0
4	EC		Orientation on admitted Branch -- corresponding labs, tools and platforms	2	0	3	0
	ES		Proficiency Modules & Productivity Tools	2	1	2	0
5	MC		Assessment on basic aptitude and mathematical skills	2	0	3	0
6	MC		Remedial Training in Foundation Courses	2	1	2	0
7	MC		Human Values & Professional Ethics	3	0	0	0
8	BS		Communication Skills -- focus on Listening,Speaking, Reading, Writing skills	2	1	2	0
9	ES		Concepts of Programming	2	0	2	0
Total				20	3	22	**0**

Course Structure and Scheme of Examination

I B.Tech I Semester-ME **Regulations : R20**

S.No	Category	Course Code	Course Name	Hours/week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	CIA	SEE	Total
1	BS	20AHS02	Differential Equationsand Multivariable Calculus	3	1	0	3	40	60	100
2	BS	20AHS03	Engineering Chemistry	3	0	0	3	40	60	100
3	HS	20AHS01	Communicative English	3	0	0	3	40	60	100
4	ES	20AEE02	Basic Electrical and Electronics Engineering	3	1	0	3	40	60	100
5	ES	20ACS01	C Programming and Data Structures	3	1	0	3	40	60	100
6	BS	20AHS06	Engineering ChemistryLab	0	0	3	1.5	40	60	100
7	HS	20AHS05	Communicative EnglishLab	0	0	3	1.5	40	60	100
8	ES	20ACS03	C Programming and Data Structures Lab	0	0	3	1.5	40	60	100
9	MC	20AMB01	Design Thinking	2	0	0	0	100	00	100
Total				**17**	**3**	**9**	**19.5**	**420**	**480**	**900**

I B.Tech II Semester-ME **Regulations : R20**

S. No	Category	Course Code	Course Name	Hours/week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	CIA	SEE	Total
1	BS	20AHS04	Engineering Physics	3	0	0	3	40	60	100
2	BS	20AHS08	Algebra and Transformation Techniques	3	1	0	3	40	60	100
3	ES	20ACE02	Applied Mechanics	3	1	0	3	40	60	100
4	ES	20ACS04	Problem Solving and Programming using Python	3	1	0	3	40	60	100
5	ES	20AME01	Computer Aided Engineering Drawing	1	0	4	3	40	60	100
6	BS	20AHS07	Engineering Physics Lab	0	0	3	1.5	40	60	100
7	ES	20AME02	Engineering Practice Lab	0	0	3	1.5	40	60	100
8	ES	20ACS05	Problem Solving and Programming using Python Lab	0	0	3	1.5	40	60	100
9	MC	20AHS09	Environmental Sciences	2	0	0	0	100	00	100
10		20ANSS1/ 20ANCC1	NCC/NSS	0	0	2				
Total				**15**	**3**	**13**	**19.5**	**420**	**480**	**900**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
R.V.S. NAGAR, CHITTOOR-517 127, ANDHRA PRADESH
DEPARTMENT OF MECHANICAL ENGINEERING
Course Structure and Scheme of Examination

II B. Tech I Semester-ME **Regulations: R20**

Sl.No	Category	Course Code	Course Name	Hours per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		CIA	SEE	Total
1	BS	20AHS10	Numerical Methods	3	0	0	3	40	60	100
2	PC	20AME03	Engineering Materials	3	0	0	3	40	60	100
3	PC	20AME04	Thermodynamics	3	0	0	3	40	60	100
4	PC	20ACE11	Mechanics of Solids	3	0	0	3	40	60	100
5	PC	20AME05	Manufacturing Processes	3	0	0	3	40	60	100
6	PC	20AME06	Engineering Materials and Testing Lab	0	0	3	1.5	40	60	100
7	PC	20AEE12	Electrical and Electronics Lab	0	0	3	1.5	40	60	100
8	PC	20AME07	Manufacturing Processes Lab	0	0	3	1.5	40	60	100
9	SC	20AME08	Modelling using CATIA	1	0	2	2	40	60	100
10	MC	20AMB02	Universal Human Values	2	0	0	0	100	-	-
11		20ANSS1/ 20ANCC1	**NCC/NSS**	0	0	2	-	-	-	-
12	AC	20AHS11	Quantitative Aptitude and Reasoning-1	4	0	0	-	-	-	-
			Total credits	**22**	**0**	**14**	**21.5**	**460**	**540**	**1000**
			Total Periods	**36**						

II B.Tech II Semester-ME **Regulations : R20**

Sl.No	Category	Course Code	Course Name	Hours per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		CIA	SEE	Total
1	BS	20AHS13	Probability and Statistics	3	0	0	3	40	60	100
2	ES	20ACE12	Fluid Mechanics and Hydraulic Machinery	3	0	0	3	40	60	100
3	HS	20AMB03	Managerial Economics and Financial Analysis	3	0	0	3	40	60	100
4	PC	20AME09	Thermal Engineering	3	0	0	3	40	60	100
5	PC	20AME10	Kinematics of Machinery	3	0	0	3	40	60	100
6	PC	20AME11	Thermal Engineering Lab	0	0	3	1.5	40	60	100
7	PC	20AME12	Computer Aided Machine and production Drawing Lab	0	0	3	1.5	40	60	100
8	ESC	20ACE21	Fluid Mechanics and Hydraulic Machinery Lab	0	0	3	1.5	40	60	100
9	SC	20AME13	Surface modelling using CATIA	1	0	2	2	40	60	100
10	AC	20AHS15	Quantitative Aptitude and Reasoning-2	4	0	0	-	-	-	-
			Total credits	**20**	**0**	**11**	**21.5**	**360**	**540**	**900**
			Total Periods	**31**						
Internship 2 Months (Mandatory) during summer vacation/ community service										
Honors/Minor courses (The hours distribution can be 3-0-2 or 4-0-0 also)										

Course Structure and Scheme of Examination

III B. Tech I Semester-ME **Regulations: R20**

S. No	Category	Course Code	Course Name	Hours/week L	Hours/week T	Hours/week P	Credits C	Scheme of Examination Maximum Marks CIA	SEE	Total
1.	PC	20AME14	Dynamics of Machinery	3	0	0	3	40	60	100
2.	PC	20AME15	Heat Transfer	3	0	0	3	40	60	100
3.	PC	20AME16	Machine Tools and Measuring Systems	3	0	0	3	40	60	100
Professional Elective Courses-I										
4.	PE	20AME17	Automobile Engineering	3	0	0	3	40	60	100
		20AME18	Robotics and Artificial Intelligence							
		20AME19	Product Design & Development							
		20AME20	Total Quality Management and Reliability Engineering							
		20AME21	Manufacturing of Composite Materials							
Open Elective Course/ Job Oriented Elective -I										
5.	OE/JOE	20AME22	Hybrid and Electrical Vehicles	3	0	0	3	40	60	100
		20AME23	Renewable Energy Technology							
		20ACS21	Computer Graphics							
		20ACE36	Disaster Management							
		20AEC25	MEMS and NEMS							
6.	PC	20AME24	Machine Tools and Measuring Systems Lab	0	0	3	1.5	40	60	100
7.	PC	20AME25	Heat Transfer Lab	0	0	3	1.5	40	60	100
8	SC	20AME26	3D Printing Practice Lab	1	0	2	2	40	60	100
9	MC	20AHS21	Indian Constitution	2	0	0	0	100	-	100
10	AC	20AHS17	Quantitative Aptitude and Reasoning-III	4	0	0	-	-	-	-
11	AC	20AHS18	French Language	4	0	0	-	-	-	-
		20AHS19	German Language							
		20AHS20	Japanese Language							
12	20AME27/20AMEA8		Summer Internship/ Community Service Project	0	0	0	1.5	40	60	100
			Total	**22**	**0**	**12**	**21.5**	**460**	**540**	**1000**
Honor Degree hours distribution **3-1-0-4**										
Minor General Degree hours distribution **3-0-2-4** and Minor Industrial Relevant Track Degree hours distribution 3-**1-0-4**										

Course Structure and Scheme of Examination

III B. Tech II Semester-ME **Regulations: R20**

S. No	Category	Course Code	Course Name	Hours/week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	CIA	SEE	Total
1.	PC	20AME28	Computer Aided Design and Manufacturing	3	0	0	3	40	60	100
2.	PC	20AME29	Finite Element Methods	3	0	0	3	40	60	100
3.	PC	20AME30	Design of Machine Elements	3	0	0	3	40	60	100
Professional Elective courses -II										
4.	PE	20AME31	Operations Research	3	0	0	3	40	60	100
		20AME32	Industrial Engineering and Management							
		20AME33	Material Processing Techniques							
		20AME34	NDT Techniques							
		20AME35	Additive Manufacturing							
Open Elective Course/ Job Oriented Elective -II										
5.	OE/JOE	20AME36	Tool Design	3	0	0	3	40	60	100
		20AME37	Refrigeration & Air Conditioning							
		20AEE45	Electrical Safety							
		20ACS34	Machine Learning							
		20AMB09	Intellectual Property Rights							
6.	PC	20AME38	Computer Aided Manufacturing Lab	0	0	3	1.5	40	60	100
7.	PC	20AME39	Simulation and Analysis Lab	0	0	3	1.5	40	60	100
8.	PC	20AME40	Dynamics and Control System Lab	0	0	3	1.5	40	60	100
9	SC	20AHS16	Advanced English Communication Skills Lab	1	0	2	2	40	60	100
10	MC	20AHS23	Essence of Indian Traditional Knowledge	2	0	0	0	100	-	100
			Total	**22**	**0**	**11**	**21.5**	**460**	**540**	**1000**

Honor Degree hours distribution **3-1-0-4**

Minor General Degree hours distribution **3-0-2-4** and Minor Industrial Relevant Track Degree hours distribution 3-**1-0-4**

Industrial/Research Internship (Mandatory) 2 Months during summer vacation (to be evaluated during IV year, I Sem)

Course Structure and Scheme of Examination

IV B. Tech I Semester-ME **Regulations: R20**

S. No	Category	Course Code	Course Name	Hours/week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	CIA	SEE	Total
			Professional Elective Courses -III							
1.	PE	20AME41	Flexible Manufacturing Systems	3	0	0	3	40	60	100
		20AME42	Heating, Ventilation, and Air Conditioning							
		20AME43	Casting and Welding Technology							
		20AME44	Advance Manufacturing Processes							
		20AME45	Applied Industrial Hydraulics							
			Professional Elective Courses -IV							
2.	PE	20AME46	Computational Fluid dynamics	3	0	0	3	40	60	100
		20AME47	Power Plant Engineering							
		20AME48	Geometric Modelling							
		20AME49	Hydrogen and Fuel cells							
		20AME50	Production Planning and Control							
			Professional Elective Courses -V							
3.	PE	20AME51	Supply Chain Management	3	0	0	3	40	60	100
		20AME52	Tribology							
		20AME53	Quality in Manufacturing							
		20AME54	Optimization Techniques							
		20AME55	Gear Design							
			Open Elective Courses /Job Oriented Elective -III							
4.	OE/JOE	20AME56	Sustainable Manufacturing	3	0	0	3	40	60	100
		20AME57	Industry Automation and Control Systems							
		20ACS38	Cryptocurrency and Block Chain Technologies							
		20ACS17	Computer Networks							
		20ACE35	Integrated Waste Management for Smart City							
			Open Elective Courses /Job Oriented Elective -IV							
5.	OE/JOE	20AME58	Plant Maintenance	3	0	0	3	40	60	100
		20AME59	Automotive Electronics							
		20ACS28	Internet of Things							
		20ACS31	Ethical Hacking							
		20AEC69	Mechatronics							
			Humanities and Social Sciences (HSS)							
6.	HSS	20AMB04	Creativity and Innovation	3	0	0	3	40	60	100
		20AMB05	Leadership Essentials							
		20AMB06	Law for Engineers							
		20AMB07	Entrepreneurship Essentials							
		20AMB08	Essentials of Management Science							
7.	SC	20AME60	MATLAB for Mechanical Engineers	1	0	2	2	40	60	100
8.	MC	20AMB12	Professional Ethics	2	0	0	0	100	-	100
9.	20AME61		Industrial/Research Internship	0	0	0	3	40	60	100
			Total	**17**	**0**	**6**	**23**	**420**	**480**	**900**

Honor Degree hours distribution **3-1-0-4**

Minor General Degree hours distribution **3-0-2-4** and Minor Industrial Relevant Track Degree hours distribution 3-**1-0-4**

Course Structure and Scheme of Examination

IV B. Tech II Semester-ME **Regulations: R20**

S. NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	Major Project	20AME62	Project Project work, Seminar and Internship in Industry	0	0	24	12	40	60	100
	INTERNSHIP (6 MONTHS)									
TOTAL										**12**

Scheme of Instruction and Examination under R20 Regulations

HONOR DEGREE with SPECIALIZED TRACKS

S.NO.		COURSE CODE	COURSE NAME	L-T-P-C	POOL	PRE-REQ.	OFFERED TO
1	**II-II** (Any 1 course from Pool-I)	20AME63	Mechanical Behavior of Materials	3-1-0-4	EDP	EM	ME
2		20AME64	Automotive Chassis	3-1-0-4	AE	TE, AE	ME
3		20AME65	Drives and Actuators for IndustrialAutomation	3-1-0-4	RM	KOM, IR	ME
4		20AME66	Elements of Nanoscience andNanotechnology	3-1-0-4	NT	EC	ME
1	**III-I** (Any 1 course from Pool-II)	20AME67	Tribology in Design	3-1-0-4	EDP	KOM	ME
2		20AME68	Engine and Vehicle ManagementSystems	3-1-0-4	AE	AE	ME
3		20AME69	Measurements and ControlsSystems	3-1-0-4	RM	KOM, MEMS	ME
4		20AME70	Mechanical Vibrations	3-1-0-4	TE	DOM, DMM	ME
1	**III-II** (Any 1 course from Pool-III)	20AME71	Experimental stress Analysis	3-1-0-4	EDP	DOM, MT	ME
2		20AME72	Advanced Mechanical Design	3-1-0-4	RM	DOM	ME
3		20AME73	Advanced Thermodynamics	3-1-0-4	TE	TD, HT	ME
4		20AME74	Synthesis of Nanomaterials	3-1-0-4	NT	EC	
1	**III-II** (Any 1 course from Pool-IV)	20AME75	Optimization Technique inEngineering	3-1-0-4	EDP	PS, MT	ME
2		20AME76	FEM in Automobile	3-1-0-4	AE	NM, HT	ME
3		20AME77	Waste to Energy	3-1-0-4	TE	TD, TE	ME
4		20AME78	Characterization of Nanomaterials	3-1-0-4	NT	EC	ME
1	**IV-I** (Any 1 course from Pool-V)	20AME79	Advanced Heat Transfer	3-1-0-4	TE	TD	ME
2		20AME80	Vehicle Dynamics	3-1-0-4	AE	AE, DOM	ME
3		20AME81	Design of Transmission Systems	3-1-0-4	RM	DOM, MEMS	ME
4		20AME82	Nano Biomedical Applications	3-1-0-4	NT	EC	ME

POOL – 1: Engineering Design and Production-EDP
POOL – 2: Automotive Engineering- AE
POOL – 3: Robotics & Mechatronics- RM
POOL – 4: Thermal Engineering - TE
POOL – 5: Nanotechnology – NT

Scheme of Instruction and Examination under R20 Regulations

General MINOR DEGREE IN A DISCIPLINE

Courses for Minor Degree in Mechanical Engineering

Sl.No		Category	Course Code	Category	Hours/week			Credits	Maximum Marks		
					L	T	P		Internal	External	Total
1	**II-II**	PC	20AME83	Thermodynamics and Internal Combustion Engines	3	0	2	4	40	60	100
2	**III-I**	PC	20AME84	Engineering Materials and Manufacturing Technology	3	0	2	4	40	60	100
3	**III-II**	PC	20AME85	Metrology and Machine Tools	3	0	2	4	40	60	100
4	**III-II**	PC	20AME86	Computer Integrated Manufacturing	3	0	2	4	40	60	100
5	**IV-I**	PC	20AME87	Robotics	3	0	2	4	40	60	100
				Total	**15**	**0**	**10**	**20**	**320**	**480**	**800**

Scheme of Instruction and Examination under R20 Regulations

MINOR DEGREE with Specialized Industrial Tracks

Courses for Minor Degree in Mechanical Engineering

S.NO.	Year & SEM	Subject Code	COURSE NAME	L-T-P	CR	PRE-REQ.	OFFERED TO
			TRACK-1 (Design)				
1	**II-II**	20AME88	Human Factors and Ergonomics	3-1-0	4	SOM	ME
2	**III-I**	20AME89	Vibration Analysis & Condition Monitoring	3-1-0	4	KOM	ME
3	**III-II**	20AME90	Product Design for Manufacturing	3-1-0	4	MP, MMS	ME
4	**III-II**	20AME91	Computer Applications In Design	3-1-0	4	CAD/CAM	ME
5	**IV-I**	20AME92	Precision Engineering	3-1-0	4	MMS	ME
			TRACK2 (Materials and Manufacturing)				
1	**II-II**	20AME93	Materials characterization techniques	3-1-0	4	EM	ME
2	**III-I**	20AME94	Advanced Tool Design	3-1-0	4	MMS	ME
3	**III-II**	20AME95	Micro and Nano Machining	3-1-0	4	MP, MMS	ME
4	**III-II**	20AME96	Geometric Dimensioning and Tolerance	3-1-0	4	MMS	ME
5	**IV-I**	20AME97	Intelligent Manufacturing Systems	3-1-0	4	CAD/CAM	ME
			TRACK-3 (Automobile Engineering)				
1	**II-II**	20AME98	Fuels and Combustion	3-1-0	4	EC, TD	ME
2	**III-I**	20AME99	Design of Automotive Components	3-1-0	4	TE, AE	ME
3	**III-II**	20AMEA0	Autotronics & Vehicle Intelligence	3-1-0	4	BEE, AE	ME
4	**III-II**	20AMEA1	Vehicle Maintenance	3-1-0	4	TE & BEE	ME
5	**IV-I**	20AMEA2	Automotive Electrical Systems	3-1-0	4	TE, AE MET	
			TRACK 4 (Robotics and Automation)				
1	**II-II**	20AMEA3	Manufacturing Automation	3-1-0	4	MP, CAD	ME
2	**III-I**	20AMEA4	Principles of Robotics	3-1-0	4	MT, IE	ME
3	**III-II**	20AMEA5	Robot Dynamics	3-1-0	4	MET, KOM	ME
4	**III-II**	20AMEA6	Applied And Industrial Robotics	3-1-0	4	MT,	ME
5	**IV-I**	20AMEA7	Robotic Programming	3-1-0	4	KOM	ME

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

I B.Tech I Semester (Common to all Branches)

L	T	P	C
3	1	0	3

20AHS02 DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS

Course Outcomes:

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

1. Classify and interpret the solution of ordinary differential equations.
2. Apply the principles of differential equations to the engineering and scientific problems.
3. Analyze the maxima and minima of functions of two or more variables.
4. Evaluate the double and triple integral to find surface area and volumes.
5. Compute the derivatives and line integrals of vector functions and learn their applications.

UNIT-I **9 Hours**

DIFFERENTIAL EQUATIONS: Exact differential Equations - Linear Differential Equations – Bernoulli's Equations – Non – homogenous Linear Differential equation of second and higher order with constant coefficients with R.H.S terms of the form e^{ax}, $Sinax$, $Cosax$, x^m, $e^{ax}V(x)$, $x^mV(x)$ and $xV(x)$.

UNIT-II **9 Hours**

APPLICATIONS OF DIFFERENTIAL EQUATIONS: Orthogonal Trajectories (Cartesian and polar forms) - Newton's law of cooling- Law of natural Growth and Decay- L- R-C circuits, Bending of beams- Mass spring System

UNIT-III **9 Hours**

FUNCTIONS OF SEVERAL VARIABLES: Partial derivatives- chain rule- Total derivative, Jocobian-Maxima and Minima for functions of two variables – Lagrange's method of multipliers of three variables only.

UNIT-IV **9 Hours**

APPLICATIONS OF INTEGRATION: Length of an arc and area using 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-V **9 Hours**

VECTOR CALCULUS: Gradient, Divergence, Curl and their properties (withoutidentities). **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. Higher Engineering Mathematics, Dr. B.S. Grewal, Kanna Publications, 40^{th} edition.
2. A Text book of Engineering Mathematics –I, T.K.V. Iyengar, B. Krishna Gandhi and others, S. Chand and company.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics. John Wiley & Sons.2016
2. Thomson, A Text book of Engineering Mathematics, Book Collection
3. B.V. Ramana, A Text book of Engineering Mathematics-I, Tata Mc Grawhill.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	2	-	-	-	-	-	-	-	-	-	-
Average	2.8	2	-	1.6	-	-	-	-	-	-	-	-	-	-
Level of correlation	3	2	-	2	-	-	-	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester (Common to CE, ME, ECE, CAI, CSC & CSO)
I B.Tech II Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
3	0	0	3

20AHS03 ENGINEERING CHEMISTRY

Course Outcomes:

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

1. Understand the impact of hard water and its removal, apply the concept of estimation of hardness.
2. Analyze the selection of suitable engineering materials for specific applications.
3. Understand the Effect of corrosion and to know the designing of corrosion resistant articles.
4. Apply suitable fuels based on analysis of coal, calorific value for a particular application, calculation of air requirements for combustion of fuel, types of various batteries.

UNIT - I **9 Hours**

WATER TECHNOLOGY: Sources of water - impurities in water - Hardness of Water and its unit of expression - Estimation of hardness in water by EDTA titration method - Numerical problems - Boiler troubles and prevention methods - Estimation of Dissolved Oxygen in water by Winkler's method - specifications for drinking water Bureau of Indian Standards(BIS) and World health organization(WHO) standards - Water softening methods by Internal conditioning and External conditioning methods - Chlorination Of Domestic Water Treatment - Desalination of Brackish Water by Reverse Osmosis and electro dialysis methods.

UNIT - II **12 Hours**

MATERIALS CHEMISTRY: High Polymers: Polymers – Definition - Nomenclature of polymers - Types of polymerization reactions addition, condensation and copolymerization with examples. Plastics: Thermoplastics and thermosetting plastics and differences between them - Preparation, Properties and Engineering applications of PE, PTFE, PVC, Nylon and Bakelite. Conducting polymers - polyacetylene, polyaniline, polypyrroles - mechanism of conduction and applications. **Rubbers:** Natural Rubbers – Vulcanization - Synthetic Rubbers (Buna-S, Silicone Rubber, Neoprene) preparation, properties and applications. **Lubricants:** Functions of Lubricants - Classification of Lubricants - various properties of Lubricants (Viscosity, Viscosity Index, Flash and fire point, Cloud and pour point, Aniline point, Acid value or Neutralization number. **Refractories**: Important properties of refractories (Refractoriness, Refractoriness under Load, Porosity, Thermal spalling) and their applications.

UNIT - III **9 Hours**

CHEMISTRY OF CORROSION: Introduction on corrosion - causes and consequences of corrosion - Types of corrosion - Dry, Wet, Galvanic, Differential Corrosion - Mechanism of Dry and Wet corrosion - Factors influencing the corrosion - Control of corrosion - Cathodic protection by Sacrificial anodic and Impressed current cathodic protection - Electro Plating and Electroless plating (Copper and Nickel).

UNIT - IV **11 Hours**

FUELS AND COMBUSTION: Fuels, Classification of Solid, Liquid and Gaseous fuels - Analysis of coal - Proximate and Ultimate analysis - Refining of Petroleum - Preparation of syntheticpetrol - Bergius process - knocking and anti-knock agents - Octane and Cetane values - Calorific value - HCV, LCV - Numerical problems using Dulong-Petit's formula - Measurement of calorific value using Bomb calorimeter and Junkers gas calorimeter - Numerical problems.

Combustion: Calculation of air quantity requirement for Combustion - Numerical problems.

UNIT-V **9 Hours**

ELECTROCHEMICAL ENERGY SYSTEMS: Electrochemical Cells - Electrode potential - Standard electrode potential - Nernst equation - cell potential calculations - Basic conceptsof pHmetry, Potentiometry and Conductometric Titrations - Working principles and applications of different batteries - Dry cell, Lithium-ion cell, Lead-acid cell and Nickel-cadmium cell with discharging and recharging reactions - Working principles and applications of hydrogen-oxygen fuel cell, methanol-oxygen fuel cell.

Text Books:

1. A text book of Engineering Chemistry, Jain & Jain, Dhanpat Rai Publishing Company, 15thedition, New Delhi, 2008.
2. Chemistry for Engineers, Prof. K.N.Jayaveera, Dr.G.V.Subba Reddy and Dr. C.Ramachandraiah, McGraw Hill Higher Education Hyd., 3rd edition, 2009.

Reference Books:

1. Engineering Chemistry, Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Scitech Publications (India) Pvt. Limited, Hyderabad, 2009.
2. A text book of Engineering Chemistry, Dr. K. RaviKrishnan, Sri Krishna Publications, Secunderabad, Telangana, New edition. July, 2015.
3. Chemistry of Engineering Materials, C.V. Agarwal, C. Parameswara Murthy and Andra Naidu, BS Publications, Hyderabad, 9th edition, 2006.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.25	-	-	-	-	-	-	-	-	-	-	-	-
Level of correlation	3	2	-	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B. Tech I Semester (Common to CE, ME, ECE, CAI, CSC & CSO)
I B. Tech II Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI & ML))

L	T	P	C
3	0	0	3

20AHS01 COMMUNICATIVE ENGLISH

Course Outcomes:

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

1. Develop knowledge of basic grammatical concepts to understand asking and answering general questions on familiar topics and making paragraphs.
2. Interpret context, topic, and pieces of specific information from social or Transactional dialogues spoken by native speakers of English.
3. Examine language aspects to do role plays, to study graphic elements and information transfer.
4. Demonstrate discourse markers to make effective oral presentations and to write structured essays.

UNIT- I **10 Hours**

EXPLORATION

LESSON: A proposal to Girdle the Earth, Nellie Bly.

LISTENING: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

SPEAKING: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

READING: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

READING FOR WRITING: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph

GRAMMAR AND VOCABULARY: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentence.

UNIT- II **8 Hours**

ON CAMPUS

LESSON: The District School As It Was by One Who Went It, Warren Burdon

LISTENING: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

SPEAKING: Discussion in pairs/ small groups on specific topics followed by short structured talks.

READING: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

WRITING: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

GRAMMAR AND VOCABULARY: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

UNIT- III **11 Hours**

WORKING TOGETHER

LESSON: The Future of Work

LISTENING: Listening for global comprehension and summarizing.

SPEAKING: Discussing specific topics in pairs or small groups and reporting.

READING: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

WRITING: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetition

GRAMMAR AND VOCABULARY: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

UNIT- IV **8 Hours**

FABRIC OF CHANGE

LESSON: H.G. Wells and the Uncertainties of progress, Peter J. Bowler.

LISTENING: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

SPEAKING: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/direction.

READING: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

WRITING: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.

GRAMMAR AND VOCABULARY: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms.

UNIT- V

TOOLS FOR LIFE **8 Hours**

LESSON: Leaves from the Mental Portfolio of a Eurasian, Sui San Far.

LISTENING: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

SPEAKING: Formal oral presentations on topics from academic contexts – without the use of PPT slides.

READING: Reading for comprehension.

WRITING: Writing structured essays on specific topics using suitable claims and evidences.

GRAMMAR AND VOCABULARY: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Text Books

1. English all round: Communication Skills for under graduation Learners Vol. I,Orient Black Swan Publishers, First Edition2019.

Reference Books

1. Academic writing: A handbook for international students, Bailey, Stephen, Routledge.2014.
2. Pathways: Listening, Speaking and Critical Thinking Chase. BeckyTarver, Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) MacmillanEducation.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	3	-	-	-	-
CO4	3	-	-	-	-	-	-	-	3	3	-	-	-	-
Average	2.75	2.5	-	-	-	-	-	-	3	3	-	-	-	-
Level of correlation	3	3	-	-	-	-	-	-	3	3	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

I B.Tech I Semester (ME)

20AEE02	**Basic Electrical and Electronics Engineering**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

Course Outcomess:

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

1.Evaluate the circuit parameters and design electrical networks.

2.Acquire the concept to all types of Electrical Machines like DC.

3.Design and analyze AC Machines.

4.Design and analyze the DC bias circuitry of BJT and FET.

UNIT:I Introduction 10 hours

Ohm's Law and Kirchhoff's Laws - Analysis of series, parallel and series-parallel circuits excited by independent voltage sources-Power and energy. Electro magnetism: Faradays Laws, Lenz's Law, Fleming's Rules, Statically and dynamically induced EMF - Concepts of self-inductance, mutual inductance and coefficient of coupling - Energy stored in magnetic fields.

UNIT:II AC Circuits 10 hours

Generation of sinusoidal voltage- Definition of average value, root mean square value, form factor and peak factor of sinusoidal voltage and current and phasor representation of alternating quantities-Analysis with phasor diagrams of R, L, C, RL, RC and RLC circuits; Real power, reactive power ,apparent power and power factor, Introduction to three phase circuits.

UNIT:III DC Machines 10 hours

Working principle of DC machine as a generator and a motor-Types and constructional features-EMF equation of generator - Back EMF and its significance - torque equation - Types of D.C. motors –characteristics and applications-Necessity of a starter for DC motor

UNIT:IV AC Machines 10 hours

Transformers: Principle of operation and construction of single phase transformers-EMF equation losses –efficiency and voltage regulation. Concept of rotating magnetic field-Principle of operation-types and constructional features-Slip and its Significance-Applications of squirrelcage and slipring motors-Principle of Operation of alternators. Applications.

UNIT:V Basic Electronics 10 hours

PN junction diode characteristics: unbiased diodes, forward and reverse bias break down barrier potential diode approximation - Rectifiers: half wave and full wave - Zener diode design of regulators and Characteristics. Introduction to BJT: characteristics curves and region of operation;Biasing: Load line fixed and voltage divider bias.

Text Book(s)

1. V.K.Mehta & Rohit Mehta, Principles of Electrical Engineering,S.Chand publications
2 D.P.KothariandI .J.Nagarath, Basic Electrical & Electronics Engineering, McGrawHill Publications.

Reference Books

1 H.Cotton, Electrical Technology, CBS Publishers & Distributors, 2004.
2 T.K.Nagasarkar,M.S.Sukhija, Basic Electrical Engineering, Oxford University press New Delhi, 2010
3 S.Hasan Saeed, D.K.Sharma, Non-Conventional Energy Resources, Katson Books,2013
4 S Salivahanan and N Suresh Kumar, Electronic Devices and Circuits, Mc Graw Hill Education, Fourth Edition,2017.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	2	-	-	-	-	-	-	-	-	-	-	-	-
Level of correlation	3	2	-	-	-	-	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

I B.Tech I Semester (Common to all branches)

20ACS01	**C Programming and Data Structures**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

Course Outcomess:

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

1. Analyze the basic concepts of C Programming language.
2. Design applications in C, using functions, arrays, pointers and structures.
3. Apply the concepts of Stacks and Queues in solving the problems.
4. Explore various operations on Linked lists.
5. Demonstrate various tree traversals and graph traversal techniques.
6. Design searching and sorting methods

UNIT:I **10 hours**

Introduction to C Language - C language elements, structure of C program, A simple C program, variable declarations and data types, operators and expressions, decision statements - If and switch statements, loop control statements-while, for, do- while statements, arrays, control statements-break and continue, programming examples.

UNIT:II **10 hours**

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),

Arrays: Declaration and Definition of an array, Processing an Array, Passing arrays to functions, Two dimensional and Multi-dimensional arrays,

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

UNIT:III **10 hours**

Pointers: Fundamentals, Pointer declarations, Pointers and One-dimensional array, Dynamic memory allocation, Operations on pointers,

Structures and Unions: Declaration, Definition and Initialization of structures, Accessing structures, User defined data type (typedef), Enumerated Data types, Nested structures, Array of structures, Structures and pointers, Passing structures to functions, Unions.

UNIT:IV **10 hours**

Over view of data structures, stacks and queues, representation of a stack, operations on a stack, implementation of a stack, evaluation of arithmetic expressions, infix, prefix, and postfix notations, evaluation of postfix expression, conversion of expression from infix to postfix, recursion, queues - various positions of queue, representation of queue, insertion, deletion, searching operations. Linked Lists – Singly linked list, dynamically linked stacks and queues, polynomials using singly linked lists, using circularly linked lists, insertion, deletion and searching operations, doubly linked lists and its operations, circular linked lists and its operations.

UNIT:V **10 hours**

Trees - Tree terminology, Binary trees, representation, binary tree traversals. Binary tree operations, Graphs -graph terminology, graph representation, elementary graph operations, Breadth First Search (BFS) and Depth First Search (DFS), connected components, spanning trees.

Searching and Sorting–sequential search, binary search, exchange(bubble)sort, selection sort, Insertion sort.

Text Book(s)

1. Behrouz A. Forouzan, Richard F. Gilberg, ―C Programming & Data Structures‖, India Edition, Course Technology, 2010.
2. The C Programming Language, Brian WKernighan and Dennis M Ritchie, Second Edition, Prentice Hall Publication.
3. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.
4. Programming in C and Data Structures, J.R.Hanly, Ashok N.Kamthane and A.AnandaRao, Pearson Education.
5. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C",Third edition, CENGAGE Learning, 2016.
6. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Reference Books

1. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press,2nd Edition 2011.
2. E. Balaguruswamy,"C and Data Structures", 4th Edition,Tata Mc GrawHill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition,.UniversityPress.
4. M.T.Somashekara,"Problem Solving Using C", PHI, 2nd Edition2009.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**3**												
CO2	**3**	**3**	3	1										
CO3	**3**	**3**												
CO4	**3**	**3**	1	**2**										
CO5	**3**	**3**	2	**3**										
CO6	**3**	**3**	3	**2**										
Average	**3**	**3**	2.25	**2**										
Level of correlation	**3**	**3**	3	**2**										

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

I B.Tech I Semester (Common to CE, ME, ECE, CAI, CSC & CSO)
I B.Tech II Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
0	0	3	1.5

20AHS06 ENGINEERING CHEMISTRY LAB

Course Outcomes:

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

1. Estimate the amount of metal ions, hardness of water, chlorides in water, acidity, alkalinity, dissolved oxygen in water by using volumetric analysis.
2. Demonstrate the importance of viscosity index, flash point and fire point of lubricants and to prepare a polymer.
3. Apply pH meter, conductivity meter and potentiometer to find the normality and amounts of substances in solution

Any **TEN** of the following experiments

1. Estimation of Hardness of water by EDTA method.
2. Estimation of Chlorides in Water sample.
3. Determination of acid strength by using a pH meter (I) Strong acid VS Strong base (II) Weak acid Vs Strong base.
4. Estimation of Copper using EDTA by complexometric method.
5. Determination of effect of temperature on absolute and kinematic viscosity of oils through Redwood viscometer No.1.
6. Estimation of Ferrous Ion by Potentiometry using standard Potassium Dichromate in a Redox reaction.
7. Determination of rate of corrosion by weight loss method.
8. Determination of acid strength by Conductometric method – Strong acid VS Strong base.
9. Determination of Alkalinity of water sample.
10. Determination of Acidity of water sample.
11. Estimation of Dissolved Oxygen in water by Winkler's method.
12. Estimation of Ferrous Ion by Potassium Dichromate method.
13. Determination of Flash and Fire point by using Pensky Marten's apparatus.
14. Preparation of Phenol-Formaldehyde resin.
15. Determination of moisture content in a coal sample

Text Books:

1. Chemistry pre-lab manual by Dr K. N. Jayaveera and K.B. Chandra Sekhar, S.M. EnterprisesLtd., 2007.
2. Vogel'S text book of Quantitative Inorganic Analysis, ELBS Edition, 1994.

Equipment Required:

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

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.67	-	-	-	-	-	-	-	-	-	-	-	-
Level of correlation	3	3	-	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

I B.Tech I Semester (Common to CE, ME & ECE)

I B.Tech II Semester (Common to EEE, CSE, IT, CSE(DS) & CSE(AI&ML)

		L	T	P	C
20AHS05	**Communicative English Lab**	**0**	**0**	**3**	**1.5**

Course Outcomess:

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

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
2. Develop communication skills through debates, oral presentations, group discussions and various language learning activities
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and reading comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional settings

UNIT:I **10 hours**

1.Phonetics for listening comprehension of various accents

2.Reading comprehension

3.Describing objects/places/persons

UNIT: II **10 hours**

1.JAM

2.Small talks on general topics

3.Debates

UNIT: III **10 hours**

1.Situational dialogues - Greeting and introduction

2.Summarizing and Note making

3.Group Discussion

UNIT: IV **10 hours**

1.Asking for Information and Giving Directions

2.Information Transfer

3.Non-verbal Communication - Dumb Charade

UNIT: V **10 hours**

1.Oral Presentations

2.Précis Writing and Paraphrasing

3.Reading Comprehension and spotting errors

Prescribed Software For Practice:

Sky Pronunciation, Pro-power2 & Globarena

Reference Books

1. Academic writing: A hand book for international students, Bailey, Stephen, Routledge, 2014.
2. Skill ful Level 2 Reading & Writing Student's Book Pack(B1) Macmillan Educational.
3. Cambridge Academic English (B2),Hewings, Martin.2012.
4. Effective Technical Communication, Ashrif Rizvi, TataMcGrahill, 2011
5. Technical Communication by Meenakshi Raman & Sangeeta Sharma, 3rd Edition, O U Press 2015

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	3	-	-	3	2
CO2	3	3	-	-	-	-	-	-	3	3	-	-	3	3
CO3	2	2	-	-	-	-	-	-	-	3	-	2	2	2
CO4	3	-	-	-	-	-	-	-	-	3	-	2	3	-
Average	2.75	2.33	-	-	-	-	-	-	3	3	-	2	2.75	2.33
Level of correlation	3	2	-	-	-	-	-	-	3	3	-	2	3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

I B.Tech I Semester (Common to All Branches)

		L	T	P	C
20ACS03	**C – Programming and Data Structures Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

Course Outcomess:

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

1. Demonstrate basic concepts of C programming language.
2. Develop C programs using functions, arrays, structures and pointers.
3. Illustrate the concepts Stacks and Queues.
4. Design operations on Linked lists.
5. Develop searching and sorting methods.

Week l

a) Programs using I/O statements and expressions.

b) Programs using decision-making constructs.

Week 2

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

i) To find the factorial of a given integer.

ii) To solve Towers of Hanoi problem.

Week 3

a) Write a C program to find both the large stand smallest number in a list of integers.

b) Write a C program that uses function stopper form the following:

i) Addition of Two Matrices ii)Multiplication of Two Matrices

Week 4

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) Given a string―a$bcd./fg‖find its reverse with out changing the position of special characters.

(Example input:a@gh%;j and output:j@hg%;a)

Week 5

From a given paragraphper form the following using built-in functions:

a. Find the total number of words.

b. Capitalize the first word of each sentence.

c. Replace a given word with another word.

Week 6

a) Write a C Program to perform various arithmetic operations on pointer variables.

b) Write a C Program to demonstrate the following parameter passing mechanisms:

i) call-by-value ii) call-by-reference

Week 7

Write C programs that implement stack(itsoperations) using

i) Arrays

ii) Pointers

Week 8

Write C programs that implement Queue (itsoperations) using

i) Arrays

ii) Pointers

Week 9

Write a C program that uses Stack operation stopper form the following:

i) Converting in fix expression in to postfix expression

ii) Evaluating the post fix expression

Week 10

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

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

Week 11

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

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

Week 12

Write a C program that uses functionst o perform the following operations on circular linked list.

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

Week 13

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

i) Creating a Binary Tree of integers

ii) Traversing the above binary tree in preorder, inorder and postorder.

Week 14

Write C programs that use both recursive and non-recursive function stopper form the following searching operations for a key value in a given list of integers:

i) Linear search

ii) Binary search

Week 15

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

i) Bubble sort

ii) Selection sort

iii) Insertion sort

Week 16(CaseStudy)

Create a―Railway reservation system with the following modules

i) Booking

ii) Availability checking

iii) Cancellation

Prepare chart.

Text Book(s)

1. Programming in C and Data Structures,J.R.Hanly, Ashok N.Kamthane and A.Ananda Rao,Pearson Education.
2 B.A.Forouzon and R.F.Gilberg,"COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3 Richard F.Gilberg & Behrouz A.Forouzan,"Data Structures:APseudo code Approach with C",Second Edition, CENGAGELearning,2011.

Reference Books

1 Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press,2nd Edition 2011.
2 E.Balaguruswamy,"C and Data Structures",4th Edition,Tata McGrawHill
3 A.K.Sharma,Computer Fundamentals and Programming in C, 2nd Edition,University Press.
4 M.T.Somashekara,"Problem Solving UsingC",PHI,2ndEdition 2009.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2		3									
CO2	3	3	3	3	3				2					
CO3	3	3	1	2	3									
CO4	3	2	2		2									
CO5	3	3	3	2	3						2			
Average	3	2.8	2.2	2.33	2.8				2		2			
Level of correlation	3	3	2	3	3				2		2			

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester(Common to CE, ME & ECE)

I B.Tech II Semester(Common to EEE, CSE, IT, CSE(DS) & CSE(AI&ML)

20AMB01	**Design Thinking**	**L**	**T**	**P**	**C**
	(Mandatory Course)	**2**	**0**	**0**	**0**

Course Outcomess:

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

1. Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.
2. Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.
3. Develop innovative products or services for a customer base using ideation techniques.
4. Build proto types for complex problems using gathered user requirements.
5. Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.
6. Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

UNIT:I Introduction to Design Thinking 10 hours

Design Thinking Process:Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Designvs Design thinking, Problem solving,Under standing design thinking and its process model,Design thinking tools.

UNIT:II Empathize 10 hours

Design thinking phases, How to empathize,Role of empathy in design thinking, purpose of empathy maps,Things to be done prior to empathy mapping, Activities during and after the session, Under standing empathy tools : Customer Journey Map,Personas.

UNIT:III Ideation 10 hours

Challenges in idea generation, need for systematic method to connect to user, Visualize, Empathize, and Ideate method,Importance of visualizing and empathizing before ideating,Applying the method**,**Ideation Tools: How Might We? (HMW),Story board,Brain storming.

UNIT:IV Prototyping **10 hours**

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes,Process of prototyping-Minimum Viable prototype.

UNIT:V Testing Prototypes **10 hours**

Prototyping for digital products: what’s unique for digital products, preparation : prototype for physic a Products :what’s Unique for physical products,Preparation;Testing prototypes with users.

Text Book(s)

1. S.Salivahanan, S.Suresh Kumar,D.PraveenSam, ‘’Introduction to Design Thinking ‘’, Tata MCgraw Hill , first Edition, 2019.
2 KathrynMcElroy, Protyping for Designers:Developing the best Digital and Physical Products’’, O Reilly,2017.

Reference Books

1 MichaelG. Luchs, ScottSwan, AbbieGriffin, ‘’Desig in Thinking – New Product Essentials from PDMA’’,Wiley, 2015

2 Vijay kumar, 101 Design Methods:A Structured Approach for Driving Innovation in Your Organization 2012

Additional Learning Resources:

1. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
2. https://www.ibm.com/design/thinking/page/toolkit
3. https://www.interaction-design.org/literature/article/define-and-frame-your-design-challenge-by- creating-your-point-of-view-and-ask-how-might-we
4. https://hbr.org/2018/09/design-thinking-is-fundamentally-conservative-and-preserves-the-status- quo
5. https://hbr.org/2018/09/why-design-thinking-works
6. https://hbr.org/2015/09/design-thinking-comes-of-age
7. https://www.culturepartnership.eu/en/article/ten-tools-for-design-thinking
8. https://nptel.ac.in/courses/109/104/109104109/
9. https://nptel.ac.in/courses/110106124/

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	3	-	-	-	-	-	-	-	-	-	-	3
CO2	-	2	3	-	-	-	-	-	-	-	3	-	-	3
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	3
CO4	-	-	3	2	-	-	-	-	-	-	-	-	-	3
CO5	-	2	3	2	-	-	-	-	-	-	-	-	-	3
CO6	-	2	3	2	-	-	-	-	-	-	3	-	-	3
Average	-	2	3	2	-	-	-	-	-	-	3	-	-	3
Level of correlation	-	2	3	-	-	-	-	-	-	-	3	-	-	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, IT, CSE(DS) & CSE(AI &ML))
I B.Tech II Semester (Common to CE, ME, ECE, CAI, CSC & CSO)

L	T	P	C
3	0	0	3

20AHS04 ENGINEERING PHYSICS

Course Outcomes:

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

1. Demonstrate strong fundamental knowledge in optic, lasers and optical fibers.
2. Comprehend and apply quantum mechanical principles towards the free electron theory.
3. Learn about the crystal structure, magnetic materials, semiconductors, superconductors and their applications.
4. Propose preparation methods for different nanomaterials and relate structure of nanomaterials with their property.

UNIT-I **9 Hours**

OPTICS

INTERFERENCE: Introduction - Principle of superposition - Conditions for sustained interference – interference in thin films by reflection – Newton’s Rings - Determination of wavelength of light and refractive index of liquid.

DIFFRACTION: Introduction–Definition of Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit and double slit.

UNIT-II **9 Hours**

LASERS & FIBER OPTICS

Lasers: Introduction - Laser Characteristics - spontaneous and stimulated emission of radiation - Einstein’s coefficients - population inversion - Ruby laser - He-Ne laser- Applications of laser.

Fiber Optics: Introduction - Principle of optical fiber - Acceptance angle and acceptance cone - Numerical aperture - Classification of Optical Fibers-Optical fiber communication system- Applications of optical fibers.

UNIT-III **9 Hours**

PRINCIPLE OF QUANTUM MECHANICS: Wave and particles - de Broglie hypotheses - de Broglie’s wavelength for electron - Properties of Matter waves -Schrödinger time independent wave equation - Physical significance of wave function -Particle in one dimensional infinite potential box (qualitative only).

CRYSTAL PHYSICS: Single crystalline, Polycrystalline and amorphous materials -Fundamental of crystallography- Space lattice - Basis - unit cell - Lattice parameters - Crystal systems –Bravais Lattice - Structure and packing fraction of Simple cubic and body centered cubic - Miller Indices-Bragg's law- X-ray diffraction by powder method.

FREE ELECTRON THEORY: Electrical conductivity of Classical free electron theory and Quantum free electron theory - merits and demerits - Kronig penny model (qualitative only).

UNIT-IV **9 Hours**

SEMICONDUCTORS & SUPERCONDUCTORS

SEMI CONDUCTORS: Introduction - Intrinsic and extrinsic Semiconductors - Fermi level- Drift and diffusion - Einstein's equation - Hall Effect – LED.

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

UNIT-V **9 Hours**

MAGNETISM & NANOMATERIALS

MAGNETISM: Introduction and basic definitions - Origin of magnetic moment -Classification of magnetic materials - Hysteresis curve - Hard and Soft Magnetic Materials - Applications.

NANOMATERIALS: Introduction - Significance of Nano scale - Types of nanomaterials -Ball Milling-Chemical vapor deposition - Properties of nanomaterials, Optical and magnetic – application of Nano materials.

Text Books:

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

Reference Books:

1. Solid State Physics, Pillai. S.O, New Age International, New Delhi, 2005.
2. Introduction to Nanoscience and Technology, Chattapadhyay K.K, Banerjee A.N, New Delhi.
3. Engineering Physics, Vijaya kumara K, S. Chand & Company Ltd., New Delhi .

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	1	-	-	-	-	-	-	-	-	-	-
CO4	2	-	-	2	1	-	-	-	-	-	-	-		
Average	2.75	2	-	1.33	1	-	-	-	-	-	-	-	-	-
Level of correlation	3	2	-	1	1	-	-	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

I B.Tech II Semester (Common to All Branches)

20AHS08	**Algebra and Transformation Techniques**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

Course Outcomess:

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

1. Solve the system of linear equations and determine the eigen values and eigen vectors.
2. Apply the Laplace transform techniques to solve ordinary differential equations.
3. Apply Fourier series to expand periodic and elementary functions.
4. Evaluate Fourier sin and cosine transforms for given functions.
5. Analyze the principles of Z-transforms for solving the difference equation.

UNIT-I **10 Hours**

MATRICES: Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous linear equations. Eigen values and Eigen vectors. Cayley- Hamilton theorem (without proof) – Finding inverse and power of a matrix by Cayley-Hamilton theorem. Diagonalization of a matrix.

UNIT-II **10 Hours**

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. Applications of Laplace Transforms to ODE

UNIT-III **7 Hours**

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

UNIT-IV **8 Hours**

FOURIER TRANSFORMS: Fourier integral theorem (only statement) - Fourier sine and cosine integrals. Fourier Transforms - Fourier sine and cosine Transforms – properties –Inverse transforms – Infinite Fourier transforms.

UNIT-V **10 Hours**

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

Text Books:

1. Higher Engineering Mathematics, Dr. B. S. Grewal, 44/e Kanna Publications, 2017.
2. A Text book of Engineering Mathematics –II, T. K. V. Iyengar, B. Krishna Gandhi and others, S. Chand and company. 8th Revised edition, 2013.

Reference Books:

1. A Text Book of Engineering Mathematics-I, B.V. Ramana, , Tata Mc Grawhill
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons-2016.
3. Introductory Methods of Numerical Analysis S.S. Sastry, Printice Hall of India publications, 2012.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-		
CO5	3	2	-	-	-	-	-	-	-	-	-	-		
Average	3	2	-	2	-	-	-	-	-	-	-	-	-	-
Level of correlation	3	2	-	2	-	-	-	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

I B.Tech II Semester (ME)

20ACE02	**Applied Mechanics**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

Course Outcomess:

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

1. Apply the various methods to determine resultant forces and equilibrium equations.
2. Analyze the dynamic analysis of rigid body motion.
3. Analyze the work energy relations.
4. Apply the concept of centroid and Moment of Inertia for composite sections.
5. Identify and formulate various methods for solving simple frames and Trusses.

UNIT:I Basic Concepts of Engineering Mechanics 10 hours

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 - 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 diagram – Equilibrium of coplanar force systems, Types of members and supports, Support reactions.

UNIT:II Kinematics 10 hours

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

UNIT:III Kinetics 10 hours

Bodies in rectilinear translation Curvilinear translation Bodies rotating about fixed axis–D'Alemberts Principle- Principle of work energy Principle of impulse and momentum, virtual work, Langrange's Equation.

UNIT:IV Centroid and Centre of Gravity 10 hours

Introduction to centre of gravity and centroid Centroids of symmetrical and unsymmetrical shapes Theorems of Pappus and Guldinus (simple problems).

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 and composites, Moment of inertia of mass (Simple problems only).

UNIT:V Simple Stresses and Strains 10 hours

Introduction Elasticity Stress Strain - Types of stresses and strains Elastic limit -Hooke's law – young's Modulus lateral –Lateral Strain, possion's ratio and 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 Book(s)

1. Engineering Mechanics 2nd Edition ,Bhavikatti and Rajasekharappa, New Age Intl. Publications, New Delhi, 2016.
2. A text book of Engineering Mechanics 6th Edition,R.K.Bansal, Laxmi Publications, New Delhi, 2017
3. Engineering Mechanics (Statics and Dynamics)4th Edition,A Nelson-Tata McGrawHill Education Private Limited, NewDelhi, 2014

Reference Books

1. Engineering Mechanics, Strength of Materials and Elements of Structural Analysis1st Edition, C.Venkatramaiah & A.V.Narasimha Rao-CBS Publishers & Distributors, NewDelhi. 2018
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,NewDelhi.
5. Engineering Mechanics by Ferdin and L.Singer Published by Row Publishers, NewYork.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2											2
CO2	3	3	3											2
CO3	3	3	3											2
CO4	3	3	2											2
CO5	3	3	2											2
Average	3	3	2											2
Level of correlation	3	3	2											2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IB.Tech IISemester (**Common to all branches**)

20ACS04	**Problem Solving and Programming using Python**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

Course Outcomess:

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

1. Demonstrate knowledge in Basics of python programming
2. Use the data structure lists, Dictionaries and Tuples.
3. Solve the problems by applying the modularity principle.
4. Demonstrate knowledge in OOP.
5. Demonstrate various mathematical operations using Num Py, Analyze Data using P and as and visualizations using Mat plot lib.

UNIT:I Introduction to Problem-Solving, Expression and Data Types 10 hours

Fundamentals: what is computer science - Computer Algorithms - Computer Hardware – Computer soft ware - Computational problem solving the Python programming language - Overview of Python , Environmental Setup, First program in Python, Python I/O Statement.

Expressions and Data Types:Literals, Identifiers and Variables, Operators, Expressions. Datatypes, Numbers, Type Conversion, Random Number.

Problemsolving: Restaurant Tab calculation and Age in seconds.

UNIT:II Control Structures & Collections 10 hours

Control Structures: Boolean expressions, Selection control and Iterative control.

Arrays - Creation, Behavior of Arrays, Operations on Arrays, Built-In Methods of Arrays.

List - Creation, Behavior of Lists, Operations on Lists, Built-In Methods of Lists.

Tuple - Creation, Behavior of Tuples, Operations on Tuples, Built-In Methods of Tuples.

Dictionary - Creation, Behavior of Dictionary, Operations on Dictionary, Built-In Methods of Dictionary.

Sets - Creation, Behavior of Sets, Operations on Sets, Built-In Methods of Sets, Frozen set.

ProblemSolving: A food Co-op’s Worker Scheduling Simulation.

UNIT:III Strings, Functions and Files 10 hours

Strings-String Literal, Assigning String to a variable, Multiline Strings, String Slicing, Built-in Functions and Methods.

Functions–Creating functions, calling a function, passing arguments to functions, function with return statement, Recursive function, Lambda Function.

Files – File Handling, Create, Write, Read and Delete Files.

UNIT:4 Object Oriented Programming and Exceptions 10 hours

OOP - Classes and Objects, Encapsulation, Inheritance, Polymorphism, Constructor and Destructor, Self parameter, Local and Global Scope, Access Modifiers, Polymorphism, super () method. Modules in python.

Exceptions - Handling Exceptions, Raising Exceptions, Exception Chaining, User Defined Exceptions.

Problem solving: Credit card calculation.

UNIT:V Introduction to numPy, P and as, Mat plot lib 10 hours

Exploratory Data Analysis (EDA), Data Science life cycle, Descriptive Statistics, Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA.

Data Visualization: Scatter plot, bar chart, histogram, boxplot, heat maps, etc.

Text Book(s)

1. Introduction to Computer Science using Python:A Computational Problem-Solving Focus, First Edition, Charles Dierbach, Wiley India , 2012.
2 Programming Python, MarkLutz, O' Reilly Publications, Fourth Edition, 2011.

Reference Books

1 Core Python Programming, 2nd edition, R.Nageswara Rao, Dream Tech Press,2018.

2 Fundamentals of Python, Third Edition, Kenneth Lambert and B.L.Juneja, Cengage Learning, 2012.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3	2												
CO3	3	3	3	3	2									
CO4	3	3	1	1										
CO5	3	3	3	3	3									
Average	3	2.75	2.33	2.33	2.5									
Level of correlation	3	3	3	3	3									

3-High Mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, IT, CSE(DS) & CSE(AI&ML))

I B.Tech II Semester (Common to CE, ME & ECE)

20AME01	Computer Aided Engineering Drawing	L	T	P	C
		1	0	4	3

Course Outcomess:

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

1. Communicate ideas effectively by using Auto CAD software.
2. Project the points,lines,planes,solids with digital environment
3. Represent sectional views of solids and develop the sectioned object surfaces.
4. Communicate ideas effectively by using Orthographic Projections and Isometric Views using computer software.

UNIT:I **10 hours**

Geometrical constructions of polygons (in scribing, circum scribing), special methods circle-tangents, Conics-ellipse, parabola, hyperbola -properties of conics, special methods of construction.

UNIT:II **10 hours**

Projections of points, straight lines-lines inclined to both the principal planes, determination of true length, traces and true inclinations.

UNIT:III **10 hours**

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:IV **10 hours**

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

Development of surfaces of simple solids, as above and part solids.

UNIT:V **10 hours**

Principles of isometric projection is o metric scale isometric projection of planes and solids conversion of orthographic views into isometric views and vice-versa.

Practice:

1.Geometrical constructions:

a) Sketching of polygons - Triangles, Square, Rectangle, Pentagon, Hexagon, Circle at different positions.

Sketching of Tangents to the circles

2.Conics:

Constructions of Ellipse, Parabola ,Hyperbola

3.Points:

Drawing the quadrant sand positioning of the points with reference to H.P and V.P with dimensions.

4.Lines:

Sketching of lines when they are

1.Parallel to both H.P & V.P

2.Parallel to V.P/H.P and perpendicular to H.P/V.P

3.Parallel toV.P/H.P and inclined to H.P/V.P

4.Inclined to both the planes

a) Sketching of the line to measure true length & true inclinations

b) Sketching of the line to determine the traces

5 Planes:

Sketching of the planes when they are

a) Perpendicular to V.P/H.Pandparallel to H.P /V.P

b) Inclined to V.P/H.P and perpendicular to H.P/V.P

c) Perpendicular to both V.P and H.P.

d) Inclined to bothV.P and H.P.

6 Solids:

a) Sketching of 2D shapes and convert it to 3D solids (Prisms, Pyramids, cube , cylinder, one, tetrahedron)

b) Sketching of projections of solids when the position of axisis

i. Perpendicular to V.P/H.P and parallel toH.P/V.P.

ii. Inclined to V.P/H.P and parallel toH.P/V.P.

iii. Parallel to both V.P and H.P.

7.Sections of solids:

a) Different types of hatching on the polygons.

b) Sketching of sections of solids when the section/cutting planeis

i. Parallel to V.P/H.P and perpendicular to H.P/V.P.

ii. Inclined to V.P/H.P and perpendicular to H.P/V.P.

iii. Perpendicular to both principal planes.

c) Sketching of sections when the cutting plane passing through different positions-base, axis, corner, apex /vertex, generator, lateraledge.

Sketching of true shapes

8 Development of surfaces:

Sketching of developed surfaces of

a) cylinder, prisms using parallel line method

b) cone, pyramids using radial line method

c) truncated solids and frustum

9.Orthographic Projections:

Sketching of 2D views of front, top and side views of 3D objects.

10. Isometric projections:

a) Setting of isometric grid

b) Sketching of isometric views of 3D models / shapes.

Text Book(s)

1. K. L. Narayana and S. Bheemanjaneyulu, Engineering Drawing with Auto CAD 2016 ,New Age Publishers, NewDelhi,2017
2 Basant Agrawal and C.M.Agrawal, Engineering Drawing, McGraw Hill Education 2nd edition.

Reference Books

1 K.Venugopal, Engineering Drawing and Graphics+Auto Cad, New Age International (P)Ltd, Publishers , New Delhi, Fourth Edition

2 Siddiquee Arshad. N., Zahid A. Khan, Mukhtar Ahmad, Engineering Drawing: Withprimeron AUTO CAD, PHI Learning Pvt. Ltd.,

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	3	-	-	-	3	3	-		2	3
CO2	3	3	3	-	3	-	-	-	3	-	-		2	3
CO3	3	3	-	-	3	-	-	-	3	-	-		2	3
CO4	3	3	-	-	3	-	-	-	3	3	-		2	3
Average	3	3	3	-	3	-	-	-	3	3	-		2	3
Level of correlation	3	3	3	-	3	-	-	-	3	3	-		2	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI&ML))
I B.Tech II Semester (Common to CE, ME, ECE, CAI, CSC & CSO)

L	T	P	C
0	0	3	1.5

20AHS07 ENGINEERING PHYSICS LAB

Course Outcomes:

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

1. Explore the knowledge of Spectrometer and other optical instruments.
2. Apply concepts of magnetic materials, lasers, semiconductor, and it's their relative parameters.
3. Access, process and analyze scientific information of optical communication.

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 thickness of thin wire by Interference.
4. Determine the wavelength of given laser source - Diffraction grating.
5. Determine the radius of curvature of given piano convex lens by forming Newton Rings.
6. Magnetic field along the axis of a current carrying coll - Stewart and Gee's method.
7. Numerical Aperture of an optical fiber.
8. Bending losses In Optical Fiber.
9. Determine the wavelength of Laser source using optical fiber.
10. Determine Hall Coefficient and Carrier concentration of the given Semiconductor.
11. Determine the energy loss of ferromagnetic sample by plotting B-H curve.
12. Energy gap of a given semiconductor.
13. Solar Cell: To study the V-I Characteristics of solar cell.
14. Determine the particle size using laser source.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	-	-	2	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	2.67	1	-	-	2	-	-	-	-	-	-	-	-	-
Level of correlation	3	1	-	-	2	-	-	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IB.Tech I Semester (Common to EEE, CSE, IT, CSE(DS) & CSE(AI&ML))

IB.Tech II Semester(Common to CE, ME & ECE)

20AME02	**Engineering Practice lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

Course Outcomes:

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

1. Perform a different prototype models in the carpentry trade such as Mortise and tenonjoint, and Table stand usingwood turning lathe.
2. Prepare models such as Dove tail joint and Half Round joint using Fitting tools and rectangulartray,and funnel prototypes in the trade of Tinsmithy.
3. Perform various basic House Wiring techniques such Staircase wiring (i.e. control of onelamp by two switches fixed at two different places), and wiring for tube light (Fluorescent Lamp)/Focus light.
4. Fabricate different models in a foundry shop such as single and two pieces pattrens and prototypes in the trade of Welding suchasT-Jointand H-Joint.

TRADES FOR EXERCISES:

a. Carpentryshop.

1. Preparea Mortise and tenonjoint from a given 300 x 40 x 25mm soft wood stock.
2. Preparea Table stand (desiredshape) by using wood turning Lathe from a given 300x 40x25mm soft wood stock.

b. Fittingshop

1. Preparea Dovetail joint from a given100x50x5mmM.S.stock.
2. Preparea Half Round joint from a given100x50x5mmM.S.stock.

c. Sheetmetalshop

1. PrepareaFunnelfromgivenG.I.sheet.
2. Preparea Rectangular Tray from given G.I.sheet.

d. House-wiring

1. Stair case wiring (i.e.control of one lampby two switches fixed attwo different places).

2. Prepare a wiring for tube light (‘’Fluorescent Lamp ‘’)/ Focus light
3. Preparea mould for a single piecepattern (Connectingrod)
4. Preparea mould for a Double piecepattern(SteppedPulley)

e. Welding

1. Preparea T-Joint from given M.SFlat pates using Arc Welding.
2. Preparea H-Joint from given M.SFlat pate susing Arc Welding.

2. TRADES FOR DEMONSTRATION:

a) Plumbing
b) MachineShop
c) MetalCutting

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, woodfaults, 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 thestudent). 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/SciTechPublishers.
2 Engineering Practices Lab Manual,Jeyapoovan ,Saravana Pandian,4/eVika0073
3 Dictionary of Mechanical Engineering,GHF Nayler,Jaico Publishing House.
4 Engineering Work shopby Vishnu UniversalLearning.
5 Engineering Work shop by GRI Einstitute.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		3				3				3	
CO2	3	2	2		3				3				3	
CO3	3	2	2		3				3				3	
CO4	3	2	2		3				3				3	
Average	3	2	2		3				3				3	
Level of correlation	3	2	2		3				3				3	

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

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

20ACS05	**Problem Solving and Programming Uusing Python Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	

Course Outcomes:

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

1. Write,Test and Debug Python Programs
2. Implement Condition als and Loops for Python Programs
3. Use functions and represent Compound data using Lists,Tuples and Dictionaries
4. Read and write data from &to files in Python

WEEK 1

a. Writeapythonscripttodisplayasimplemessage

b. Write a python script to perform basic arithmetic operations on two values which are accepted fromthe user.

WEEK 2

a. Write a python scripttocal culate the factorial of a given number.

b. Write a python script tocal culate sum of individual digits of a given number.

c. Write a Python program that prompts the user for two floating-point values and displays the result of the first number divided by the second with exactly six decimal places displayed.

WEEK 3

a. Write a python script to find the largest number among three numbers and display them in ascending order using if-else construct.

b. Write a python script to display Fibonacci sequence of numbers using while loop, for loop and do-whileloop constructs.

c. Write a python script to display the prime number series up to the given NValue.

WEEK 4

a. Write a Pythonprogram

i. To calculate sum all the items in a list ii.To remove duplicates from a list.

iii. To find the list of words that are longer than from a given list of words.

iv. To get the difference between the two lists.

To append a list to the second list.

b.Write a Python program to print a specified list after removing the 0^{th}, 4^{th} and 5^{th} elements. Sample List:['Red','Green','White','Black','Pink','Yellow']

Expected Output:['Green','White','Black']

c.Write a python script to arrange the given list of elements in ascending or descending order.

WEEK 5

a. Towrit eapython program to create, slice,change,delete and index element susingTuple.

b. Write a Python program to replacelast value of tuplesinalist.

c. Samplelist:[(10, 20,40),(40, 50, 60),(70, 80,90)]

Expected Output:[(10,20,100),(40, 50,100), (70, 80,100)]

WEEK 6

a.Write a program to demonstrate working with dictionaries in Python

WEEK 7

a.Write a Python program

i. To create set.

ii. To remove item (s) froma set.

iii. To remove anitem from a set if it is presentinthe set.

iv. To createaunion and intersection of sets.

v. To create set difference.

WEEK 8

a. Write a python script to demonstrate string methods.

b. Write a Python program to count the number of characters (character frequency) in a string.Sample String:google.com'

Expected Result:{'g':2, 'o':3, 'l':1, 'e':1, '.':1,'c':1, 'm':1}

c. Write a Python program to rever seastring.

SampleString: "1234abcd"

ExpectedOutput:"dcba4321"

d. Write a Pythonscript that takes input from the user and displays that input back inupper and lower cases.

e. Write a Pythons cript to get a string made of 4copies of the last two characters of a specified string (length must beat least 2).

Sample Input/Output

Input: Python – Output:

onionin Input

:Exercises –Output:

eseseses

a. Write a Python function that checks whether a passed string is palindrome or not.

WEEK 9

a. Write a python script to find GCD of two numbers using recursive and non recursive functions.

b. Write a python script to convert the following using functions:

i. Fahrenheit to Celsius temperature.

ii. Celsius to Fahrenheit temperature.

WEEK10

a. Write a python script to demon strate the Exception Handling.

WEEK11

a. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order

b. Write a script named cop

c. yfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be the input that to be written to the second file.

WEEK12

a. Write a program to demonstrate a) arrays b) array indexing such as slicing, integer array indexing and Boolean array indexing a long with their basic operations in

NumPy.

b. Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given differenttypesofdata.

WEEK13

a. Write a python script to implement in heritance.

Write a python scripttoimplement constructor

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3									
CO2	3	3												
CO3	3	3	3	3	3									
CO4	3	3												
Average	3	3	3	2.5	3									
Level of correlation	3	3	3	3	3									

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, CSE (DS), CSE (AI & ML) & IT)
I B.Tech II Semester (Common to CE, ME, ECE, CAI, CSC & CSO)

L	T	P	C
2	0	0	0

20AHS09 **Environmental Sciences**

(Mandatory Course)

Course Outcomes:

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

1. Aware of the complex relationships between environment and human system.
2. Develop critical thinking (or) observation skills and apply them in the analysis of a problem (or) question related to the environment.
3. Identify the major pollutants and abatement devices in order to protect the environment from pollution for effective environmental management.
4. Analyze and interpret the fundamental physical, chemical, biological principles and social factors that govern natural process.

UNIT-I **5 Hours**

ECO SYSTEMS AND BIODIVERSITY AND ITS CONSERVATION: Definition, scope and importance, Need for public awareness. Concept of an ecosystem - Structure and function of an ecosystem.- Producers, consumers, decomposers - Energy flow in the eco systems - Ecological succession - Food chains, food webs and ecological pyramids -Introduction, types, characteristicfeatures, structure and function of the following eco systems: - Forest ecosystem - Grass land ecosystem - Desert ecosystem - Aquatic eco systems (lakes, rivers, oceans) – Introduction - Definition: genetics, species and ecosystem diversity - Biogeographical classification of India. - Value of biodiversity: consumptive use,productive use, social, ethical, aesthetic and option values - India as a mega diversity nation - Hot-spots of biodiversity. - Threats to biodiversity: habitats loss, poaching of wild life, man wildlife conflicts- Endangered and endemic species of India- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-II **5 Hours**

NATURAL RESOURCES:

Forest resources - Use and over-exploitation – deforestation - case studies - Timber extraction – mining- dams and their effects on forests and tribal people. **Water resources** - Use and over-utilization of surface and ground water - floods, drought - conflicts over water - dam's benefits and problems.

Mineral resources - Use and exploitation - environmental effects of extracting and using mineral resources - case studies. **Food resources** - World food problems - effects of modern agriculture - fertilizers- pesticides problems. **Energy Resources** - Growing energy needs- renewable and non- renewable energy sources, use of alternate energy sources - case studies - Role of an individual in conservation of natural resources - Equitable use of resources for sustainable life styles.

UNIT-III **5 Hours**

ENVIRONMENTAL POLLUTION: Definition Causes, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards - Solid waste Management: - Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution - Pollution case studies - Disaster management: Floods, earth quake, cyclone and landslides.

UNIT-IV **5 Hours**

SOCIAL ISSUES AND THE ENVIRONMENT: Form unsustainable to sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, water shed management - Resettlement and rehabilitation of people; its problems and concerns, case studies - Environmental ethics: issues and possible solutions - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies - Wasteland reclamation - Consumerism and waste products - Environment protection Act - Air (prevention and control of pollution) Act - Water (prevention and control of pollution) Act - Wildlife protection act - Forest conservation act - Issues involved in enforcement of environmental legislations - Public awareness. Visit to a local area to document environment assets river / forest / grassland / hill / mountain.

UNIT-V **3 Hours**

HUMAN POPULATION AND THE ENVIRONMENT: Population growth and variation among nations - Population explosion- family welfare program - Environment and human health - Human rights - Value education - HIV / AIDS -Women and child welfare - Role of information technology in environment and human health - Case studies. Visit to a local polluted site-urban/rural/industrial/agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hills lopes, etc.

Text Books:

1. Textbook of Environmental studies, Erach Bharucha, UGC.
2. Fundamental concepts in Environmental Studies, D D Mishra, , S Chand & Co Ltd

References Books:

1. Environmental Science G. Tyler Miller and Scottt Spoolman, Cengage Learning Publishers, 15lhEdition, 2015.
2. Environmental Encyclopedia Cunningham, W. P, Cooper T.H, Gorhani, Jaico publications,Mumbai, 2001.
3. Environmental Chemistry, B.K.Sharma, Krishna Prakashan Media (p) Ltd, 2011.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	3	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	3	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	3	-	-	-	-	-	-	-
CO4	2	-	-	-	-	-	3	-	-	-	-	-		
Average	2	-	-	-	-	-	3	-	-	-	-	-	-	-
Level of correlation	2	-	-	-	-	-	3	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

II B.Tech-I Semester (Common to All Branches)

L	T	P	C
3	1	0	3

20AHS10 Numerical Methods

Course Outcomes:

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

1. Classify the algebraic and non-algebraic equations and solve them using different iterative methods.
2. Apply numerical techniques to solve engineering problems.
3. Interpret the data and drawing the valid conclusion.
4. Evaluate the numerical solutions of ordinary differential equations using single step and multistepmethods.
5. Solve real world problems using solutions of partial differential equations.

UNIT-I **10 Hours**

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS: Introduction–Inter mediate value theorem-The Bisection method-The method of false position Newton - Raphson method- Problems on Iterative methods. Interpolation: Forward Differences - backward differences-Newton's forward and backward differences formulae for interpolation –Problems on Interpolation - Lagrange's interpolation formula-Inverse interpolation- Problems.

UNIT-II **8 Hours**

NUMERICAL DIFFERENTIATION AND INTEGRATION: Approximation of derivatives using interpolation polynomials-First and second order derivatives-Problems on numerical differentiation. Newton Cotes formulae – Numerical integration using Trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 Rule.

UNIT-III **10 Hours**

CURVE FITTING: Fitting of Curves by method of Least - squares – Fitting of Straight lines – Fitting of second-degree Parabola-Fitting of the exponential curve- Fitting of the power curve – Problems –Regression- Correlation–Problems on interpretation of data–Drawing conclusions.

UNIT-IV **8 Hours**

NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS: Taylor's series-Picard's method of successive Approximations -Euler's and Modified Euler's Method-Problems onsingle step methods– Runge – Kutta Methods – Predictor – corrector method-Milne's method.

UNIT-V **9 Hours**

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.

Text Books:

1. Dr. B. S. GREWAL, Higher Engineering Mathematics. Kanna Publications, 42^{th} edition.
2. B.V. Ramana, A Text Book of Engineering Mathematics-I, TATA MCGRAWHILL
3. E. Rukmangadachari and Keshava Reddy, A Text Book of Engineering Mathematics-I, PEARSON EDUCATION.
4. T.K.V. Iyengar, B. Krishna Gandhi and Others, A Text Book of Engineering Mathematics–I, S. Chand and Company.

References:

1. Erwin Kreyszig, Advanced EngineeringMathematics.JOHNWILEY&SONS-2016.
2. Jain.M. K, Iyengar T.K. V, Jain.R.K. Numerical Methods for Scientific and Engineering Computation. New age International Publishers.
3. N. Bail, M.Goyal & C.Walking, A Text Book of Advanced Engineering Mathematics-AComputer Approach.
4. Pal, Mathematical Methods, Oxford University Press, 2009.
5. S.S. Sastry, Introductory Methods of Numerical Analysis, Printice Hall of India publications, 2011

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-		
CO5	3	2	-	-	-	-	-	-	-	-	-	-		
Average	3	2.4	-	-	-	-	-	-	-	-	-	-	-	-
Level of correlation	3	2	-	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - I - Semester

20AME03	**Engineering Materials**	**L T P C**
		3 0 0 3

Course Outcomes:

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

1. Identify various phases of metals and alloys through appropriate phase diagrams.
2. Describe steels and cast irons for a given application.
3. Select the heat treatment process for various applications.
4. Apply nonferrous metals and alloys for engineering applications.
5. Identify the suitable ceramics, plastics and composites for various applications.

UNIT: I Structures of Metals and Alloys 10 hours

Structure of Metals: Crystal Structures: Unit cells, Metallic crystal structures, Imperfection in solids: Point, Line, interstitial and volume defects; dislocation strengthening mechanisms and slip systems, critically resolved shear stress.

Constitution of Alloys: Necessity of Alloying, substitutional and interstitial solid solutions- Phase diagrams & simple problems- Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions. Iron-Iron-carbide diagram and microstructural aspects of ferrite, cementite, austenite, ledeburite, and cast iron.

UNIT: II Steels And Cast Iron 10 hours

Steels: Plain carbon steels, use and limitations of plain carbon steels. AISI & BIS classification of steels. Classification of alloys steels. Microstructure, properties and applications of alloy steels-stainless steels and tool steels.

Cast Irons: Microstructure, properties and applications of white cast iron, malleable cast iron, grey cast iron, nodular cast iron and alloy cast irons.

UNIT: III Heat Treatment of Steels 10 hours

Annealing, tempering, normalizing and hardening, isothermal transformation diagrams for Fe-Fe_3C alloys and microstructure development. Continuous cooling curves and simple problems and interpretation of final microstructures and properties- austempering, martempering, case hardening - carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, and vacuum and plasma hardening.

UNIT: IV Non-ferrous Metals and Alloys 08 hours

Microstructure, properties and applications of copper, aluminium, titanium, nickel and their alloys. Study of Al-Cu phase diagram.

UNIT: V Ceramics, Polymers and Composites 12 hours

Structure, properties and applications of ceramics, polymers and Bio -composites. Introduction to super alloys and nanomaterials.

Textbook(s)

1. V.Raghavan, Material Science and Engineering, 5/e, Prentice Hall of India, 2004.
2 R.Balasubramaniam, Callister's Material Science and Engineering, 2/e, Wiley India, 2014.

Reference Books

1 Y. Lakhtin, Engineering Physical Metallurgy, University Press of the Pacific, 2000.
2 S.H.Avner, Introduction to Physical Metallurgy, 2/e, Tata McGraw- Hill, 1997.
3 L.H.Van Vlack, Elements of Material Science and Engineering, 6/e, Pearson Education, 2008.
4 George E.Dieter, Mechanical Metallurgy, 3/e, McGraw-Hill, 2013.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	
CO2	3	3											3	3
CO3	3	3											3	3
CO4	3	3											3	3
CO5	3	3											3	3
Average	3	3											3	3
Level of correlation	3	3											3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - I - Semester

20AME04	**Thermodynamics**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

Course Outcomes:

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

1. Apply the principles of Thermodynamics to conduct analysis of various thermal engineering systems and processes using Analysis lab complying entropy to environment.
2. Apply the properties and principles of steam to solve problems in the power generation system using steam tables, mollier charts.
3. Analyze the working principles of different air standard power cycles in solving problems in various engineering applications and their performance using IC Engine software.

UNIT: I Basic Concepts and First Law of Thermodynamics 10 hours

Basic concepts -concept of continuum, Macroscopic and Microscopic approach: Thermodynamic systems -closed, open and isolated: Property, State, Path and Process, Quasi-static process, Work, Modes of work, work and heat transfer for different thermodynamic processes, Zeroth law of thermodynamics –concept of Temperature and Heat. First law of thermodynamics–SFEE -Application to closed and open systems. Related problems.

UNIT: II Second Law of Thermodynamics 10 hours

Second law of thermodynamics –Kelvin’s and Clausius statements of Second Law, Heat Engines, Refrigerator and Heat Pump, Coefficient of Performance, Clausius theorem, Clausius in-equality, Reversibility and Irreversibility, Carnot cycle-, efficiency, Carnot theorem and corollaries, Absolute thermodynamic temperature scale, related problems.

UNIT: III Entropy and Thermodynamics Relations 10 hours

Concept of Entropy, entropy of ideal gas, change of entropy for different non-flow processes, principle of increase of entropy –absolute entropy, Effect of Entropy on Environment, Availability and Irreversibility. Exact differentials, T-D relations: Maxwell’s relations, Clausius Clapeyron equations, Joule-Thomson coefficient. energy and exergy analysis.

UNIT: IV Properties of Steam and Applications 12 hours

Formation of steam, Types of steam, Steam tables and uses, Dryness fraction of steam, External work done during evaporation, Internal energy of Steam, Entropy of steam –Mollier diagram, related problems.

Steam Power Cycles and Boilers

Steam power cycles, standard Rankine cycle, Reheat and Regenerative cycle. related problems **Boilers:** Classification based on Working principles & Pressures of operation - L.P & H.P Boilers – Mountings and Accessories – Boiler horsepower, equivalent evaporation, efficiency – Draught: classification – artificial draught, induced and forced draught, Height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney– Related simple problems for the design of chimney.

UNIT: V Air Standard Cycles **12 hours**

Power Cycles: Stirling Cycle, Ericsson Cycle, Otto Cycle, Diesel Cycle, Dual Combustion Cycle, Brayton Cycle, Atkinson Cycle, Lenoir Cycle. Description and representation on P–V and T-S diagram, comparison, thermal efficiency. Mean effective pressure, related problems and problems solving using Matlab tool.

Gas Turbines: Simple gas turbine plant – Ideal cycle, essential components – Closed and Semi-closed cycles – merits and demerits, methods for increasing efficiency, combustion chambers. related simple problems

Jet Propulsion: Principle of Operation – Classification of jet propulsive engines – Turbo jet, Turbo prop, Pulse jet –Working Principles with schematic diagrams and representation on T-S diagram. related simple problems.

Textbook(s)

1. P.K. Nag., Engineering Thermodynamics, Tata McGraw Hill, New Delhi, 5th Edition, 2014.
2 K. Rajput, Thermal Engineering, Hyderabad, Lakshmi Publications Pvt. Ltd, 9th Edition, 2013.

Reference Books

1 J.P. Holman, Thermodynamics, 3rd Edition, Tata McGraw Hill, 1995.
2 C.P. Arora, Thermodynamics, Tata McGraw Hill, New Delhi,12th reprint 2007.
3 Cengel, Thermodynamics – An Engineering Approach, 3rd Edition, Tata McGraw Hill, New Delhi, 2003.
4 R. Yadav, Steam & Gas Turbines and Power plant engineering, 7th revised Edition, Central Publishing House, Allahabad, 2009.

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

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		1		1						3	2
CO2	3	2	2										3	2
CO3	3	2	2		1								3	2
Average	3	2	2		1		1						3	2
Level of correlation	3	2	2		1		1						3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - I - Semester

20ACE11	**Mechanics of Solids**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course 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 shear stress distribution across the various members
5. Formulate the expressions for longitudinal and circumferential stresses in thin and thick cylinders

UNIT: I Simple Stresses and Strains 12 hours

Elasticity and Plasticity – Types of stresses and strains – Hooke's law – Stress –Strain curve - 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 12 hours

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.

UNIT: III Theory Of Simple Bending 10 hours

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), 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 10 hours

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.

UNIT: V Thin and Thick Cylinders 12 hours

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 – Lame's equation – Design of thick cylindrical shells – Compound cylinders – Shrink fit allowance – Initial difference of radii at the junction.

Textbook(s)

1. B.C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, Mechanics of Materials, Mumbai, 1st Edition, Laxmi Publications, 2002.
2 R. Subramaniyan, Strength of Materials, Oxford University Press, New Delhi, 2008.

Reference Books

1 Bhavikatti, Strength of materials, New Delhi, 4th Edition, S. Chand & Co., 2009

2 Timoshenko & Young, Elements of Strength of materials, New Delhi, 2nd Edition, Eastern Wiley Publications, 2011.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-												2
CO2	3	3												2
CO3	3	3												2
CO4	3	3												2
CO5	3	3												2
Average	3	3												2
Level of correlation	3	3												2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - I - Semester

20AME05	**Manufacturing Processes**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

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

1. Describe the basic components, principles of various casting process and apply the principle to design gating systems for an industrial application.
2. Classify working principle of various welding processes and identify the causes and remedies of defects.
3. Demonstrate the principle of different metal forming processes and identify the causes and remedies of defects.
4. Describe the various manufacturing processes of plastics, ceramics, and powder metallurgy.
5. Explain the principles, different methods, and identify applications of additive manufacturing.

UNIT: I Casting Processes 12 hours

Introduction: Importance and selection of manufacturing processes. Introduction to casting process, process steps; pattern and design of gating system; Solidification of casting: Concept, solidification of pure metal and alloy; Special casting processes: Shell casting, investment casting, die casting, centrifugal casting, casting defects and remedies.

UNIT: II Metal Joining Processes 12hours

Classification of welding processes, types of welds and welded joints and V-I characteristics & problem, arc welding, weld bead geometry, submerged Arc welding, Gas Tungsten Arc welding, gas metal arc welding. applications, advantages and disadvantages of the above processes, Plasma Arc welding, Laser Beam Welding, Electron Beam Welding and Friction Stir Welding. Heat affected zones in welding; soldering and brazing: Types and their applications, Welding defects: causes and remedies.

UNIT: III Metal Forming & Forging 10 hours

Introduction, nature of plastic deformation, hot and cold working of metals, mechanics of metal forming; **Rolling:** Principle, types of rolling mill and products, roll passes, forces in rolling and power requirements, defects and remedies.

Extrusion: Basic extrusion process and its characteristics, hot extrusion and cold extrusion, wire drawing, tube drawing, defects and remedies.

Principles of forging, tools and dies. Types- Smith forging, drop forging, forging hammers, rotary forging and forging defects and remedies.

Sheet metal forming: Mechanics of sheet metal working, blanking, piercing, bending, stamping, defects and remedies.

UNIT: IV Plastic Processing, Ceramics and Powder Metallurgy 10 hours

Plastics: Types, properties and their applications, processing of plastics, extrusion of plastics, transfer moulding and compression moulding, injection moulding, thermoforming, rotational moulding, and blow moulding.

Ceramics: Classification of ceramic materials, properties and their application, ceramic powder preparation; Processing of ceramic parts: Pressing, casting, sintering; Secondary processing of ceramics: Coatings, finishing.

Powder Metallurgy: Principle, manufacture of powders, steps involved.

UNIT: V Additive Manufacturing Processes 12 hours

Additive manufacturing evolution, additive manufacturing processes and their relationship with subtractive manufacturing, reverse engineering, extrusion, and beam deposition techniques, materials, Applications of additive manufacturing.

Textbook(s)

1. P.N. Rao, Manufacturing Technology, 2nd Edition, Tata McGraw Hill, 2008.
2 Kalpakjain, Manufacturing Technology, Chennai, 4th Edition, Pearson Edition, 2002.
3 Ian Gibson, David W. Rosen, Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 2nd Ed., Springer Science & Business Media, 2015.

Reference Books

1 R.K. Jain, Production Technology New Delhi, 2nd Edition, Kanna Publishers, 2001.
2 B.S. Raghuwanshi, Workshop Technology, Volume-I, 2nd Edition Dhanpat Rai & Co Pvt. Ltd, 2014.
3 Andreas Gebhardt, Understanding additive manufacturing: rapid prototyping, rapid tooling, rapid manufacturing, Hanser Publishers, 2011.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2										3	3
CO2	3	2											3	
CO3	3	2											3	
CO4	3												3	
CO5	3	2											3	
Average	3	2	2										3	3
Level of correlation	3	2	2										3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - I - Semester

20AME06	**Engineering Materials and Testing Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

Course Outcomes:

After completion of this course the student will be able to

1. Choose the microscopes and different machinery for studying metallurgical properties.
2. Differentiate the structures of ferrous and non-ferrous metals and alloys.
3. Analyse the behaviour of metals and alloys in different heat treatments.
4. Compare various classes of metals, relationship between structure and their performance in different environments.

LIST OF EXPERIMENTS

Any TEN experiments are required to be conducted

1. Study of specimen preparation for metallographic examination and sample mounting in specimen mounting press.
2. Preparation and study of the Microstructure of pure Aluminium and pure Copper
3. Study of the Microstructures of Non-Ferrous alloy Brass and Cast Irons.
4. Preparation and study of the Microstructure of Low Carbon steel and High Carbon steel.
5. Determination of Harden ability of steel by Jominy end Quench test.
6. Hardness measurement of various heats treated and non-treated steels.
7. Find the hardness of the composite materials.
8. Study the stress–strain characteristics of mild steel rod using universal testing machine.
9. Determination of direct shear strength of rod using compressive testing machine.
10. Estimation of the modulus of elasticity of given material by measuring deflection in beams
    a. Simply supported beam.
    b. Over hanging beam.
    c. Cantilever beam.
11. Determination of modulus of rigidity of given material using torsion testing machine and spring testing machine.
12. Determination of impact strength (Izod and Charpy) using impact testing machine.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3							3				3	3
CO2	3	3			3				3				3	3
CO3	3	3			3				3				3	3
CO4	3	3			3				3				3	3
Average	3	3			3				3				3	3
Level of correlation	3	3			3				3				3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech - I - Semester

20AEE12 Electrical And Electronics Engineering Lab

L	T	P	C
0	0	3	1.5

Course Outcomes:

After completion of this course the student will be able to

1. Analyze the Efficiency of DC machines by different methods
2. Analyze the speed control of DC shunt machine
3. Analysis of Diode, Transistor and SCR Characteristics
4. Analysis of the Rectifiers and CRO operations

LIST OF EXPERIMENTS

Any TEN experiments are required to be conducted

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. Determination of impact strength (Izod and Charpy) using impact testing machine.

References books:

1. D. P. Kothari and B. S. Umre, Laboratory Manual for Electrical Machines, I.K International Publishing House Pvt. Ltd., 2017

Online Learning Resources/Virtual Labs:

1. http://em-coep.vlabs.ac.in/List%20of%20experiments.html?domain=Electrical Engineering
2. http://vlabs.iitb.ac.in/vlabs-dev/vlab_bootcamp/bootcamp/Sadhya/experimentlist.html

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3			1		3					
CO2	3	3		3			2		3					
CO3	3	2		1			2		3					
CO4	3	2		3			2		3					
Average	3	2.5		2.5			1.75		3					
Level of correlation	3	3		3			2		3					

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - I - Semester

20AME07	**Manufacturing Processes Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

Course Outcomes:

After completion of this course the student will be able to

1. Demonstrate the principle and basic components of conventional and additive manufacturing process.
2. Select the suitable manufacturing processes to produce the desired components in domestic and industrial applications.
3. Create different types of components using conventional and additive manufacturing techniques.

LIST OF EXPERIMENTS

Any TEN experiments are required to be conducted

1. Gating Design and pouring time and solidification time calculations.
2. Sand Properties Testing – Exercise for Strength and Permeability.
3. Moulding, Melting and Casting for ferrous/ non-ferrous materials.
4. TIG/MIG Welding.
5. Friction stir welding.
6. Spot Welding (Any other Special Welding Processes).
7. Press Tool: Blanking and Piercing operation.
8. Study of simple, compound and progressive dies.
9. Hydraulic Press: Bending operation.
10. Injection Moulding
11. Blow Moulding
12. Additive manufacturing with reverse engineering

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		-					3				3	3
CO2	3	3		3					3				3	3
CO3	3	3		3	3				3				3	3
Average	3	3		3	3				3				3	3
Level of correlation	3	3		3	1				3				3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - I - Semester

20AME08	**Modelling using CATIA**	**L**	**T**	**P**	**C**
		1	**0**	**2**	**2**

Course Outcomes:

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

1. Identify the various sketcher and modelling tools for design of engineering parts
2. Create the three-dimensional components using padding tools.
3. Create parts using modelling software Boolean Operations.

LIST OF EXPERIMENTS

Any TEN experiments are required to be conducted

1. Creating a normal sketch by considering the given dimensions
2. Creating profiles by using lines, Circles, Rectangles, Splines, and arcs, Modifying profiles by using Trims, Extend, Mirror. Move, Copy, Rotate
3. Design of Bearing Bracket, Shifter.
4. Design of Sliding Bracket, Depth Slot.
5. Design Knuckle Joint.
6. Design Universal Coupling.
7. Boolean operations.
8. Press Tool: Blanking and Piercing operation.
9. Applying modification to the assembly constraint by using a manipulation tool.
10. Exploded view for the created assembly.
11. Creating views of the final assembly on drafting sheet.
12. Creating front view side view and top view & Isometric view of Assembly.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		3				3				3	3
CO2	3	3	3		3				3				3	3
CO3	3	3	3		3				3				3	3
Average	3	3	3		3				3				3	3
Level of correlation	3	3	3		3				3				3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - I – Semester (Common to CE, EEE, ME, ECE, CSE, IT, CSE(DS), CSE(AI &ML), CAI , CSC & CSO)

20AMB02	**Universal Human Values**	**L T P C**
	(Mandatory Course)	**2 0 0 0**

Course Outcomes:

After completion of the course students will be able to

1. Apply the principles of natural acceptance to design a happy and prosperous living with responsibility.
2. Analyse the elements of sentient 'I' and material human body to design a living with responsibility for happiness and prosperity.
3. Apply the principles of 'trust' and 'respect' for designing a society with universal human order.
4. Analyse the situations causing imbalance in nature and further design an ecosystem for peaceful co-existence.
5. Apply the principles of science technology and management to solve contemporary problems professionally and ethically.

UNIT: I Introduction - Need, Basic Guidelines, Content and Process for Value Education 8 hours

Purpose and motivation for the course, recapitulation from Universal Human Values-I; Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration; Continuous Happiness and Prosperity- A look at basic Human Aspirations; Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority; Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario; Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT: II Understanding Harmony in the Human Being - Harmony in Myself 10 hours

Understanding human being as a co-existence of the sentient 'I' and the material Body; Understanding the needs of Self ('I') and 'Body' - happiness and physical facility; Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer); Understanding the characteristics and activities of 'I' and harmony in 'I'; Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail; Programs to ensure Sanyam and Health.

UNIT: III Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship 10 hours

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship; Understanding the meaning of Trust; Difference between intention and competence; Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship; Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals; Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

UNIT: IV Understanding Harmony in the Nature and Existence - Whole existence as Coexistence 08 hours

Understanding the harmony in the Nature; Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self- regulation in nature;

Understanding Existence as Co-existence of mutually interacting units in all- pervasive space; Holistic perception of harmony at all levels of existence

UNIT: V Implications of the above Holistic Understanding of Harmony on Professional Ethics 10 hours

Natural acceptance of human values; Definitiveness of Ethical Human Conduct; Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people friendly and eco- friendly production systems, c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

Strategy for transition from the present state to Universal Human Order:

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b. At the level of society: as mutually enriching institutions and organizations.

Textbook(s)

1. R R Gaur, R Asthana, G P Bagaria, “A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2 R R Gaur, R Asthana, G P Bagaria, “Teachers’ Manual for A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2.

Reference Books

1 Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2 N. Tripathi, “Human Values”, New Age Intl. Publishers, New Delhi, 2004. The Story of Stuff (Book).

3 Mohandas Karamchand Gandhi “The Story of My Experiments with Truth” E. FSchumacher. “Small is Beautiful” Slow is Beautiful –Cecile Andrews J C Kumarappa “Economy of Permanence” Pandit Sunderlal “Bharat Mein Angreji Raj” Dharampal.

4 Rediscovering India. Mohandas K. Gandhi, “Hind Swaraj or Indian Home Rule” India Wins Freedom - Maulana Abdul Kalam Azad Vivekananda - Romain Rolland (English)Gandhi - Romain Rolland (English).

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	3	3	3	2	-	-	-	-	-
CO2	-	-	-	-	-	3	3	3	2	-	-	-	-	-
CO3	-	-	-	-	-	3	3	3	2	-	-	-	-	-
CO4	-	-	-	-	-	3	3	3	2	-	-	-	-	-
CO5	-	-	-	-	-	3	3	3		-	-	-	-	-
Average	-	-	-	-	-	3	3	3	2	-	-	-	-	-
Level of correlation	-	-	-	-	-	3	3	3	2	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

II B.Tech - I Semester (Common to All Branches)

L	T	P	C
2	0	0	0

20AHS11 QUANTITATIVE APTITUDE AND REASONING-I

Course Outcomes:

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

1. Develop the thinking ability to meet the challenges in solving Logical Reasoning problems.
2. Solve campus placements aptitude papers covering Quantitative Ability and Verbal Ability.
3. Apply different placement practice techniques.

UNIT- I **9 Hours**

QUANTITATIVE ABILITY – I: Vedic Maths – Square - Square root – Cube - Cube root – Fractions – Mathematical operations – Number System – Types of numbers - Divisibility Rule – Unit Digit – Factors and Factorials – Remainder Theorem – Factorization and Trailing Zeroes – LCM And HCF

UNIT-II **9 Hours**

QUANTITATIVE ABILITY – II: Arithmetic Progression – Common Difference- n^{th} Term – Sum of terms – Geometric Progression – Common Ratio – n^{th} term – Sum of Terms – Averages - Weighted average – Percentages – Conversion – Increasing and decreasing in quantity – Change in Percentage – Successive discount – Compound Growth

UNIT-III **9 Hours**

REASONING ABILITY I: Coding and Decoding – Blood Relations – Directions – Number Series and Letter Series – Ranking and Ordering

UNIT-IV **9 Hours**

VERBAL I: Verbal analogy - Types - Parts of Speech – Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction and Interjection - Prepositions –Preposition of Place, Preposition of Placement, Preposition of Time and Preposition of Duration - Articles – Usage of a, an, the, Omission of articles - Sentences - Pattern and Types.

UNIT-V **9 Hours**

SOFT SKILL I: Communication Skills - Self-Confidence - Introductions & Greetings - Presentation Skills - Self- Motivation

Text Books:

1. Quantitative Aptitude, Logic Reasoning & Verbal Reasoning, R S Agarwal, S.ChandPublications.
2. Quantitative Aptitude for Competitive Examinations, R S Agarwal, S.Chand Publications

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	2	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	2	-	-	-	-
Average	2.33	2	-	-	-	-	-	-	-	2	-	-	-	-
Level of correlation	2	2	-	-	-	-	-	-	-	2	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OFENGINEERING & TECHNOLOGY
(AUTONOMOUS)

II B. Tech - II Semester (Common to CE, ME, CSE, CSE(AI&ML) & IT)

L	T	P	C
3	1	0	3

20AHS13 PROBABILITY AND STATISTICS

Course Outcomes:

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

1. Apply probability distributions to real life problems.
2. Analyze inference theory to make wise decisions about a population parameter.
3. Apply sampling methods in the day-to-day practical life to assess the quality of commodities.
4. Apply the testing of hypothesis for large and small samples.

UNIT-I **11 Hours**

RANDOM VARIABLES & THEORITICAL DISTRIBUTIONS: Introduction on Probability - Discrete and Continuous random variables – Distribution functions – Moment generating functions. Binomial distribution – Poisson distribution – Normal distribution – related properties.

UNIT-II **9 Hours**

SAMPLING DISTRIBUTIONS & ESTIMATION: Population - Sample - Parameter and Statistic - Characteristics of a good estimator - Consistency - Invariance property of Consistent estimator - Sufficient condition for consistency - Unbiasedness – Sampling distributions of means (known and unknown)- sums and difference. Estimation- Estimator, Estimate, Point estimation – Interval estimation –Bayesian estimation.

UNIT-III **8 Hours**

TEST OF HYPOTHESIS: Null Hypothesis-Alternative Hypothesis-Critical region – Level of Significance-Type I error and Type II errors-One tail test -Two tail tests - Hypothesis concerning one and two means – Hypothesis concerning one and two proportions.

UNIT-IV **9 Hours**

TEST OF SIGNIFICANCE: Student’s t-test, test for a population mean, equality of two Population means, paired t-test, F-test for equality of two population variances, $\chi 2$ -Chi-square test for goodness of fit and test for attributes.

ANALYSIS OF VARIANCE – One way and Two way Classifications

UNIT-V **8 Hours**

QUEUING THEORY: Introduction - Queues with impatient customers: Balking and reneging- Classification, stationary process, Binomial process, Poisson process, Birth and death process, - M/M/1 Model –Problems on M/M/1 Model.

Text Books:

1. Miller and John Freund. E, Probability & Statistics for Engineers, New Delhi, Pearson Education, 2014.
2. S. P. Gupta, Statistical Methods,33rdEdition, publications Sultan Chand& Sons.2021.
3. Iyengar, T.K.V., Krishna Gandhi B., Probability & Statistics, New Delhi, S. Chand & Company, 2014.

References Books:

1. Arnold O Allen, Probability & Statistics, Academic Press. 2014.
2. Manoj Kumar Srivastava and Namita Srivastava, Statistical Inference Testing of Hypotheses, Prentice Hall of India, 2014.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	1	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-		
Average	3	2.5	-	1	-	-	-	-	-	-	-	-	-	-
Level of correlation	3	3	-	1	-	-	-	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - II - Semester

20AMB03	**Managerial Economics and Financial Analysis**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

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

1. Explain the fundamental concepts and theoretical principles of the Economics
2. Apply economic principles for problem solving.
3. Identify market structures and types of business organizations.
4. List features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI & IRR methods of Capital Budgeting
5. Explain the basic concepts of book keeping and accounting, and analyze financial statements.

UNIT: I Introduction To Managerial Economics 10 hours

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 10 hours

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 10 hours

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 8 hours

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 10 hours

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).

Textbook(s)

1. Aryasri A. R., Managerial Economics and Financial Analysis, 4/E, TMH, 2009.
2 Varshney R.L. and K.L. Maheswari, Managerial Economics, Sultan Chand & Sons, 19/E, 2009.
3 Siddiqui S.A. and Siddiqui A.S., Managerial Economics and Financial Analysis, New Age international, 2009.

Reference Books

1 Gupta R.L., Financial Accounting, Volume I, Sultan Chand & Sons, New Delhi, 2001
2 James C. Van Horne, Financial Management policy, 12/E, PHI, 2001.
3 Joel Dean, Managerial Economics, PHI, 2001.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	-	-	-	-	3	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	2	-	-	-	-	3	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	3	-	-	-
Average	-	-	2	-	-	2	-	-	-	-	3	-	-	-
Level of correlation	-	-	2	-	-	2	-	-	-	-	3	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - II - Semester

20ACE12	**Fluid Mechanics and Hydraulic Machinery**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

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

1. Apply and calculate the pressure on surfaces and in pipes.
2. Identify and analyse frictional losses in a pipe when there is a flow between two places.
3. Identify the types of flow and its measurements and applications.
4. Identify the turbines and design criteria based on water availability.
5. Identify the suitable pump required for different purposes.

UNIT: I Fluid Properties and Statics 12 hours

Dimensions and units - Definition of a fluid – Physical properties of fluids – Density, Specific weight, Specific volume, Specific gravity, Compressibility, Vapor pressure, Surface tension, Capillarity and 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 surfaces– Buoyancy-Buoyant Force and Centre of Buoyancy Metacentre and Metacentric Height- Stability of Submerged and Floating Bodies.

UNIT: II Fluid Kinematics and Fluid Dynamics 10 hours

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, Impulse momentum equation and applications (pipe bend).

UNIT: III Flow Measurement 10 hours

Reynolds’s experiment – Reynolds’s number - Minor losses in pipe flow - Darcy– Weisbach equation – Variation of friction Factor – Moody’s chart – Pipes in series –Pipes in parallel.

Flow Measurement: Velocity measurement by Pitot tube and Pitot static tube – Discharge measurement by Venturimeter and orifice meter – Turbine Flow meter.

UNIT: IV Boundary Layer Theory 10 hours

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 – Mathematical models for boundary layer flows.

UNIT: V Hydraulic Turbines **12 hours**

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 – NPSH- Priming – Priming devices – Minimum starting speed – Multistage pumps – Pumps in series and parallel – Submersible pumps – Limiting suction head – Cavitation – Expression for specific speed.

Textbook(s)

1. P.N. Modi & S.M. Seth, Hydraulics and Fluid Mechanics including Hydraulic Machines, New Delhi, Standard Book House,14th Edition 2002.
2 R.K. Bansal, A Textbook of Fluid Mechanics and Hydraulic machinery, 9th Edition, Laxmi Publications (P) Ltd, 2010.

Reference Books

1 Nachleba, Hydraulic Turbines, New Delhi, 1st Edition, Tata McGraw Hill Publishing Co.Ltd, 2012.

2 Streeter & Wylie, Fluid Mechanics, 10th Edition, T M H Publications, 1997.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-											
CO2	3	3	2											
CO3	3	3	-											
CO4	3	3	3											
CO5	3	3	2											
Average	3	3	2.33											
Level of correlation	3	3	2											

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech - I - Semester

20AME09 **Thermal Engineering**

L	T	P	C
3	0	0	3

Course Outcomes:

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

1. Apply the working principles of condensers, nozzles, and steam Turbines in design of thermal power plant using Software Tools.
2. Apply the principles of performance evaluation and combustion process concepts in the design of IC engines for pollution standards.
3. Apply the principles of pneumatics to analyze various characteristics of compressors for the selection of a suitable compressor.

UNIT: I Steam Nozzles & Steam Condensers 12 hours

Steam Nozzles: Function of nozzle, applications, types, Flow through nozzles, thermodynamic analysis, assumptions, nozzle efficiency, condition for maximum discharge, critical pressure ratio, diameters of throat and exit for maximum discharge, super saturated flow through nozzle. Related problems. Design and Analysis of Flow pattern using Ansys software.

Steam Condensers: Requirements of steam condensing plant, Classification of condensers, working principle of different types, vacuum efficiency and condenser efficiency, mass of cooling water required for condensation of steam, Effect of air leakage. Related problems.

UNIT: II Steam Turbines 15 hours

Impulse Turbine: Mechanical details – classification of steam Turbines, De-Laval Turbine - its features, velocity triangles for moving blade, combined velocity triangle for moving blades, effect of friction – power developed, axial thrust, blade or diagram efficiency, Gross or Stage efficiency-combined velocity diagram for axial discharge – condition for maximum efficiency. Methods to reduce rotor speed-Velocity compounding, pressure compounding, Pressure and velocity compounding variation along the flow– Governing of impulse turbine- related problems.

Reaction Turbine: Mechanical details – principle of operation, thermodynamic analysis of a stage, power developed, degree of reaction, Height of blades –velocity diagrams for moving blades – Parson's reaction turbine – condition for maximum efficiency- Governing of reaction turbine, Related problems, Design and Analysis of Flow pattern on blades.

UNIT: III **I.C Engines, Testing and Performance** **10 hours**

I.C. Engines: Definition of Engine and Heat Engine, I.C Engine Classification – Parts of I.C. Engines, Working of I.C. Engines, Two Stroke & Four Stroke I.C. Engines, SI & CI Engines, Valve and Port Timing Diagrams. Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss factor, Heat loss factor, Exhaust blow down, Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of C.I Engines.

Testing and Performance: Parameters of Performance - Measurement of Cylinder Pressure, Fuel Consumption, Air Intake, Exhaust Gas Composition and their effect on environment, Brake Power – Determination of Frictional Losses and Indicated Power – Performance Test – Heat Balance Sheet, Related problems. Performance evaluation using IC engine software.

UNIT: IV **Combustion in S.I and C.I Engines** **10 hours**

Combustion in S.I Engines: stages of combustion, Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Types of Abnormal combustion, pre-ignition and knocking—combustion chamber – requirements, types.

Combustion in C.I Engines: Four stages of combustion – Delay period and its importance –Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and Combustion. Induced turbulence – open and divided combustion chambers and nozzles used.

UNIT: V **Compressors** **12 hours**

Compressors: Classification – Reciprocating –positive displacement, Rotary and dynamic machinery –Power producing and power absorbing machines, fan, blower and compressor.

Reciprocating: Principle of operation, work required, efficiencies – isothermal, isentropic, polytropic, mechanical and volumetric efficiency and effect of clearance, multi-stage compression, under cooling, saving of work, minimum work condition for stage compression, ratio of cylinder diameters. related problems.

Rotary (Positive displacement type): Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.

Dynamic Compressors: Centrifugal compressors: Mechanical details and principle of operation–work done- velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power. Axial flow compressors: Mechanical details and principle of operation– velocity diagrams – degree of reaction – simple problems.

Text Book(s)

1. R.K. Rajput, Thermal Engineering, Hyderabad, Lakshmi Publications Pvt. Ltd, 9th Edition, 2013.
2. V. Ganesan, I.C. Engines, Noida, 4th Edition, Tata McGraw Hill, 2014.
3. R.S. Khurmi &J.K.Gupta, Thermal Engineering, 15th Edition, Hyderabad, S.Chand, 2013.

Reference Books

1. P.L. Balleny, Thermal Engineering, 20th Edition, Khanna Publishers, New Delhi, 1994.
2. R. Yadav, Steam & Gas Turbines and Power plant engineering, 7th revised Edition, Central Publishing House, Allahabad, 2009.
3. S. Domkundwar, C.P. Kothandaraman, Anand Domkundwar, Dhanpat Rai & Co. 2016.

(Use of standard thermodynamic steam tables and mollier charts are permitted)

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2										3	3
CO2	3	3	2				1						3	3
CO3	3	3											3	2
Average	3	3	2				2						3	2.67
Level of correlation	3	3	2				2						3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II – Semester

20AME10 **Kinematics of Machinery**

L	T	P	C
3	0	0	3

Course Outcomes:

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

1. Know the basics of mechanism and perform kinematic analysis for designing the machines.
2. Describe the usage of lower pairs for different mechanisms in the engineering applications.
3. Compute the velocity and acceleration analysis of various mechanisms using graphical methods.
4. Design and kinematic analysis of various cam profiles based on follower motion and design the specified contour profiles for high speed applications.
5. Explain the different types of gears, gear trains and their importance in the power transmissions.

UNIT: I Mechanisms and Machines 12 hours

Machine and Mechanism, Rigid and Resistant bodies, Types of Constrained Motion, Elements or Links, Linkage, Kinematic Pairs, Types of Joints, Classification of Kinematic Pairs, Degree of freedom and mobility of Mechanisms, Mechanical advantage and Transmission angle. Kinematic chain – Inversion of mechanism (quadric cycle chain, single and double slider crank chains).

UNIT: II Mechanism with Lower Pairs 12 hours

Introduction, Pantograph, Exact and approximate straight line motion mechanisms and its types.

Automobile Steering Gear: Conditions for correct steering, Ackermann and Davis steering gear mechanism.

Hooke's Joint: Single and double Hooke's joint.

UNIT: III Velocity and Acceleration Analysis 10 hours

Analysis of simple mechanisms (Single slider crank mechanism and four bar mechanism) – Velocity by Instantaneous centre and relative velocity method, Kennedy's theorem, Acceleration diagrams, Coriolis acceleration, Klein's construction.

UNIT: IV Cams and Followers 12 hours

Introduction, Types of cams and followers, Terminology, High speed cams, Undercutting, Motions of the follower, Construction of cam profiles, Tangent cam with roller follower, Circular arc cam with flat faced follower.

UNIT: V Gears **12 hours**

Classification of Gears, Gear terminology, law of gearing, velocity of sliding, Form of teeth – cycloidal and involute profiles, Length of path and arc of contact, contact ratio, Interference in involute gears, minimum number of teeth, Comparison of Cycloidal and Involute tooth forms.

GEAR TRAINS: Introduction, Train value, Types of Gear Trains – Simple, Compound, Reverted and Epicyclic gear trains, Epicyclic gear trains – Analysis of Epicyclic gear trains, Torques in Epicyclic gear trains, Automotive transmission gear trains, differential gear trains.

Textbook(s)

1. S.S. Rattan, Theory of Machines and Mechanisms, Noida, 4th Edition, Tata McGraw Hill Publishers, 2016.
2 Bansal R.K., "Theory of Machines", Laxmi Publications Pvt Ltd., New Delhi, 20th edition 2009.

Reference Books

1 Joseph Edward Shigley and John Jospeh Uicker JR, Theory of Machines and Mechanisms SI Edition, Oxford University Press, 2014
2 R.L. Norton, Kinematics and Dynamics of Machinery, McGraw Hill Publishers, 2017.
3 Sadhu Singh, Theory of Machines, New Delhi, 2nd Edition, Pearson Edition, 2012.
4 Rao J.S. and Dukkipati R.V., "Mechanism and Machine Theory", Second Edition, Wiley Eastern Limited, 2006.

Mapping of Cos with Pos & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3	3									3	3
CO4	3	3	3	3									3	3
CO5	3	3	3	3									3	3
Average	3	3	3	3									3	3
Level of correlation	3	3	3	3									3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech - II - Semester

20AME11	**Thermal Engineering Lab**	**L**	**T**	**P**	**C**
		-	-	3	1.5

Course Outcomes:

After completion of the course the student will be able to

1. Identify the properties of fuels like flash point, fire point and calorific value.
2. Demonstrate the working principle, components of different types of engines, compressors, refrigeration and air conditioning systems.
3. Compute the frictional power of an I.C. engine by conducting retardation test or morse test.
4. Calculate the various efficiencies of engine and compressors by conducting performance test and 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 /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 petrol engine and to draw Port Timing Diagram of an I.C. Engine.
5 Study of the constructional details & working principles of four stroke diesel engine and to draw Valve Timing Diagram of an I.C. Engine.
6 Performance test and Preparation of Heat balance sheet on 4-stroke, single cylinder diesel engine test rig.
7 Retardation test on 4-stroke, single cylinder diesel engine test rig.
8. Morse test on 4-stroke, 4- cylinder petrol engine test rig.
9. Performance and emission test on 2- stroke, single cylinder petrol engine test rig.
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, Emission test on computerized 4-stroke, single cylinder diesel engine testrig.

Note: Minimum of 10 Experiments need to be performed

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3							3				3	3
CO2	3	3							3				3	3
CO3	3	3			3				3				3	3
CO4	3	3							3				3	3
Average	3	3			3				3				3	3
Level of correlation	3	3			3				3				3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - II - Semester

20AME12	**Computer Aided Machine and Production Drawing Lab**	**L**	**T**	**P**	**C**
		0	**0**	3	1.5

Course Outcomes:

After completion of the course the student will be able to

1. Demonstrate the conventional representations of materials and machine components.
2. Model the three-dimensional machine components using CAD system.
3. Create assembly models of the machine parts and sectional views of machine components using modelling software.
4. Create manufacturing drawing with dimensional and geometric tolerances

Unit-I

DRAWING OF MACHINE ELEMENTS AND SIMPLE PARTS

a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.

b) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.

c) Keys, cotter joints and knuckle joint.

d) Riveted joints for plates

e) Bushed journal, foot step bearing.

Unit-II

PRODUCTION DRAWING PRACTICE

I. **Assembly:** Assembly of bolt and nut with different screw thread, Assembly of keys and cotter joints, Riveted joints Couplings Stuffing box Petrol engine connecting rod, Eccentric, Screw jack, Plummer block, Light duty non return valve, Details of slip bush, Main spindle of lathe tail stock, Single tool post.

II. **Tolerances of Form and position**: Symbols representing the characteristics to be Tolerance-Indication of Geometrical Tolerances on a Drawing -Indication of Surface roughness & machining symbols.

List of Experiments

1. Assembly of bolt and nut with different screw thread
2. Assembly of keys and cotter joints.
3. Design of Riveted joints
4. Design of Couplings
5. Design of Stuffing box and Connecting rod
6. Design of Eccentric
7. Design of Screw jack
8. Design of Plummer block
9. Design of Light duty non return valve
10. Details of slip bush
11. Details of Main spindle of lathe tail stock
12. Details of Single tool post

Textbooks

1. K.L. Narayana, P. Kannaiah & K. Venkata Reddy, Machine Drawing, NewAge Publishers 4th Edition, 2012.
2. R.K. Dhawan, Machine Drawing, 2nd Edition, S. Chand Publications, 1996.

References:

1. P.S. Gill, Machine Drawing, Madhurai, 12th Edition, Sk Kataria & Sons,2009.
2. Rajput, Machine Drawing, Hyderabad, 4th Edition, S.Chand Publications, 2002.

Note: Minimum of 10 Experiments need to be performed

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		3				3				3	3
CO2	3	3	3		3				3				3	3
CO3	3	3	3		3				3				3	3
CO4	3	3	3		3				3				3	3
Average	3	3	3		3				3				3	3
Level of correlation	3	3	3		3				3				3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech - II - Semester

20ACE21	**Fluid Mechanics and Hydraulic Machinery lab**	**L**	**T**	**P**	**C**
		0	**0**	3	1.5

Course Outcomes:

After completion of the course the student will be able to

1. Perform and calculate the Coefficient of discharge measuring devices.
2. Calculate and determine the head loss due to sudden contraction and expansion in pipes.
3. Demonstrate the working principles of various pumps and motors

List of Experiments

1. Verification of Bernoulli's equation.
2. Calibration of Venturi meter.
3. Calibration of Orifice meter
4. Determination of Coefficient of discharge for an external mouth piece by Constant head method.
5. Determination of Coefficient of discharge for an external mouth piece by variable head method.
6. Calibration of contracted Rectangular Notch.
7. Calibration of contracted Triangular Notch. Determination of friction factor
8. Determination of loss of head in a sudden contraction.
9. Determination of loss of head in a sudden Expansion.
10. Performance test on Impulse turbines
11. Performance test on reaction turbines (Francis and Kaplan Turbines)
12. Performance test Impact of jet
13. Performance test on centrifugal pumps, determination of operating point and efficiency

Textbooks

1. Fluid Mechanics & Hydraulic Machines A Lab Manual by TS Desmukh (Author), Laxmi Publications (P) Ltd
2. Fluid Mechanics & Machinery Laboratory Manual by N Kumara Swamy (Author), Charotar Books Distributors.
3. Lab. Manual of Fluid Mechanics & Machines by Gupta, Chandra (Author), CBSPD (Publisher).

Online Learning Resources/Virtual Labs: http://eerc03-iiith.vlabs.ac.in/

Note: Minimum of 10 Experiments need to be performed

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3							3					
CO2	3	3							3					
CO3	3	-							3					
Average	3	3							3					
Level of correlation	3	3							3					

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - I - Semester

20AME13 **Surface Modelling using Catia** **L T P C**

1 0 2 2

Course Outcomes:

After completion of the course the student will be able to

1. Identify the various drafting tools for engineering parts
2. Apply the GD & T commands for three-dimensional components.
3. Create parts using surface modelling tools.

List of Experiments

1. Creating drafting sheet for the final product
2. Create the Sheet Background, place the Views of assembly components.
3. Apply the Sheet Background, Views Generate Dimension & Create Dimension
4. Create parts and apply the Datums & Tolerance Views
5. Apply GD & T and apply the Note, Leaders, Table, Symbols.
6. Design the models using Extrude, Revolve, Sphere, Cylinder for Surfacing Modelling based Plastic Component
7. Design the models Surfacing Modelling based Plastic Component
8. Design and modify the models using Trim, Split, Shape Fillet, Close Surface, Thickness
9. Design the surfacing by offset (All 3 types), Fill, Blend, Join, healing, Project-Combine
10. Design the models using the Adaptive Sweep, Sweep, Multisession Surface Advanced Surfacing.
11. Design the models with Wire-frame Modelling, Point, Line, Planes
12. Design the models with Wire-frame Modelling Curves, Circle-Conic

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3				3				3	3
CO2	3	3	3	3	3				3				3	3
CO3	3	3	3	3	3				3				3	3
Average	3	3	3	3	3				3				3	3
Level of correlation	3	3	3	3	3				3				3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - I - Semester

20AHS15	Quantitative Aptitude and Reasoning-II	L	T	P	C
		2	0	2	0

Course Outcomes:

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

1. Develop the thinking ability to meet the challenges in solving Logical Reasoning problems.
2. Solve campus placements aptitude papers covering Quantitative Ability and Verbal Ability.
3. Apply different placement practice techniques.

UNIT-I **9 Hours**

QUANTITATIVE ABILITY III: Profit, Loss and Discount – Cost Price – Selling Price – Retail Price – Markup Price – Ratio and Proportion Antecedent – Consequent - Mean Proportion –Direct variation – Indirect Variation – Joint Variation Partnership – Mixture and Allegation – Problems on Ages – Surds and Indices

UNIT-II **9 Hours**

QUANTITATIVE ABILITY IV: Time Speed and Distance – Uniform and Variable speed – Conversion - Average Speed –Relative Speed – Effective speed - Problems on Trains – Stationary point and object – Moving Point and Object – Boats and Streams – Downstream and Upstream - Races and Games – Head start – Dead Heat – Escalator – Number of steps

UNIT-III **9 Hours**

REASONING ABILITY II: Syllogism – Statement and Conclusion - Data Sufficiency – Data Arrangement – Linear and Circular arrangement - Data Interpretation - Line Graph – Bar graph – Pie Chart -

UNIT-IV **9 Hours**

VERBAL II: Tense – Present Tense, Past Tense, Future Tense - Voice – Active voice, Passive voice and Active to Passive Voice Conversion Rules – Speech – Direct Speech, Indirect Speech and Direct to Indirect Speech Conversion Rules –Essay Writing – Types, Steps, Format.

UNIT V **9 Hours**

SOFT SKILL II: Time Management - Stress Management - Team Work - Accent and Voice Communication - Interview Skills.

Text Books:

1. Quantitative Aptitude, Logic Reasoning & Verbal Reasoning, R S Agarwal, S.Chand Publications.
2. Quantitative Aptitude for Competitive Examinations, R S Agarwal, S.Chand Publications.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												
CO2	1	2								2				
CO3	2	-								2				
Average	2	2								2				
Level of correlation	2	2								2				

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech - I - Semester

20AME14	**Dynamics of Machinery**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

After completion of the course, the students will be able to

1. Describe various components of clutches, brakes and other devices related to automobiles.
2. Describe the effect of gyroscope in automobiles and analyze the force-motion relationship in components subjected to external forces and analyze the standard mechanisms.
3. Describe the various effects of engine force analysis and make use of flywheels in power fluctuations.
4. Describe the usage of governors in automobile applications and analyse balancing of mass for the stability of the moving parts in systems.
5. Identify the different types of vibrations causes due to unbalance system in the machines and mechanisms.

UNIT: I Friction, Brakes and Dynamometers 12 hours

Friction: Pivots and Collars, Uniform pressure and Uniform wear, simple problems; Clutches, Single and Multi-plate clutches, cone clutch and centrifugal clutch, simple problems.

Brakes and Dynamometers: Types of brakes: Simple block brake, band and block brake- internal expanding shoe brake-effect of braking of a vehicle, Effect of brake materials in environmental aspects. Dynamometers – absorption and transmission types. General description and methods of operation.

UNIT: II Gyroscope, Static and Dynamic Force Analysis 12 hours

Gyroscope: Gyroscopes – effect of precession – motion on the stability of moving vehicles such as motorcycle – motorcar – aeroplanes and ships.

Static and Dynamic Force Analysis: Applied and Constrained Forces – Free body diagrams – static Equilibrium conditions – Two, Three and four members – Static Force analysis in simple machine members – Dynamic Force Analysis – Inertia Forces and Inertia Torque – D'Alembert's principle – superposition principle – dynamic Force Analysis in simple machine members

UNIT: III Turning Moment Diagram and Flywheels 10 hours

Engine Force Analysis – Piston Effort, Crank Effort, etc., Inertia Force in Reciprocating Engine – Graphical Method - Turning moment diagram –fluctuation of energy – flywheels and their design - Crank effort and torque diagrams.

UNIT: IV Governors and Balancing **10 hours**

Governor: Types - Watt, Porter and Proell governors – Hartnell governors - Stability, sensitiveness, sochronism and hunting - effort, power and controlling force of a governor, simple problems.

Balancing: Balancing of rotating masses - single and multiple, single and different planes, analytical and graphical methods. Balancing of reciprocating masses – Primary and Secondary unbalanced forces, partial balancing and its effects, balancing of primary and secondary forces in V and multi cylinder engines.

UNIT: V Vibration **12 hours**

Introduction, Types of vibratory motion, Free and forced vibrations of single degree of freedom systems, Dunkerly's method, Raleigh's method, whirling speeds, damping vibration, isolation, resonance, Torsional vibrations of two and three rotor systems, Torsional equivalent shaft.

Textbook(s)

1. S.S. Rattan, Theory of Machines and Mechanisms, New Delhi, 4th Edition, Tata McGraw Hill Publishers, 2017.
2 R.K. Bansal, Theory of Machines, New Delhi, 5th Edition, laxmi publications, 2016.
3 Sadhu Singh, Theory of Machines, New Delhi, 2nd Edition, Pearson Edition, 2012.

Reference Books

1 Rao.J.S. and Dukkipati.R.V. "Mechanism and Machine Theory", New Age International Pvt. Ltd., 2006.
2 Robert L. Norton, Kinematics and Dynamics of Machinery, Tata McGraw-Hill, 2009.
3 Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms", Oxford University Press, 2017.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
CO5	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech - I - Semester

20AME15	**Heat Transfer**	**L**	**T**	**P**	**C**
		3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Apply the principle of heat conduction in solving the problems in Cartesian, Cylindrical and Spherical coordinates, by transforming the physical system into a mathematical model.
2. Apply the physics of conduction in extended surfaces and time dependent heat transfer.
3. Solve the convective heat transfer coefficients in forced convection, natural convection for internal flows & external flows.
4. Apply the fundamentals for heat exchangers and principle involved in boiling and condensation in design of heat exchangers and industrial components.
5. Apply the principle of radiation heat transfer and solve the problems of radiation heat transfer between black and non-black bodies.

UNIT: I Introduction 10 hours

introduction: Basic Modes and laws of Heat transfer, thermal conductivity, General conduction equation in Cartesian, Cylindrical and Spherical coordinates, initial and final boundary conditions. One- Dimensional Steady State Heat Conduction: Heat flow through plane wall, cylinder and sphere with constant thermal conductivity; Heat flow through composite slab and Cylinders; Thermal resistance, Electrical analogy, Thermal contact resistance, and critical insulation thickness.

UNIT: II Extended Surfaces 10 hours

Extended Surfaces: Types, Applications, Fin materials, Heat transfer from fins with uniform cross section, Fin efficiency and Effectiveness.

Transient Heat Conduction: Lumped parameter analysis system – Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems- Problems on semi-infinite body.

UNIT: III Forced Convection 10 hours

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

External Flows: Concepts of hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer for flow over-Flat plates, Cylinders and spheres.

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

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

UNIT: IV Phase Change **10 hours**

Phase Change: Introduction – Film wise & Drop wise Condensation, Boiling Curve.

Heat Exchangers: Classification of heat exchangers, overall heat transfer coefficient, fouling and fouling factor, LMTD, Effectiveness-NTU methods of analysis of heat exchangers

UNIT: V Radiation Heat Transfer **10 hours**

Radiation Heat Transfer: Basic laws governing radiation heat transfer; Thermal radiation; definitions of various terms; Stefan-Boltzmann law, Kirchoff's law, Planck's law, Wein's displacement law, Intensity of radiation and Lambert's cosine law.

Radiation heat exchange between two parallel infinite black surfaces, two parallel infinite gray surfaces; Infinite long concentric cylinders, small body in a large enclosure; shape factor, Radiation shields.

Textbook(s)

1. R.C. Sachdeva, Heat and Mass Transfer, New age Publication.
2 R.K.Rajput, Heat and Mass Transfer, S.Chand Publication.

Reference Books

1 D.S. Kumar, Basic of Heat & Mass Transfer, 8th Edition, S.K. Kataria & Sons.
2 J.P. Holman, Heat transfer, Tata McGraw Hill, 9th Edition.

Note: - Heat and mass transfer data book by C.P. kothandaraman, New age publications is permitted for internal and external examinations.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	2
CO2	3	3	3										3	2
CO3	3	3	3										3	2
CO4	3	3	3										3	3
CO5	3	3	3										3	2
Average	3	3	3										3	2.2
Level of correlation	3	3	3										3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I - Semester

20AME16	**Machine Tools and Measuring Systems**	**L**	**T**	**P**	**C**
		3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Analyze the mechanics of metal cutting to estimate cutting forces and machining parameters.
2. Demonstrate the basic structure, mechanism and operations of lathe, drilling and boring, milling and grinding machines.
3. Apply limits, fits and tolerances for limit gauges and dimensional measurements for quality products for linear, angular and surface components.
4. Demonstrate the knowledge on methods and instruments used for the measurement of strain, Temperature and Pressure.

UNIT: I Metal Cutting and Lathe 10 hours

Mechanics of metal cutting - cutting tool materials, temperature, wear, and tool life considerations and problems, geometry and chip formation and types, surface finish and machinability, optimization.

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.

UNIT: II Drilling and Milling 10 hours

Drilling: Specifications, types, operations performed, tool holding devices, twist drill and types. Boring machines–Fine boring machines, Jig Boring machines.

Milling: Specifications, classifications of milling machines - machining operations, Types and geometry of milling cutters- methods of indexing.

UNIT: III Shaping and Grinding 10 hours

Shaping; Principles of working- specification, classification, Planning. Operations performed on Shaping, Slotting and Planning.

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 and Honing

UNIT: IV Metrology 10 hours

Linear and angular measurements – taper measurement, threads, surface finish, inspection of straightness, flatness and alignment – Comparators - Gear testing.

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, Indian standard of systems of limits and fits.

Precision Instrumentation based on Laser Principals, Coordinate measuring machines, Optical Measuring Techniques: Tool Maker's Microscope, Profile Projector.

UNIT: V Measuring systems 10 hours

Significance of mechanical measurement,-Fundamental methods of measurement, Generalized measuring system and its elements-Temperature measuring instruments-Flow measuring systems-Rotameter-Commercially available strain measuring systems-strain gauge Rosettes,- Measurement of speed, acceleration and vibration

Text Book(s)

1. R.K. Jain & S.C. Gupta Production Technology, New Delhi, 5th Edition, Khanna Publishers, 2010.
2 P.N. Rao, Manufacturing Technology (Machine Tools), Vol- II, Noida, 4th Edition, Tata McGraw Hill, 2013.
3 Mahajan, Engineering Metrology, New Delhi, 4th Edition, Dhanpat Rai, 2009.
4 S. Bhaskar, Instrumentation and Control Systems, Wiley Publications,4thEdition, Anuradha Agencies, 2008.

Reference Books

1 Kalpakjain, Manufacturing Technology, New Delhi, 3rd Edition, Pearson Publishers, 2012.
2 Elements of workshop technology / Vol. 2, Machine tools, S K Hajra Choudhury, Asia Pub. House, 1967.
3 K.L. Narayana, Engineering Metrology, Hyderabad, 1st Edition, SciTech Publication, 2010.
4 D.S. Kumar, Measurement Systems, Applications & design, New Delhi, 8thEdition, Lakshmi Publication, 2010

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2										3	2
CO2	3	3											3	1
CO3	3	3											3	2
CO4	3	3											3	1
Average	3	3	2										3	1.5
Level of correlation	3	3	2										3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I - Semester

20AME17	**Automobile Engineering**	**L**	**T**	**P**	**C**
	(*Professional Elective - I)	3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Use various types of automobile chassis, drives and engines for suitable Vehicle application
2. Implement the concept of fuel injection, ignition systems and starting systems used in the automobiles, complying with environmental aspects.
3. Execute the importance of cooling systems and transmission System in automobiles.
4. Implement the working principle of steering systems, braking systems and suspension systems for suitable application of various vehicles.
5. Demonstrate the IC engine emissions, alternative fuels and their conversion kits used in automobile complying with environmental aspects

UNIT: I Vehicle Structure and Engines 10 hours

Introduction: General Classification of Automobiles, Layout of Chassis, Types of Drives of Automobile. Chassis and Body – Body Parts, Functions, Material and Vehicle Construction. Engines – Types of Engines, Components, Functions and Materials, Working Principle, Comparison of Four Stroke and Two Stroke Engines.

UNIT: II Engine Auxiliary Systems 10 hours

Carburettor–Working Principle- Electronic Fuel injection System – Mono-Point and Multi – Point injection Systems – Battery Coil and Magneto Ignition Systems, Electronic Ignition Systems. Construction, Operation and Maintenance of Lead Acid Battery - Principle and Construction of Starter Motor, Working of Different Starter Drive Units. Supercharging and Turbo Charging

UNIT: III Cooling and Transmission Systems 10 hours

Need for Cooling System, Types of Cooling System: Air Cooling System, Liquid Cooling System, Forced Circulation System, Pressure Cooling System. Clutch – Types and Construction – Gear Boxes, Manual and Automatic –Flywheel-Torque Converters– Propeller Shaft – Slip Joint – Universal Joints – Differential and Rear Axle – Hotchkiss Drive.

UNIT: IV Steering, Brakes and Suspension 10 hours

Wheels and Tyres - Steering Geometry – Power Steering – Types of Front Axle – Classification of Brakes, Drum Brakes and Disc Brakes, Constructional Details, Theory of Braking, Parking Brake, Braking Material, Hydraulic System, Vacuum Assisted System, Air Brake System, Antilock Braking System. Need of Suspension System, Types of Suspension, Suspension Springs, Constructional Details and Characteristics of Leaf, Coil and Torsion Bar Springs, independent Suspension, Rubber Suspension, Pneumatic Suspension, Shock Absorbers.

UNIT: V Emission, Emission Control and Alternative Fuels 10 hours

Mechanism of HC, NOx and CO Formation in Four Stroke and Two Stroke SI Engines, Smoke and particulate Emissions in CI Engines, NOx Formation and Control. Noise Pollution from Automobiles, Measurement and Standards. Design of Engine, Optimum Selection of Operating Variables for Control of Emissions, Catalytic Converters, Catalysts. Fuel Modifications -Use of Natural Gas, LPG, Biodiesel, Gasohol and Hydrogen in Automobiles - Electric and Hybrid Vehicles, Fuel Cells.

Textbook(s)

1. Ganesan, V., Internal Combustion Engines, Tata McGraw-Hill, New Delhi, 2012.
2. Kirpal Singh, Automobile Engineering- Vol. I and II, Standard Publishers, New Delhi, 2011.
3. Ramalingam. K .K, Automobile Engineering, Scitech publications,2011.

Reference Books

1 N. K. Giri, Automobile Mechanics, 5th Edition, Khanna Publications, 2014.

2 Heitner J, Automotive Mechanics, 2nd Edition, CBS Publications, 2000.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3				3						3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
CO5	2	3	3				3						3	3
Average	2.8	3	3				3						3	3
Level of correlation	3	3	3				3						3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech I Semester (Common to ME, CSE, EEE, IT, CSE(DS), CSE(ALML))

IV B.Tech - I – Semester (ECE)

20AME18	**Robotics and Artificial Intelligence**	**L**	**T**	**P**	**C**
	(*Professional Elective - I)	**3**	**0**	**0**	**3**

Course Outcomes:

After completion of the course, the students will be able to

1. Demonstrate the knowledge in an application of AI, and select strategies based on application requirement.
2. Describe the basic concepts of robotics and its importance in the modern world and classification of robots and its end effectors for typical manufacturing industry and service sector.
3. Summarize the perception about robot components, actuators, sensors and machine vision.
4. Analyze the manipulator kinematics, dynamics for typical robots which will be used for complex operations and analyze the path planning for typical robots.
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.

UNIT: I Introduction of AI 10 hours

Artificial Intelligence: Introduction to Artificial Intelligence (AI), History. AI techniques, LISP programming, AI and Robotics, LISP in the factory, sensoring and digitizing function in machine vision, image processing and analysis, training and vision system. Intelligent Agents: Agents and Environments, the Concept of Rationality, the Nature of Environments, the Structure of Agents.

UNIT: II Introduction to Robotics 10 hours

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

UNIT: III Robot Actuators, Sensors and Machine Vision 12 hours

Robot Actuators and Feedback Components: Actuators - Pneumatic and Hydraulic actuators, electric & stepper motors, comparison. Position sensors, resolvers, encoders, velocity sensors, tactile sensors, Proximity sensors, Slip Sensor, Range Sensor, Force Sensor.

Machine Vision: Camera, Frame Grabber, Sensing and Digitizing Image Data Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms, Applications, Inspection, Identification, Visual Serving and Navigation.

UNIT:4 Manipulator Kinematics and Trajectory Planning 10 hours

Mathematical representation of Robots - Position and orientation, Homogeneous transformations - D-H notation, Forward and inverse kinematics. Manipulator dynamics, Differential transformation, Jacobeans.

Trajectory planning and avoidance of obstacles, path planning, joint integrated motion – straight line motion, basics of trajectory planning, polynomial trajectory planning.

UNIT:5 Robot Applications and Programming 8 hours

Robot Application in Manufacturing: Material Transfer, Material handling, loading and unloading, Processing, spot and continuous arc welding & spray painting, Assembly and Inspection.

Robot Programming: Types, features of languages and software packages.

Textbook(s)

1. M.P. Groover, Industrial Robotics, Second Edition, New Delhi, Tata McGraw Hill, 2017.
2 R.K. Mittal & I.J.Nagrath, Robotics and Control, New Delhi, 3rdEdition, Tata McGraw Hill, 2017.
3 John J.Craig, Introduction to Robotics Mechanics and Control, Third edition, Pearson Education, 2009.

Reference Books

1 Ashitava Ghoshal, Robotics-Fundamental Concepts and Analysis', Oxford University Press, Sixth impression, 2010.
2 K.S. Fu, Robotics, New Delhi, 3rd Edition, Tata McGraw Hill, 2008.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	2
CO2	3												3	2
CO3	3	3	3										3	2
CO4	3	3	3	3									3	2
CO5	3	3											3	2
Average	3	3	3	3									3	2
Level of correlation	3	3	3	3									3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I - Semester

20AME19	**Product Design and Development**	**L**	**T**	**P**	**C**
	(*Professional Elective - I)	3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Demonstrate key concepts and principles concerning the role of product innovation and their contribution to generate competitive advantage in firms.
2. Identify key concepts and principles concerning the activitie and competencies involved in new product development.
3. Evaluate key concepts and principles concerning- the range of tools and methods that are used to manage new product development.
4. Analyse the product design and its architecture applicable in various domains.
5. Apply the concepts of product evaluation, prototyping, quality checking and testing the products.

UNIT: I Introduction 10 hours

Introduction to New Product Development, Need for developing new products – Evolution of design, types of design – the design process –product life cycle – generic product development process – Strategic Planning and Opportunity Identification for new products – Identifying Market Opportunities- sustainability for design and manufacturing.

UNIT: II Translation of needs into specifications 10 hours

Understanding Customer and User Needs – customer survey – need gathering methods – clarification - search-externally and internally - Explore systematically - needs importance - establishing product specification -competitive benchmarking.

UNIT: III Creativity, Innovation and Concept Development 10 hours

Need for design creativity - Creative thinking – creativity and problem solving – creative thinking methods- generating design concepts - systematic methods for designing –morphological methods - TRIZ methodology of Inventive Problem Solving. Concept Generations- Concept Screening- Concept Scoring - Concept Testing methods.

UNIT: IV Embodiment Design 10 hours

Introduction to embodiment design – product architecture – types of modular architecture –steps in developing product architecture Industrial design – human factors design –user friendly design.

UNIT: V Design for X **10 hours**

Design for serviceability – design for environment – prototyping and testing – Cost evaluation – categories of cost – overhead costs – activity based costing. Design for Quality - Reliability - Failure Mode and Effect Analysis - Test and Inspection – Maintenance - Warranty.

Text Book(s)

1. Karl T. Ulrich, Steven D. Eppinger, Product Design and Development, Sixth Edition, McGraw-Hill, 2015.

Reference Books

1 Robert G. Cooper, Winning at New Products: Creating Value Through Innovation, Hachette Book Group, Newyork, 2017.

2 John Starc, Product Lifecycle Management (Decision Engineering), Springer Publications, 2015.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
CO5	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech I Semester (Common to ME, ECE)

IV B.Tech I Semester (Common to CSE, IT, CSE(DS), CSE(AIML))

20AME20	**Total Quality Management & Reliability Engineering**	**L**	**T**	**P**	**C**
	(*Professional Elective - I)	3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Develop action plans for customer centric business on the basis of various quality philosophies.
2. Select the best solution for problem solving using QC tools, QFD model, JIT method.
3. Solve industry problems with available sources, software tools, modern TQM techniques with system approach.
4. Establish quality management system and environmental management system for product and service industries.
5. Design systems with a focus on enhancing reliability and availability.

UNIT: I Introduction 10 hours

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality, Employee involvement, Quality Awards.

UNIT: II TQM Principles 10 hours

Quality circles - PDCA cycle, Control Charts - Process Capability – Problem solving - Quality Function Development (QFD) - Taguchi quality loss function – Total Productive Maintenance - Concepts, improvement needs - Performance measures. Poka-yoke, Kaizen , JIT, Terotechnology.

UNIT: III TQM Tools and Technique 10 hours

The seven traditional tools of quality - New management tools - Six sigma: Concepts, DMAIC, Methodology, applications to manufacturing, service sector including IT - Bench marking -Reason to bench mark, Bench marking process - FMEA - Stages, Fault tree analysis.

UNIT: IV Quality Systems 8 hours

Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, Accounting Systems, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

UNIT: V Fundamental concepts of Reliability 10 hours

Reliability definitions, failure, failure density, failure Rate, hazard rate, Mean Time To Failure (MTTF), Mean Time Between Failure (MTBF), maintainability, availability, safety and reliability, product liability, importance of reliability. Problem solving. Business process re-engineering (BPR) – principles, applications.

Textbooks

1. Dale H. Besterfiled, et at., "Total quality Management", Third Edition, Pearson Education Asia, Indian Reprint, 2006
2 Dr.K.C.Arora, "Total Quality Management", 4th Edition, S. K. Kataria & Sons, 2009.

Reference Books

1 James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012
2 Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd.,2006.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3					3	3				1		3	-
CO2	3	3				3	3				1		3	3
CO3	3	3				3	3				1		3	3
CO4	3					3	3				1		3	3
CO5	3					3	3				1		3	3
Average	3	3				3	3				1		3	3
Level of correlation	3	3				3	3				1		3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I Semester

20AME21	**Manufacturing of Composite Materials**	**L**	**T**	**P**	**C**
	(*Professional Elective - I)	3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Describe the enhancement of properties of the composites when adding the reinforcements in the form of particles, fibers and whisker and conduct investigation on the influence of different volume fraction of reinforcements on the various mechanical properties.
2. Categorize the various variety of composite materials based on the nature of matrix and reinforcements and group them for various social requirements.
3. Design and fabricate the composite materials with various properties to suit various applications and examine the same by using modern software tool like ANSYS as a team.
4. Analyze the recyclability, biodegradability and sustainability of the various composite materials and prefer the cost effective as well as environmental friendly composites for the societal needs.
5. Compile the various advanced composites and their tailorability limits of the different composites and expose them into various forums.

UNIT: I Introduction of Composites and Polymer Matrix Composites 10 hours

Definitions -Composites, Multi scale Composites and Nano composites, Reinforcements and Matrices, Properties of these composites in comparison with standard materials.

PMC processes – hand layup processes – spray up processes – compression moulding – reinforced reaction injection moulding – resin transfer moulding – Pultrusion – Filament winding –Injection moulding. Fibre reinforced plastics (FRP), Glass Fibre Reinforced Plastics (GFRP).spray technique-Sandwich Mould Composites (SMC)- Properties, Advantages- Limitations-Applications.

UNIT: II Metal Matrix Composites 10 hours

Characteristics of MMC, various types of metal matrix composites alloy vs. MMC, advantages of MMC, limitations of MMC, Reinforcements – particles – fibres. Effect of reinforcement – volume fraction – rule of mixtures. Processing of MMC – powder metallurgy process – diffusion bonding – stir casting – squeeze casting, a spray process, Liquid infiltration. Material simulation software for composites. Properties, Advantages-Limitations-Applications.

UNIT: III Ceramic Matrix Composites **9 hours**

Need for CMC – ceramic matrix – various types of ceramic matrix composites- oxide ceramics – non oxide ceramics – aluminium oxide – silicon nitride – reinforcements – particles- fibres- whiskers. Sintering – Hot pressing – Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing). Carbon carbon composites – advantages of carbon matrix – limitations of carbon matrix carbon fibre – chemical vapour deposition of carbon-on-carbon fibre perform.

UNIT: IV Nano and Bio Composites **9 hours**

Nano composites-nano ceramic reinforced composites-carbon nano tube reinforced composites, Graphene reinforced composite, nano clay reinforced composites- nano composites by laser cladding-In-situ composites-hybrid composites, bio composites and green composites. Properties, Advantages-Limitations-Applications.

UNIT: V Laminated Composites General Composite Products **10 hours**

Manufacturing Composite Laminates: Plaster Masters- Template Method- Follow Board Method- Sweep Method- Lay-up Molds- Prepreg Method- Wet Lay-up Method- Fiber-Only Preforms- Combined Fiber-Matrix Preforms- Mechanics of laminated composites and finite element based analysis of the laminates.

Case studies in design and development of composite parts, boats, pressure vessels, automotive parts, aerospace parts, electronics parts and composites for space vehicles.

Textbooks

1. Suong V. Hoa, Principles of the Manufacturing of Composite Materials, DEStech Publications, Inc, 2009
2. Mallick, P.K. and Newman, S., (edition), "Composite Materials Technology: Processes and Properties", Hansen Publisher, Munish, 1990.

Reference Books

1. Clyne, T. W. and Withers, P. J., "Introduction to Metal Matrix Composites", Cambridge University Press, 1995.
2. Broutman, L.J. and Krock,R.M., " Modern Composite Materials", Addison-Wesley, 1967. ASM Hand Book, " Composites", Vol.21, ASM International, 2001

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	-
CO2	3	3				2							3	3
CO3	3	3											3	3
CO4	3	3											3	3
CO5	3	3					2						3	3
Average	3	3				2	2						3	3
Level of correlation	3	3				2	2						3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I Semester

20AME22	**Hybrid and Electric Vehicles**	**L**	**T**	**P**	**C**
	(*Open Elective - I)	3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Demonstrate the construction and working principle of hybrid and electric vehicles.
2. Choose a suitable drive scheme for developing a hybrid and electric vehicles depending on resources.
3. Apply the electric propulsion unit and its control for application of electric vehicles.
4. Choose proper energy storage systems for vehicle applications.
5. Design and develop a drive system and sizing of electric vehicles and hybrid electric vehicles.

UNIT: I Introduction to Hybrid and Electric Vehicles 10 hours

Introduction to Hybrid and Electric Vehicles: History of hybrid and electric vehicles, Need for hybrid and electric vehicles and their limitations. Social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Specifications of hybrid and electric vehicles.

UNIT: II Hybrid Electric Drivetrains 10 hours

Hybrid Electric Drivetrains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Electric Drivetrains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

UNIT: III Electric Propulsion 10 hours

Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, and drive system efficiency.

UNIT: IV Energy Storage 10 hours

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT: V Sizing the Drive System 10 hours

Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications,

Design Considerations for Electric Vehicles: Various Resistance- Transmission efficiency- Vehicle mass- Electric vehicle chassis and Body design considerations- Heating and cooling systems- Power steering- Tire choice- Wing Mirror, Aerials and Luggage racks.

Textbooks

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, 2/e, CRC Press, 2003.
2. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach, illustrated edition, John Wiley & Sons, 2014.
3. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.

Reference Books

1 James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

2 John G. Hayes, G. Abas Goodarzi, Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles, 1/e, Wiley-Blackwell, 2018.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3				3						3	3
CO2	3	3	3				2						3	3
CO3	3	3	3				3						3	3
CO4	3	3	3				3						3	3
CO5	3	3	3				3						3	3
Average	3	3	3				2.8						3	3
Level of correlation	3	3	3				3						3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech - I – Semester (Common to CE, ME)

20AME23	**Renewable Energy Technology**	**L**	**T**	**P**	**C**
	(*Professional Elective - I)	3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Apply the principle of Solar radiation in solving the problems related to solar radiations measurements and solar energy collectors.
2. Apply the principle of solar energy storage Photovoltaic conversion systems and solar refrigeration systems for various industrial applications
3. Apply the fundamentals of Biomass and Geothermal thermal energy conversion systems to produce useful energy for efficient utilization.
4. Apply the Principle of Wind and Direct Energy conversion systems to generate energy in efficient methods.
5. Use the principles of ocean, wave, tidal energy systems to produce useful energy for efficient utilization and applications.

UNIT: I Energy Colletors 9 hours

Energy- under the Sun-Fireworks-Disappearing Mass-Measure Up-Energy Around the World, Source of Energy, Use of Energy. Temperature - Liquid Nitrogen – Energy from the Chemistry – Heat Engines – Working of Car engine – Diesel Engine – Octane number – Hybrid car – Electricity – Smart Grid – Shock and Lightning.

UNIT: II Solar Energy Storage and Applications 9 hours

Coal – Coal reserves – Uses – Burning Coal – Smoke – A Coal and Gas power plant- Acid rain – Trading Smoke works – Cleaning Coal – Working of Greenhouse – Bad Gasses- Effects of Global Warming – Geo engineering – Formation of Oil – Locating Oil under the ground- Oil Extraction – Refining Crude – Oil producers and Consumers – Tar Sands – Pipeline Controversies – Oil Economics – Gas Extraction – Natural gas – hydraulic fracturing - Fracking and the environment- Producers and Consumers of natural gas – Combined Cycle - Converting Coal.

UNIT: III Biomass and Geothermal Energy 9 hours

Magic in a solar cell – Cost of Sunshine – Passive Solar – Ice Rinks – Salt Pond – Windmills – Blowing in the Wind – Fuel Cells and Hydrogen Economy – Making Moonshine – Biofuels – Growing stuff to burn – Energy from Garbage.

UNIT: IV Wind and Direct Energy 12 hours

Small-Scale Hydropower – Large Scale Hydropower – The power of Water – Hot Rocks – Home Improvements – Basics of Radiation – Radioactive – Food Irradiation – Energy from atoms – Nuclear Fission – Nuclear Reactor.

UNIT - V Ocean, Wave & Tidal Energy 8 hours

Start and End of TMI – Chernobyl and Health Effects - An Earthquake and Tsunami Hit Fukushima - Uranium from the Ground - Uranium Enrichment- Depleted Uranium - Economics of Nuclear Power - Natural Nuclear Reactor - Moving Nuclear Waste - New Generation Reactors - Reprocessing - Plasma and working - Magnetic Fusion's Progress - Inertial Confinement's Progress - Plasmas and Computer Chips.

Textbooks:

1. G.D. Rai, Non-Conventional Energy Source,4th edition, Khanna Publishers.,2000.
2. Dr. R.K. Rajput, Non-Conventional Energy Sources and Utilization, 2nd revised edition, S. Chand

Reference Books:

1. B.S. Magal, Frank Kreith & J.F. Kreith, Solar Power Engineering, 1st edition, Tata McGraw Hill, 1899.
2. J P Navani & Sonal Sapra, Non-Conventional Energy Resources, Revised Edition, S Chand Publishers, 2013.

Online Resources

1. https://www.coursera.org/learn/energy-environment-life
2. https://nptel.ac.in/courses/103103206

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3					3						3	
CO2	3	3					3						3	
CO3	3	3					3						3	
CO4	3	3					3						3	
CO5	3	3					3						3	
Average	3	3					3						3	
Level of correlation	3	3					3						3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech I Semester (Common to CSE,IT)-PE-I
III B.Tech I Semester ME(Open Elective-I)
III B.Tech II Semester CE(Open Elective-II)

20ACS21	**Computer Graphics**	**L**	**T**	**P**	**C**
	(*Open Elective - I)	3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Demonstrate different computer graphics applications and standards.
2. Design algorithms to render different geometric shapes like line, circle, and ellipse and Appreciate illumination and color models.
3. Apply two dimensional geometrical. Analyze the issues in projecting graphical objects and identify solutions.
4. Compare different 2D, 3D viewing and clipping techniques and analyze the issues in projecting graphical objects and identify solutions.
5. Develop solutions to problems related to computer graphics and animations by creating, rendering, and projecting the Graphical object.

UNIT : I Introduction: 10 hours

Basic concepts, Application areas of Computer Graphics, overview of graphics systems, Video-display devices, Raster-scan systems, Random-scan systems, Graphics monitors and work stations and input devices, graphics standards.

UNIT: II Output primitives 10 hours

Points and lines, line drawing algorithms – DDA, Bresenham's, midpoint circle Generating Algorithm-Ellipse Generating Algorithms, filled area primitives, Scan line polygon fill algorithm, inside-outside tests, boundary-fill and flood-fill algorithms.

UNIT: III 2D geometrical transforms 8 hours

Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

The viewing pipeline, Window-to-Viewport coordinate transformation, viewing functions, Cohen-Sutherland line clipping algorithms, Sutherland –Hodgeman polygon clipping
algorithm.

UNIT: IV Three Dimensional Concepts 10 hours

3D Display method, 3D object representation: Polygon surfaces, Curved lines and surfaces, quadric surfaces, spline representation, Bezier curve and B-spline curves, Beizer and B-spline surfaces, Hermite curve.

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

3D Viewing: Viewing pipeline, viewing coordinates, projections, clipping.

UNIT: V Color Model and its Applications 8 hours

Color Model and its Applications: RGB Color Model, YIQ Color Model, CMY Color Model, HSV Color Model.

Computer animation: Design of animation sequence, General Computer animation Function, Raster animations, Key-Frame Systems, Morphing, motion specifications, Direct Motion specifications, Kinematics and Dynamics.

Textbooks

1. Donald Hearn and M.Pauline Baker,"Computer Graphics C version",2 nd edition, , Pearson Education,1997.
2. Foley, VanDam, Feiner and Hughes ,"Computer Graphics Principles & practice", second edition in C, Pearson Education,1995.

Reference Books

1. Steven Harrington,"Computer Graphics", TMH,1983
2. Zhigandxiang, Roy Plastock ,"Computer Graphics Second edition", Schaum's outlines, Tata Mc, Graw hill edition,2000.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												2
CO2	3	3	3											3
CO3	3	3	2	2										3
CO4	3	3	1	1										3
CO5	3	2	2	2	2									3
Average	3	2.6	2	1.67	2									2.8
Level of correlation	3	3	2	2	2									3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I Semester

20ACE36	**Disaster Management**	**L**	**T**	**P**	**C**
	(*Open Elective - I)	3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Understand the natural hazards and its management
2. Analyze the fire hazards and solid waste management
3. Apply the regulations of building codes and land use planning related to risk and vulnerability
4. Apply the technological aspects of disaster management
5. Analyze risk reduction and education schools and communities

UNIT: I Natural Hazards and Disaster Management 10 hours

Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT: II Disaster 10 hours

Man Made Disaster and Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism -threat in mega cities, rail and air craft’s accidents, and Emerging infectious diseases & Aids and their management.

UNIT: III Risk and Vulnerability 8 hours

Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

UNIT: IV Role of Technology in Disaster Managements 8 hours

Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earthquakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training transformable indigenous knowledge in disaster reduction.

UNIT: V Education and Community Preparedness 10 hours

Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience building community capacity for action.

Textbooks

1. Rajib shah & R R Krishnamurthy "Disaster Management" – Global Challenges and Local Solutions' Universities press. (2009).
2. Tushar Bhattacharya, "Disaster Science & Management" Tata McGraw Hill Education Pvt. Ltd., New Delhi.

Reference Books

1. Jagbir Singh "Disaster Management" – Future Challenges and Opportunities' I K International Publishing House Pvt. Ltd. (2007),
2. Harsh. K . Gupta "Disaster Management edited", Universities press, 2003.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	3	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	3	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	3	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	3	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	3	-	-	-	-	-	-	-
Average	3	2.25				-	3							
Level of correlation	3	2					3							

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I Semester

20AEC25	**MEMS and NEMS**	**L**	**T**	**P**	**C**
	(*Open Elective - I)	3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Understand the fundamental concepts and background of MEMS and Microsystems.
2. Understand construction and working principle of various sensors and actuators.
3. Identify various materials for Microsystem designing.
4. Apply various micro and nano machining technologies for MEMS and NEMS production.

UNIT: I Overview of Mems and Microsystems 8 hours

Introduction to MEMS and Microsystems, Typical MEMS and Microsystems products, Evolution of Microfabrication, Microsystems and Microelectronics, The Multidisciplinary nature of Microsystem design and manufacture, Microsystems and Miniaturization, Applications of Microsystems in the Automotive industry and Applications of Microsystems in other industries.

UNIT: II Introduction to Micro Sensors and Actuators 10 hours

Microsensors: Acoustic wave sensors, Biomedical sensors and Biosensors, Chemical sensor, Optical Sensors, Pressure sensor, Thermal sensor, Gyro sensor, Flow sensor. Micro actuation: Actuation using Thermal forces, Shape-Memory Alloys, Piezoelectric crystals, Electrostatic forces, Micro-accelerometers and Microfluidics.

UNIT: III Materials for Mems and Microsystems 10 hours

Introduction, Substrates and Wafers, Active Substrate Materials, Silicon as a Substrate material, Silicon Compounds, Silicon Piezo resistors, Gallium Arsenide, Quartz, Piezoelectric crystals, Polymers and Packaging materials.

UNIT: IV Micromachining Technologies 8 hours

Overview of silicon processes techniques, Photolithography, Ion Implantation, Diffusion, Chemical Vapor Deposition, Physical vapor Deposition, Epitaxy, Etching, Bulk micromachining, Surface Micromachining, LIGA and other techniques.

UNIT: V Nano Electromechanical Systems 10 hours

Nano machining of NEMS via electron beam lithography, Nano electromechanical systems fabrication, nano imprint lithography, focused ion beam doping and wet chemical etching, stencil lithography and sacrificial etching, large scale integration, future challenges and applications.

Textbooks

1. Tai-Ran Hsu, "MEMS & Microsystems Design and Manufacture", Tata McGraw Hill edition, 2008.
2. Chang Liu, "Foundations of MEMS" Pearson Education India Limited, 2009.

Reference Books

1. Marc Madou, "Fundamentals of Microfabrication" CRC press 2002.
2. Stephen D. Senturia, "RF Microelectronics", Kluwer Academic Publishers, 2001.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3										
CO2	3	3	3	2										
CO3	3	1	3	3										
CO4	3	3	3											
Average	2.75	2.25	3	2.67										
Level of correlation	3	2	3	3										

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech - I - Semester

20AME24	**Machine Tools and Measuring Systems Lab**	**L**	**T**	**P**	**C**
		0	**0**	3	1.5

Course Outcomes:

After completion of the course, the students will be able to

1. Design and model different components by performing metal cutting operations using lathe, Drilling, Shaping, Milling and Grinding machine with in the realistic constraints.
2. Apply suitable tools, instruments and methods for linear, angular, straightness, surface roughness and flatness measurements.
3. Measure and Analyze gear tooth and surfaces for roughness of the components.

List of Experiments

MACHINING EXPERIMENTS

1. Determination of cutting force measurement using Lathe Tool Dynamometer.
2. Perform the part shown in the sketch from a mild steel rod on a Lathe.
3. Perform the Machine the hexagonal head shown in the sketch on the specimen.
4. Perform the Machining a keyway by using slotting machine.
5. Perform the Machining a V-block by using shaper.
6. Perform the Gear cutting using milling machines.
7. Perform the and check the dimensions of the sample by Surface Grinding.

METROLOGY EXPERIMENTS

8. Calibration of Micrometer, Mechanical Comparator, Vernier Caliper and Dial Gauge.
9. Measurement of taper angle using Bevel Protractor, Dial Gauge and Sine Bar.
10. Measure the flatness of the object using dial gauge.
11. Measurement of Screw threads Parameters using Three-wire method and Profile Projector.
12. Measurement of Gear tooth thickness by using Gear tooth Vernier.
13. Surface roughness measurement of machined component.
14. Measurement of single point tool by using Tool Makers Microscope.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2				3				3	3
CO2	3	2		1	2				3				3	2
CO3	3	3	2	1	2				3				3	2
Average	3	2.67	2.5	1.67	2				3				3	2.33
Level of correlation	3	3	3	2	2				3				3	2

3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech - I - Semester

20AME25	**Heat Transfer Lab**	**L T P C**
		0 0 3 1.5

Course Outcomes:

After completion of the course, the students will be able to

1. Apply the basic principle of modes of heat transfer, steady and unsteady state heat transfer, forced and free convection, phase change processes, heat exchangers and basic laws of radiation.
2. Solve industry problems with advanced technologies in the domain of thermal systems with optimal resources for minimum total cost and environment friendly.
3. Apply the best solution for heat transfer system involving attainment of long term goals with system integration and synergy.

List of Experiments

1. Determination of Thermal conductivity of insulating powder material through Concentric Sphere Apparatus.
2. Determination of Thermal conductivity of insulating material through lagged pipe apparatus
3. Determination of Overall heat transfer co-efficient through Composite Slab Apparatus
4. Determination of Thermal Conductivity of metal (conductor).
5. Determination of Heat transfer in pin-fin apparatus.
6. Determination of Heat transfer coefficient in forced convection.
7. Determination of Heat transfer coefficient in natural convection.
8. Determination of Effectiveness and efficiency on Parallel and counter flow heat exchanger.
9. Determination of Heat transfer in drop and film wise condensation.
10. Study of heat pipe and its demonstration.
11. Determination of Stefan Boltzman constant using Stefan Boltzman Apparatus.
12. Determination of Emissivity of a grey body through Emissivity apparatus.

NOTE: Heat transfer data books are permitted in the Lab examination.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3			2				3				3	2
CO2	3	3			2				3				3	2
CO3	3	3			2				3				3	2
Average	3	3			2				3				3	2
Level of correlation	3	3			2				3				3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech - I - Semester

20AME26 **3D Printing and Design lab**

L	T	P	C
1	**0**	2	2

Course Outcomes:

After completion of the course, the students will be able to

1. Demonstrate the knowledge on 3D printing and .stl files for developing complex components.
2. Demonstrate the knowledge on additive manufacturing techniques, and processes for various applications.
3. Analyze the functional characteristics of 3D printing and reverse engineering techniques for engineering applications.

List of Experiments

1. Design the 3D Simple Box
2. Design the bolt and create the threads over the surface.
3. Design a Basic Hex Nut
4. Design a U Bracket Sheet Metal
5. Design a Project Name Text
6. How to Print the design in 3D printer
7. Fabricate the key chain in 3D printer
8. Fabricate the simple box in 3D printer
9. Fabricate the Hex Nut in 3D printer
10. Fabricate U Bracket in 3D printer

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2				3				2	2
CO2	3	2	2	2	2				3				3	2
CO3	3	3	2	2	2				3				2	2
Average	3	2.33	2	2	2				3				2.33	2
Level of correlation	3	2	2	2	2				3				2	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech I Semester (Common to all branches)

20AHS21	**Indian Constitution**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**0**

Course Outcomes:

After completion of the course, the students will be able to

1. Understand the historical background of the constitution making and its importance for building a democratic India.
2. Examine the importance of Preamble of the Indian Constitution and Parliamentary Structure.
3. Analyze decentralization of power among central, state and local self-government.
4. Demonstrate functioning of judiciary system, fundamental rights and duties of all India Services and international institutions.

UNIT: I PREAMBLE AND ITS PHILOSOPHY 5 hours

Introduction to Indian Constitution, Evolution of Indian Constitution, preamble and its philosophy.

UNIT: II UNION LEGISLATURE 5 hours

The Parliament, Parliamentary Structure, Process of Legislation, President of India - Powers and Functions; Prime Minister and Council of Ministers; Constitution Amendment Procedure.

UNIT: III FEDERALISM IN INDIA 6 hours

Centre-State Administrative Relationship; Governors - Powers and Functions; State Legislature - Composition and powers; Chief Ministers - Powers and Functions; The Election Commission - Powers and Functions.

UNIT: IV JUDICIARY AND PUBLIC SERVICES 6 hours

The Union Judiciary - Supreme Court and High Court; Fundamental Rights and Duties All India Services - Central Civil Services -State Services - Local Services.

UNIT: V INTERNATIONAL PARTICIPATION 6 hours

Foreign Policy of India; International Institutions Influence: UNO, WTO, WHO, SAARC, International Summits: BRICS, NSS, UNEP - India’s Role in International Negotiations; Environmentalism in India.

Textbooks

1. Briji Kishore Sharma, Introduction to the Constitution of India, Prentice Hall of India, 2005.

Reference Books

1 Mahendra Pal Singh, V. N. Shukla, Constitution of India, Eastern Book Company, 2011.

2 J. N. Pandey, Constitutional Law of India - Central Law Agency, 1998

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	3	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	3	-	3	-	-	-	-	-	-
Average	2	-	-	-	-	3	-	3	-	-	-		-	-
Level of correlation	2	-	-	-	-	3	-	3	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I Semester (Common to All Branches)

20AHS17	**Quantitative Aptitude and Reasoning-3**	**L T P C**
	(*Open Elective - I)	3 **0 0** 3

Course Outcomes

After completion of the course, the students will be able to

1. Develop the thinking ability to meet the challenges in solving Logical Reasoning problems.
2. Solve campus placements aptitude papers covering Quantitative Ability and Verbal Ability.
3. Apply different placement practice techniques.

UNIT: I QUANTITATIVE ABILITY V **9 hours**

Time and Work – Equal Efficiency – Different Efficiency – Combined work – Alternate work – Partial work – Negative work - Pipes and Cistern – Simple Interest – Compound Interest - Year Zero – Difference between SI and CI – Clocks – Angle of the Clock –Minutes hand Loss or Gain – Calendars – Leap Year – Non Leap year – Odd days – Days of the week

UNIT: II QUANTITATIVE ABILITY VI **9 hours**

Mensuration 2D – Area and Perimeter - Mensuration 3D – Volume - Total Surface area – Lateral Surface Area – Statistics- Mean - Mean Deviation – Median – Mode - Range – Variance - – Standard Deviation - Set theory

UNIT: III REASONING ABILITY III **9 hours**

Puzzles – Cubes & Dices – Algebra – Selection Decision table – Visual reasoning - Inequalities

UNIT: IV VERBAL III **9 hours**

Vocabulary - Synonyms, Antonyms, One Word Substitution, and Spelling - Sentence Correction - Sentence Selection, Error Identification, Sentence Improvement, Sentence completion – Cloze Test, Types, Strategies - Para jumbles- Types, Strategies.

UNIT: V SOFT SKILLS III **9 hours**

Written Communication - Listening Skills - Mentoring & Coaching - Decision Making - Competitiveness - Inspiring & Motivating.

Textbooks

1. Quantitative Aptitude, Logic Reasoning & Verbal Reasoning, R S Agarwal, S.Chand Publications.
2. Quantitative Aptitude for Competitive Examinations, R S Agarwal, S.Chand Publications

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	2	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	2	-	-	-	-
Average	2	1.5	-	-	-	-	-	-	-	2	-	-	-	-
Level of correlation	2	2	-	-	-	-	-	-	-	2	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I Semester (Common to All Branches)

20AHS18	**French Language**	**L**	**T**	**P**	**C**
		2	0	0	0

Course Outcomes:

After completion of the course, the students will be able to

1. Understand basic knowledge of French language and analyze several corecompetencies.
2. Develop and improve comprehensive capabilities and apply simple phrases & sentencesin real-life conversation.
3. Analyze ability to ask and answer questions about the self, personal interest,everyday life, and the immediate environment.
4. Demonstrate knowledge of tenses in making sentences for day-to-day conversations in different time frame.

UNIT: I INTRODUCTION & PRESENTATION 10 hours

Conversation, Introduction, Alphabets & Accents Culture, Formal & Informal – Use of 'tu' and 'vous', Map of France: Geographical, Administrative Greeting, Presenting oneself & others, Asking & giving identity, Days of the week, Months of the year, Numbers, Nationality, Profession, Making a visiting card salutations, Gestures & Handshakes.

UNIT: II RENDEZVOUS 8 hours

Conversation, approaching someone, Tele conversation, Buying a train ticket, Numbers the formula to write a post card, Culture and Life in France.

UNIT: III AGENDA & INVITATION 9 hours

Conversation, Time, Fixing a meeting, Alimentation, Moments of the day (from morning to night), Punctuality, Good moments of the day, Inviting someone, Accepting & Refusing Invitations, Family tree, Describing a house interior.

UNIT: IV VACATION & SHOPPING 8 hours

Describing an event, Reservations at a Hotel, Describing a person, Expressing opinion, Indication of time: Depuis & pendant, Gestures: Polite & Impolite, A French vacation, Culture, Making a purchase, Choosing & Paying, Trying a dress on, Talking about weather, Understanding a Weather Bulletin, Comparison, Dress & weather, Dialogue between a client and an employee of a store and Money in everyday life in France: Parking ticket / telephone card.

UNIT: V ITINERARY, EXCURSION & WEEKEND 10 hours

Asking for & giving directions, Giving order / advice / prohibition, Reservation at a restaurant, Taking an order, Asking for bill at a Restaurant, Expression of Quantity, Alimentation: Shopping list (portions), Making Suggestion & Proposal, Going for an outing, Acceptance & Refusal of an invitation, Giving arguments: favour & against, A French Weekend.

Textbooks

1. CAMPUS 1 Methode de Francais, Jacques Pecheur et Jacky Girardet, CLE International Paris 2002.
2. La France de toujours, Nelly Mauchamp; CLE international.
3. Sans Frontireres - Vols. 1, 2, & 3 – Hachette.

Reference Books

1. Declic 1; Jacques Balnc, Jean-Michel Cartier, Pierre Lederlion; CLE International.
2. Nouveau Sans Frontieres – Vols. 1, 2 & 3.
3. Cours de langue et de civilisation Francaise – Hachette.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	3	3	-	-	-	-
CO2	2	-	-	-	-	-	-	-	3	3	-	-	-	-
CO3	2	-	-	-	-	-	-	-	3	3	-	-	-	-
CO4	2	-	-	-	-	-	-	-	3	3	-	-		
Average	2.25	-	-	-	-	-	-	-	3	3	-	-	-	-
Level of correlation	2	-	-	-	-	-	-	-	3	3	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech - I Semester (Common to All Branches)

20AHS19	**German Language**	**L**	**T**	**P**	**C**
		2	0	0	0

Course Outcomes:

After completion of the course, the students will be able to

1. Understand fundamental knowledge to learn German language, sounds, pronunciations, sentence structures and the verb conjugation.
2. Comprehend and apply the knowledge of vocabulary and phrases in day-to-day real-life conversation.
3. Analyze various sentence structures by examining the rules of grammar in speaking and writing.
4. Demonstrate various verb structures of English and German languageeffectively in professional writing.

UNIT: I GERMAN SOUNDS 10 hours

Vowels, consonants, diphthongs, umlaut, the nouns, gender distinctions, cases, definite and indefinite articles, conjugation of verbs, verbs with separable and inseparable prefixes, modal verbs, personal pronouns, possessive pronouns, reflexive pronouns, cases nominative, accusative and dative.

UNIT: II Sentence Formation 8 hours

Infinite sentences, use of conjunctive-I and conjunctive-II, plusquam perfect, modal verb, Conjunction, temporal, subordinate clauses & complex sentences.

UNIT: III German Basic Grammar 9 hours

Verbs: Different forms, past tense and present perfect tense, adjectives and their declension, degrees of comparison; Prepositions, genitive case conjunctive. Different conjunctions (coordinating and subordinating), simple, complex and compound sentences, active and passive voice, relative pronouns.

UNIT: IV Purpose Of Language Study 8 hours

Pictures and perceptions, conflicts and solutions, change and the future, the purpose of the study of the German language, listening, understanding, reacting, speaking, communicating, use of language, pronunciation and intonation, reading, reading and understanding, writing, text writing, text forming, use of language, language reflection, building up the language, language comparison, culture reflection, other cultures and cultural identity.

UNIT: V German Advanced Communication Level - 1 10 hours

The significance of language study, Speaking and thinking, Self – discovery, Communication, Language Competence, Language and culture, Language changes, Connection with other areas of study, The mother language and the other languages.

Textbooks

1. Korbinian, Lorenz Nieder Deutschals Fremdsprache IA. Ausländer German Language", Perfect Paperback Publishers, 1st Edition, 1992.
2. Deutschals Fremdsprache, IB, Erganzungskurs, "German Language", Front Cover. Klett, Glossar Deutsch-Spanisch Publishers, 1st Edition, 1981.

Reference Books

1. Griesbach, "Moderner Gebrauch der deutschen Sprache", Schulz Publishers, 10th Edition, 2011.

2. Anna Quick, Hermann Glaser U.A, "Intermediate German: A Grammar and workbook", Paperback, 1st Edition, 2006.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	1	-	-	-	3	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	3	-	-	-	-	2	-	-	-	3	-	-	-	-
CO4	2	-	-	-	-	-	-	-	-	3	-	-		
Average	2.25	-	-	-	-	1.5	-	-	-	3	-	-	-	-
Level of correlation	2	-	-	-	-	2	-	-	-	3	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I Semester (Common to All Branches)

20AHS20	**Japanese Language**	**L T P C**
		4 0 0 0

Course Outcomes:

After completion of the course, the students will be able to

1. Remember and understand Japanese alphabet and demonstrate basic structures of sentences in reading and writing.
2. Examine the limitations of language by examining pronouns, verbs form, adjectives and conjunctions.
3. Analyze the skills of vocabulary and apply it to learn time and dates and express them in Japanese.
4. Demonstrate the formation of simple questions and answers in Japanese to know the Japanese culture and etiquette.

UNIT: I INTRODUCTION TO JAPANESE SYLLABLES AND GREETINGS 8 hours

Introduction of Japanese language, alphabets; Hiragana, katakana, and Kanji Pronunciation, vowels and consonants. Hiragana – writing and reading; Vocabulary: 50 Nouns and 20 pronouns, Greetings.

UNIT: II DEMONSTRATIVE PRONOUNS, VERBS AND SENTENCE FORMATION 10 hours

Grammar: N1 wa N2 desu, Japanese Numerals, Demonstrative pronoun - Kore, Sore, Are and Dore (This, That, Over there, which) Kono, sono, Ano and Dono (this, that, over there, which) Kochira, Sochira, Achira and Dochira. this way....) Koko, Soko, Asoko and Doko (Here, There,...location), Classification of verbs Be verb desu Present and Present negative Basic structure of sentence (Subject+ Object+ Verb) Katakana-reading and writing

UNIT: III CONJUNCTION, ADJECTIVES, VOCABULARY AND ITS MEANING 8 hours

Conjunction-Ya…..nado Classification of Adjectives ‘I’ and ‘na’-ending Set phrase – Onegaishimasu – Sumimasen, wakarimasen Particle –Wa, Particle-Ni ‘Ga imasu’ and ‘Ga arimasu’ for Existence of living things and non-living things Particle- Ka, Ni, Ga, Days/ Months /Year/Week (Current, Previous, Next, Next to Next); Nation, People and Language Relationship of family (look and learn); Simple kanji recognition.

UNIT: IV FORMING QUESTIONS AND GIVING ANSWERS 10 hours

Classification of Question words (Dare, Nani, Itsu, Doyatte, dooshite, Ikutsu, Ikura); Classification of Te forms, Polite form of verbs.

UNIT: V **EXPRESSING TIME, POSITION AND DIRECTIONS** **9 hours**

Classification of question words (Doko, Dore, Dono, Dochira); Time expressions (Jikan), Number of hours, Number of months, calendar of a month; Visiting the departmental store, railway stations, Hospital (Byoki), office and University.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	3	-	-		
Average	2.75	-	-	-	-	-	-	-	-	3	-	-	-	-
Level of correlation	3	-	-	-	-	-	-	-	-	3	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech -II Semester

20AME28	**Computer Aided Design and Manufacturing**	**L**	**T**	**P**	**C**
		3	**0**	**0**	3

Course Outcomes:

After completion of the course, the students will be able to

1. Summarize various computer aided tools utilized in a manufacturing process.
2. Distinguish application of various tools like CAD, CAM, CIM, CAPP modeling and problem solving with system approach.
3. Solve industrial problems with advanced technologies, eco- friendly, and utilization of resources at minimum total cost.
4. Develop skills to promote system integration and synergy for industry growth, and attainment of goals.
5. Explain the principles robotics, CIM, AR, VR and AI in CIM.

UNIT: I Introduction 9 hours

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

Computer Graphics− Raster scan graphics, Coordinate systems, database structures for Geometric modeling, transformation of geometry, 3D transformations, mathematics of projection, clipping, hidden line/surface removal, shading.

UNIT: II Geometric Modeling 9 hours

Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

Group Technology- Part Families, Parts Classification and Coding, Features of Parts Classification and Coding Systems, Production Flow Analysis, cellular manufacturing.

Computer Aided Processes Planning- Benefits of CAPP- Approaches of CAPP- Retrieval type and Generative type, Implementation techniques

UNIT: III Computer Aided Quality Control 9 hours

Inspection and Testing, Coordinate measuring machine, non-contact inspection methods, integration of CAQC with CAD/CAM. Computer Numerical Control- Fundamentals of NC-Basic Components of NC System, Motion Control systems, NC Positioning systems, advantages and disadvantages of NC. CNC- Features of CNC, machine tool control unit, CNC software. DNC- Distinguish from CNC, Direct and

Distributed NC.

UNIT: IV CNC Programing **10 hours**

Part program fundamentals, Manual part program methods, Preparatory Functions, Miscellaneous functions, Tool length compensation, canned cycles, cutter radius compensation, tool nose radius compensation. Manual part programming for CNC turning and machining centre for popular controllers like Fanuc. Advanced part programming methods looping and jumping, subroutines, Mirror Imaging. Fundamentals of computer aided part programming.

UNIT - 5 Automation **8 Hrs**

Automation: Anatomy and configuration of robot, characteristics of robots, grippers, application of robots in manufacturing, robot programming languages. Computer integrated manufacturing (CIM): Elements of CIM, Virtual Reality (VR), Augmented Reality (AR), Artificial Intelligence (AI) and expert systems in CIM.

Textbooks:

1. P. N. Rao, CAD/CAM: Principles and applications, 3/e, Tata McGraw-Hill, Delhi, 2017
2. Ibrahim Zeid, R.Siva Subramanian, CAD/CAM: Theory and Practice, 2/e, Tata McGraw-Hill, Delhi, 2009

Reference Books:

1. Mikell P. Groover, Emory W. Zimmers , CAD/CAM, 5/e, Pearson Prentice Hall of India, Delhi, 2008
2. P. Radhakrishnan, S. Subramanyan & V. Raju, CAD/CAM/CIM, 3/e, New Age International Publishers, 2008
3. Computer Aided Manufacturing, 3/e, Tien Chien Chang, Pearson, 2008

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc20_me44/preview
- https://web.iitd.ac.in/~hegde/cad/lecture/L01_Introduction.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1530947994.pdf
- https://www.iare.ac.in/sites/default/files/lecture_notes/CAD_CAM_LECTURE_NOTES.pdf

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3			2							3	3
CO3	3	3	3			2							3	3
CO4	3	3	3										3	3
CO5	3	3	3				2						3	3
Average	3	3	3			2	2						3	3
Level of correlation	3	3	3			2	2						3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech -II Semester

20AME29	**Finite Element Methods**	**L T P C**
		3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Develop equations in finite element methods for 1D, 2D and 3D problems
2. Develop element matrix equation by potential energy and Galerkin approach.
3. Analyze ordinary and partial differential equations to solve 2D elements problems.
4. Formulate and solve basic problems in heat transfer 1D and 2D problems.

UNIT: I Fundamental Concepts 8 hours

Introduction, Stresses and Equilibrium, Boundary Conditions, strain-Displacement Relations, Stress-Strain Relations, Temperature effects, Potential energy and equilibrium, Finite element Modeling.

UNIT: II One-Dimensional Problems & Trusses 14 hours

Coordinates and shape functions, Potential-Energy Approach, Gelerkin approach. Assemble of the Global Stiffness Matrix and Load Vector, Properties of K, The Finite Element Equations; Treatment of Boundary Conditions - Elimination approach, quadratic shape functions, Temperature effect, problems for bar element.

Trusses: Introduction, Plane Trusses, Local and Global Coordinate Systems, Formulas for Calculating Element stiffness matrix, Stress Calculations

UNIT: III Two-Dimensional Problems Using Constant Strain Triangles & Isoparametric Representation 12 hours

Introduction, Finite Element Modeling, Constant-Strain Triangle (CST), Problem Modeling and Boundary Conditions. Ax-symmetric solids subjected to axi-symmetric loading. Axi-symmetric formulation for Triangular element.

Isoperimetric Representation: Introduction, 4 noded quadrilateral element, numerical integration, Four Noded quadrilateral Axi-Symmetric problems.

UNIT: IV Beams & Frames - Plates & Shells 12 hours

Beams & Frames: Introduction of Beam, Potential-Energy Approach, Gelerkin Approach, Finite element formulation, load vector, Boundary conditions - simple problems. Plane frames simple problems.

Plates & Shells: Introduction of plates and shells, strain-displacement relation for continuum and plates, Derivation of plate equilibrium equation, Example problem with axi-symmetric plate, Elastic buckling of cylindrical shells, simple problems

UNIT: V Heat Transfer & Dynamic 10 hours

Heat Transfer: Introduction, Derivation of the Basic Differential Equation, Heat Transfer with Convection, One-Dimensional Finite Element Formulation Using a Variational Method, Two-Dimensional Finite element formulation.

Dynamic: Introduction, Element mass matrices equation of eigen values and eigenvectors – Properties of Eigen vectors, Eigen Value – Eigen vector evaluation.

Text book(s)

1. Chandrupatla, Tirupathi R., and Belegundu, Ashok D.. Introduction to Finite Elements in Engineering PDF EBook: International Edition. United Kingdom, Pearson Education, 2014
2. Logan, Daryl L. A First Course in the Finite Element Method. United States, Cengage Learning, 2016.

Reference Books

1 O.C. Zienkiewicz, Finite Element Method, its basis and fundamentals, 6th Edition, ELSCVIER, 2005.

2 Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smith & Ted G. Byrom, The Finite Element Method for Engineers, New York, 4th Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2001.

3 Fundamentals of Finite Element Analysis David V. Hutton

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech -II Semester

20AME30	**Design of Machine Elements**	**L**	**T**	**P**	**C**
		3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Describe the concepts of mechanics of materials to estimate the stresses in a machine element.
2. Design various machine elements like shafts, keys, couplings, cotters, bolted, riveted, and welded joints with standards.
3. Choose and analyze the suitable machine elements like bearings, springs, and power screws to develop a mechanical system.
4. Design the mechanical elements like bearings, springs, power screws, and contact bearings used in an industrial system with available resources.

UNIT: I Stresses in Machine Elements & Design of Fluctuating Loads 12 hours

Stresses in Machine Elements: Simple stresses, Torsion and bending Stresses, Combined stresses, impact stresses, stress-strain relation, theories of failure, factor of safety.

Design of Fluctuating Loads: Stress concentration, notch sensitivity, Design for fluctuating stresses, Fatigue strength and S-N Diagrams, Endurance limit and strength, Goodman's line, Soderberg's line, modified Goodman's line.

UNIT: II Design of Shafts, Cotter and Knuckle Joints 12 hours

Design of solid and hollow shafts for strength and rigidityDesign of shafts for combined bending and axial loads. Design of Cotter joints- spigot and socket, sleeve and cotter, jib and cotter joints, and Knuckle joints

UNIT: III Design of Bolted, Riveted and Welded Joints 12 hours

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.

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 Design of Springs and Power Screws 12 hours

Springs: Introduction, Types of Springs, Terms used in Compression springs, Stresses and Deflections of helical springs of circular wire, Helical Torsion springs, Concentric or Composite springs, Leaf springs – Construction of leaf springs, Length of spring leaves.

Power Screws: Introduction, Types of screw threads used for power screws, Stresses in power screws, Design of screw jack, Problems.

UNIT: V Design of Sliding and Rolling Contact Bearings 12 hours

Sliding Contact Bearings: Terms used in Hydrodynamic journal bearings, Bearing Characteristic Number and Bearing modulus for journal bearings, Design procedure for Journal bearings, Problems.

Rolling Contact Bearings: Basic static load rating, Basic dynamic load rating of rolling contact bearings, Static Equivalent load &Dynamic Equivalent load, Dynamic load rating for Rolling contact bearings under variable loads, Life of a bearing, Reliability of a bearing.

Textbook(s)

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

Reference Books

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, 6th edition, Scitech Publishers, 2010.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech II Semester (Common to CSE, CE, ME, CSE(DS), CSE(AIML), IT)

20AME31	**Operations Research**	**L T P C**
	(*Professional Elective – II)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Summarize various LPP, TPP, AP, sequencing, replacement, game theory, project management, 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.

UNIT: I Introduction and Liner programming 12 Hours

Development – definition – characteristics and phases – types of Operations Research models – applications – limitations.

Linear Programming and its Applications: Linear Programming Problem – Graphical solution of LP Problems. Simplex method – artificial variables techniques - Two phase method, - Big M method

UNIT: II Transportation and Assignment problems 12 Hours

Transportation: Introduction – Methods of basic feasible solution, Optimality test, Degeneracy in transportation problem, unbalanced transportation Problem, -- Assignment problem – Introduction – unbalanced model -- optimal solution – Hungarian method, - un-balanced assignment problems-travelling salesman problem.

UNIT: III Replacement and waiting line problems 12 Hours

Replacement: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement, Waiting lines. Introduction, single channel Poisson arrival, exponential service time with finite population and infinite population.

UNIT: IV Simulation and Theory of Games 12 Hours

Simulation Definition – types of simulation models – phases of simulation – application of simulation – inventory and queuing problems – merits and demerits -- simulation languages.

Theory of Games: Introduction – mini, max (max, mini) – criterion and optimal strategy-- to solve the rectangular two-person zero sum games, solution of rectangular games in terms of mixed strategies, solution of 2x2 games without saddle point, solution of a two person zero sum 2Xn game, Graphical method for 2Xn and nX2 games.

UNIT: V Network Models and Project Management 12 Hours

Network models - Introduction, Rules for construction and errors. Shortest route - Dijkstra's algorithm, Minimal spanning tree - Kruskal's algorithm, Maximum flow models. Project management- CPM and PERT networks.

Textbook(s)

1. Taha, Introduction to Operations Research, New Delhi, 8th Edition, Printice Hall International Publisher, 2016.
2 A.M. Natarajan, P. Blalsubramani & A Tamilarasi, Operations Research, New Delhi. 1st Edition, Pearson Piblishers, 2005.

Reference Books

1 Hiller & Liberman, Introduction to Operations Research, Noida RC, 7th Edition,Tata Mc Graw Hill publication
2 R. Panneerselvam, Operations Research, New Delhi, 2nd Edition, Prentice Hall International Publisher, 2006

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	3
CO2	3	3											3	3
CO3	3	3	3										3	3
CO4	3	3		3									3	3
Average	3	3	3	3									3	3
Level of correlation	3	3	3	3									3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II Semester

20AME32	**Industrial Engineering and Management**	**L**	**T**	**P**	**C**
	(*Professional Elective - II)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Summarize the concepts of industrial engineering, financial management, human resources, production management, and marketing management.
2. Apply productivity techniques for continuous improvement in different functionalities of an industry.
3. Identify the optimum solutions with a system approach to both industry and service sector.
4. Apply cellular manufacturing concepts in industry.
5. Illustrate the application and to identify solutions for industry problems.

UNIT: I Forecasting and Aggregate planning 10 hours

Defining Operations Management, functions and its historical evolution.

Forecasting: Approaches to Forecasting: Qualitative approach - Judgmental methods, quantitative methods- time series, regression, Macro-economic measures – microeconomics.

Aggregate Planning: purpose, procedure and techniques.

UNIT: II Production Management and Scheduling 10 hours

Production Management: Types of production systems, Product analysis, brief treatment of functions of production Planning and Control, Value analysis

Scheduling: Introduction, concept of batch production systems, Loading, Sequencing, and Scheduling the n jobs on a single machine, two machines, three machines, m-machines. Problem solving.

UNIT: III Inventory Control 10 hours

Introduction, models, Inventory costs, Basic models EOQ and EBQ with-out shortages, Quantity discounts, Selective control -- ABC analysis, Problem solving. Quality Control: Inspection and types, SQC - Control charts for attributes and variables, construction and application – Acceptance sampling, sampling plans, Construction of O.C. curve. Problem solving.

UNIT: IV Personal Management and Cellular Manufacturing 10 hours

Personnel Management, Job Design, Job Information, Group Technology – Cellular layout – Machine. Part Cell Formation (MPCF) – Heuristic approaches – Hierarchical clustering for MPCF.

UNIT: V Financial Management 10 hours

Financial Management: Concept of Interest, Compound Interest, Economic Evaluation of **Alternatives**: The Annual Equivalent Method, Present Worth Method, Future Worth Method. Depreciation – Purpose, Types of Depreciation; Common Methods of Depreciation; The Straight-Line Method, Declining Balance Method, The Sum of the years Digits Method, A Brief Treatment of Balance Sheet, Ratio Analysis, MRP system.

Textbook(s)

1. O.P.Khanna, Industrial Engineering and Management, 7th Edition, DhanpatRai & Sons, 2002.

2 MortandTelsang, Production and Operating Management, 2nd Edition, S. Chand,2006.

Reference Books

1 E.S.Buffa, Modern Production/Operation Management, 8th Edition, Wiley India, 2007.

2 Joseph G Monks, Operation Management, 3rd Edition, Tata McGraw Hill, 1987.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3										1		3	-
CO2	3	3									-		3	3
CO3	3	3									1		3	3
CO4	3	3									-		3	3
CO5	3	3									1		3	3
Average	3	3									3		3	3
Level of correlation	3	3									1		3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II - Semester

20AME33	**Material Processing Techniques**	**L**	**T**	**P**	**C**
	(*Professional Elective - II)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Describe the principles and classification of various material processing techniques used in industrial applications.
2. Analyse the influence of process parameters in the performance of products.
3. Select and apply appropriate process for producing sustainable, eco-friendly industrial components.

UNIT: I Introduction and Polymer processing 12 hours

Introduction of Materials, Types, distinctions, properties and applications of Metals, Ceramics and Polymers. Different types of polymer processing operations and engineering aspects: Mixing and compounding (twin screw extruders, banbury and other mixing equipments in polymer processing), extrusion process, injection moulding, blow moulding, thermoforming, rotational moulding, compression moulding, transfer moulding, calendering, roller and blade coating, film blowing, textile/fiber spinning technology.

UNIT: II Ceramic Processing 7 hours

Technology for ceramic powder preparations, solid state reactions, Sintering operations, Types of sintering, sintering mechanisms, Colloidal processing of ceramics, Co-precipitation method, Sol-Gel process, products for engineering applications

UNIT: III Metal Forming 12 hours

Metal Forming: Introduction to rolling, forging, extrusion, drawing and its engineering aspects, Development of microstructures with different processing technologies and its effects on forging, extrusion, rolling, and drawing on metallic alloy components. Effect of alloying additions.

UNIT: IV Casting and joining 12 hours

Casting: Pattern and Mould, Melting and Pouring, Solidification and Pouring, Fundamentals of Solidification.

Joining: Welding and its types, Brazing and Soldering, Microstructural mechanisms associated with metals joining operations and it engineering applications.

UNIT: V Powder Metallurgy 7 hours

Powder Metallurgy - Production of metal powders, recent developments in powder production, Characteristics of powders. Compaction in rigid dies, hot and cold isostatic compaction. Mechanisms involved in sintering of metal powders, application of powder metallurgy products. Development of composite materials via powder processing route.

Textbook(s)

1. Principles of Polymer Processing, Tadmor; 2 (ed.), Wiley, 2006.
2 Ceramic Processing and Sintering, Mohamed N. Rahaman; 2 (ed.), Marcel Dekker Inc.,2003.
3 Solidification and Crystallization Processing in Metals and Alloys, Hasse Fredriksson; Wiley, 2012.

Reference Books

1 Polymer processing fundamentals, Tim A. Osswald, Hanser (eds.); 1998
2 Ceramic Materials: Science and Engineering, C. Barry Carter, M. Grant Norton; 2nd (ed.), Springer, 2013.
3 Chemical Processing of Ceramics, Burtrand Lee, Sridhar Komarneni; 2 (ed.), CRC Press, 2010.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	2
CO2	3	3	3										3	3
CO3	3	3	3										3	3
Average	3	3	3										3	2.67
Level of correlation	3	3	3										3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II Semester

20AME34	**Non-Destructive Testing Techniques**	**L**	**T**	**P**	**C**
	(Professional Elective - II)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Identify appropriate surface inspection techniques for various engineering component.
2. Select suitable radiography testing methods for different applications.
3. Apply eddy current and ultrasonic testing methods suitably for detecting internal defects.
4. Apply acoustic emission techniques for suitable engineering applications
5. Detect the defects using non-destructive testing methods

UNIT: I Introduction to NDT and Surface NDT Techniques 10 hours

Visual examination-Procedure, testing and evaluation.

Liquid penetrant testing - Dye penetrant testing, Basic principle, Types of dye and methods of application, Developer; Magnetic particle testing - Magnetic particle testing, Basic theory of magnetism, Magnetization methods, Field indicators, Particle application, Inspection. Advantages and limitations of techniques.

UNIT: II Radiographic and Eddy Current Testing 10 hours

Radiography principle, X-ray films, exposure, penetrameter, radiographic imaging, inspection standards and techniques, Radiography applications, limitations and safety.

UNIT: III Ultrasonic Testing 8 hours

Properties of sound beam, ultrasonic transducers,inspection methods, flaw characterization technique, immersion testing.

UNIT: IV Acoustic emission testing 8 hours

Theory of AE sources and Waves, Equipment, Signal Features, Data display, source location, Barkhausen noise, Applications.

UNIT: V Emerging Techniques 9 hours

Leak testing, Holography, Thermography,Magnetic resonance Imaging, Magnetic Barkhausen Effect. In-situ metallography.

Textbooks

1. Wong B Stephen, Non-Destructive Testing - Theory, Practice and Industrial Applications, 1st

edition, LAP Lambert Academic Publishing, USA, 2014.

Reference Books

1. Ravi Prakash, Nondestructive Testing Techniques, 1st rev. edition, New Age International Publishers, 2010.
2. J. Prasad and C. G. K. Nair, Non-Destructive Test and Evaluation of Materials, 2nd edition, Tata McGraw-Hill Education, 2011.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	
CO2	3	3											3	3
CO3	3	3											3	3
CO4	3	3											3	3
CO5	3	3											3	3
Average	3	3											3	3
Level of correlation	3	3											3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II - Semester

20AME35	**Additive Manufacturing**	**L**	**T**	**P**	**C**
	(*Professional Elective - II)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Develop CAD models for 3D printing and generate .stl files for simple to complex components.
2. Demonstrate the knowledge on additive manufacturing techniques, and processes for various applications.
3. Apply material selection techniques for specific processes considering post processing and quality challenges.
4. Analyze the functional characteristics of 3D printing and reverse engineering techniques for engineering applications.

UNIT: I Introduction 8 hours

Introduction, Process, Classifications, Advantages, Additive v/s Conventional Manufacturing processes, Applications, Material science aspects in additive manufacturing.

UNIT: II CAD and Reverse Engineering 8 hours

Basic concept-digitisation techniques-model reconstruction-data processing for additive manufacturing technology.

CAD Data formats, Data translation, Data loss, STL format. Slicing-tool path generation-software's for additive manufacturing technology.

UNIT: III Additive Manufacturing Techniques 10 hours

Introduction, Types- Stereo- Lithography, LOM, FDM, SLS, SLM and Binder Jet Technology-Design and Process parameters, Process Selection for various applications.

UNIT: IV Materials, Post Processing and Product Quality 10 hours

Materials: Polymers, Metals, Non-Metals, Ceramics Process, Process parameter, Process Selection for various applications, Support Materials.

Various forms of raw material- Liquid, Solid, Wire, Powder; Powder Preparation and their desired properties, Polymers and their properties.

Post Processing: Support Removal, Sanding, Acetone treatment, polishing.

Product Quality: Inspection and testing, Defects and their causes.

UNIT: V Reverse Engineering with 3D Printing Technology 10 hours

Allied processes: Vacuum casting, Surface digitizing, Surface generation from point cloud, Surface modification, Data transfer to solid models.

Reverse Engineering: Capturing and reading the scan data, Align point clouds and simplify data, Polygon meshing and editing, Defining surface boundaries, applying nurbs, Exporting data, Reverse engineering update.

Textbook(s)

1. Paul F. Jacobs, Stereo lithography and other RP and M Technologies, SME, New York, 3rd edition, 1996.
2 Frank W. Liou, Rapid Prototyping and Engineering Applications, CRC Press Taylor and Francis Group, New York, Special Indian Edition, 2011.

Reference Books

1 C. K. Chua, K. F. Leong, C. S. Lim, Rapid Prototyping - Principles and Applications, Yesdee publications Pvt. Ltd., Mumbai, India, 2nd edition, 2010.

2 Hari Prasad, K.S. Badarinarayan, Rapid Prototyping and Tooling, SIP PageTuners, Bangalore, 1st Edition, 2013.

3 Fiham D.T, Dinjoy S. S, Rapid Manufacturing, Verlog, London, 4th edition, 2002.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3												3	
CO3	3	3	3			2							3	
CO4	3	3	3										3	3
Average	3	3	3			2							3	3
Level of correlation	3	3	3			2							3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech - II - Semester

20AME36	**Tool Design**	**L T P C**
	(*Open Elective – II)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Demonstrate the knowledge of cutting tools and tool cost estimation for machining of materials.
2. Design single point cutting tools for metal removal.
3. Design multi-point cutting tool for effective metal removal rate and enhanced productivity.
4. Design dies for sheet metal operations
5. Design jigs and fixtures for holding the work and guiding the tool.

UNIT: I Introduction to Cutting Tools 10 Hours

Introduction, Different types of cutting tools used for machining, Designation of cutting tools, Types of systems used for designating cutting tools, Selection of tool material, Types, Properties and Characteristics of tool Material, Tool wear, Tool life criteria, variables affecting tool life and machinability, Taylor's tool life equation, Types of coolants, Elements of machining cost, Tool cost estimation.

UNIT: II Design of Single Point Cutting Tools 10 Hours

Introduction, Basic Elements, Design of Tool Shank, Geometry of single point cutting tool, Nomenclature of single point cutting tool, Influence of various Angles on Tool Design, Calculation of Forces and Design for Cutting Forces, Mechanics of orthogonal cutting, Merchant's circle diagram, Geometry and their interrelation, Theories of formation of chip and their effect.

UNIT: III Design of Multi Point Cutting Tools 10 Hours

Introduction, Classification of multi point cutting tools, Drill geometry, Design of Drills, Rake & Relief angles of twist drill, Speed, Feed and depth of cut, Machining time.

Milling cutters: Up milling & down milling, Cutting speeds and Feed machining times-Design of form cutters, combination tools & reamers.

UNIT: IV Press Tool Design **10 Hours**

Press work terminology, requirements of press tool design, types of dies, press operations-dimensions of punch and die for blanking and piercing. Principle of metal cutting- cutting forces, methods of reducing forces, minimum diameter of piercing.

Die block design, punch design, centre of pressure, scrap strip layout, considerations in press tool design, design procedure of blanking die.

UNIT: V Design of Jigs and Fixtures **10 Hours**

Introduction, Concept of degrees of freedom, 3-2-1 principle of location, Principles of location and clamping for jig and fixtures design, Different types of locators and clamps, Jig bushes and its types, Different types of jigs and its design, Essential features of different types of fixtures, Design of fixtures, Indexing jigs and fixtures, Automatic clamping devices.

Text Book(s)

1. Donaldson, Lecain and Goold, Tool Design, Tata McGraw Hill, 4th edition, 2012.
2 G.R.Nagpal, Tool Engineering & Design, Khanna Publishers, Tata McGraw Hill, 6th edition, 2008.
3 Cyrill Donaldson, George H. LeCain, Joyjeet Ghose & V.C. Goold, Tool Design, New Delhi, 4th Edition, Tata McGraw Hill, 2012.
4 V.Arshinov, G.Alekseev, Metal Cutting Theory and Cutting Tool Design, MIR Publications.

Reference Books

1 P C Sharma, Production Engineering, Revised Edition, S Chand Publications, 2009.
2 R K Singal, Mridual Singal & Rishi Singal, Fundamentals of Machining and Machine Tools, 1st Edition, I.K. International, 2008.
3 Surendra Kenav and Umesh Chandra, Satya prakashan, Production Engineering Design (Tool Design), New Delhi.
4 Amitabha Battacharya and Inyong Ham, Design of Cutting Tools use of Metal Cutting Theory, ASTME Publication, Michigan USA.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2										2	1
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
CO5	3	3	3										3	3
Average	3	2.8	2.8										2.8	2.6
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech - II - Semester

20AME37	**Refrigeration and Air Conditioning**	**L**	**T**	**P**	**C**
	(*Open Elective- II)	**3**	0	0	**3**

Course Outcomes:

After completion of the course, the students will be able to

1. Apply the basic concepts and fundamentals of refrigeration to solve problems related to air and vapour compression refrigeration systems.
2. Use the principle of vapour absorption and steam jet refrigeration systems for industrial applications. Further execute a suitable refrigerant for a given application complying with environmental aspects.
3. Apply the basic terminology of Psychrometry and Air conditioning equipment to solve problems relate to comfort Airconditioning
4. Apply the basic principles of Heat load calculations for solving problems various year-round and commercial air conditioning systems.
5. Apply the basic working principles of Cryogenics and different non-convectional refrigeration methods for space and industrial applications.

UNIT: I Basic Introduction and Refrigeration Methods 10 hours

Introduction to Refrigeration: -Basic concepts - Unit of refrigeration and C.O.P-refrigerators-heat pump - carnot refrigerator-applications of refrigerator, methods of refrigeration.

Air refrigeration system, Bell coleman cycle, COP evaluation. Related problems.

Vapour compression refrigeration- Ideal cycle –effect of sub cooling of liquid- super heating of vapour-deviations of practical (actual cycle) from ideal cycle- construction and use of P-H chart-problems.

UNIT:II Vapour Absorption Refrigeration, Refrigerants and Refrigeration Equipment 10 hours

Vapor Absorption refrigeration – Description and working of ammonia – water, Li Br – water system – Calculation of HCOP, Principle and operation of three fluid vapour absorption refrigeration system. Steam jet refrigeration system – working principle – basic operation.

Refrigerants: Desirable properties – classification of refrigerants used – nomenclature –secondary refrigerants – lubricants – Ozone Depletion – Global Warming – newer refrigerants.

Refrigeration Equipment: Compressors, Condensers, Evaporators & Expansion Devices – Principle of working, applications.

UNIT: III Introduction to Air Conditioning Systems, Equipment and its Applications **10 hours**

Introduction to Air- Conditioning: Psychometric terms, Psychometric Chart, Psychometric Processes. Comfort Conditions: Requirement of human comfort and concept of Effective Temperature –Comfort Chart, Comfort air conditioning.

Air-Conditioning Equipment and Applications: Humidifiers, Dehumidifiers, Air filters, fans and blowers, grills and registers, ducts–supply ducts–outlets–return outlets.

UNIT: IV Types of Air Conditioning Systems and Load Calculations **10 hours**

Air Conditioning Systems: Summer A/C, Winter A/C, Year-round A/C, Central A/C & Unitary A/Csystems - Principle of working, Energy efficiency ratio, Concepts of RSHF, GSHF- Typical numerical problems.

Estimation of Cooling Load: Components of a cooling Load, Heat gains due to Ventilation, Infiltration, from the products, ducts, occupants-Typical numerical problems.

UNIT: V Cryogenics and Non-Conventional Refrigeration Systems **10 hours**

Cryogenics: Introduction, cascade refrigeration system, liquefaction of gases, linde system and claude system, liquefaction of hydrogen and helium, adiabatic demagnetization.

Non-conventional refrigeration systems-Thermoelectric, Vortex tube refrigeration systems-Principle of working, applications, limitations.

Textbook(s)

1. S.C. Arora &Domkudwar, A Corse in Refrigeration and Air Conditioning, Dhanapat Rai Publications, New Delhi,2016.
2. A Text book of Refrigeration and Air Conditioning by R.S Kurmi, Revised Edition,S C Chand Publications, 2006.

Reference Books

1. C.P. Arora, Refrigeration and Air Conditioning, Third Edition, Tata McGraw Hill,2017.
2. Manohar Prasad, Refrigeration and Air Conditioning, Second Edition, New Age Publishers,2013.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	2
CO2	3	3	2										3	2
CO3	3	3	3										3	2
CO4	3	3	3										3	2
CO5	3	2	3										3	2
Average	3	2.8	2.8										3	2
Level of correlation	3	3	3										3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II Semester (common to ME & CIVIL)

20AEE45	**Electrical Safety**	**L T P C**
	(*Open Elective - II)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Acquire the knowledge of electrical safety and maintenance.
2. Understand the concept of electrical hazard and the role of statutory bodies and their codes.
3. Design of electrical safety protection equipment and fire hazards for the personal protection
4. Develop human safety scheme and preventive maintenance through installation, operation and maintenance of insulators.
5. Enrich the safety through classification of hazardous zones and equipment for societal needs.

UNIT: I Concepts And Statutory Requirements 10 hours

Introduction – electrostatics –electromagnetism – stored energy- energy radiation and electromagnetic interference- working principles of electrical equipment – Indian electricity act and rules – statutory requirements from electrical inspectorate – international standards on electrical safety – first aid – cardio pulmonary resuscitation (CPR)

UNIT: II Electrical Hazards 10 hours

Primary and secondary hazards –shocks, burns, scalds, falls – human safety in the use of electricity energy leakage- clearances and insulation – classes of insulation-voltage classifications – excess energy – current surges – over current and short circuit current – heating effects of current – electromagnetic forces – corona effect – static electricity – definition – sources – hazardous conditions –control – electrical causes of fire and explosion – ionization –spark and arc- ignition energy – control –national electrical safety code ANSI C2, class ii, division 1 & 2.lighting –hazards – lighting arrestor –installation earthing – specification –earth resistance – earth pit maintenance.

UNIT: III Protection Systems 10 hours

Fuse – circuit breakers and overload relays – protection against over voltage and under voltage – safe limits of amperage – voltage – safe distance from lines capacity and protection of conductor – joints and connections – means of cutting of power –overload and short circuit protection – no load protection –earth fault protection- earthing standards. FRLS insulation and continuity test system grounding equipment grounding – earth leakage circuit breaker (ELCB) – cable wires – maintenance of ground-ground fault circuit interrupter-use of low voltage-electrical guards-personal protective equipment-safety in handling hand held electrical appliances and tools.

UNIT: IV Selection, Installation, Operation and Maintenance 10 hours

Role of environment in selection-safety aspects in application-(protection and interlock-self diagnostic features and fail safe concepts-Surge withstand capability test requirements-lock out and work permit system-discharge rod and earthing devices- safety in the use of portable tools-cabling and cable joints-preventive maintenance.

UNIT: V Hazardous Zones 10 hours

Classification of hazardous zones-intrinsically safe and explosion proof electrical apparatus-increase safe equipment-their selection for different zones-temperature classification-grouping of gases-use of batteries and isolators-equipment certifying agencies.

Textbooks

1. Terrell Croft, Frederic P.Hartwell, American Electricians Handbook, MC Graw Hill, 16th Edition, 2011.

Reference Books

1. Electrical safety requirement for employee work places (NFPA 70E)
2. National electrical code NEC, edition 2002

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	-	-	1	1							
CO2	3	2	-	2	-	1	1							
CO3	3	2	3	2	2	2	3							
CO4	3	2	2	2	3	3	3							
CO5	3	2	1	1	-	2	2							
Average	3	2.2	1.75	1.75	2.5	1.8	2							
Level of correlation	3	2	2	2	3	2	2							

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech II Semester CSE

III B.Tech II Semester ME(Open Elective-II)

20ACS34	**Machine Learning**	**L T P C**
	(*Open Elective - II)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Understand the concept of Machine Learning and its classification.
2. Appreciate the importance of Linear classification and SVM.
3. Apply artificial neutral networks and Bayesian Principle.
4. Apply Bayesian learning using bayes theorem, naive bayes classifier.
5. Develop an appreciation of clustering and Reinforcement Learning.

UNIT: I **10 hours**

Introduction to machine learning- Supervised Learning- Unsupervised Learning - Reinforcement Learning - Probability Basics - Linear Algebra.

Statistical Decision Theory - Regression - Statistical Decision Theory – Classification- Bias-Variance- Linear Regression - Multivariate Regression-Dimensionality Reduction- Subset Selection - Shrinkage Methods - Principal Components Regression - Partial Least Squares

UNIT: II **10 hours**

Linear Classification - Logistic Regression- Linear Discriminant Analysis – Optimization- Perceptron Learning - SVM - Formulation - SVM - Interpretation & Analysis - SVMs for Linearly Non-Separable Data - SVM Kernels - SVM - Hinge Loss Formulation

UNIT: III **10 hours**

Artificial Neural Network- Early Models - Backpropogation I - Initialization, Training & Validation- Maximum Likelihood Estimate - Priors & MAP Estimate - Bayesian Parameter Estimation- Regression Trees- Stopping Criteria & Pruning- Loss Functions for Classification - Categorical Attributes - Multiway Splits - Missing Values, Imputation & Surrogate Splits - Instability, Smoothness & Repeated Subtrees.

UNIT: IV **10 hours**

Evaluation Measures - Bootstrapping & Cross Validation - Class Evaluation Measures- The ROC Curve - Minimum Description Length & Exploratory Analysis- Introduction to Hypothesis Testing - Basic Concepts - Sampling Distributions & the Z Test - Student\'s t-test - The Two Sample & Paired Sample t-tests - Confidence Intervals- Bagging, Committee Machines & Stacking – Boosting- Gradient Boosting - Random Forest-- Naive Bayes - Bayesian Networks - Undirected Graphical Models - Introduction --Undirected Graphical Models - Potential Functions - Hidden Markov Models - Variable Elimination.

UNIT: V **10hours**

Belief Propagation- Partitional Clustering- Hierarchical Clustering - Threshold Graphs - The BIRCH Algorithm - The CURE Algorithm- Density Based Clustering- Gaussian Mixture Models - Expectation Maximization- Expectation Maximization Continued- Spectral Clustering- Learning Theory- Frequent Itemset Mining - The Apriori Property- Introduction to Reinforcement Learning- RL Framework and TD Learning - Solution Methods & Applications - Multi-class Classification.

Textbooks

1. Introduction to Machine Learning by Prof.Balaraman Ravindran,Computer Science and Engineering,IIT Madras

   https://drive.google.com/file/d/1pJAMtgwNyfhVnP9nrQv_yVcrm6cBNLJH/view

2 Introduction to Machine Learning Edition 2, by Ethem Alpaydin

3. Marco Gori , Machine Learning: A Constraint-Based Approach, Morgan Kaufmann. 2017

Reference Books

1. Introduction to Machine Learning,Third Edition, by Kubát & Miroslav,2nd edition.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2											
CO2	3	3	3											
CO3	3	2		2										
CO4	3	3	2	1										
CO5	3	3	3	3								1		
Average	3	2.6	2.5	2								1		
Level of correlation	3	3	3	2								1		

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II Semester

20AMB09	**Intellectual property Rights**	**L**	**T**	**P**	**C**
	(*Open Elective - II)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Outline different types of intellectual properties.
2. Distinguish the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
3. Formulate designs, patent and copyright for their innovative research works.
4. Apply intellectual property law principles of Trademarks to real problems.
5. Examine ethical and professional issues which arise in the intellectual property law context.

UNIT: I Understanding and Overview Of IPR 8 hours

Introduction- meaning- nature- forms of intellectual property- types of intellectual property-industry property-International conventions.

UNIT: II Copyright ACT, 1957 11 hours

Meaning –Nature and object of copyright-origin and development of copyright law in India-salient features of copyright act,1957-Definitons- originality material-rights of reproduction.

UNIT: III Trademarks ACT, 1999 8 hours

Salient features of Trademarks Act, 1999-Meaning- objectives and functions of trademark-Definition of Trademark- trademark protection- -acquisition of Trademark rights-protectable matter-trademark registration process.

UNIT: IV Patent ACT, 1970 9 hours

Meaning –definition of patent-history and concept of patent law-salient features of the patent act-Definition-kinds of patents and advantages-rights and obligations of patentee- Process of obtaining a patent.

UNIT: V Designs ACT, 2000 9 hours

Meaning –definition- Salient features of Designs-Registration of Designs-Rights granted to design holders -Infringement of Design.

Textbooks

1. Narayanan, P.(Revised 2017, Reprint 2018).Patent Law. Eastern Law House.
2 Acharya, N.K. (2021). Intellectual Property Rights: Scandinavian Languages Edition.
3 Chowdhary, R., S.K. & Other. Law of Trademark, Copyrights, Patents and Designs.
4 Reddy, G.B., Intellectual Property Rights and the Law, Gogia Law Agency.
5 Holyoak, J. &Torremans, P. Intellectual Property Law.

Reference Books

1. Bouchoux, E.B. Intellectual Property Rights, Cengage Learning.
2. Ganguli, P. Intellectual Property Rights– Unleash my Knowledge Economy. Tata McGraw Hill Publishing Company Ltd.
3. Wadhera, B.L. Intellectual Property Law, Universal Publishers.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO3	-	-	3	3	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	-	-	-	-
Average	-	-	3	3	3	-	3	3	-	-	-	-	-	-
Level of correlation	-	-	3	3	3	-	3	3	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech - II - Semester

20AME38	**Computer Aided Manufacturing Lab**	**L**	**T**	**P**	**C**
		0	0	3	1.5

Course Outcomes:

After completion of the course, the students will be able to

1. Design the different types of geometry models as a team to take up projects.
2. Apply the concepts in NC technology for milling and turning operations to solve complex industrial problems. Use CAE and CAM advanced software to serve mankind .
3. Construct the simple robotic components to promote research.

List of Experiments

To generate CNC manual programming for Turning operations-

1 Simulation of CNC Lathe Manual Part Programs.

2 Simulation of CNC Milling Manual Part Programs.

3 Perform the operations like Facing cycle, Step Turning cycle on CNC Lathe.

4 Perform the Taper turning cycle operation on CNC Lathe.

5 Perform the operations Threading cycle, Drilling cycle using CNC Lathe.

6 Perform the Grooving cycle, Linear operation CNC Milling.

7 Perform the circular interpolation operation CNC Milling.

To generate CNC manual programming for Vertical milling operations

8. Perform the Engraving of letters on Vertical milling
9. Perform the Mirroring operation on Vertical milling
10. Perform the Rotation operation using Vertical milling

To operate the pick and place robot using program

11. Develop Program for Single Pick and Place.
12. Develop Program for Cyclic Pick and Place

NOTE: Minimum of 10 Exercises need to be performed.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3			3				3				3	3
CO2	3	3			3				3				3	3
CO3	3	3			3				3				3	3
Average	3	3			3				3				3	3
Level of correlation	3	3			3				3				3	3

3-High Mapping **2- Medium Mapping** **1-Low M**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech - II - Semester

20AME39 **Simulation and Analysis Lab**

L	T	P	C
0	0	3	1.5

Course Outcomes:

After completion of the course, the students will be able to

1. Develop 3D solid model parts of mechanical systems and assemble the parts using CAD software.
2. Analyze the simulation models and structural problems in mechanical engineering to calculate stress and strains destitutions using FEM software.
3. Analyze the simulation models and thermal problems in mechanical engineering to calculate temperature distribution using FEM and CFD software.
4. Analyze and simulate mechanical engineering systems using simulation software.

Structural Analysis

1 Simulate the stress concentration phenomena on a flat plate with central hole under the application of tensile load.

2 Determination of deflection and stresses in 2D trusses and beams.

3 Determination of deflections component and principal and Von-Mises stresses in simple 3D plane and axisymmetric components.

Thermal Analysis

4 2D problem with conduction and convection boundary conditions.

5 Conductive heat transfer Analysis of plane and axisymmetric components.

6 Convective heat transfer Analysis of 2D components.

7 Harmonic, transient and spectrum analysis of simple systems.

Computational Fluid Dynamics Analysis

8. Simple fluid flow and heat transfer problems.
9. Modeling Periodic flow and heat transfer.
10. Modeling external compressible flows.
11. Modeling transient compressible flows.
12. Modeling radiation and natural convection.

NOTE: Minimum of 10 Exercises need to be performed.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3		3				3				3	3
CO2	3	2	3		3				3				3	3
CO3	3	2	3		3				3				3	3
CO4	3	2	3		3				3				3	3
Average	3	2	3		3				3				3	3
Level of correlation	3	2	3		3				3				3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech - II - Semester

20AME40 **Dynamics and Control System Lab**

L	T	P	C
0	0	3	1.5

Course Outcomes:

After completion of the course, the students will be able to

1. Apply and analysis of various types of governors and its performance characteristics.
2. Analysis the Motorized Gyroscope and its effects using in automobiles, aeroplanes and naval ships.
3. Analysis the radius of gyration and moment of inertia of various engineering components.
4. Apply and analysis with measuring systems to solve industry problems.

List of Experiments

1 To prepare performance characteristic Curves on watt Governors.

2 To prepare performance characteristic Curves on Porter Governors.

3 To prepare performance characteristic Curves on Proell Governors.

4 To determine gyroscopic couple acting on a rotating disc by Motorized Gyroscope.

5 To determine the radius of gyration of connecting rod by compound pendulum method.

6 Determine the moment of inertia of Disc & Ring by tri-flair suspension method.

7 Calibration of capacitive transducer for angular displacement.

8. Study and calibration of Force Cell for force measurement.

9. Study and calibration of a rotameter for flow measurement.

10. Calibration of thermocouple for temperature measurement.

11. Study and calibration of photo and magnetic speed pickups for the measurement of speed.

12. Study of LVDT for displacement measurement.

NOTE: Minimum of 10 Exercises need to be performed.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2						3				3	3
CO2	3	3	2						3				3	3
CO3	3	3							3				3	3
CO4	3	3							3				3	3
Average	3	3	2						3				3	3
Level of correlation	3	3	2						3				3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech I Semester (EEE, CSE, IT, CSE (DS) & CSE (AI & ML))

III B. Tech II Semester (CE, ME, ECE, CAI, CSC & CSO)

		L	T	P	C
20AHS16	**Advanced English Communication Skills**	**1**	0	**2**	**2**

Course Outcomes:

After completion of the course, the students will be able to

1. Understand language fluency through conversational practices and demonstrate appropriate body language during communication.
2. Apply synonyms, antonyms, one word substitutes, prefixes and suffixes to develop vocabulary to comprehend oral and written communication.
3. Analyze reading and writing techniques in preparing letters, resumes and technical reports by examining and applying guessing meaning, scanning, skimming and interfering meaning.
4. Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying skills in oral presentations, Interviews and Group Discussions.

UNIT: I **INTER-PERSONAL COMMUNICATION AND BUILDING VOCABULARY** **9 hours**

Starting a conversation, Responding appropriately and relevantly, Using appropriate Body language, Role play in Different situations, Synonyms and antonyms, One-word substitutes, Prefixes and suffixes, Idioms & Phrases and Collocations.

UNIT: II **READING COMPREHENSION** **9 hours**

General vs. Local Comprehension, Reading for Facts, guessing meanings from Context, Skimming, Scanning and inferring meaning.

UNIT: III **WRITING SKILLS** **9 hours**

Structures and Presentation of different types of writing – Letter writing, resume writing, e-correspondence and Technical report writing.

UNIT: IV **PRESENTATION SKILLS** **9 hours**

Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/e-mails/Assignments, etc.

UNIT: V GROUP DISCUSSION AND INTERVIEW SKILLS 9 hours

Dynamics of Group discussion, Intervention, Summarizing, Modulation of voice, Body Language, Relevance, Fluency and organization of ideas and rubrics of evaluation, Concept and Process of interviews, Pre-interview planning, Opening strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews.

Reference Books

1 Kumar Sanjay, Pushpa Lata. English for Effective Communication, Oxford University Press, 2015.

2. Konar Nira, English Language Laboratories – A Comprehensive Manual, PHI Learning Pvt. Ltd., 2011.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	2	-	-	-	3	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	3	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	3	-	-	-	-
CO4	2	-	-	-	-	-	-	-	3	3	-	-	-	-
Average	2.25	2.5	-	-	-	2	-	-	3	3	-	-	-	-
Level of correlation	2	3	-	-	-	2	-	-	3	3	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II – Semester (Common to all Branches)

20AHS23	**Essence of Indian Traditional Knowledge**	**L**	**T**	**P**	**C**
		2	0	0	0

Course Outcomes:

After completion of the course, the students will be able to

1. Identify various aspects of Traditional knowledge and its importance.
2. Explain briefly to understand the needs and importance of protecting traditional knowledge.
3. Analyze the various systems, concepts and strategies of traditional knowledge.
4. Apply the concepts of traditional knowledge in different sectors.

UNIT: I INTRODUCTION TO TRADITIONAL KNOWLEDGE 5 hours

Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge Vs western knowledge.

UNIT: II PROTECTION OF TRADITIONAL KNOWLEDGE 5 hours

The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT: III LEGAL FRAMEWORK AND TRADITIONAL KNOWLEDGE 6 hours

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016.

UNIT: IV TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY 6 hours

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge.

UNIT: V TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS 6 hours

Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Text Book(s)

1. Traditional Knowledge System in India, by Amit Jha, 2009.

Reference Books

1 Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.

2 Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino

Web Links:

1.https://www.youtube.com/watch?v=LZP1StpYEPM

2. http://nptel.ac.in/courses/121106003/

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	3	3	-	-	-	-	-	-	-
CO2	2	-	-	-	-	3	3	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	3	-	-	-	-	-	-	-
CO4	3	-	-	-	-	3	3	-	-	-	-	-	-	-
Average	2.67	-	-	-	-	3	3	-	-	-	-	-	-	-
Level of correlation	3	-	-	-	-	3	3	-	-	-	-	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester (Common to all Branches)

20AME41	**Flexible Manufacturing Systems**	**L**	**T**	**P**	**C**
	(*Professional Elective – III)	**3**	0	0	**3**

Course Outcomes:

After completion of the course, the students will be able to

1. Classify and select FMS systems by integrating its components in today's production environments.
2. Interpret types of material handling equipment and material handling system used in FMS environments.
3. Choose of appropriate cutting tool in manufacturing system contributing towards the quality of the product.
4. Design and analyze FMS using simulation and analytical techniques.
5. Apply concept of group technology in process planning for a manufacturing system.

UNIT: I Flexible Manufacturing Systems 9 Hours

Introduction, components of FMS, Types of FMS systems, Flexibility in FMS, building blocks of FMS, Machining system of FMS-Horizontal machining centers, functions of computer control system, human resources, flexible transfer lines, flexible machining systems, applications of FMS.

UNIT: II Material Handling Equipment 9 Hours

Types of material handling equipment, selection of material handling quipment, principles of material handling equipment. Conveyor Systems: Roller conveyors, stake-wheel conveyors, belt conveyors, chain conveyors, salt conveyors, overhead trolley conveyors, in-floor towline conveyors, cart-on-track conveyors. Automated storage and retrieval systems: types, automated material handling.

UNIT: III Tool Management Systems: 9 Hours

Tool coding systems, tool supply systems, work and tool probing, Tool monitoring systems, tool management systems. Work piece handling system: work piece setup, work piece store, work piece transport, FMS control and FMS layout configurations.

UNIT: IV Flexible Manufacturing Cell 10 Hours

Operational elements of a typical manufacturing cell-FMC software, types of data associated with the FMC, job scheduling, tool requirements, setting-up work piece carrier, palletizing, material flow control, machine tool program, tool flow control, cell magazine management. FMS Modeling and analysis: Mathematical programming, Queuing network, Markov model, perturbation analysis, FMS simulation, FMS benefits, FMS planning and implementation issues, FMS operational issues.

UNIT - V Automation 8 Hours

Automation: Anatomy and configuration of robot, characteristics of robots, grippers, application of robots in manufacturing, robot programming languages. Computer integrated manufacturing (CIM): Elements of CIM, Virtual Reality (VR), Augmented Reality (AR), Artificial Intelligence (AI) and expert systems in CIM.

Textbooks:

1. K. Lalit Narayan, K. Mallikarjuna Rao, M.M.M. Sarcar, "Computer Aided Design and Manufacturing", Prentice Hall of India, 2008.
2. P. Radhakrishnan, S. Subramaniam and V. raju, "CAD/CAM/CIM", New Age Publications, 2009.

Reference Books:

1. Groover, M.P "Automation, Production Systems and Computer Integrated Manufacturing", Prentice Hall, 2007.
2. Mikell P. Groover and Emory W. Zimmers Jr, "Computer-Aided Design and Manufacturing", Pearson Education, 2003.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3			2							3	3
CO3	3	3	3			3							3	3
CO4	3	3	3										3	3
CO5	3	3	3				2						3	3
Average	3	3	3			2.5	2						3	3
Level of correlation	3	3	3			3	2						3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME42	**Heating Ventilation and Air Conditioning**	**L**	**T**	**P**	**C**
	(*Professional Elective – III)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Apply the fundamentals of heating, ventilation and air conditioning systems in solving the Relationship Between Heat and Work, Heat Transfer, Specific, Sensible, and Latent Heat, Heat-Conveying Mediums: Air, Steam, Water and Electricity.
2. Apply the working principles of different air heating systems and their applicability in air conditioning systems.
3. Apply the working principles of different ventilation systems in the design of various building applications.
4. Apply the different psychrometric processes in solving the problems related to air conditioning systems.
5. Solve the numerical related to cooling and heating load calculations in air conditioning systems.

UNIT: I Introduction, Heating Fundamentals 10 Hours

Introduction: Heating and Ventilating Systems, Air Conditioning, Selecting a Suitable Heating, Ventilating, or Air Conditioning System, Career Opportunities, Professional Organizations.

Heating Fundamentals: British Thermal Unit, Relationship Between Heat and Work, Heat Transfer, Specific, Sensible, and Latent Heat, Heat-Conveying Mediums: Air, Steam, Water, Electricity.

UNIT: II Air Heating Systems 10 Hours

Air Heating Systems: Classification - gravity warm heating system, forced warm air heating system balancing a warm air heating system, warm air furnaces, air cleaners, humidifiers & De-humidifiers, advantages & Disadvantages of warm air heating system. Common problems and remedies of warm air heating system.

UNIT: III Ventilation 10 Hours

Ventilation: Introduction, domestic ventilation, indoor air quality, ventilation of commercial buildings, ventilation systems: extract ventilation, supply ventilation, and balanced ventilation, fans: axial flow fans and centrifugal fans and heat recovery: Plate heat exchangers, thermal wheels and run around coils.

UNIT: IV Psychrometry of Air-Air Conditioning Processes 10 Hours

Psychrometry of Air-Air Conditioning Processes: Mixing process, basic processes in conditioning of air, psychrometric processes in air conditioning equipment, simple air conditioning system and state and mass rate of supply air, summer air conditioning-apparatus dew point, winter air conditioning, related numericals.

UNIT: V Load Calculations and Applied Psychrometrics 10 Hours

Load Calculations and Applied Psychrometrics: Preliminary considerations, internal heat gains,system heat gains, break-up of ventilation load and effective sensible heat factor, cooling load estimate, heating load estimate, psychrometric calculations for cooling, selection of air conditioning apparatus for cooling and dehumidification, evaporative cooling, building requirements and energy conservation in air-conditioned buildings, related numericals.

Text Book(s)

1. HVAC Fundamentals Volume-l / James E. Brumbou /Audel/ 4th Edition.
2 Richard Nicholls, Heating Ventilation and Air Conditioning, Third edition, Academic Year 2001-2002.
3 C.P. Arora, Refrigeration and Air Conditioning, 3rd edition

Reference Books

1 Fundamentals of HVAC Systems / Robert MCdowall / Academic Press / 2007
2 Design of Industrial Ventilation Systems / John L Alden / Industrial Press / 5th Edition.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2										3	2
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
CO5	3	3	3										3	3
Average	3	2.8	2.8										3	2.8
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech - I - Semester

20AME43	**Casting and Welding Technology**	**L**	**T**	**P**	**C**
	(*Professional Elective – III)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Design patterns, dies, gating systems and riser systems in casting metallurgy considering standards.
2. Demonstrate knowledge on modern molding, core making and special casting process.
3. Design weld joints in welding metallurgy considering standards.
4. Demonstrate knowledge on special welding process.
5. Analyze casting and welding process involving advanced processes with environmental considerations.

UNIT: I Casting Metallurgy and Design 10 hours

Casting metallurgy and design-Heat transfer between metal and mould-Solidification of pure metals and alloys- Shrinkage in cast metals-Feeding characteristics of Alloys; Progressive and directional solidification-Elements and types of gating systems; Pressurized and nonpressurized gating; design considerations of gating system; applications. Risers: types and Functions of risers; Computer Aided design for gating and riser systems.

UNIT: II Special Casting Processes 10 hours

Special Casting Processes: Investment casting processes; Continuous casting processes; Die casting-low pressure / Gravity, pressure and squeeze; Centrifugal Casting: Calculations of various parameters in centrifugal casting, die temperature, Rotational speeds, advantages, limitations and applications; Defects in various special casting processes.

UNIT: III Welding Metallurgy and Design 10 hours

Welding metallurgy and design-Heat affected zone and its characteristics- Weldability of steels, Stainless steel, Aluminium and Titanium alloys-Hydrogen Embrittlement-Lamellar tearing - Residual Stress-Heat transfer and solidification-Analysis of stresses in welded structures - pre and post welding heat treatments-Weld joint design-Welding defects-testing of weldment.

UNIT: IV Special Welding Processes 10 hours

Special welding processes-Friction Welding-Friction stir welding-Explosive Welding-Diffusion Bonding-High frequency Induction Welding-Ultrasonic Welding-Electron beam welding-Laser beam welding.

UNIT: V Recent Advances in Casting and Welding 10 hours

Recent advances in casting and welding-Layout of mechanized foundry-sand reclamation Material handling in foundry-Pollution control in Foundry-Recent trends in casting-Computer Aided design of

Casting. Automation in welding-Welding Robots-Overview of automation of welding in aerospace, nuclear, surface transport vehicles and underwater welding. Introduction to codes and standards, Welding procedure specification, Welding performance qualification.

Text Book(s)

1. Ravi B, "Metal Casting: Computer Aided Design and Analysis" Prentice Hall ,2005.
2 R S Parmer, "Welding Engineering Technology", Khanna publishers, 2ndEdition, 2008.

Reference Books

1 John Campbell, "Casting Practice" Elsevier Science Publishing C0.,2004.
2 Richard L Little, "Welding and Welding Technology" Tata McGraw Hill, 2004.
3 ASM Hand Book "Casting", ASM International 1998

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3			3							3	3
CO2	3												3	
CO3	3	3	3			3							3	3
CO4	3												3	
CO5	3	3	3			3	3						3	3
Average	3	3	3			3	3						3	3
Level of correlation	3	3	3			3	3						3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME44	**Advanced Manufacturing Processes**	**L T P C**
	(*Professional Elective – III)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Describe the classification of advanced manufacturing processes and their applications in industries.
2. Apply safety and economic considerations in choosing suitable advanced metal casting, welding, machining and other manufacturing processes..
3. Apply quality and eco friendly constraints in selection of appropriate advanced metal casting, welding, machining and other manufacturing processes for producing industrial components

UNIT: I **9 Hours**

Introduction: Manufacturing and Manufacturing Systems - Manufacturing Trends and Challenges- Manufacturing Aspects, Selection and Classification -Description and Taxonomy of the Mfg. Processes.

UNIT: II **9 Hours**

Advanced Metal Casting Processes: Metal Casting basics, Gating and Risering design - Evaporative Pattern Casting Process (EPC) - Continuous, Permanent mold, Centrifugal and Pressure Die Casting - Hybrid EPC Processes and Vacuum EPC Process -Set-up of VEPC and Investment Casting Processes -Ceramic Shell Investment Casting Process - Shell Molding Process.

UNIT: III **9 Hours**

Advanced Machining Processes: Abrasive Flow Machining - Mechanism of Material Removal in AFM and Variant processes in AFM - Abrasive Jet Machining (AJM) - Water Jet and Abrasive Water Jet Machining - Ultrasonic Machining Process (USM) - Mechanism, Processes Variants and applications of USM - Micro USM and advances in USM.

UNIT: IV **10 Hours**

lectric Discharge Machining (EDM) Process - Die-Sinker EDM and Wire Cut Electric Discharge Machining (WEDM) -Variant Processes in EDM - Electro Chemical Discharge Machining (ECDM) - Laser Beam Machining (LBM) - Equipment and Process Parameters in LBM- Electrochemical Machining (ECM) - ECM Kinematics and Tool Design - The Subsystems in ECM, advantages and applications - Variant Processes in ECM: ECG, ECH, ECDe and STEM - Electron Beam, Plasma Beam and Ion Beam Machining.

UNIT: V **12 Hours**

Advanced Welding Processes: Submerged Arc Welding (SAW)- Resistance Welding Process -Solid State Welding processes - Friction Welding process - Electron Beam and Plasma Welding Processes -Laser Beam welding and Diffusion welding process.

Advanced Processes

High Energy Rate Forming Processes - Rapid Prototyping Technology (RPT) - Rapid Manufacturing, applications and advancements - Microwave Processing of Materials - Applications and new trends in Microwave Material Processing.

Text Book(s)

1. "Materials and Processes in Manufacturing" (8th Edition), E. P. DeGarmo, J. T Black, R. A. Kohser, Prentice Hall of India, New Delhi (ISBN 0-02-978760).
2 V. K. Jain, “Advanced Machining Processes”, Allied Publishers Pvt. Ltd., New Delhi, 2002.
3. "Manufacturing Science" A. Ghosh, and A. K. Mallik, Affiliated East-West Press Pvt. Ltd. New Delhi.

Reference Books

1 Gary F. Benedict, “Non-traditional Manufacturing Processes”, Marcel Dekker, 1987.
2 "Nontraditional Manufacturing Processes", G.F. Benedict, Marcel Dekker, Inc. New York (ISBN 0-8247-7352-7).

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		2								3	2
CO2	3				2								3	
CO3	3	3	3		2								3	2
Average	3	3	3		2								3	2
Level of correlation	3	3	3		2								3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech - I - Semester

20AME45	**Applied Industrial Hydraulics**	**L T P C**
	(*Professional Elective - III)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Understand and apply the hydraulic accessories for industrial applications.
2. Analysis the hydraulic circuits and apply for design of power and pumps.
3. Design the circuits for motors to control the hydraulic systems.
4. Analysis the trouble shoots and apply the remedial measures in hydraulic systems.

UNIT: I **10 hours**

Introduction to Industrial Hydraulics Power System elements and standard symbolic representation (CETOP symbols)

UNIT: II **10 hours**

Various control valves used in Hydraulics System, Hydraulics accessories, advantages of Hydro-Pneumatics and its applications, different types of Hydraulics pumps and their applications, Hydraulics system and their classification.

UNIT: III **10 hours**

Hydraulics circuits Hydraulic motors, Hydraulic fluids and effective contamination control.

UNIT: IV **10 hours**

Electro hydraulics system, Servo valves and proportional valves, Design of Cartridge Valves.

UNIT: V **10 hours**

Hydraulics systems with PID controls Trouble shooting and remedial measures in Hydraulic system.

Text Book(s)

1. Hydraulic Handbook by Trade and technical press LTD.
2 Hydraulic Circuits by Fawcelt, Trade and technical press.
3 Oil Hydraulic Systems BY Majumdar. S.R. Tata MC Graw-Hill

Reference Books

1 Fluid Mechanics and Hydraulics by Jagdish Lal, Metropolitan Book company
2 Hydraulic Systems Handbook, Utility publications limited.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											2	
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3											3	2
Average	3	3	3										2.75	2.67
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME46	**Computational Fluid Dynamics**	**L T P C**
	(*Professional Elective – IV)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Use the basic governing equations applied for fluid flow and heat transfer problems.
2. Apply the differential equations to fluid flow and heat transfer problems.
3. Apply the concept of discretization to solve the CFD problems.
4. Solve simple problems in heat conduction with steady and transient condition with different solving schemes.
5. Apply the different turbulence modelling in fluid flow and heat transfer problems.

UNIT: I Introduction 10 Hours

Computational Fluid Dynamics as a Research and Design Tool, Applications of Computational Fluid Dynamics Governing Equations of Fluid Dynamics: Introduction, Control Volume, Substantial Derivative, Divergence of Velocity, Continuity Equation, Momentum Equation and Energy Equation

UNIT: II Mathematical Behavior of Partial Differential Equations 10 Hours

Introduction, Classification of Quasi-Linear Partial Differential Equations, Eigen Value Method, Hyperbolic Equations, Parabolic Equations, Elliptic Equations.

UNIT: III Basics aspects of discretization 10 Hours

Introduction, Introduction of Finite Differences, Difference Equations, Explicit and Implicit Approaches, Errors and Stability Analysis, Grid Generation Incompressible Fluid Flow: Introduction, Implicit Crank-Nicholson Technique, Pressure Correction Method, SIMPLE and SIMPLER algorithms, Computation of Boundary Layer Flow.

UNIT: IV Heat Transfer 10 Hours

Finite Difference Applications in Heat conduction and Convention – Heat conduction, steady heat conduction, in a rectangular geometry, transient heat conduction, Steady one-dimensional convection and diffusion – Central difference, upwind, quick, schemes-

UNIT: V Turbulence Models 10 Hours

Introduction – Types of Turbulence modelling – Reynolds Time Averaging – Reynolds Time Averaged conservation equations – Boussinesq approach – One equation k - ε model.

Text Book(s)

1. John D. Anderson, Computational Fluid Dynamics - Basics with Applications, Second Edition, Tata McGraw Hill, 1995.

2 Suhas V. Patankar, Numerical Heat Transfer and Fluid Flow, Second Series, Butter worth Publishers, 1980

Reference Books

1 Frank Chorlton, Textbook of Fluid Dynamics, CBS Publishers, 2005.

2 T.K. Sengupta, Fundamentals of Computational Fluid Dynamics, University Press, 2012.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
CO5	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME47	**Power Plant Engineering**	**L T P C**
	(*Professional Elective – IV)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Analyze various resources of energy and their development in India and apply the Principles of economics for solving the energy demand and tariff.
2. Use various Layouts of Steam power plants and choose fuel handling, ash, dust and combustions methods.
3. Apply various types of Diesel power plants and Gas turbines in power generation sectors.
4. Use various principle of Hydrology and choose suitable Hydroelectric power station for power generation.
5. Apply various principles of Nuclear reactions and use in generation of Nuclear power and complying with environment safety

UNIT: I Introduction to the Source of Energy and Power Plant Econamics 10 Hours

Introduction to the sources of energy– Sources of Energy and Development of Power in India. Power Plant Economics: Introduction-Terms and Definitions-connected load, demand, maximum demand, demand factor, load factor, diversity factor, utilization factor, Plant capacity factor, Plant use factor, Load curve-its significance, and load duration curve, Problems on load curves, Location of power plant, Cost analysis-capital cost, operational costs, Factors affecting economics of generation and distribution of power, Tariff for electrical energy.

UNIT: II Steam Power Plant and Combustion Process 10 Hours

Steam power plant: Introduction, Classification of steam power plants, Layout of a Modern Steam Power Plant, Selection of site for steam power station - Fuel handling- introduction, lay out of fuel handling equipment, out-plant handling of coal, coal storage at plant site, in-plant handling of coal, and Ash handling systems.

Combustion process: Coal- Classification of coal- Properties of coal –Coal Burning methods, Stoker Firing-classification, overfeed stokers-travelling grate stokers, spreader stokers, Underfeed stokers-retort stokers, Pulverized fuel firing, pulverized fuel handling systems, Fluidized bed combustion, Cyclone furnace-design and construction, Dust collectors, Cooling ponds and cooling towers.

UNIT: III Internal Combustion Engine Plant and Gas Turbine Plant 10 Hours

Internal combustion engine plant: Diesel Power Plant: Introduction – IC Engines, types, construction– Plant layout with auxiliaries – Different systems of diesel power plant, Fuel injection system-types.

Gas turbine plant: Introduction – Classification - Construction – Layout with auxiliaries – Principles of working of closed and open cycle gas turbines. Advantages and disadvantages, Combined Cycle Power Plants.

UNIT: IV Hydrology and Hydroelectric Power Plants 10 Hours

Hydrology: Introduction, Hydrological cycle, Rainfall and its measurement – runoff and its measurement – Hydrographs – Classification of dams and spill ways.

Hydroelectric power plants: Introduction, Site selection, Classification – Typical layouts – plant operation, Pumped storage plants, General arrangement of storage type hydro- electric power plant and its operation.

UNIT: V Nuclear Power and Nuclear Reactors 10 Hours

Nuclear power: nuclear fuels –Release of energy by Nuclear reaction, Types of Nuclear reactions, Initiation of nuclear reactions, Nuclear fission, Fertile materials and breeding.

Nuclear reactors: Introduction –Components of nuclear reactor, Types of Reactors- Pressurized water reactor, boiling water reactor, Sodium-Graphite reactor, Fast Breeder Reactor, Homogeneous Reactor, Gas cooled Reactor, Selection of materials for reactor components, Shielding.

Environmental Considerations: Effluents from power plants and Impact on environment – pollutants and pollution standards – Methods of Pollution control.

Text Book(s)

1. R.K. Rajput, A Textbook of Power Plant Engineering, Fifth Edition, Laxmi Publication,2013.
2. Arora & S. Domkundwar, A Course in Power Plant Engineering, Revised Edition, Dhanpat Rai & Co, 2014.

Reference Books

1 P.C. Sharma, Power Plant Engineering, Revised Edition, S.K. Kataria Publishers, 2013.
2 P.K. Nag, Power Plant Engineering, Fourth Edition, Tata McGraw Hill,2002.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3										2	3
CO2	3	2											3	2
CO3	3	3	3										3	3
CO4	3	3	3										3	2
CO5	2	2	2										2	3
Average	2.6	2.6	2.75										2.6	2.6
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME48	**Geometric Modeling**	**L T P C**
	(*Professional Elective – IV)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Effectively choose graphic systems and analyze their functioning.
2. Analyze the aspects of 2D & 3D transformations and viewing.
3. Choose appropriate algorithms suitable for designing mechanical elements.
4. Effectively choose software for 3D solid modeling and Assembly.

UNIT: I Introduction and Output Primitives 10 Hours

Introduction, Application area of Computer graphics, overview of graphic system, video- display devices, raster- scan systems, random scan systems, graphics monitors and workstations and input devices.

Output primitives: Points and lines, line drawing algorithms, mid-point circle algorithm, Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood –fill algorithm.

UNIT: II 2D Geometrical Transformation and Viewing 10 Hours

2-D Geometrical transformations: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates.

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view –port- co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus –beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm.

UNIT: III 3D Object Representation and Geometrical Transformation 10 Hours

Object Representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B- spline curve, Bezier and B- spline surfaces, Basic illumination models, shading algorithms.

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

UNIT: IV Visible surface detection methods & Computer animation 10 Hours

Visible surface detection methods: Classification, back-face detection, depth- buffer, scan- line, depth sorting.

Computer animation: Design of animation sequence, general computer animation functions, raster animation. Computer animation language, key frame system, motion specification

UNIT: V Solid Modeling and Assembly 10 Hours

Solid Modeling: Geometry and topology, solid entities and representation, Boundary representation, Constructive solid geometry, Features.

Assembly Modeling: Introduction, assembly tree, assembly planning, mating conditions, assembly approaches, testing mating conditions, managing assemblies, inference of position and orientation, assembly analysis

Text Book(s)

1. Donald Hearn & M. Pauline Baker, Computer Graphics C version, Second Edition, Pearson / Printice Hall International Publishers, 2008.
2. David F Rogers, Mathematical Elements for computer graphics, Second Edition, Tata McGraw Hill, 1990.

Reference Books

1 M.C. Trivedi, Computer Graphics and Automation, Second Edition, Pearson Education, Jaico Publishers, 2000.

2 Zhigand xiang & Roy Plastock, Computer Graphics, 2nd Edition, Schaum's outlines, Tata McGraw Hill, 1986.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		2								3	3
CO2	3	3	3		2								3	3
CO3	3	3	3		2								3	3
CO4	3	3	3		2								3	3
Average	3	3	3		2								3	3
Level of correlation	3	3	3		2								3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME49	**Hydrogen and Fuel Cell**	**L T P C**
	(*Professional Elective – IV)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Apply the various methods of hydrogen production from steam reformers, water electrolysis and biomass gasification.
2. Execute the hydrogen storage technique and the application of hydrogen in various processes.
3. Demonstrate the working principle and thermodynamics aspects of fuel cell.
4. Apply the working principle of the fuel cell and its construction procedures in production of different types of fuel cell
5. Use the various Types of Fuel cells for different application and the economics considering environmental factors of the fuel cell.

UNIT: I Hydrogen and Production Techniques 10 Hours

Hydrogen – physical and chemical properties, salient characteristics. Production of hydrogen – steam reforming – water electrolysis – gasification and woody biomass conversion – biological hydrogen production – photo dissociation – direct thermal or catalytic splitting of water.

UNIT: II Hydrogen Storage and Applications 10 Hours

Hydrogen storage options – compressed gas – liquid hydrogen – Hydride – chemical Storage – comparisons. Hydrogen transmission systems. Applications of Hydrogen.

UNIT: III Fuel Cells 10 Hours

History – principle – working – thermodynamics and kinetics of fuel cell process – performance evaluation of fuel cell – comparison on battery Vs fuel cell

UNIT: IV Fuel Cell – Types 10 Hours

Types of fuel cells – AFC, PAFC, SOFC, MCFC, DMFC, PEMFC – relative merits and demerits

UNIT: V Application of Fuel Cell and Economics 10 Hours

Fuel cell usage for domestic power systems, large scale power generation, Automobile, Space. Economic and environmental analysis on usage of Hydrogen and Fuel cell. Future trends in fuel cells.

Text Book(s)

1. Viswanathan.B and Aulice Scibion (2008), Fuel Cells: Principles and applications, CRC Press
2. Ryan O'Hayre, Suk-Won Cha, Whitney Colella, Fritz B. Prinz (2016), Fuel Cell Fundamentals, John Wiley & Sons. Print ISBN:9781119113805

Reference Books

1 Bent Sorensen (2011) Hydrogen and Fuel cells, Academic Press

2 Noriko Hikosaka Behling (2012), Fuel cells, Elsevier Publishers

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3					3						3	
CO2	3	3					3						3	
CO3	3	3					3						3	
CO4	3	3					3						3	
CO5	2	3					3						3	
Average	2.8	3					3						3	
Level of correlation	3	3					3						3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME50	**Production Planning and Control**	**L**	**T**	**P**	**C**
	(*Professional Elective – IV)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Describe and determine the effect of product, process, inventory costs, product forecasting, and operations strategies
2. Apply and analyze forecasting models to develop business enterprise forecasts for products.
3. Develop and analyze production and inventory planning/control systems, and scheduling techniques by using engineering techniques for a complete production facility.
4. Perform and analyze methods of evaluating operations location alternatives.
5. Develop and analyze the capacity planning process and Master Production Schedule.

UNIT: I Introduction 9 Hours

Definition, Objectives of production Planning and Control, Functions of production planning and control, Types of production Systems, Organization of production planning and control department.

Forecasting: Definition, Uses of forecasting ,Factors affecting the forecasting ,Types of forecasting and their uses - Demand patterns, General principles of forecasting, Forecasting techniques , Quantitative techniques , Qualitative techniques , Measures of forecasting errors

UNIT: II Inventory Management 9 Hours

Functions of inventories, relevant inventory costs, ABC analysis, VED analysis, Basic EOQ model, Inventory control systems, Continuous preview systems and periodic preview systems MRP, ERP, JIT Systems.

UNIT: III Line Balancing 9 Hours

Definition methods of line balancing, RPW method, Largest candidate method Routing, Routing procedure, Factors effecting routing - Procedure for routing sheets.

Aggregate Planning: Definition, Aggregate planning strategies, Aggregate planning methods, Transportation model.

UNIT: IV Scheduling 9 Hours

Definition, Scheduling policies, Types of Scheduling methods, Differences with loading, Flow shop scheduling, job shop scheduling Line of balance (LOB), Objectives, Steps involved.

UNIT - V Dispatching **9 Hours**

Definition, Activities of dispatcher, Dispatching procedure, Various Forms used in dispatching.

Followup & Expediting Definition, Types of follow-up, Expediting, Definition, Expediting procedures, Applications of computers in planning and control.

Textbooks:

1. S. L. Narasimha (2010), Production planning and inventory control, 2nd edition, Prentice Hall of India Publishers, New Delhi, India.
2. Samuel Eilon (2011), Elements of Production Planning and Control, 2nd edition, Universal book corporation, Mumbai, India.

Reference Books:

1. Ravi Shankar (2010), Industrial Engineering and management, Galgotia Publishers, New Delhi, India.
2. Panner Selvanm(2012), Production Operation Management, 2nd edition, Prentice Hall of India Publishers, New Delhi, India.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	3
CO2	3	3				2							3	3
CO3	3	3				2							3	3
CO4	3	3											3	3
CO5	3	3											3	3
Average	3	3				2							3	3
Level of correlation	3	3				2							3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME51	**Supply Chain Management**	**L T P C**
	(*Professional Elective – V)	**3** 0 0 **3**

Course Outcomes:

After completion of the course, the students will be able to

1. Summarize the concepts of SCM, with inventory management, application of IT tools, logistic management, and emerging trends.
2. Illustrate the application of SCM tools 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.

UNIT: I Introduction to SCM 9 Hours

Supply Chain - Definition, Objectives; Global optimization, Importance of Supply Chain Decisions, Decision Phases in a Supply Chain and Importance of supply chain. SCM and objectives of SCM; Competitive and Supply Chain Strategies; Achieving Strategic fit, Obstacles to achieve strategic fit. Supply Chan Drivers - Inventory, Information, Transportation and Facilities.

UNIT: II Inventory Management in SCM 9 Hours

Role of Safety Inventory in the Supply Chain, Determining Appropriate Level of Safety Inventory, Impact of Supply Uncertainty on Safety Inventory, Impact of Aggregation on Safety Inventory, Impact of Replenishment Policies on Safety Inventory.

UNIT: III Value of information 9 Hours

Bullwhip effect, Information and supply chain technology, Supply chain integration- push, Pull and push-pull system, Demand driven strategies, Role of Information Technology in SCM -Impact of internet on SCM, DSS for SCM - Goals, Standardization and Infrastructure.

UNIT: IV Designing And Planning Transportation Networks 10Hours

The role of transportation in a Supply chain, Modes of transportation and their performance characteristics, Transportation infrastructure and policies, Design options for a transportation, network, Trade-offs in transportation design, tailored transportation.

UNIT: V International & Contemporary issues in SCM 10 Hours

Global issues and Outsourcing problems, aligning the Supply Chain with Business Strategy - SCOR Model, Third party logistics; Retailer-Supplier Partnership, Distributors integration, Supply Chain Management Metrics, Emerging trends in SCM, Role of E-Business in Supply Chains.

Text Book(s)

1. Sunil Chopra & Peter Meindl, Supply Chain Management strategy, Planning & Operation, 4th Edition, Pearson Education Asia.
2 Janat Shah, Supply Chain Management, Pearson, 1st edition 2009.

Reference Books

1 Thomas E Vollman and Clay Whybark D, Manufacturing Planning and Control for SupplyChain Management, Tata McGraw Hill, Fifth Edition, New Delhi, 2005.

2 Simchi - Levi Davi, Kaminsky Philip and Simchi-Levi Edith, Designing and Managing the Supply Chain, Tata McGraw Hill, New Delhi, 3rd edition 2007

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	
CO2	3	3	3										3	3
CO3	3	3											3	3
CO4	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME52	**Tribology**	**L**	**T**	**P**	**C**
	(*Professional Elective – V)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Design machine components related to industrial tribology.
2. Estimate the friction and wear in interacting surfaces
3. Apply the principles of lubrication in designing various types of bearings
4. Estimate the friction and power loss in a journal bearing
5. Test components and characterize tribological failures

UNIT: I **10 Hours**

Tribology in Design - Mechanical design of oil seals and gasket - Tribological design of oil seals and gasket, Tribology in Industry (Maintenance).

Laws of friction - Stick-slip phenomenon - Friction characteristics of metals and non-metals - Ploughing theory of friction - Measurement of friction.

Wear - Wear mechanisms – Interfacial wear and Chemical wear-Wear measurements - Ferrography and oil analysis.

UNIT: II **10 Hours**

Lubrication types, Regimes, Basic Modes of Lubrication, Properties of Lubricants, Lubricant Additives, Bearing Terminology – Sliding contact bearings – Rolling contact bearings, Comparison between Sliding and Rolling Contact Bearings.

UNIT: III **10 Hours**

Fluid film in simple shear – Mechanism of pressure development in a convergent film – pressure induced and velocity induced flows - Reynolds equation for fluid film lubrication – Slider bearing-Load carrying capacity – Journal bearing – Pressure development. Squeeze film lubrication.

UNIT: IV **10 Hours**

Long bearing and short bearing approximations - Load carrying capacity – Sommerfeld Number – Friction – Petroff's equation – Oil flow and Thermal equilibrium.

UNIT: V **10 Hours**

Interatomic Interactions, Atomic Force Microscope (AFM), Challenges of Tribological Testing at Small Scales. Common Geometries, Instrumentation and Methods used for Testing, Influences of Test Parameters –Tribology in metal cutting – Automotive Tribology.

Text Book(s)

1. Gwidon Stachowiak, Andrew W Bachelor, Engineering Tribology, Butterworth-Heinemann, 2013.

Reference Books

1. Majumdar.B.C, Introduction to Tribology of Bearings, Universal Books, 2010.
2. Bharat Bhushan, Introduction to Tribology, John Wiley & Sons, 2013.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3											3	2
CO3	3	3	3										3	3
CO4	3	3											3	2
CO5	3	3	3										3	3
Average	3	3	3										3	2.6
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME53	**Quality in Manufacturing**	**L T P C**
	(*Professional Elective – V)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Demonstrate knowledge on the concepts of standardization and bodies of standardization for improvement of quality.
2. Apply quality control codes, standards, and techniques in controlling the quality of a product/ process.
3. Select the appropriate quality control strategy for product and process control.
4. Apply the concepts of quality and continuous improvement as a passion and habit.
5. Use the concept of QMS, EMS and EnMS in industries.

UNIT: I Quality Concepts 10 Hours

Quality Concepts: Definition of quality, dimensions of quality, quality planning, quality costs. Cost estimation and principles, leadership, quality council, quality statements, strategic, Quality Guru’s, Criteria for Deming’s Prize.

UNIT: II Product Design and Analysis 9 Hours

Product Design and Analysis: Basic Design Concepts and TQM Principles, Failure Mode Effect Analysis, Fault Tree Analysis, Design for Robustness, Value Analysis.

UNIT: III Process Improvement and Modern Production Management Tools 9 Hours

Process Improvement and Modern Production Management Tools: Six Sigma Approach, Total Productive Maintenance, Just-In-Time, Lean Manufacturing, Paradigms, Quality Improvement Tools and Continuous Improvement. Q-7 Tools, New Q-7 Tools, Quality Function Deployment, Kaizen, 5S, Poka- Yoke, SMED.

UNIT: IV Statistical Process Control 9 Hours

Statistical Process Control Statistical Fundamentals - Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables X bar and R chart and attributes, nP, C, and u charts, Industrial Examples, Process capability, Concept of six sigma

UNIT: V Quality Management Systems 9 Hours

Need for ISO 9000 and Other Quality Systems - Elements, Implementation of Quality System, Documentation, Quality Auditing, ISO 9000:2015, ISO 9001:2015 and ISO 9004:2018, TS 16949, ISO 14000, ISO 50001 - Concept, Requirements and Benefits.

Textbook(s)

1. Amitava Mitra, Fundamentals of Quality Control and Improvement, Wiley, 3Rd edition,2013.
2. Montgomery D. C., ‘Introduction to Statistical Quality Control’, John Wiley - 2010

Reference Books

1. James R Evans, “Quality and Performance Excellence”, 8th Edition, Cengage Learning, 2019.
2. P. N. Muherjee, Total Quality Management, Prentice Hall of India, New Delhi, 2006

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	3
CO2	3	3											3	3
CO3	3	3											3	3
CO4	3	3					3						3	3
CO5	3	3					3						3	3
Average	3	3					3						3	3
Level of correlation	3	3					3						3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech I Semester (Common to CE, ME, EEE, CSE, IT, CSE(DS), CSE(AIML))

20AME54	**Optimization Techniques**	**L**	**T**	**P**	**C**
	(*Professional Elective – V)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Formulate unconstrained optimization techniques in the engineering application.
2. Formulate constrained optimization techniques for various application.
3. Implement neural network technique and swarm optimization to real world design problems.
4. Apply genetic algorithms and multi objective optimization to the complex engineering problems.
5. Evaluate solutions by various optimization approaches for structural and dynamic problem.

UNIT: I Unconstrained Optimization Techniques 10 Hours

Introduction to optimum design - General principles of optimization – Problem formulation & their classifications - Single variable and multivariable optimization, Techniques of unconstrained minimization – Golden section, Random, pattern and gradient search methods – Interpolation methods.

UNIT: II Constrained optimization techniques 10 Hours

Optimization with equality and inequality constraints - Direct methods – Indirect methods using penalty functions, Lagrange multipliers - Geometric programming.

UNIT: III Artificial Neural Networks and Swarm intelligence 10 Hours

Introduction – Activation functions, types of activation functions, neural network architectures, Single layer feed forward network, multilayer feed forward network, Neural netwok applications. Swarm intelligence - Various animal behaviors, Ant Colony optimization, Particle Swarm optimization.

UNIT: IV Advanced Optimization Techniques 10 Hours

Multistage optimization – dynamic programming; stochastic programming; Multi objective optimization, Genetic algorithms and Simulated Annealing technique.

UNIT: V Static and Dynamic Applications 10 Hours

Structural applications – Design of simple truss members – Design of simple axial, transverse loaded members for minimum cost, weight – Design of shafts and torsionally loaded members – Design of springs.

Dynamic Applications – Optimum design of single, two degree of freedom systems, vibration absorbers. Application in Mechanisms – Optimum design of simple linkage mechanisms.

Textbook(s)

1. Kalyanmoy Deb, “Optimization for Engineering Design: Algorithms and Examples”, PHI Learning Private Limited, 2nd Edition, 2012.
2. Rao Singiresu S., “Engineering Optimization – Theory and Practice”, New Age International Limited, New Delhi, 3rd Edition, 2013.
3. Rajasekaran S and VijayalakshmiPai, G.A, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2011

Reference Books

1. Goldberg, David .E, “Genetic Algorithms in Search, Optimization and Machine Learning”, Pearson, 2009.
2. Srinivasan G, “Operations Research Principles and Applications”, PHI, 2017.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3							2		3	3
CO2	3	3	3	3							2		3	3
CO3	3	3	3	3							2		3	3
CO4	3	3	3	3							2		3	3
CO5	3	3	3	3							2		3	3
Average	3	3	3	3							2		3	3
Level of correlation	3	3	3	3							2		3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME55	**Gear Design**	**L T P C**
	(*Professional Elective – V)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Describe the classification of gears and their manufacturing processes.
2. Design the spur gears, helical gears, bevel gears and worm gars using standard procedure and check the satisfactory condition for industrial applications.
3. Describe the gear trains and design gearboxes for automobiles using standard procedure.
4. Apply the optimization approach to select optimal parameters in design of gears/gear trains.

UNIT: I Introduction 10 Hours

Principles of gear tooth action, Generation of Cycloid and Involute gears, Involutometry , gear manufacturing processes and inspection, gear tooth failure modes, stresses, selection of right kind of gears.

UNIT: II Spur Gears and Helical Gears 10 Hours

Spur Gears: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of spur gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load, Design of gear shaft and bearings.

Helical Gears: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of helical gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load, Design of gear shaft and bearings.

UNIT: III Bevel Gears and Worm Gears 10 Hours

Bevel Gears: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of bevel gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load, Design of gear shaft and bearings.

Worm Gears: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of worm gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load, Heat dissipation considerations. Design of gear shaft and bearings.

UNIT: IV Gear trains **8 Hours**

Gear trains: Simple, compound and epicyclic gear trains, Ray diagrams, Design of a gear box of an automobile.

UNIT: V Optimal Gear design **9 Hours**

Optimal Gear design: Optimization of gear design parameters, Weight minimization, Constraints in gear train design-space, interference, strength, dynamic considerations, rigidity etc. Compact design of gear trains, multi objective optimization of gear trains.

Text Book(s)

1. Henry E.Merrit, Gear engineering ,Wheeler publishing,Allahabad,1992.
2 R.S. Khurmi and J. K. Gupta, Machine design, Hyderabad, 25th edition, S.Chand Publishers, 2014.
3 V.B. Bhandari, Machine Design, 3rd edition, Tata McGraw Hill, 2010.

Reference Books

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, 6th edition, Scitech Publishers, 2010.
3 Maleev and Hartman, Machine Design, C.B.S. Publishers, India.

Data Book

1 K. Mahadevan, K. Balaveera Reddy, Design Data Hand Book, Third Edition, CBS Publishers & Distributors
2 Machine Design Data Hand Book Vol 2 Lingaiah K, Suma Publishers.

Note: Design data book are permitted in all examinations

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2											3	2
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
Average	3	2.75	3										3	2.75
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME56	**Sustainable Manufacturing**	**L T P C**
	(*Open Elective – III)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Describe the basics and dimensions of sustainable manufacturing.
2. Choose and apply appropriate tool and technique of stainable manufacturing.
3. Select and apply the suitable approach in sustainability assessment of projects.
4. Analyze the sustainable characteristics in eco-friendly processes/products.
5. Describe and apply the product life cycle assessment in industries.

UNIT: I Introduction to Sustainable Manufacturing 9 Hours

Introduction to Sustainable Manufacturing; Drivers of Sustainable Manufacturing; Concept of Triple bottom line; Environmental, Economic and Social Dimensions of Sustainability; Relation between Lean and Sustainable manufacturing; Green manufacturing.

UNIT: II Tools and Techniques 9 Hours

Environmental Conscious, Quality Function Deployment, Design for Environment; Design for Disassembly, Design for recycling, Eco friendly Product design methods. Environmental Impact Assessment Methods and Standards.

UNIT: III Sustainability Assessment 9 Hours

Sustainability Assessment -Concept Models and Various Approaches, Product Sustainability and Risk/Benefit assessment; Corporate Social Responsibility.

UNIT: IV Sustainable characteristics 10 Hours

Sustainable characteristics of manufacturing processes - Energy efficiency analysis of manufacturing processes - Sustainability analysis and Scope of sustainable manufacturing canters.

UNIT: V Sustainable Product Design 10 Hours

Sustainable Product design; Principles of Life cycle assessment; Product Life Cycle Assessment. Introduction to Software packages related to Sustainable Manufacturing.

Text Book(s)

1. Mrityunjay Singh, T.Ohji and Rajiv Asthana, "Green and Sustainable Manufacturing of Advanced Materials" Elsevier (1st Ed.) 2015.
2. G. Seliger, Marwan, M.K. Khraisheh, I.S. Jawahir, D. Rodick, "Advances in Sustainable Manufacturing", IRP, Springer publishers, 2011

Reference Books

1. G. Atkinson, S. Dietz, E. Neumayer, "Handbook of Sustainable Manufacturing", Edward Elgar Publishing Limited, 2007.
2. P. Lawn, Sustainable Development Indicators in Ecological Economics, Edward Elgar Publishing Limited.
3. D. Rodick, Industrial Development for the 21st Century: Sustainable Development Perspectives, New York, 2007.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3						3						3	3
CO2	3	3	3			3	3						3	3
CO3	3	3				3	3						3	3
CO4	3	3				3	3						3	3
CO5	3	3					3						3	3
Average	3	3	3			3	3						3	3
Level of correlation	3	3	3			3	3						3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME57	**Industrial Automation and Control Systems**	**L T P C**
	(*Open Elective – III)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Demonstrate knowledge on Industrial automation components and systems used in automated manufacturing industries.
2. Design material handling systems for a manufacturing plant based on its working principle and capabilities.
3. Analyze transfer lines in automation involving Manufacturing Cells, GT, Cellular Manufacturing, FMS, and FMS.
4. Demonstrate the knowledge on control systems in manufacturing.
5. Develop mathematical models for manufacturing plants using AI.

UNIT: I Introduction to Automation 9 Hours

Automation in Production System, Principles and Strategies of Automation, Basic Elements of an Automated System, Advanced Automation Functions, Levels of Automations, introduction to automation productivity.

UNIT: II Material Handling Systems 9 Hours

Overview of Material Handling Systems, Rotary feeders, oscillating force feeder, vibratory feeder, elevator type and Centrifugal type feeders, Principles and Design Consideration, Material Transport Systems, Storage Systems.

UNIT: III Automation in Manufacturing 9 Hours

Components, Classification and Overview of Manufacturing Systems, Manufacturing Cells, GT and Cellular Manufacturing, FMS, FMS and its Planning and Implementation, Flow lines &Transfer Mechanisms, Fundamentals and Analysis of Transfer Lines, product design for automatic assembly.

UNIT: IV Control System in Manufacturing 10 Hours

Industrial Control Systems, Process Industries Verses Discrete - Manufacturing, Industries Continuous Verses Discrete Control, Computer Process and its Forms. Sensors Actuators and other Control System Components, Application of control system in manufacturing.

UNIT: V Artificial Intelligence in Manufacturing 10 Hours

Introduction/need for system Modeling, Building Mathematical Model of a manufacturing Plant, Modern Tools – Artificial neural networks in manufacturing automation, AI in manufacturing, Fuzzy decision and control, robots and application of robots for automation.

Text Book(s)

1. R.C. Dorf, John Wiley and Sons, Hand book of design, manufacturing and Automation, Wiley-Interscience; 1st Edition, 1994.
2 M.P. Groover, Automation, Production Systems and Computer Integrated Manufacturing, Pearson Education, 4th Edition, 2016.

Reference Books

1 W.P.David, Industrial Automation, Wiley-Interscience, 1st Edition, 1991.
2 Krishna Kant, Computer Based Industrial Control, PHI, 2nd Edition, 2011.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	3	3	3			3							3	3
CO3	3	3	3										3	3
CO4	3												3	
CO5	3	3	3										3	3
Average	3	3	3			3							3	3
Level of correlation	3	3	3			3							3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech I Semester (Common to CSE,IT,DS,AI&ML)
IV B.Tech I Semester ME(Open Elective-III)

20ACS38	**Cryptocurrency and Block Chain Technologies**	**L**	**T**	**P**	**C**
	(*Open Elective - III)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Define the Fundamental concepts of Crypto currencies and Block chain Technologies
2. Demonstrate the application of hashing and public key cryptography in protecting the block chain.
3. Explain the elements of trust in block chain: Verification Validation and consensus.
4. Interpret crypto currency Regulation and for Block chain Applications

UNIT: I Introduction to Cryptography & Crypto currencies: 8 hours

Cryptographic Hash Functions - Hash Pointers and Data Structures - Digital Signatures - Public Keys as Identities - A Simple Crypto currency - How Bitcoin Achieves Decentralization - Centralization vs. Decentralization - Distributed consensus - Consensus without identity using a block chain

UNIT: II Mechanics of Bitcoin 8 hours

Mechanics of Bitcoin: Bitcoin transactions - Bitcoin Scripts - Applications of Bitcoin scripts - Bitcoin blocks - The Bitcoin network - Limitations and improvements

How to Store and Use Bitcoins - Hot and Cold Storage - Splitting and Sharing Keys - Online Wallets and Exchanges - Payment Services - Transaction Fees - Currency Exchange Markets.

UNIT: III Bitcoin Mining 10 hours

Bitcoin Mining: The task of Bitcoin miners - Mining Hardware- Energy consumption and ecology - Mining pools - Mining incentives and strategies

Bitcoin and Anonymity: Anonymity Basics - How to De-anonymize Bitcoin – Mixing - Decentralized Mixing - Zerocoin and Zerocash.

UNIT: IV 10 hours

Community, Politics, and Regulation: Consensus in Bitcoin - Bitcoin Core Software - Roots of Bitcoin - Governments Notice Bitcoin - Anti Money-Laundering – Regulation.

UNIT: V 10 hours

Bitcoin as a Platform: Bitcoin as an Append-Only Log - Bitcoins as “Smart Property” - Secure Multi-Party Lotteries in Bitcoin - Bitcoin as Public Randomness Source - Prediction Markets and Real World Data Feeds

Altcoins and the crypto currency Ecosystem: Altcoins: A Few Altcoins in Detail - Relationship Between Bitcoin and Altcoins - Merge Mining.

Textbooks

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

Reference Books

1. Wattenhofer, The Science of the Blockchain
2. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
3. DR. Gavin Wood, “ETHEREUM: A Secure Decentralized Transaction Ledger,”Yellow paper, 2014.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												
CO2	3	3	1											
CO3	3	3	2	2										
CO4	3	2	2	1										
Average	3	2.5	1.66	1.5										
Level of correlation	3	3	2	2										

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech I Semester EEE(Open Elective-I)
IV B.Tech I Semester ME(Open Elective-III)

20ACS17	**Computer Networks**	**L**	**T**	**P**	**C**
	(*Open Elective - III)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Describe various components and topologies of computer networks
2. Use the network reference model layered structure for real time applications.
3. Implement various routing protocols from different layers.
4. Design, implement and test an efficient algorithmic solution for the give problem.
5. Analyse network security mechanics and other issues in the application layer.

UNIT: I **10 hours**

Introduction: Uses of Computer Networks, Network Hardware, Network Topologies, Network Software, References Models.

The Data Link Layer: Data link Layer Design Issues, Elementary Data Link Protocols, and Sliding Window Protocols.

UNIT: II **10 hours**

The Medium Access Control Sublayer: Channel allocation Problem, Multiple Access Protocols, Ethernet: Classic Ethernet physical layer, Ethernet MAC Sublayer Protocol, Ethernet Performance, Switched Ethernet, Fast Ethernet, Gigabit Ethernet,10-Gigabit Ethernet, Wireless LANs: The 802.11 Protocol Stack, 802.11 Physical Layer,802.11 MAC Sublayer Protocol, 802.11 Frame Structure,

UNIT: III **8 hours**

The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Internetworking, Network Layer in the Internet.

UNIT: IV **10 hours**

The Transport Layer: Transport Service, Elements of Transport Protocols, Internet Transport Protocols: UDP, Internet Transport Protocols: TCP.

UNIT: V **8 hours**

The Application Layer: Domain Name System, Electronic Mail. World Wide Web.

Textbooks

1 Computer Networks, Fifth Edition, Andrew S. Tanenbaum, David J Wetherall Pearson Education, 2011.

Reference Books

1 Data Communications and Networking, Fifth Edition, Behrouz A. Forouzan, Tata McGraw Hill,2012.
2 Computer Networking: A Top ,Down Approach Featuring the Internet, Six Edition, James F. Kurose, K.W. Ross, Pearson Education,2013
3 Computer Communications and Networking Technologies, Michael A. Gallo, William M. Hancock, Cengage Learning,2001.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3	3	2											
CO3	3	3	3	1										
CO4	3	3	3	1										
CO5	3	3												
Average	3	3	2.66	1										
Level of correlation	3	3	2	1										

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech - I Semester

20ACE35	**Integrated Waste Management for Smart City**	**L**	**T**	**P**	**C**
	(*Open Elective - III)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Understand the current issues and management in solid waste.
2. Apply basics of municipal solid waste management.
3. Apply various disposal methods of solid waste
4. Understand the construction and demolition waste management processes.
5. Explain management of electronic waste

UNIT: I Introduction To Solid Waste Management 10 hours

Municipal Solid Waste Sources; composition; generation rates Swachh Bharat Mission and Smart Cities Program, Current Issues in Solid Waste Management and Review of MSW Management Status in First List of 20 Smart Cities in the Country.

UNIT: II Municipal Solid Waste Management 8 hours

Municipal Solid Waste, Characteristics and Quantities, Collection, Transportation, Segregation and Processing.

UNIT: III Disposal Of Municipal Solid Waste 8 hours

Landfill, Biochemical Processes and Composting, Energy Recovery from Municipal Solid Waste. Municipal Solid Waste (MSW) Rules 2016.

UNIT: IV Construction And Demolition (C&D) Waste Management 8 hours

Overview of C&D Waste – Sources, Effects, and Regulations, Beneficial Reuse of C&D Waste Materials.

UNIT: V Electronic Waste (E-Waste) Management 8 hours

Sources, Effects, Issues and Status in India and globally, controlling measures, E-Waste Management Rules 2016 and Management Challenges.

Textbooks

1. William A Worrell and P. AarneVeslind, “Solid Waste Engineering”, 2nd Edition Cengage Learning, 2012 (ISBN-13: 978-1-4390-6217-3)

2. George Tchobanoglous, Hilary Theisen and Samuel A Vigil, “Integrated Solid Waste Management”, Tata McGraw Hill, 1993.

3. The Central Public Health and Environmental Engineering Organization (CPHEEO), “Manual on Solid Waste Management”, India, 2016.

Reference Books

1. Municipal Solid Waste Management Rules 2016”, Central Pollution Control Board, Govt.of India, 2016.
2. Electronic Waste Management Rules 2016”, Central Pollution Control Board, Govt. of India, 2016.
3. Construction and Demolition Waste Management Rules 2016”, Ministry of Environment and Forest and Climate Change, Govt. of India, 2016.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	3	3	-	-	-	-	-	-	-
CO2	3	-	-	-	-	3	3	-	-	-	-	-	-	-
CO3	3	-	-	-	-	3	3	-	-	-	-	-	-	-
CO4	3	-	-	-	-	3	3	-	-	-	-	-	-	-
CO5	3	-	-	-	-	3	3	-	-	-	-	-	-	-
Average	3					3	3							
Level of correlation	3					3	3							

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME58	**Plant Maintenance**	**L T P C**
	(*Open Elective – IV)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Recognize and enlist probable failures in mechanical elements.
2. Dismantle, assemble and align mechanisms in sequential order for given assembly.
3. Compare maintenance practices like on-line, shut down, corrosion, productive and preventive maintenance.
4. Analyze economics of plants and list factors affecting the maintenance of a plant.
5. Analyze different maintenance techniques and select an appropriate technique for a particular plant.

UNIT: I Introduction 9 Hours

Introduction to concept of maintenance, Type of maintenance; Preventive, Productive, corrective, online, shut down and their significance.

UNIT: II Preventive Maintenance 9 Hours

Preventive maintenance and its importance, Repair cycle, systematic recording, preventive maintenance, Programming and types of schedules, Manpower and machine planning, Lubrication methods and practice, Color code schedule.

UNIT: III Online Maintenance and Shut down Maintenance 9 Hours

On-line maintenance, attending to joints, Valves, Pumps and other equipment's leakages, Making shaft arrangement, stand-by unit, repairing damage to insulation, etc. without stopping the plant, attending faulty equipment, Fault finding and troubleshoots

UNIT: IV Maintenance of Mechanical Equipment 10 Hours

Maintenance of major equipment like boiler, furnaces, kilns, shells and tube heat exchangers, pump and compressor, Towers, Cooling vessels, Valves piping.

UNIT: V Plant Condition Monitoring 10 Hours

Plant condition monitoring systems, instrumentation, Data collection and analysis, life expectancy and maintenance scheduling. The economics of maintenance management.

Text Book(s)

1. Lindley R. Hinggin, L.C. Morrow, "Maintenance Engineering Handbook", Tata McGraw Hill Book Company.

Reference Books

1 Duncan C. Richardson, PE, "Plant Equipment and Maintenance Engineering Handbook", McGraw Hill Education, New York, Chicago, 2014.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2											3	
CO2	3	3											3	
CO3	3	3						2					3	
CO4	3	3						2					3	
CO5	3	3						2					3	
Average	3	2.8						2					3	
Level of correlation	3	3						2					3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech -I Semester

20AME59	**Automotive Electronics**	**L T P C**
	(*Open Elective – IV)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Apply the basic components of microcomputer and microprocessor architecture used in Automobiles.
2. Interface automotive sensors and actuators with microcontrollers for various measurements.
3. Execute the electronic management systems used in the automobiles
4. Apply the Electronic elements for the electronic vehicle management systems used in the automotive vehicles.
5. Demonstrate the instrumentation system used in the automobile to find the values of various parameters.

UNIT: I Introduction to Microcomputer 10 Hours

Introduction to microcomputer: Microcomputer: Buses, memory, timing, CPU registers; Microprocessor architecture: Initialization, operation codes, program counter, branch and jump instructions, subroutine. Analog to digital converters and Digital to analog converters, sampling, polling and interrupts, digital filters, lookup table.

UNIT: II Sensors and Actuators 10 Hours

Sensors and actuators: Speed sensors, Pressure sensors: Manifold Absolute Pressure sensor, knock sensor, Temperature sensors: Coolant and Exhaust gas temperature, Exhaust Oxygen level sensor, Position sensors: Throttle position sensor, accelerator pedal position sensor and crankshaft position sensor, Air mass flow sensor. Solenoids, stepper motors and relays.

UNIT: III Electronic Engine Management System 10 Hours

Electronic engine management system: Electronic engine control: Input, output and control strategies, electronic fuel control system, fuel control modes: open loop and closed loop control at various modes, EGR control, Electronic ignition systems – Spark advance correction schemes, fuel injection timing control.

UNIT: IV Electronic Vehicle Management System 10 Hours

Electronic vehicle management system: Cruise control system, Antilock braking system, electronic suspension system, electronic steering control, traction control system, Transmission control, Safety: Airbags, collision avoiding system, low tire pressure warning system.

UNIT: V Automotive Instrumentation System **10 Hours**

Automotive instrumentation system: Input and output signal conversion, multiplexing, fuel quantity measurement, coolant temperature and oil pressure measurement, display devices- LED, LCD, VFD and CRT, On board diagnostics (OBD), OBD-II, off board diagnostics.

Text Book(s)

1. Understanding Automotive Electronics, William B Ribbens, Newne Butterworth-Heinerma edition 2003.
2. Crouse W H, Automobile Electrical Equipment, McGraw Hill Book Co.Inc, Newyork 2005.

Reference Books

1 Tom Denton, "Automobile Electrical and Electronic Systems" 3rd edition- Edward Arnold, London - 2004.

2 Eric Chowanietz - 'Automotive Electronics' - SAE International USA – 1995.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	
CO2	3	3	3										3	
CO3	3	3	3										3	
CO4	3	3	3										3	
CO5	2	3	3										3	
Average	2.8	3	3										3	
Level of correlation	3	3	3										3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech II Semester (Common to CSE, IT),
IV B Tech I Sem Professional Elective-V CSE(DS), CSE (AI& ML)

IV B Tech I Sem ME, ECE (Open Elective-IV)

20ACS28	**Internet of Things**	**L**	**T**	**P**	**C**
	(*Open Elective - IV)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Understand the fundamentals of IoT, its applications.
2. Understand and analyze various tools for design of IoT system.
3. Analyze the Raspberry Pi tool and its features.
4. Deploy an IoT application and connect to the cloud.

UNIT: I Introduction and Concepts 10 hours

Introduction to Internet of Things, Physical Design of IoT, Logical Design of IoT – IoT Enabling Technologies – IoT levels & Deployment Templates.

Domain Specific IoTs: Introduction – Home Automation – Cities, Environment – Energy – Retail, Logistics – Agriculture, Industry, Health & Lifestyle.

UNIT: II IOT and M2M 10 hours

: Introduction – M2M, Difference between IoT and M2M, SDN and NFV for IoT, IoT System management with NETCONF, YANG, Need for IoT Systems Management –Simple network Management protocol(SNMP) – Network operator requirements, NETCONF,YANG, IOT systems management with NETCONF,YANG – NETOPEER.

UNIT: III Developing Internet of Things 10 hours

IoT Platforms Design Methodology, Introduction, IoT Design Methodology, Case Study on IoT System for Weather Monitoring – Motivation for Using Python – IoT Systems, logical Design using Python, installing Python, Python Data Types & Data Structures, Control flow, functions, Modules, Packages, File Handling, Data/Time Operations, Classes, Python Packages of Interest for IoT.

UNIT: IV IOT Physical Devices & Endpoint 10 hours

What is an IOT devices, Exemplary Devices: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python – Other IoT Devices.

UNIT: V IOT Physical Servers & Cloud Offerings 10 hours

Introduction to Cloud Storage Models & Communication APIs, WAMP, AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework, Django, Designing a RESTful Web API, Amazon Web services for IoT, SkyNet IoT Messaging Platform.

Textbooks

1. Arshdeep Bahga, Vijay K.Madisetti, “Internet of Things”, A HANDS ON APPROACH, Universities Press, 2014

Reference Books

1. Adrian Mcewen, Hakin Cassimally, "Designing The Internet of Things", WEILEY Publications, 2015.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, David Boyle, Stamatis Karnouskos, "From Machine to Machine to the Internet of Things", Academic Press, 2014

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3										1		
CO2	3	3	3		1									
CO3	3	3	3		2							1		
CO4	3	3	3											
Average	3	3	3		1.5							1		
Level of correlation	3	3	3		2							1		

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech II Semester (Common to CSE, IT)
B.Tech I Semester ME(Open Elective-IV)

20ACS31	**Ethical Hacking**	**L**	**T**	**P**	**C**
	(*Open Elective - IV)	3	0	0	3

Course Outcomes:

After completion of the course, the students will be able to

1. Understand the basics of ethical hacking, system hacking and viruses.
2. Understand the concepts of sniffers, DOS and session hijacking.
3. Understand the fundamentals of web and wireless network hacking.
4. Apply the different types of security and cryptography techniques.

UNIT: I **10 hours**

Defining ethical hacking – How to be ethical – Keeping it legal - Reconnaissance - Information-gathering methodology - Social engineering – Scanning - Enumeration

UNIT: II **10 hours**

The simplest way to get password – Types of passwords – Cracking a password - Understanding Key loggers and Other Spyware Technologies - Escalating Privileges - Understanding Rootkits - Hiding Files - Trojans and Backdoors - Viruses and Worms.

UNIT: III **10 hours**

Understanding Host-to-Host Communication - How a Sniffer Works - Sniffing Countermeasures - Bypassing the Limitations of Switches - Wireshark Filters - Understanding MAC Flooding and DNS Spoofing - Denial of Service - Session Hijacking

UNIT: IV **10 hours**

How Web Servers Work - Types of Web Server Vulnerabilities - Web Application Vulnerabilities - Web-Based Password-Cracking Techniques - SQL Injection - Buffer Overflows - Wi-Fi and Ethernet - Authentication and Cracking Techniques - Using Wireless Sniffers to Locate SSIDs - MAC Filters and MAC Spoofing - Rogue Access Points - Wireless Hacking Techniques - Securing Wireless Networks

UNIT: V **10 hours**

Textbooks

1. Kimberly Graves, Certified Ethical Hackers Study Guide, Wiley publications.
2. Dafydd Stuttard, Marcus Pinto, The Web Application Hacker’s Handbook, Second Edition, Wiley publications.

Reference Books

1. Michael T. Simpson, Kent Backman, and James E. Corley, Hands-On Ethical Hacking and Network Defense, Course Technology PTR A part of Cengage Learning.
2. Patrick Engebretso, The Basics of Hacking and Penetration Testing Ethical Hacking and Penetration Testing Made Easy, Syngress Press

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2						2				1		
CO2	3	2						2				1		
CO3	3	2						2				1		
CO4	3	3	2		1			2				1		
Average	3	2.25	2		1			2				1		
Level of correlation	3	2	2		1			2				1		

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech - I Semester

20AEC69	**Mechatronics**	**L T P C**
	(*Open Elective - IV)	3 0 0 3

Course Outcomes:

After completion of the course, the students will be able to

1. Describe the concept and usage of multi engineering systems.
2. Summarize various sensors, actuators, microprocessors and feedback devices
3. Distinguish the traditional actuators, feedback and control systems with modern technologies.
4. Design a mechatronic system for real time applications.

UNIT: I **10 hours**

Mechatronics Systems – Elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors

UNIT: II **8 hours**

Signal Conditioning- signal conditioning, operational amplifiers, protection, filtering.

Digital Electronics And Systems- Digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers-structure, I/O processing, PLCs versus computers, application of PLCs for control.

UNIT: III **8 hours**

Hydraulic And Pneumatic Actuating Systems – Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro- pneumatic, hydro-pneumatic, electro- hydraulic servo systems. Mechanical actuating systems and electrical actuating systems – basic principles and elements.

UNIT: IV **8 hours**

System And Interfacing And Data Acquisition – Data Acquisition Systems, Analog to Digital and Digital to Analog conversions, Digital Signal Processing – data flow in DSPs, block diagrams, typical layouts, Interfacing motor drives.

UNIT: V **8 hours**

Mechatronic System Design - Design process-stages of design process – Traditional and Mechatronics design concepts – Case studies of Mechatronics systems – Pick and place Robot – Engine Management system – Automatic car park barrier.

Textbooks

1. W. Bolton, Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering, PearsonEducation Press, 3rd Edition, 2005.
2. Nadovich.C, "Synthetic Instruments Concepts and Applications". Elsevier,2005

Reference Books

1. Richard C.Dorf and Robert H.Bishop, Modern Control Systems, 12th Edition, Pearson,2014.
2. Benjamin C.Kuo and Farid Golnaraghi, Automatic Control System, 9th Edition, John Wiley & Sons, 2016.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	3	3	-	-	-	1	3	-	-
CO2	3	3	-	-	-	3	3	-	-	-	1	3	-	-
CO3	3	3	-	-	-	3	3	-	-	-	1	3	-	-
CO4	3	-	-	-	-	3	3	-	-	-	1	-	-	-
Average	3	3	-	-	-	3	3	-	-	-	1	3	-	-
Level of correlation	3	3	-	-	-	3	3	-	-	-	1	3	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech - I Semester (Common to all Branches)

III B. Tech - II Semester (EEE)

20AMB04	**Creativity and Innovation**	**L**	**T**	**P**	**C**
		3	0	0	**3**

Course Outcomes:

After completion of the course, the students will be able to

1. Explain innovation and creativity management from the perspective of obtaining a sustainable competitive advantage and integrating innovation into the business strategy.
2. Explain the attributes of successful innovation strategies including an in-depth understanding of the dynamics of innovation
3. Identify the role that innovation plays in the competitive dynamics of industries and how these innovations affect society.
4. Explain the factors and drivers that predict creativity and innovation of individuals, groups, and organizations
5. Design a creative business concept and develop a business plan.

UNIT: I Creativity 10 hours

Concept - Convergent and Divergent Thinking -Creative Intelligence - Enhancing Creativity Intelligence -Determinants of Creativity - Creativity Process - Roots of Human Creativity - Biological, Mental, Spiritual and Social -Forms of Creativity - Essence, Elaborative and Expressive -Existential, Entrepreneurial and Empowerment.

UNIT: II Creative Personality 10 hours

Creative Personality Traits Congenial to Creativity - Motivation and Creativity - Strategies for changing Motivation - Creativogenic Environment - Formative Environment and Creativity - Adult Environment - Environmental Stimulants - Blocks to Creativity-Strategies for unblocking Creativity.

UNIT: III Organizational Creativity 8 hours

Creative Manager - Techniques of Creative Problem Solving -Creative Encounters and Creative Teams - Perpetual Creative Organizations - Creative Management Practices – Human Resource Management, Marketing Management, Management of Operations, Management of Product Design and Growth Strategies-Issues and Approaches to the Design of Creative Organizations Policy frameworks - Organizational Design for Sustained Creativity - Mechanism for Stimulating Organizational Creativity - Creative Diagnosing - Creative Societies - Necessity Model of a Creative Society.

UNIT: IV Management of Innovation **8 hours**

Nature of Innovation- Concept of Innovation- Historic Retrospective-Typology of Innovations-Innovation Process- Macroeconomic View of Innovation Approaches to Innovations-Assumptions and Barriers to Innovations-Innovation Sources, - Technological Innovations and their Management-Training for Innovation - Management of Innovation-Agents of Innovation -Skills for Sponsoring Innovation.

UNIT: V Innovation & Entrepreneurship **10 hours**

Concept of Entrepreneurship- Entrepreneurial opportunities, attitude, traits and tendencies-Design of a Successful Innovative Entrepreneurship-Idea generation & Prototype Development- Social Innovation and Entrepreneurship-Intellectual Property Right (IPR)-Commercialization of Innovations-Startup and Venture development-Pre-incubation and Incubation Stages-Govt. Schemes and funding support to ideas, innovations, and startup-Current trends, development and general awareness on Innovation and startup.

Textbooks

1. Kandwalla, P. N. (2004). Lifelong creativity : an unending quest. Tata Mcgraw-Hill..
2. Khandwalla, P. N. (2022). Corporate Creativity: The Winning Edge (1st ed.). Mc Graw Hill India.

Reference Books

1. Rastogi, P. N. (2009). Management of technology and innovation: Competing through technological excellence. SAGE Publishing India.
2. Plucker, J. A. (2021). Creativity and innovation: Theory, research, and Practice. Routledge.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	2	-	2	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	2	-	-	-	-	-	-	-	-	-
CO3	-	-	2	-	2	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	2	-	-	-	-	-	-	-	-	-
CO5	-	-	2	-	-	2	-	-	-	-	2	-	-	-
Average	-	-	2	-	2	2	-	-	-	-	2	-	-	-
Level of correlation	-	-	2	-	2	2	-	-	-	-	2	-	-	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech - I Semester (Common to CE, EEE, ME, ECE, CSE, IT, CSE (AI & ML), CSE (DS), CAI, CSC & CSO)

		L	T	P	C
20AMB05	**Leadership Essentials**	**3**	0	0	**3**

Course Outcomes:

After completion of the course, the students will be able to

1. Identify the concepts and theories of leadership and analyse its relevance to the organizations.
2. Analyze various sources of power, politics and conflict management.
3. Adapt theories of leadership to cases and contexts in organisation.
4. Interpret change, sustainable development and implications of cultural factors in organizations.
5. Develop leadership potential and practices in organizations.

UNIT: I Overview and Introduction of Leadership **9 hours**

concepts and functions of leadership; Leadership, Role and Functions of a Leader, Leadership Motives Characteristics of an Effective Leader, Leadership as a Process - the Complexities of Leadership - Effective Leadership Behaviours and Attitudes –Emerging Approaches of leadership.

UNIT: II Leadership and Power **9 hours**

Sources of Power, The link between Politics, Power and Conflict, Power and Conflict; Coercion, Trait Approach, Ohio State Leadership Study, The University of Michigan Study, Blake and Mouton's Managerial Grid.

UNIT: III Leadership theories and styles **9 hours**

Contingency Theories of Leadership -, The Path-Goal Theory, Transactional Leadership Style Charismatic Leadership. Servant Leadership, Leadership Ethics.

UNIT: IV Fostering Organizational Culture and Climate **9 hours**

Vision Building; Developing Strategic Thinking; strategies in developing a culture conducive to change; handling change; Cultural Factors Influencing Leadership Practice.

UNIT: V Developing Future Leaders **9 hours**

Strategic Leadership Competencies; 360º Leadership Assessment; The Myers–Briggs Type Indicator (MBTI); developing global leaders in organization.

Textbooks

1. Peter Guy Northouse. (2021). Introduction to leadership : concepts and practice (5th ed.). Sage.
2. Humphrey, R. H. (2014). Effective leadership : theory, cases, and applications. Sage.

Reference Books

1. Bratton, J., Grint, K., & Nelson, D. L. (2005). Organizational leadership. Thomson/South-Western.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	-	-	-	-	-	-	-	-	3	-	3	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO4	-	-	-	-	-	-	-	-	3	-	3	-	-	-
CO5	-	-	-	-	-	-	-	-	3	-	2	-	-	-
Average	-	-	-	-	-	-	-	-	3	-	2.8	-		
Level of correlation	-	-	-	-	-	-	-	-	3	-	2	-		

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech - I Semester (Common to all Branches)

III B. Tech - II Semester (EEE)

20AMB06	**Law For Engineers**	**L**	**T**	**P**	**C**
		3	0	0	**3**

Course Outcomes:

After completion of the course, the students will be able to

1. Explain the essential principles of the law relevant to engineering practice
2. Apply the relevant provisions of contract law
3. Use effective contract laws for decision making and problem-solving techniques in different scenarios
4. Recognize and explore key legal requirements for engineering including health & safety, privacy, and professional indemnity.
5. Discuss about the industrial dispute settlement mechanism.

UNIT: I The Nature and Sources of Law 9 hours

Definition and nature of law, definition law and morality, classification of law, Overview of Business laws in India – Sources of business law.

UNIT: II Law of Contract 9 hours

Contract- Essential features of a valid contract – Performance of a contract – Breach of contract and its remedies.

UNIT: III Special Contracts 9 hours

Quasi Contracts – Contingent Contracts – Indemnity and Guarantee – Contract of Agency – Bailment and Pledge.

UNIT: IV Law of Tort 9 hours

Definition of Tort, Fundamental Purpose Development of Law of Torts-Specific Torts, Negligence, Nervous Shock, Nuisance, Trespass, Defamation False Imprisonment and Malicious Prosecution Purpose.

UNIT: V Industrial Dispute & Settlement Mechanism 9 hours

Employee Grievances -Collective Bargaining- Industrial Disputes and Resolution Mechanism; Overview on IPR.

Textbooks

1. Kapoor, N. D. (1983). Elements of mercantile law: including company law and industrial law. Sultan Chand & Sons.
2. Kunwar Arora, Vibha Arora. (2017). Law for Engineers. Central Law Publications.

Reference Books

1. Gulshan, S. S. (2009). Business law. Excel Books.
2. Mulheron, R. (2020). Principles of Tort Law. Cambridge University Press.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	3	-	-	-	-	-	-	-	-
CO2	-	-	-	3	-	3	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	-	-	-	-	3	-	-	-
CO4	-	-	-	-	-	3	-	-	-	-	3	-	-	-
CO5	-	-	-	-	-	3	-	-	-	-	2	-	-	-
Average	3	-	-	3	-	3	-	-	-	-	2.6	-	-	-
Level of correlation	3	-	-	3	-	3	-	-	-	-	3	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech - I Semester (Common to CE, EEE, ME, ECE, CSE, IT, CSE (AI&ML) CSE (DS) ,CAI, CSC & CSO)

20AMB07	**Entrepreneurship Essentials**	**L**	**T**	**P**	**C**
		3	0	0	**3**

Course Outcomes:

After completion of the course, the students will be able to

1. Explain the Fundamentals and specifics of Entrepreneurship.
2. Apply theoretical concepts in developing an idea and startup a new technology-based company.
3. Prepare marketing and financial plans that are viable in nature.
4. Apply marketing research methods and tools to forecast and to analyze the trend.
5. Develop innovative business solutions with a holistic perspective from concept to reality.

UNIT: I Basic Entrepreneurship 9 hours

Entrepreneurial traits, true motivation & leadership, understanding of Entrepreneurial process, understanding of personal aspirations, Entrepreneurial personality development, Entrepreneurial communication, Entrepreneurship in Indian Scenario, Future prospects in India and emerging economies.

UNIT: II Marketing And Market Research 9 hours

Market dynamics, Market segmentations and creation of derivatives, Marketing Research methodologies, trend, assessment, analysis and forecasting, structural aspects of market. Identification of overall market, addressable market and serviceable market for product and services.

UNIT: III Engineering Design Process 9 hours

Introduction to Engineering Design Process; Design Approaches - Forward and Reverse Engineering; Reverse Engineering Process – Definition and goal of Reverse engineering (RE); Theory of inventive problem solving (TRIZ): Fundamentals, methods and techniques, inventive design strategies and Simulation in Engineering Design - Computer Aided Engineering and Simulation; Engineering Manufacturing and Materials; Sustainability and Design: Recyclability; Reliability and Lean Design Engineering; Interface with Industrial design; Economic considerations in design; Eco Design and Green Engineering Product Development.

UNIT: IV Financial And Legal Aspects Of Business 9 hours

Process for effective financial planning, types of budgets preparation, overview of specific ratios to measure financial performance, liquidity, asset management, profitability, leverage and comparative analysis, business laws enshrined in the Indian constitution, the policies of the state, Income tax structure, the labor laws.

UNIT: V Management Of Growth Venture 9 hours

Importance of Innovation as a differentiator in growth venture, Underlying opportunities, Strategic management for Launching process of growth ventures, understanding organizational & institutional aspects of growth ventures, Exit strategies of Growth ventures, Future prospects of venture financing of growth venture firms.

Textbooks

1. Allen, K. R. (2018). Launching New Ventures: An Entrepreneurial Approach. United States: Cengage Learning.
2. Khanka, S. S. (2006). Entrepreneurial Development. India: S. Chand Limited.
3. Nelson, A. J., Byers, T. H., Dorf, R. C. (2018). Technology Ventures: From Idea to Enterprise. United Kingdom: McGraw-Hill Education.

Reference Books

1. Harrington, H. J. (2018). Creativity, Innovation, and Entrepreneurship: The Only Way to Renew Your Organization. United States: Taylor & Francis.
2. Smith, A., Pigneur, Y., Papadakos, T., Osterwalder, A., Bernarda, G. (2015). Value Proposition Design: How to Create Products and Services Customers Want. Germany: Wiley.
3. Allen, K. R. (2010). Entrepreneurship for Scientists and Engineers. United Kingdom: Pearson Prentice Hall.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO3	-	1	1	-	-	-	-	-	-	-	3	-	-	-
CO4	-	1	1	-	-	-	-	-	-	-	3	-	-	-
CO5	-	1	1	-	-	-	-	-	-	-	3	-	-	-
Average	-	1	1	-	-	-	-	-	-	-	3	-	-	-
Level of correlation	-	1	1	-	-	-	-	-	-	-	3	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech - I Semester (Common to all Branches)

III B. Tech - II Semester (EEE)

		L	T	P	C
20AMB08	**Essential of Management Science**	**3**	0	0	**3**

Course Outcomes:

After completion of the course, the students will be able to

1. Apply various areas of functional management for the prospects of business organization.
2. Apply management principles for decision making.
3. Apply various functions of Hr manager.
4. Use tools and techniques to become an effective manager.
5. Apply production tools and techniques in every area of business

UNIT: I Introduction To Management 9 hours

Nature, importance and Functions of Management, Approaches to Management - Taylor's Scientific Management - Henry Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles.

UNIT: II Introduction To Oranisation 9 hours

Types of Mechanistic and organic structures. Delegation, Decentralization - Formal and Informal Organization.

UNIT: III Operations Management 9 hours

Principles and Types of Plant Layout - Methods of production (Job, batch and Mass Production), Work Study - Basic procedure involved in Method Study and Work Measurement.

UNIT: IV Materials Management 9 hours

Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records, Marketing: Functions of Marketing, Marketing Mix, Product Life Cycle and Channels of Distribution.

UNIT: V Human Resources Management (HRM) 9 hours

Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Wage and Salary Administration, Job Evaluation and Merit Rating, Performance Appraisal.

Textbooks

1. Aryasri, Management Science, TMH, 4 th Edition, 2009.
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 6 th Edition, 2004.
3. PannerSelvem, Production and Operations Management, Prentice Hall of India, 3 rd Edition, 2012

Reference Books

1. Kotler Philip & Keller Kevin Lane, Marketing Management, PHI, 12th Edition, 2005.
2. Koontz &Weihrich, Essentials of Management, TMH, 6 th Edition, 2005.
3. SubbaRao. P, Personnel and Human Resource Management, Himalaya Publishing House, 2000

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	3	-	-	-
CO2	-	-	-	-	-	-	-	-	3	-	3	-	-	-
CO3	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	-	3	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	3	-	-	-
Average	-	-	-	-	-	-	-	-	3	-	3	-	-	-
Level of correlation	-	-	-	-	-	-	-	-	3	-	3	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech - I - Semester

20AME60	**MATLAB for Mechanical Engineers**	**L**	**T**	**P**	**C**
		0	0	2	2

Course Outcomes:

After completion of the course, the students will be able to

1. Understand the basic operations of MATLAB
2. Demonstrate the knowledge on syntax, built-in functions, and mathematical operations of MATLAB.
3. Analyze the syntax for preparing MATLAB script file and function file.
4. Analyze the given data through visualization.
5. Develop MATLAB code for solving Mechanical Engineering problems.

List of Experiments

1 Write a script file to test the integer is even or odd. (use if-else).

2 Write script file and a function file to print the square root of the even integers up to n, by using for loop.

3 Write a script and function file by using while loop to display all powers of two from 2 to 10.

4 Plot the basic signals (Impulse, Step function and Ramp function) and create 2-D and 3-D plots.

5 Programs for Two-Dimensional (2-D) and Three- Dimensional (3-D) Plotting.

6 Program to Solve Differential Equations.

7 To study the programs for deflections, shear forces and bending moments of beams under various boundary and loading conditions.

8\. To study program for Euler Crippling Load of column under different boundary condition using integration method.

9\. To study the Mechanical behavior of a stepped bar under axial load using finite element method.

10\. Calculate and plot the position, velocity, and acceleration of the piston for one revolution of the crank using Matlab.

11\. Write a MATLAB program to determine the magnitude and direction of the resultant of 3 coplanar forces applied at a point.

12\. Preparing MATLAB codes for Free vibration of Single Degree of Freedom Systems, free vibration of damped system.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3				3				2	1
CO2	3				3				3				2	1
CO3	3	3			3				3				3	2
CO4	3	3			3				3				3	2
CO5	3	3			3				3				3	3
Average	3	3			3				3				2.6	1.8
Level of correlation	3	3			3				3				3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech - I - Semester (Common to CE, ME, EEE, ECE, IT, CSE, CSE(DS), CSE(AIML)

20AMB12	Professional Ethics	L	T	P	C
		2	0	0	0

Course Outcomes:

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

1. Identify and analyze an ethical issue in the relevant field.
2. Apply specific ethical theories to current social issues.
3. Identify significant problems in contemporary professional ethics.
4. Explain the ethical roles of engineers in industry and society.
5. Explain moral and ethical obligations toward the environment.

UNIT: I Introduction 10 Hours

INTRODUCTION: 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 10 Hours

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 Hours

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 Hours

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 10 Hours

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

Text Book(s)

1 Subramanian R, Professional Ethics,1st Edition, Oxford University Press. 2013.

2 Naagarazan , R.S., A Textbook on Professional Ethics and Human Values,1st edition, New Age International (P) Limited, Publishers New Delhi.,2014

3 R. R. Gaur, R. Sangal and G. P. Bagaria, Human Values and Professional Ethics:,EecelBooks,New Delhi.2010.

Reference Books

1 Fundamentals of Ethics for scientists and Engineers, Edmond G Seebauer and Robert L. Barry, 1st edition Oxford University Press, 2008.

2 Professional Ethics and Human Values – M.Govindrajan, S.Natarajan and V.S. Senthil Kumar, PHI Learning Pvt. Ltd. Delhi.

3 Professional Ethics and Human Values: Prof. D.R. Kiran, TATA McGraw Hill Education, 2007.

4 Charles D Fleddermann, "Engineering Ethics", Prentice Hall.

5 Charles E Harris, Micheal J Rabins, "Engineering Ethics, Cengage Learning.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							2	3						
CO2							2	3						
CO3							2	3						
CO4							2	3						
CO5							2	3						
Average							2	3						
Level of correlation							2	3						

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech - I - Semester

20AME61	**Industrial / research internship**	**L**	**T**	**P**	**C**
		0	0	0	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech - II - Semester

20AME62	**Project, Project work, Seminar & internship in industry**	**L T P C**
		0 0 24 **12**

Honors Degree with Specialized tracks

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - II - Semester

20AME63 **Mechanical Behavior of Materials**

L	T	P	C
3	1	0	4

Course Outcomes:

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

1. Demonstrate the knowledge on mechanism involved in elastic and plastic behavior of materials.
2. Apply strengthening mechanism for ferrous and non ferrous materials.
3. Analyze Fatigue behavior of components using S-N curve.
4. Analyze fractures and mechanics of fractures and determine its parameters.
5. Analyze the materials using creep tests for engineering applications.

UNIT: I Elastic And Plastic Behaviour 09 Hours

Elastic behavior of materials, Hooke's law, plastic behavior, dislocation theory, Burger's vectors and dislocation loops, dislocations in the FCC, HCP and BCC lattice, stress fields and energies of dislocations, forces on and between dislocations, dislocation climb, intersections of dislocations, Jogs, dislocation sources, multiplication of dislocations, dislocation pile-ups, Slip and twinning.

UNIT: II Strengthening Mechanisms 09 Hours

Elementary discussion of cold working, grain boundary strengthening. Solid solution strengthening, Martensitic strengthening, Precipitation strengthening, Particulate Strengthening, Dispersion strengthening, Fiber strengthening, Examples of above strengthening mechanisms from ferrous and non-ferrous systems, Yield point phenomenon, strain aging and dynamic strain aging.

UNIT: III Fatigue Behaviour 09 Hours

Fatigue: Stress cycles, S-N curves, Effect of mean stress, Factors affecting Fatigue, Structural changes accompanying fatigue, Cumulative damage, HCF / LCF, thermo -mechanical fatigue, application of fracture mechanics to fatigue crack propagation, fatigue testing machines- Pari's Equation, Residual life prediction under Fatigue. Macro, Microstructural features of fatigue fracture.

UNIT: IV Fracture And Fracture Mechanics 09 Hours

Types of fracture, Basic mechanisms of ductile and brittle fracture, Griffith's theory of brittle fracture, Orowan's modification. Izod and Charpy Impacts tests, Ductile to Brittle Transition Temperature (DBTT), Factors affecting DBTT, Determination of DBTT.

Fracture mechanics-Introduction, Modes of fracture, Stress intensity factor, Strain energy release rate, Fracture toughness and Determination of KIC, Introduction to COD, J integral.

UNIT: V Creep Behaviour And Testing 09 Hours

Creep curve, Stages in creep curve and explanation, Structural changes during creep, Creep mechanisms, Metallurgical factors affecting creep, High temperature alloys, Stress rupture testing, Creep testing machines, Parametric methods of extrapolation. Deformation Mechanism Maps according to Frost/Ashby.

Text Book(s)

1. Dieter, G. E., Mechanical Metallurgy, McGraw-Hill Co., 3rd Edition, 2017.
2. Thomas H.Courtney, Mechanical Behavior of Materials", McGraw-Hilll, 2nd edition, 2019.

Reference Books

1 Suryanarayana, A. V. K., Testing of Metallic Materials, Prentice Hall India, New Delhi.

2 Marc Andr'e Meyers and Krishan Kumar Chawla, "Mechanical Behavior of Materials" Cambridge University Press, 2009.

3 Prashant Kumar, Elements of Fracture Mechanics, McGraw-Hilll, 2009.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	-	-	-	2	
CO2	3	1	-	-	-	1	-	-	-	-	-	-	2	
CO3	3	3	1	-	-	1	-	-	-	-	-	-	3	
CO4	3	3	1	-	-	1	-	-	-	-	-	-	3	
CO5	3	3	1	-	-	1	-	-	-	-	-	-	3	
Average	3	2.2	1			1							2.6	
Level of correlation	3	2	1			1							3	

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - II - Semester

20AME64	**Automotive Chassis**	**L T P C**
		3 1 0 **4**

Course Outcomes:

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

1. Interpret various chassis systems and subcomponents present in the automobiles.
2. Recognize the suitable frame, steering and drive line system for the different automobiles.
3. Classify the various braking and suspension systems of automobiles.
4. Recognize the suitable axles, wheels and tyres for the different automobiles.

UNIT: I Chassis Layouts and Frames 10 Hours

Types of Chassis Layout with reference to Power Plant Location and Drive, Automotive Frames - Material Selection and its Constructional Details, Various types, Different Loads acting on Frame, Testing of Automotive Frames.

UNIT: II Steering System 10 Hours

Types of Front Axles and Stub Axles, Front Wheel Geometry, Condition for True Rolling Motion of Wheels during Steering, Steering Mechanisms, Steering Error Curve, Steering Linkages, Different Types of Steering Gears, Slip Angle, Over Steer and Under Steer, Reversible and Irreversible Steering, Power Assisted Steering.

UNIT: III Drive Line 10 Hours

Propeller Shaft - Design Considerations & Constructional Details, Universal Joints, Constant Velocity Joints, Hotchkiss Drive, Torque Tube Drive, Radius Rods and Stabilizers, Final drive - Different types, Multi axle Vehicles, Differential - Working Principle and Constructional Details, Non–Slip Differential, Differential Locks.

UNIT: IV Suspension System and Braking Systems 10 Hours

Need for Suspension System, Types of Suspension Springs, Constructional details and Characteristics of Single Leaf, Multi Leaf, Coil, Torsion bar, Rubber, Pneumatic and Hydro – elastic Suspension Systems, Independent Suspension System, Shock Absorbers - Types and Constructional details.

UNIT: V Axles, Wheels and Tyres 10 Hours

Axles – Live and Dead Axles, Constructional Details, Different Types of Loads acting on Drive Axles, Rear Axle Shaft Supporting Types: Semi Floating, Full Floating, Three Quarter Floating, Axle Housings and Types.

Types of Wheels, Construction, Structure and Function, Wheel Dimensions. Structure and Function of Tyres, Static and Dynamic Properties of Pneumatic Tyres, Types of Tyres, Materials, Tyre Section & Designation, Factors affecting Tyre Life, Quick Change Wheels, Special Wheels.

Text Book(s)

1. K.V James, D Halderman (2013) "Automotive Chassis Systems" 6th Edition, Prentice Hall Publisher.

Reference Books

1 James E Duffy (2011) "Modern Automotive Technology", Goodheart-Willcox; Seventh Edition.

2 Jack Erjavec (2009) "Automotive Technology – A systems approach", Cengage Learning.

3. William H. Crouse and Donald L. Anglin (2007) Automotive Mechanics, 10th edition.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	3	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-	3	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	3	-
Average	3	2	2										3	
Level of correlation	3	2	2										3	

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B.Tech - II - Semester

20AME65	**Drives and Actuators for Industrial Automation**	**L**	**T**	**P**	**C**
		3	**1**	0	**4**

Course Outcomes:

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

1. Identify the appropriate fluid power generation and actuation elements and fluid power symbols to designand integrate the pneumatic and hydraulic systems.
2. Identify the basic fluid power circuits using control valves and regulating elements for various types ofactuators.
3. Interpret the circuit design using the advanced techniques for manual and automatic control.
4. Identify and select the suitable electrical actuators and motors for typical applications in the industrialneeds.
5. Analyse the need of appropriate drive and its functions for various actuator and valve control inmechatronic system development.

UNIT: I Fluid Power System Generation and Actuators 10 Hours

Need for Automation, Classification of Drives - Hydraulic, Pneumatic and Electric – Comparison – ISO Symbols for their Elements, Selection Criteria. Generating Elements- Hydraulic Pumps and Motor Gears, Vane, Piston Pumps – Motors - Selection and Specification - Drive Characteristics – Utilizing Elements - Linear Actuator – Types, Mounting Details, Cushioning – Power Packs – Accumulators.

UNIT: II Control and Regulating Elements 10 Hours

Control and Regulating Elements — Direction, Flow and Pressure Control Valves -Methods of Actuation, Types, Sizing of Ports. Spool Valves - Operating Characteristics - Electrohydraulic Servo Valves - Types - Characteristics and Performance.

UNIT: III Circuit Design for Hydraulic and Pneumatics 10 Hours

Typical Design Methods – Sequencing Circuits Design - Combinational Logic Circuit Design - Cascade Method – KV Mapping - Electrical Control of Pneumatic and Hydraulic Circuits - Use of Relays, Timers, Counters, Programmable Logic Control of Hydraulics - Pneumatics Circuits - PLC Ladder Programming.

UNIT: IV Electrical Actuators 10 Hours

DC Motors – Construction, Working Principle, Classification, Characteristics, Applications – Single Phase and Three Phase AC Motors – Construction, Working Principle, Classification, Characteristics and Applications, Special Electrical Motors - Servomotors - Stepper Motors, Principle, Classification, Construction and Working - BLDC Motor and its Operating Modes.

UNIT: V Electrical Drive Circuits 10 Hours

Drives for Motion Control - DC Motors - Speed, Torque, Direction and Position Control - H- Bridge under PWM Mode - Control of AC Motor Drives – VFD Drives – Energy Saving AC Drives - AC Servo Drives - Speed, Breaking, Direction, Position and Torque Control – Stepper Motor Drive Circuits for Speed and Position Control - Drives for BLDC Motor - Selection of Drives – Protection and Switch gears.

Text Book(s)

1. Antony Esposito, —Fluid Power Systems and Control‖, Prentice-Hall, 2006.
2 Austin Hughes, —Electric Motors and Drives Fundamentals, Types and Applications‖, Fourth Edition, Elsevier, 2013

Reference Books

1 Gopal K.Dubey, —Fundamentals of Electrical Drives‖, Narosa Publications, 2001.
2 Peter Rohner, —Fluid Power Logic Circuit Design‖, the Macmillan Press Ltd., London, 1979.
3. Singh.M.D, Khanchandani.K.B, —Power Electronics‖, Second Edition, McGraw-Hill, 2008.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO5	3	3	3	-	-	-	-	-	-	-	-	-	3	3
Average	3	3	3	-	-	-	-	-	-	-	-	-	3	3
Level of correlation	3	3	3	-	-	-	-	-	-	-	-	-	3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech - II - Semester

20AME66	**Elements of Nanoscience and Nanotechnology**	**L T P C**
		3 1 0 **4**

Course Outcomes:

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

1. Express the concepts of nanoscale and their properties.
2. Select and apply appropriate nanomaterial for manufacturing nano components.
3. Choose apposite synthesis method and apply it in nanomaterials applications.
4. Select and apply appropriate fabrication techniques and characterization techniques in nano structures.

UNIT: I Basics and Scale of Nanotechnology 10 Hours

Introduction and scientific revolutions, Time and length scale in structures, Definition of a nano system, Dimensionality and size dependent phenomena, Surface to volume ratio, Fraction of surface atoms and surface energy, Surface stress and surface defects, Properties at nanoscale – optical & mechanical, Properties at nanoscale – electronic & magnetic.

UNIT: II Different Classes of Nanomaterials 10 Hours

Introduction and scientific revolutions, Time and length scale in structures, Definition of a nano system, Dimensionality and size dependent phenomena, Surface to volume ratio, Fraction of surface atoms and surface energy, Surface stress and surface defects, Properties at nanoscale – optical & mechanical, Properties at nanoscale – electronic & magnetic.

UNIT: III Synthesis of Nanomaterials 10 Hours

Chemical methods: Metal nanocrystals by reduction, Solvothermal synthesis and photochemical synthesis, Sonochemical routes and chemical vapor deposition (CVD), Metal oxide chemical vapor deposition (MOCVD), Physical methods: Ball milling, Electrodeposition techniques, Spray pyrolysis and flame pyrolysis, DC/RF magnetron sputtering, Molecular beam epitaxy (MBE)

UNIT: IV Fabrication and Characterization of Nanostructures 10 Hours

Nanofabrication: Photolithography and its limitation and electron beam lithography (EBL), Nanoimprinting and soft lithography patterning, Characterization: Field emission scanning electron microscopy (FESEM) and environmental scanning electron microscopy (ESEM), High resolution transmission electron microscope (HRTEM), Scanning tunneling microscope (STM), Surface enhanced raman spectroscopy (SERS), X-ray photoelectron spectroscopy (XPS), Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS).

UNIT: V Applications in Nanotechnology 10 Hours

Solar energy conversion and catalysis, Molecular electronics, nanoelectronics and printed electronics, Polymers with a special architecture, liquid crystalline systems, Linear and nonlinear optical and electro-optical properties, Applications - nanomaterials for data storage, Photonics and plasmonics, Chemical and biosensors, Nanomedicine and nanobiotechnology, Nanotoxicology challenges.

Text Book(s)

1. T. Pradeep, "A Textbook of Nanoscience and Nanotechnology", Tata McGraw HillEducation Pvt. Ltd., 2012
2 Hari Singh Nalwa, "Nanostructured Materials and Nanotechnology", Academic Press,2008
3 A.Nabok, "Organic and Inorganic Nanostructures", Artech House, 2009

Reference Books

1 C.Dupas, P.Houdy, M.Lahmani, "Nanoscience: Nanotechnologies and Nanophysics",Springer-Verlag Berlin Heidelberg, 2007
2 A. S. Edelstein and R. C. Cammarata, "Nanomaterials: Synthesis, Properties andApplications", Institute of Physics Pub., 2001

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	3	3											3	
CO3	3	3											3	
CO4	3	3											3	
Average	3	3											3	
Level of correlation	3	3											3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech - I - Semester

20AME67	**Tribology in Design**	**L T P C**
		3 1 0 **4**

Course Outcomes:

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

1. Explain the fundamentals of tribology and associated parameters.
2. Apply concepts of tribology for the performance analysis and design of components experiencing relative motion.
3. Analyse the requirements and design hydrodynamic journal and plane slider bearings for a given application.
4. Select suitable bearing lubricants and seals for a given tribological application.
5. Analyze failures in tribological components like bearing, gear and seals.

UNIT: I Introduction 10 Hours

Introduction: Nature of surfaces and contact-Surface topography-friction and wear mechanisms and effect of lubricants- methods of fluid film formation.

Selection of rolling element bearings: Nominal life, static and dynamic capacity-Equivalent load, probabilities of survival- cubic mean load- bearing mounting details, pre loading of bearings, conditioning monitoring using shock pulse method.

UNIT: II Hydrodynamic bearings 10 Hours

Hydrodynamic bearings: Fundamentals of fluid formation – Reynold's equation; Hydrodynamic journal bearings – Sommerfield number- performance parameters – optimum bearing with maximum load capacity – Friction – Heat generated and Heat dissipated. Hydrodynamic thrust bearings; Raimondi and Boyd solution for hydrodynamic thrust bearings- fixed tilting pads, single and multiple pad bearings-optimum condition with largest minimum film thickness.

UNIT: III Hydrostatic Bearings and Dry rubbing Bearings 10 Hours

Hydrostatic Bearings: Thrust bearings – pad coefficients- restriction- optimum film thickness-journal bearings – design procedure –Aerostatic bearings; Thrust bearings and Journal bearings – design procedure.

Dry rubbing Bearings: porous metal bearings and oscillatory journal bearings – qualitative approach only.

UNIT: IV Lubrication 10 Hours

Lubrication: Choice of lubricants, types of oil, Grease and solid lubricants- additives- lubrication systems and their selection – selection of pump, filters, piping design- oil changing and oil conservation.

UNIT: V Seals 10 Hours

Seals: different type-mechanical seals, lip seals, packed glands, soft piston seals, Mechanical piston rod packing, labyrinth seals and throttling bushes, oil flinger rings and drain grooves – selection of mechanical seals.

Failure of Tribological components: Failure analysis of plain bearings, rolling bearings, gears and seals, wear analysis using soap and Ferrography.

Text Book(s)

1. Rowe WW& O' Dionoghue,"Hydrostatic and Hybrid bearing design " Butterworths & Co.Publishers Ltd,1983.
2 Collacott R.A," Mechanical Fault diagnosis and condition monitoring", Chapman and Hall, London 1977.
3 Bernard J.Hamrock, " Fundamentals of fluid film lubricant", Mc Graw-Hill Co.,1994.

Reference Books

1 Neale MJ, (Editor) " Tribology hand Book"Neumann Butterworths, 1975.
2 Connor and Boyd JJO (Editors) " Standard hand book of lubrication engineers " ASLE,Mc Graw Hill Book & Co.,1968
3. Shigley J, E Charles," Mechanical Engineering Design", McGraw Hill Co., 1989

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3											3	3
CO5	3	3											3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech - I - Semester

20AME68 **Engine and Vehicle Management System**

L	T	P	C
3	1	0	4

Course Outcomes:

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

1. Explain the basics of automotive electronics in vehicle management systems.
2. Select suitable sensors for vehicle management systems.
3. Describe the working of engines and their control systems.
4. Choose appropriate electronic management system based on eco friendly and safety constraints.

UNIT: I Fundamentals of Automotive Electronics 10 Hours

Microprocessor architecture, open and closed loop control strategies, PID control, Look up tables, introduction to modern control strategies like Fuzzy logic and adaptive control. Parameters to be controlled in SI and CI engines and in the other parts of the automobile.

UNIT: II Sensors 10 Hours

Inductive, Hall effect, hot wire, thermistor, piezo electric, piezoresistive, based sensors. Throttle position, mass air flow, crank shaft position, cam position, engine and wheel speed, steering position, tire pressure, brake pressure, steering torque, fuel level, crash, exhaust oxygen level (two step and linear lambda), knock, engine temperature, manifold temperature and pressure sensors, gyro sensors.

UNIT: III SI Engine Management 10 Hours

Three-way catalytic converter, conversion efficiency versus lambda. Layout and working of SI engine management systems like Bosch L-Jetronic and LH-Jetronic. Group and sequential injection techniques. Working of the fuel system components. Cold start and warm up phases, idle speed control, acceleration and full load enrichment, deceleration fuel cutoff. Fuel control maps, open loop control of fuel injection and closed loop lambda control. Electronic ignition systems and spark timing control. Closed loop control of knock.

UNIT: IV CI Engine Management 10 Hours

Fuel injection system parameters affecting combustion, noise and emissions in CI engines. Pilot, main, advanced post injection and retarded post injection. Electronically controlled Unit Injection system.

Layout of the common rail fuel injection system. Working of components like fuel injector, fuel pump, rail pressure limiter, flow limiter, EGR valves

UNIT: V Vehicle Management Systems 10 Hours

ABS system, its need, layout and working. Electronic control of suspension – Damping control, Electric power steering, Supplementary Restraint System of air bag system – crash sensor, seat belt tightening. Cruise control. Vehicle security systems- alarms, vehicle tracking system. On board diagnostics. Collision avoidance Radar warning system.

Text Book(s)

1. Eric Chowanietz "Automobile Electronics" SAE Publications, 1994
2 William B Ribbens "Understanding Automotive Electronics", SAE Publications, 1998

Reference Books

1 Robert Bosch "Diesel Engine Management" SAE Publications, 2006.
2 Robert Bosch, "Gasoline Engine Management" SAE Publications, 2006.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	3	3											3	
CO3	3												3	
CO4	3	3				3	3						3	
Average	3	3				3	3						3	
Level of correlation	3	3				3	3						3	

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech -I Semester

20AME69 **Measurements and Control Systems**

L	T	P	C
3	1	0	4

Course Outcomes:

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

1. Describe the 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 ecofriendly 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.

UNIT: I Basics of Measurements & Viscosity and Displacement 10 Hours

Significance of mechanical measurement, fundamental methods of measurement, generalized measuring system and its elements, errors-types, classification and calibration.

Measurement of Viscosity: Measuring Systems-Capillary tube, Redwood, Engler, Falling sphere, Rotating cylinder and Electrical viscometers.

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, Humidity, Level 9 Hours

Temperature measuring instruments, Liquid-inglass and bi-metallic thermometers, Thermocouples, Resistance thermometers and thermistors, Radiation and optical pyrometers, errors and precautions in temperature measurement, measurement of temperature in rapidly moving gas, Calibration.

Measurement of Humidity And Moisture: Sling psychrometer, Absorption hygrometer, Measuring Dew point and moisture content.

Measurement of Liquid Level: Direct method, Indirect method, Electrical liquid level sensors

UNIT: III Pressure, Flow, Speed measurement 9 Hours

Measurement of Pressure: Static and dynamic pressures, Pressure measuring systems-Bourdan pressure gauge, Diaphragm gauge, Bellow gauge, High pressure measurement Electrical resistance pressure gauge, Low pressure measurement-Mcleod gauge, Thermal conductivity gauge, Ionization gauge.

Measurement of Flow: Nature of flow, Flow measuring systems-Rotameter, Ultrasonic, Electro-magnetic, Hot - wire anemometer, Laser Doppler Anemometer.

Measurement of Speed, Acceleration And Vibration: Tachometers, Mechanical, Electrical, Contactless electrical acceleration-piezoelectric type, seismic type, vibration-Reed vibrometer.

UNIT: IV Stress & Strain Measurements 10 Hours

Stress & Strain Measurements: Strain-measuring techniques, Electrical resistance strain gauge, types of metal resistance strain gauges-Bonded and unbounded, selection and installation factors for bonded metallic strain gauges, use of strain gauges on rotating shafts, commercially available strain measuring systems, strain gauge Rosettes.

Measurement of Force and Torque: Force Measurement-Elastic force meter, Loadcells. Torque measurement-Mechanical, optical, Electrical, Strain gauge torsion meters.

UNIT: V IOT based measurement and control system 10 Hours

IOT Based viscosity measurement, speed measurement, IOT based temperature and humidity monitoring system, IOT pressure sensor and IOT water level Indicator.

Control System: Introduction, classification, terminology, servomechanisms, manual and automatic control systems.

Text Book(s)

1. S. Bhaskar, Instrumentation and Control Systems, Wiley Publications,4thEdition, Anuradha Agencies, 2008.
2 D.S. Kumar, Measurement Systems, Applications & design, New Delhi, 8thEdition, Lakshmi Publication, 2010.

Reference Books

1 R.K. Jain, Mechanical and Industrial Measurements, New Delhi, 11thEdition, Khanna Publishers, 2011.
2 Beckwith, Marangoni & Linehard, Mechanical Measurements, 6th Edition, Printice Hall International Publishers, 2006. 3. Jack Philip Holman, Experimental Methods for Engineers, McGraw-Hill, 1994.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-											3	3
CO2	3	2											3	3
CO3	3	2											3	3
CO4	3	2											3	3
CO5	3	2											3	3
Average	3	2											3	3
Level of correlation	3	2											3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I - Semester

20AME70	**Mechanical Vibration**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Explain the cause and effect of vibration in mechanical system
2. Formulate governing equation of motion for physical system
3. Explain role of damping, stiffness, and inertia in mechanical system
4. Analyze rotating system and calculate critical speeds
5. Estimate the parameters of vibration isolation system, natural frequencies and mode shapes of continuous system

UNIT: I Single DOF- Free Vibrations 10 Hours

Basic concepts: Causes and effect of vibrations, practical applications, harmonic and periodic motions, vibration terminology, vibration model, Equation of motion -natural frequency, Energy method, Rayleigh method, principle of virtual work, damping model, viscously damped free vibration, Oscillatory, non-oscillatory and critically damped motions, logarithmic decrement. Coulomb's damping.

UNIT: II Single DOF- Forced Vibrations 10 Hours

Analysis of linear and torsional system subjected to harmonic force excitation, force transmissibility, Magnification factor, motion transmissibility, vibration isolation, typical isolator and mounts, critical speed of single rotor, undamped and damped.

UNIT: III Two DOF Systems 10 Hours

Introduction, formulation of equation of motion, equilibrium method, lagrangian method, free vibration response, Eigen values and eigen vector, Normal mode and mode superposition, Coordinate coupling, decoupling equation of motion.

UNIT: IV Torsional Vibration 10 Hours

Simplesystem with one or two rotor masses, Multi DOF system: transfer matrix method, geared system, and branched system.

UNIT: V Multi Degree of Freedom System and Continuous Systems 10 Hours

Formulation of equation of motion, free vibration response, natural mode and mode shapes, orthogonality of model vectors, normalization of model vectors, decoupling of modes, model analysis, mode superposition technique. Free vibration response through model analysis. DF

Continuous Systems :Vibration of strings, longitudinal and transverse vibration of rods, transverse vibrations of beams, equation of motions and boundary conditions, transverse vibration of beams, natural frequencies and mode shapes.

Text Book(s)

1. L. Meirovich, "Elements of Vibration Analysis", Tata McGraw Hill.
2 S. S. Rao, "Mechanical Vibrations", Pearson education.

Reference Books

1 W. T. Thompson, "Theory of Vibration", CBS Publisher.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											2	1
CO2	3	3											2	2
CO3	3	3											2	1
CO4	3	3											2	2
CO5	3	3											2	2
Average	3	3											2	1.6
Level of correlation	3	3											2	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech - II - Semester

20AME71	**Experimental Stress Analysis**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Apply the stress and strain relations to solve the engineering problems.
2. Analyse the stress failures on the coated components.
3. Apply the Moires method to solve the plane displacement.
4. Apply the photo elasticity method to analyse the stress distribution.

UNIT: I Introduction 10 hours

Introduction: Theory of Elasticity, Plane stress and plane strain conditions, Compatibility conditions. Three-dimensional stress strain relations.

Strain Measurement Methods: Various types of strain gauges, Electrical Resistance strain gauges, semiconductor strain gauges, strain gauge circuits, effect of poission ratio strain gauge results, measurements of residual strain general applications.

UNIT: II Brittle coatings 10 hours

Brittle coatings: Introduction, coating stresses, failure theories, brittle coating crack patterns, crack detection, ceramic based brittle coatings, resin based brittle coatings, test procedures for brittle coatings analysis, calibration procedures, analysis of brittle coating data.

UNIT: III Moire Methods 10 hours

Moire Methods: Introduction, mechanism of formation of Moire fringes, the geometrical approach to Moire-Fringe analysis, the displacement field approach to Moire-Fringe analysis, out of plane displacement measurements, out of plane slope measurements, sharpening and multiplication of Moire-Fringes, experimental procedure and techniques.

UNIT: IV Photo elasticity 10 hours

Photo elasticity: Photo elasticity – Polariscope – Plane and circularly polarized light, Bright and dark field setups, Photo elastic materials – Isochromatic fringes – Isoclinics

UNIT: V Three dimensional Photo elasticity 10 hours

Three dimensional Photo elasticity : Introduction, locking in model deformation, materials for three-dimensional photo elasticity, machining cementing and slicing three-dimensional models, slicing the model and interpretation of the resulting fringe patterns, effective stresses, the shear-difference method in three dimensions, applications of the Frozen-stress method, the scattered-light method.

Birefringent Coatings

Introduction, Coating stresses and strains, coating sensitivity, coating materials, application of coatings, effects of coating thickness, Fringe-order determinations in coatings, stress separation methods.

Text Book(s)

1. Theory of Elasticity by Timoshenke and Goodier Jr
2 Experimental stress analysis by Dally and Riley,Mc Graw-Hill

Reference Books

1 A treatise on Mathematical theory of Elasticity by Love .A.H
2 Photo Elasticity by Frocht

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2										3	2
CO2	3	3	2										3	2
CO3	3	3	2										3	2
CO4	3	3	2										3	2
Average	3	3	2										3	2
Level of correlation	3	3	2										3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech - II - Semester

20AME72	**Advanced Mechanical Design**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Compute mobility and motion parameters
2. Apply Hall and Ault's method, Goodman's indirect method and Chase solution, explain instant center of acceleration; apply Euler- Savory equation and Bobillier construction
3. Design two, and three position synthesis; apply Chebychev spacing; describe cognate linkages
4. Analyze forces on static and dynamic mechanisms
5. Analyze RSSR mechanism; apply D–H notation; contrast forward and inverse kinematics.

UNIT: I Introduction 10 Hours

Introduction – review of fundamentals of kinematics - analysis and synthesis – terminology, definitions and assumptions – planar, spherical and spatial mechanisms‟ mobility – classification of mechanisms – kinematic Inversion – Grashoff`s law Position and displacement – complex algebra solutions of planar vector equations – coupler curve generation velocity – analytical methods - vector method – complex algebra methods – Freudenstein‟s theorem.

UNIT: II Planar complex mechanisms 10 Hours

Planar complex mechanisms - kinematic analysis - low degree complexity and high degree complexity, Hall and Ault`s auxiliary point method – Goodman‟s indirect method for low degree of complexity Mechanisms Acceleration – analytical methods – Chase solution - Instant centre of acceleration. Euler-Savory equation - Bobillier construction.

UNIT: III Synthesis of mechanisms 10 Hours

Synthesis of mechanisms: Type, number and dimensional synthesis – function generation – two position synthesis of slider crank and crank rocker mechanisms with optimum transmission angle – three position synthesis – structural error – Chebychev spacing - Cognate linkages – Robert-Chebychev theorem – Block‟s method of synthesis, Freudenstein‟s equation.

UNIT: IV Static force analysis of planar 10 Hours

Static force analysis of planar mechanism – static force analysis of planar mechanism with friction – method of virtual work Dynamic force analysis of planar mechanisms - Combined static and inertia force analysis.

UNIT: V Kinematic analysis 10 Hours

Kinematic analysis of spatial revolute-Spherical-Spherical-Revolute mechanism – Denavit-Hartenberg parameters – forward and inverse kinematics of robotic manipulators.

Text Book(s)

1. Amitabh Ghosh and Ashok Kumar Mallik, "Theory of Mechanisms and Machines,",3e, EWP, 1999.
2 Shighley Joseph Edwards and Uicker John Joseph, "Theory of Machines and Mechanism", 2e, McGraw Hill,1985.

Reference Books

1 Arthur G. Erdman and G.N. Sandor, "Advanced Mechanism Design: Analysis and Synthesis", Vol. I, PHI, 1984.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2										3	2
CO2	3	3	2										3	2
CO3	3	3	3										3	3
CO4	3	3	3										3	3
CO5	3	3	3										3	3
Average	3	3	2.6										3	2.6
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech - II - Semester

20AME73	**Advanced Thermodynamics**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Explain thermodynamic concepts and laws
2. Describe the concepts entropy and exergy and their use in analyses of thermal energy systems
3. Analyze power plants, refrigeration plants and thermal/chemical installations
4. Evaluate means for minimizing excergy losses in selected processes

UNIT: I Review of Thermodynamic Laws And Corollaries 10 Hours

Transient flow analysis, Second law of thermodynamics, Entropy, Availability and unavailability, Thermodynamic potential. Maxwell relations, Specific heat relations, Mayer's relation. Evaluation of thermodynamic properties of working substance

UNIT: II P.V.T Surface 10 Hours

Equation of state. Real gas behavior, Vander Waal's equation, Generalization compressibility factor. Energy properties of real gases. Vapour pressure, Clausius-Clapeyro equation. Throttling, Joule Thompson coefficient. Non-reactive mixtures of perfect gases. Governing laws, Evaluation of properties, Psychometric mixture properties and psychometric chart, Air conditioning processes, cooling towers. Real gas mixture.

UNIT: III Combustion 10 Hours

Combustion Reactions, Enthalpy of formation. Entropy of formation, Reference levels of tables. Energy of formation, Heat reaction, Adiabatic flame temperature generated product, Enthalpies, Equilibrium. Chemical equilibrium of ideal gases, Effect of non-reacting gases equilibrium in multiple reactions, The Vent Hoff’s equation. The chemical potential and phase equilibrium. The Gibbs phase rule.

UNIT: IV Power Cycles 10 Hours

Review binary vapour cycle, co generation and combined cycles, Second law analysts of cycles. Refrigeration cycles, Thermodynamics of irreversible processes. Introduction, Phenomenological laws, Onsager Reciprocity relation, Applicability of the Phenomenological relations, Heat flux and entropy production, Thermodynamic phenomena, Thermo electric circuits.

UNIT: V Direct Energy Conversion Introduction 10 Hours

Fuel cells, Thermo electric energy, Thermo ionic power generation, Thermodynamic devices magneto hydrodynamic generations, Photovoltaic cells.

Text Book(s)

1. Basic and Applied Thermodynamics by P. K. Nag. McGraw Hill Education; 2nd edition (1 July 2017).
2 Engineering Thermodynamics by Rogers & Mayhew, 4th Edition Pearson
3. Thermodynamics by Holman, Mc Graw Hill.

Reference Books

1 Applied Thermodynamics by R.K. Rajput, Laxmi Publications
2 Thermodynamics for Engineers by Doolittle-Messe, John Wiley & Sons
3 Engineering Thermodynamics by Chatopadyaya

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2										3	
CO2	3	3	1										3	2
CO3	3	2	3										3	2
CO4	3	3	2										3	2
Average	3	2.75	2										3	2
Level of correlation	3	3	2										3	2

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech - II - Semester

20AME74	**Synthesis of Nanomaterials**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Apply the appropriate physical and chemical methods for engineering components.
2. Apply the biology method for analysis the nanomaterials used in industries.
3. Select and apply the deposition method for characterization of nanomaterials.

UNIT: I Introduction 7 Hours

Introduction, Bottom-up approach: Sol-gel method, emulsion and Top-down: ball milling approach with examples.

UNIT: II Physical methods 10 Hours

Inert gas condensation, Arc discharge, plasma synthesis, electric explosion of wires, molecular beam epitaxy, Physical Vapour Deposition, thermal evaporation, lithography and sputtering.

UNIT: III Chemical methods 10 Hours

Nanocrystals by chemical reduction, photochemical synthesis, electrochemical synthesis, co-precipitation method. Semiconductor nanocrystals by arrested precipitation, sonochemical routes.

UNIT: IV Biological methods 10 Hours

Biological methods – use of bacteria, fungi, actinomycetes for nano-particle synthesis nanoparticles Solvated metal atom dispersion, Template based synthesis of nanomaterials.

UNIT: V Deposition methods 10 Hours

Thermolysis route - spray pyrolysis, solvothermal and hydrothermal routes, solution combustion synthesis, Chemical vapor deposition.

Text Book(s)

1. Textbook of Nanoscience and Nanotechnology – B. S. Murthy, P. Shankar, Baldev Raj, B. B . Rath and James Murday, University Press-IIM Series in Metallurgy and Materials Science.
2 A Textbook of Nanoscience and Nanotechnology – T. Pradeep, Tata McGraw Hill edition.
3 Nanostructures and Nanomaterials by Guozhong Cao

4 Inorganic Materials Synthesis and Fabrication by J.N. Lalena, D.A. Cleary, E.E. Carpenter, N.F. Dean, John Wiley & Sons Inc.

5 The Chemistry of nanomaterials: Synthesis, Properties and Applications, Vol-I by C.N.R. Rao, A. Muller and A.K. Cheetham

Reference Books

1 Encyclopedia of Nanotechnology by M. Balakrishna Rao and K. Krishna Reddy, Vol I to X, Campus books.

2 Encyclopedia of Nanotechnology by H.S. Nalwa

3 Nano: The Essentials – Understanding Nano Science and Nanotechnology – by T.Pradeep, Tata McGraw Hill

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2											3	
CO2	3	2											3	
CO3	3	2											3	
Average	3	2											3	
Level of correlation	3	2											3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech - II - Semester

20AME75	**Optimization Techniques in Engineering**	**L**	**T**	**P**	**C**
		3	1	0	3

Course Outcomes:

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

1. Solve the optimization problems using single variable or multivariable.
2. Conduct sensitivity analysis to study effect of changes in parameters of LPP on the optimal solution without reworking.
3. Solve the problem by using a appropriate optimization techniques
4. Apply chance constrained algorithm and solve stochastic linear programme.

UNIT: I Single Variable Non-Linear Unconstrained Optimization 10 Hours

Single Variable Non-Linear Unconstrained Optimization: Elimination methods: Uni- Model function-its importance, Fibonacci method & Golden section method.

Interpolation methods: Quadratic & Cubic interpolation methods.

UNIT: II Multi variable non-linear unconstrained optimization 10 Hours

Multi variable non-linear unconstrained optimization: Direct search methods – Univariant method, Pattern search methods – Powell's, Hook - Jeeves, Rosen brock search methods. Gradient methods: Gradient of function& its importance, Steepest descent method

Conjugate direction methods: Fletcher-Reeves method & variable metric method.

UNIT: III Linear Programming 10 Hours

Linear Programming – Formulation, Simplex method, & artificial variable optimization techniques: Big M & Two phase methods. Sensitivity analysis: Changes in the objective coefficients, constants& coefficients of the constraints. Addition and deletion of variables, constraints.

Simulation – Introduction – Types- steps – applications: inventory & queuing – Advantages and disadvantages

UNIT: IV Integer Programming 10 Hours

Integer Programming- Introduction – formulation – Gomory cutting plane algorithm – Zero or one algorithm, branch and bound method

Stochastic Programming: Basic concepts of probability theory, random variablesdistributions- mean, variance, correlation, co variance, joint probability distribution.
Stochastic linear programming: Chance constrained algorithm.

UNIT: V Geometric Programming 10 Hours

Geometric Programming: Polynomials – Arithmetic - Geometric inequality – unconstrained G.P- constrained G.P (≤ type only)
Non Traditional Optimization Algorithms: Genetics Algorithm-Working Principles, Similarities, and Differences between Genetic Algorithm & Traditional Methods. Simulated Annealing- Working Principle-Simple Problems. Introduction to Particle Swarm Optimization (PSO).

Text Book(s)

1. Optimization theory & Applications / S. S. Rao / New Age International.
2 Optimization for Engineering Design, Kalyanmoy Deb, PHI
3. Optimization Techniques theory and practice by M. C. Joshi, K. M. Moudgalya Narosa Publications

Reference Books

1 Operations Research by S. D. Sharma Kedarnath & Ramnath Publisher
2 Operation Research by Hamdy A Taha Pearson Educations

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech - II - Semester

20AME76	**Advanced Finite Elements Methods**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Develop equations in finite element methods with governing equations to solve problems with different boundary conditions.
2. Apply and analyze the structural and heat transfer distribution in 1D and 2D industrial problems.
3. Apply Isoparametric Formulation to solve industrial problems.
4. Analyze the static and dynamic problems.

UNIT: I Introduction 10 Hours

Formulation Techniques: Methodology, Engineering problems and governing differential equations, finite elements., Variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, Galerkin and weighted residual methods, calculus of variations, Essential and natural boundary conditions.

UNIT: II One-Dimensional Elements 10 Hours

One-Dimensional Elements: Bar, trusses, beams and frames, displacements, stresses and temperature effects.

UNIT: III Two Dimensional Problems 10 Hours

Two Dimensional Problems: CST, LST, four nodded and eight nodded rectangular elements, Lagrange basis for triangles and rectangles, serendipity interpolation functions. Axisymmetric Problems: Axisymmetric formulations, Element matrices, boundary conditions. Heat Transfer problems: Conduction and convection, examples: - two- dimensional fin.

UNIT: IV Isoparametric Formulation 10 Hours

Isoparametric Formulation: Concepts, sub parametric, super parametric elements, numerical integration, Requirements for convergence, h-refinement and p-refinement, complete and incomplete interpolation functions, Pascal’s triangle, Patch test.

UNIT: V Finite Elements In Structural Analysis 10 Hours

Finite Elements In Structural Analysis: Static and dynamic analysis, eigen value problems, and their solution methods, case studies using commercial finite element packages.

Text Book(s)

1. Finite element methods by Chandrubatla & Belagondu.
2 J.N. Reddy, Finite element method in Heat transfer and fluid dynamics, CRC press, 1994

Reference Books

1 Zienckiwicz O.C. & R. L. Taylor, Finite Element Method, McGraw-Hill,1983.

2 K. J. Bathe, Finite element procedures, Prentice-Hall, 1996

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech - II - Semester

20AME77	**Waste to Energy**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Apply the basic working principles to understand the energy conversion devices, incinerators, gasifiers, digestors.
2. Apply the different methods of biomass pyrolysis to manufacture of pyrolytic oils and gases.
3. Apply the basic terminology in biomass gasification process to understand the working principle of fixed and fluidized bed gasifiers.
4. Apply the basic principles of biomass combustion process to understand the different kinds of combustors.
5. Use the basic information related to biogas and also understand the working principles of its power plant layout.

UNIT: I Introduction 10 hours

Introduction to Energy from Waste: Classification of waste as fuel,Agro based, Forest residue, Industrial waste , MSW, Conversion devices, Incinerators, gasifiers, digestors

UNIT: II Biomass Pyrolysis 10 hours

Biomass Pyrolysis: Pyrolysis, Types, slow fast, Manufacture of charcoal, Methods Yields and application, Manufacture of pyrolytic oils and gases, yields and applications.

UNIT: III Biomass Gasification 10 hours

Biomass Gasification: Gasifiers, Fixed bed system, Downdraft and updraft gasifierFluidized bed gasifiers, Design, construction and operation, Gasifier burner arrangement for thermal heating, gasifier engine arrangement and electrical power Equilibrium and kinetic consideration in gasifier operation.

UNIT: IV Biomass Combustion 10 hours

Biomass Combustion: Biomass stoves, Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation, Operation of all the above biomass combustors.

UNIT: V Biogas **10 hours**

Biogas: Properties of biogas (Calorific value and composition) , Biogas plant technology and status, Bio energy system , Design and constructional features , Biomass resources and their classification, Biomass conversion processes, Thermo chemical conversion, Direct combustion ,biomass gasification, pyrolysis and liquefaction , biochemical conversion, anaerobic digestion ,Types of biogas Plants, Applications , Alcohol production from biomass, Bio diesel production, Urban waste to energy conversion , Biomass energy programmed in India.

Text Book(s)

1. Biogas Technology , A Practical Hand Book , Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
2 Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

Reference Books

1 Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2 Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	
CO2	3	3											3	
CO3	3	3											3	
CO4	3	3											3	
CO5	3	3											3	
Average	3	3											3	
Level of correlation	3	3											3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech - II - Semester

20AME78	**Characterization of Nanomaterials**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Describe advanced optical and magnetic characterization techniques in used nanomaterials.
2. Explain various specimen preparation methods based on different sample types.
3. Apply and analysis characterization of nanomaterials for future research.
4. Analysis characters of non-materials through advanced characterization techniques.

UNIT: I Fundamentals of Electron Microscopy 10 Hours

Advantages of Electron Microscope over Optical Microscope (Magnification, Resolution, Depth of field). Theory and principle of Electron Microscope, Electron sources, Electron lenses (Electrostatic and Electromagnetic).

UNIT: II Scanning Electron Microscopy (SEM) 10 Hours

Theory of operation, Specimen-Beam interactions Importance of beam spot size, Machine variables, Scanning Electron Microscope (SEM).

Specimen Preparation in SEM: Special methods for various sample types – Biological sample preparation, Applications of SEM

UNIT: III Transmission Electron Microscopy (TEM) 10 Hours

Theory of operation, Modes of operation, Transmission Electron Microscope (TEM), Bright field Imaging, Electron diffraction, Dark field imaging, High Resolution TEM (HRTEM), Applications of TEM.

UNIT: IV Atomic Force Microscopy 10 Hours

AFM: Basic concepts – Interactive forces, Principle and instrumentation, Force curves and force measurements, Modes of imaging: Tapping, contact and non-contact, Probes, Tip functionalization.

UNIT: V X-Ray Diffraction and Spectroscopic methods: 10 Hours

X-ray diffraction–Powder method, Single crystal diffraction technique -Determination of crystal strucures – Nanostructural analysis – Profile analysis (peak broadening and micro strain) – Crystallite size analysis using Scherer formula and Williamson – Hall equation. UV Spectroscopy, IR Spectroscopy and Raman Spectroscopy.

Text Book(s)

1. Nanotechnology: Principles and Practices – Sulabha K. Kulkarni – Capital Publishing Company
2 Nano: The Essentials – Understanding Nanoscience and Nanotechnology by T. Pradeep. Tata McGraw Hill
3 Introduction to Nano Technology by Charles. P. Poole Jr and Frank J. Owens, Wiley India Pvt Ltd.
4 A practical approach to X-Ray diffraction analysis by C. Suryanarayana

Reference Books

1 Haynes. R, Woodruff. D. P. and Talchar, T.A., optical Microscopy of Materials Cambridge University press, 1986.
2 Flegler, S.L., Heckman, J.W. and Klomparens, K.L., scanning and Transmission Electron Microscopy: A Introduction WH Freeman & Co, 1993.
3 Paul E. West, introduction to Atomic Force Microscopy Theory Practice Applications
4 Julian Chen N, C., introduction to Scanning Tunneling Microscopy, Oxford University Press, Inc., 1993.
5 Goldstein, J., Newbury, D.E., Joy, D.C., and Lym, C.E., scanning Electron Microscopy and X-ray Microanalysis, 2003.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	3												3	
CO3	3	3											3	
CO4	3	3											3	
Average	3	3											3	
Level of correlation	3	3											3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B. Tech - I - Semester

20AME79 **Advanced Heat Transfer** **L T P C**

3 1 0 4

Course Outcomes:

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

1. Apply the basic heat conduction equations in solving the problems related to lumped system analysis.
2. Apply the 1D and 2D steady state equations in solving the problems in transient heat conduction. Further also the apply the basic fundamental equations for solving the problems in forced convection.
3. Apply the basic convection equations for solving the problems under internal and external flow conditions.
4. Apply the basic fundamentals in solving the problems related to boiling and condensation.
5. Understand the basic concepts in radiation heat transfer and solving its problems.

UNIT: I Modes of Heat Transfer 10 Hours

Conduction: General heat Conduction equation-initial and boundary conditions.

Transient heat conduction: Lumped system analysis-Heisler charts-semi infinite solid-use of shape factors in conduction-2D transient heat conduction-product solutions.

UNIT: II Methods for Conduction 10 Hours

Finite Difference Methods for Conduction: ID & 2D steady state and simple transient heat conduction problems-implicit and explicit methods.

Forced Convection: Equations of fluid flow-concepts of continuity, momentum equations derivation of energy equation-methods to determine heat transfer coefficient: Analytical methods-dimensional analysis and concept of exact solution. Approximate method-integral analysis.

UNIT: III External and Internal heat flows 10 Hours

External Flows: Flow over a flat plate: integral method for laminar heat transfer coefficient for different velocity and temperature profiles. Application of empirical relations to variation geometries for laminar and turbulent flows.

Internal flows: Fully developed flow: integral analysis for laminar heat transfer coefficienttypes of flow-constant wall temperature and constant heat flux boundary conditionshydrodynamic & thermal entry lengths; use of empirical correlations.

UNIT: IV Conduction 10 Hours

Free Convection: Approximate analysis on laminar free convective heat transfer boussinesque approximation-different geometries-combined free and forced convection.

Boiling and condensation: Boiling curve-correlations-Nusselts theory of film condensation on a vertical plate-assumptions & correlations of film condensation for different geometries.

UNIT: V Radiation Heat Transfer 10 hours

Radiant heat exchange in grey, non-grey bodies, with transmitting. Reflecting and absorbing media, specular surfaces, gas radiation-radiation from flames.

Text Book(s)

1. Principles of Heat Transfer. Frank Kreith | Raj M. Manglik | Mark S. Bohn.
2 Heat and Mass Transfer by, R. K. Rajput. S. Chand, 2007

Reference Books

1 Engineering Heat and Mass Transfer. By: Das, Sarit K. Material type: material Type Label Book Publisher: New Delhi Dhanpat Rai Publishing Company (P) LTD.

2 Heat Transfer, by P. S. Ghoshdastidar, Edition 2, illustrated, Publisher Oxford University Press, 2012

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	2
CO2	3	3	1										3	2
CO3	3	3	2										3	2
CO4	3	3	3										3	2
CO5	3	2											3	2
Average	3	2.8	2										3	2
Level of correlation	3	3	2										3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B. Tech - I - Semester

20AME80	**Vehicle Dynamics**	**L T P C**
		3 1 0 4

Course Outcomes:

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

1. Evaluate the natural frequency of a single and multi-degree freedom systems
2. Predict the stability of vehicle at different operating conditions
3. Predict the behavior of tyres during braking, acceleration and cornering
4. Discuss the roll stability of a vehicle
5. Analyse the directional stability of the vehicle during cornering

UNIT: I Vehicle Vibrations 10 Hours

Vibration System and human comforts, One DOF, Two DOF, Free and Forced Vibration, Random Vibration, Magnification and Transmissibility, Vibration Absorber.

Multi DOF systems, Modal Analysis, Vehicle Vibration Models- Quarter Car and Half Car Model.

UNIT: II Stability of Vehicles 10 Hours

Load Distribution, Stability on Curved Track and on slope, Gyroscopic Effect, weight Transfer during Acceleration, Cornering and Braking, Overturning and Sliding. Cross wind stability and Equations of motions.

UNIT: III Tyre Dynamics 10 Hours

Rolling Radius, Rolling Resistance – Factors, Forces acting on tyres – Tractive and Braking efforts, Dynamic Tyre Stiffness, Vibration Characteristics, Noise Levels of Tyres.

Cornering Behavior: Behavior while Cornering, Slip angle, Cornering force, Cornering Properties, Camber Thrust, Camber Scrub and Camber Steer.

UNIT: IV Suspension and Roll Stability: 10 Hours

Road irregularities, Suspension Angles, Roll Center, Roll Axis, Roll Center Height, Roll Stability, Suspension Roll and Bump steer.

UNIT: V Vehicle Handling: 10 Hours

Steady State Handling Characteristics- Under steer, Over steer, Directional stability of vehicles. Steady state response to steering input, handling Diagram.

Text Book(s)

1. Rao V. Dukkipati, Jian Pang, “Road Vehicle Dynamics problems and solution”,SAE,2010.
2 David Corolla, “Automotive Engineering: Power-train, chassis system and Vehicle Body’, Butterworth Heinmann, 2009.

Reference Books

1 Thomas D.Gillespie, “Fundamentals of vehicle dynamics”, SAE,1992
2 J.G. Giles, “Steering, Suspension and Tyres”, Illiffe Books Ltd., 1968.
3 J. Y. Wong, “Theory of Ground Vehicles”, John Wiley and Sons Inc., New York, 2001.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2											3
CO2	3	3	2											3
CO3	3	3	2											3
CO4	3													2
CO5	3	3	2											3
Average	3	3	2											2.8
Level of correlation	3	3	2											3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech - I - Semester

20AME81	**Design of Transmission Systems**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Design of pulleys, chain drives, rope drives, belt drives, journal bearings and select rolling contact bearings
2. Analyze forces acting on elements of transmission systems
3. Design of various types of gears and gear boxes.
4. Apply various systems, materials and methods and design transmission systems

UNIT: I Flexible transmission elements 10 Hours

Introduction to transmission systems –factors -materials selection –stresses – belt &chain drives, Design of flat and V- belts, Design of chain drives, Design of rope drives.

Design of bearings : Lubrication, Design of journal bearings – using Sommerfeld number – using McKee's equations, Selection of rolling contact bearings – problems.

UNIT: II Design of gears 10 Hours

Design of spur gears: Introduction - gear kinematics – forces & stresses – factors –materials selection – design of spur gears.

Design of helical gears : Introduction – types - gear kinematics – virtual number of teeth - forces & stresses – factors – design of helical gears.

UNIT: III Design of bevel gears 10 Hours

Introduction – classifications - gear kinematics – factors – design of bevel gears – force analysis.

UNIT: IV Design of worm gears 10 Hours

Introduction – classifications – applications – efficiency – design of worm gears.

UNIT: V Design of gear boxes 10 Hours

Introduction – Types – Components – gear box housing – progression ratio – kinematic arrangement – ray diagram – design of multi speed gear boxes.

Text Book(s)

1. Richard G. Budynas, J.Keith Nisbett, Shigley's Mechanical Engineering Design, 10th edition, McGraw–Hill Education, 2014.
2 Robert L.Norton, Machine Design – An Integrated Approach, 5th edition, Pearson Higher Education, 2014.

Reference Books

1 Juvinal, R.C and Kurt M.Marshek, Machine component design, John Wiley, 2012.
2 V.B. Bhandari, Design of Machine elements, 3rd Edition, Tata Mc Graw Hill, 2010.
3 Design Data, PSG College of Technology, DPV Printers, Coimbatore, 2010.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	2										3	2
CO3	3	3	3										3	3
CO4	3	3	2										3	2
Average	3	3	2.5										3	2.5
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B. Tech - I - Semester

20AME82	**Nano Biomedical Applications**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Understand the concepts of Biological Nanostructures
2. Select the role of nano structured materials in diagnosis
3. Explain the improvements in drug delivery system using nanotechnology.
4. Analysis of various Nanopharmacology & Drug Targeting and drugs delivery systems

UNIT: I Introduction **10 Hours**

Fundamentals terms in biotechnology, Biological building blocks: Sizes of building blocks and Nanostructures, nucleic acids, genetic code and protein synthesis, Enzymes, DNA Nanotechnology, protein nanoparticles and polypeptide nanowires, Protein & Glyco Nanotechnology, Lipid nanotechnology: Lipid based carrier systems(liposomes, solid-lipid nanoparticles), applications .

UNIT: II Biological Nanostructures **10 Hours**

Biological Nanostructures: Bio-mimitics with examples, Bio mineralization, Biocompatible Bio sensors, Examples of proteins, micelles, vesicles, bilayers, and Multilayer films, application of bio-nanotechnology: bio nano machines.

UNIT: III Nano biosensors **10 Hours**

Nano biosensors and biomedical applications, organic semiconductors, biological neurons and their functions, bio-chemical and quantum mechanical computers: DNA computers, parallel processing, Bit and 'Q' bit, Quantum parallelism.

UNIT: IV Nanomaterials in Medical application **10 Hours**

Nanomaterials for Cancer Diagnosis, Carbon Nanomaterials in biomedical applications, nanoscale polymer fabrication for biomedical application, nanotechnology in cancer drug therapy: A biocomputational approach, Nanotoxicology.

UNIT: V Nanotechnology in Organ Printing 10 Hours

Nanotechnology in Organ Printing: Organ Printing, types of organ printing, 3D Bio Printing approachs, Nanotechnology for organ printing. Nanotechnology in Tissues Engineering, Nano Artificial Cells: Artificial RBC, applications of artificial cells, synthetic cells and its applications, Nanotechnology in Point of Care Diagnostics: point-of-care tests, paper-based diagnosis, Nanotechnology for point-of-care testing.

Text Book(s)

1. Introduction to Nanotechnology by Charles. P.PooleJr and Frank J. Owens, Wiley India Pvt Ltd.
2 Nano Technology, A gentle introduction to the next big idea by Mark Ranter and Daniel Ranter,Pearson education
3 Nanotechnology – science, innovation and opportunity by Lynn E Foster, Prentice Hall – Pearson education.

Reference Books

1 Encyclopedia of Nanotechnology by H.S.Nalwa
2 Encyclopaedia of Nanotechnology by M.BalakrishnaRao and K.Krishna Reddy (Vol I to X).

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												2	
CO2	3												2	
CO3	3												2	
CO4	3	3											3	
Average	3	3											2.25	
Level of correlation	3	3											2	

3-High Mapping 2- Medium Mapping 1-Low Mapping

General MINOR degree in a Discipline

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B. Tech - II - Semester

20AME83	**Thermodynamics and Internal Combustion Engines**	**L**	**T**	**P**	**C**
		3	0	2	4

Course Outcomes:

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

1. Apply the principles of Thermodynamics to conduct analysis of various thermal engineering systems and processes, complying entropy to environment
2. Use the working principles of different air standard power cycles in solving the problems for Internal Combustion Engines.
3. Apply the principle of various performance parameters and measurements in solving the problems related to performance of IC Engine, complying to pollution standards

UNIT: I Basic Concepts and First Law of Thermodynamics 10 hours

Basic concepts -concept of continuum, Macroscopic and Microscopic approach: Thermodynamic systems -closed, open and isolated systems, Property, State, Path and Process, Quasi-static process, Work, Modes of work, work and heat transfer for different thermodynamic processes, Zeroth law of thermodynamics –concept of Temperature and Heat. First law of thermodynamics– SFEE - Application to closed and open systems. Related problems

UNIT: II Second Law of Thermodynamics 10 hours

Second law of thermodynamics –Kelvin’s and Clausius statements of Second Law, Heat Engines, Refrigerator and Heat Pump, Coefficient of Performance, Clausius theorem, Clausius in-equality, Reversibility and Irreversibility, Carnot cycle-, efficiency, Carnot theorem and corollaries, Absolute thermodynamic temperature scale, related problems.

UNIT: III Entropy and Thermodynamics Relations 10 hours

Concept of Entropy, entropy of ideal gas, change of entropy for different non-flow processes, principle of increase of entropy –absolute entropy, Effect of Entropy on Environment, Availability and Irreversibility. Exact differentials, T-D relations: Maxwell’s relations, Clausius Clapeyron equations, Joule-Thomson coefficient.

UNIT: IV Air Standard Cycles and Internal Combustion Engines 10 hours

Air Standard Power Cycles: Otto Cycle, Diesel Cycle, Dual Combustion Cycle, Description and representation on P–V and T-S diagram, comparison, thermal efficiency. Mean effective pressure, related problems.

I.C. Engines: Definition of Engine and Heat Engine, I.C Engine Classification – Parts of I.C. Engines, Working of I.C. Engines, Two Stroke & Four Stroke I.C. Engines, SI & CI Engines, differences, Valve and Port Timing Diagrams.

UNIT: V Testing and Performance 10 hours

Testing and Performance: Parameters of Performance - Measurement of Cylinder Pressure, Fuel Consumption, Air Intake, Exhaust Gas Composition and their effect on environment, Brake Power – Determination of Frictional Losses and Indicated Power – Performance Test – Heat Balance Sheet, Related problems.

Text Book(s)

1. P.K. Nag., Engineering Thermodynamics, Tata McGraw Hill, New Delhi, 5th Edition, 2014.
2 R.K. Rajput, Thermal Engineering, Hyderabad, Lakshmi Publications Pvt. Ltd, 9th Edition, 2013.
3 V. Ganesan, I.C. Engines, Noida, 4th Edition, Tata McGraw Hill, 2014.
4 R.S. Khurmi & J.K.Gupta, Thermal Engineering, 15th Edition, Hyderabad, S.Chand, 2013.

Reference Books

1 J.P. Holman, Thermodynamics, 3rd Edition, Tata McGraw Hill, 1995.
2 P.L. Balleny, Thermal Engineering, 20th Edition, Khanna Publishers, New Delhi, 1994.
3. S. Domkundwar, C.P. Kothandaraman, Anand Domkundwar, Thermal Engineering, Dhanpat Rai & Co. 2016.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	2	-	-	-	-	-	3	2
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	2
CO3	3	3	-	-	-	-	2	-	-	-	-	-	3	2
Average	3	3	-	-	-	-	2	-	-	-	-	-	3	2
Level of correlation	3	3	-	-	-	-	2	-	-	-	-	-	3	2

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
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III B. Tech - I - Semester

20AME84 Engineering Materials and Manufacturing process

L	T	P	C
3	0	2	4

Course Outcomes:

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

1. Analyze the structural, constitutional characteristics of alloys and calculate atomic packing factor of different structures.
2. Analyze the properties of materials and enhance the same through heat treatment processes.
3. Design the gating system using the knowledge of foundry.
4. Demonstrate the knowledge on casting process, cast defects and operational procedures required in manufacturing the cast part.

UNIT: I Materials Structure and Constitution of Alloys 10 hours

Materials Structure: Space lattice, Unit cells and Metallic crystal structures (SC, BCC, FCC and HCP), Crystal defects: Point, Line, Interstitial and Volume, Primary and secondary bonding in materials.

Constitution of Alloys: Necessity of Alloying, Gibbs's phase and Hume Rothery rule, Iron-Iron-carbide diagram and its microstructural aspects.

UNIT: II Heat Treatment of Steels 10 hours

Annealing, Normalizing, Tempering, Carburization and Hardening- Austempering, Martempering, Carburizing, Nitriding, Cyaniding, Carbo-Nitriding, Flame and Induction Hardening, Vacuum and Plasma Hardening, Time-Temperature-Transformation Diagrams and Continuous Cooling Transformation Diagrams.

UNIT: III Casting 10 hours

Introduction, Sand mould making procedure, Types of Patterns, Pattern Materials, Pattern Allowances, Gates and Risers, Design of Gating systems, Properties of Moulding Sand, Testing of Moulding Sand, Moulding Machines, Cores - Types of Cores and Applications, Melting furnaces: Blast and Cupola Furnaces.

UNIT: IV Special Casting Processes 10 hours

Introduction, Special Casting Processes – Shell Moulding, Carbon Dioxide Moulding, Casting, Precision Investment Casting, Permanent Mould Casting, Full Mould Casting, Die Casting, Centrifugal casting, Continuous Casting, Cleaning and Finishing of Castings - Inspection and Testing of Castings, Casting Defects.

UNIT: V Welding Processes 10 hours

Introduction, Classification of Welding Processes - Arc Welding, TIG Welding, MIG Welding, Submerged Arc Welding; Gas Welding Process – Types of Flames; Resistance Welding – Spot Welding, Seam Welding; Thermit Welding, Electron Beam Welding, Laser Beam, Welding, Ultrasonic Welding, Welding Defects - Causes and Remedies; Destructive and Nondestructive Testing of Welds, Soldering and Brazing.

Text Book(s)

1. V. Raghavan, Materials Science & Engineering, Prentice Hall of India, 5th edition, 2004.
2 Hazra Choudary S.K. and Hazra Choudary A.K., Elements of Workshop Technology, Vol I, Media Promoters, 12th Edition, 2007.
3 P.N.Rao, Manufacturing Technology, Vol.1, TMH, 4th Edition, 2013

Reference Books

1 George E Dieter, Mechanical Metallurgy, Tata McGraw Hill, 3rd edition, 2013.
2 R.K.Jain, Production Technology, Khanna Publishers, 17th Edition, 2010.
3. MikellP.Groover, Fundamentals of Modern Manufacturing, Materials, Processes and Systems, John Wiley and Sons, 9th Edition, 2007.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3									3	2
CO2	3	3											3	
CO3	3	3		3									3	3
CO4	3	3											3	
Average	3	3		3									3	2.5
Level of correlation	3	3		3									3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II - Semester

20AME85	**Metrology and Machine Tools**	**L**	**T**	**P**	**C**
		3	0	2	4

Course Outcomes:

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

1. Apply limits, fits and tolerances for limit gauges and dimensional measurements for quality products.
2. Analyze angular, screw threads and coordinates with suitable instruments and methods for their quality.
3. Demonstrate the basic structure, mechanism and operations of lathe, drilling and milling and grinding machines

UNIT: I Linear Measurements 10 hours

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.

Linear Measurement: Length standards-line & end standards, slip gauges – calibration of the slip gauges, Dial indicator.

UNIT: II Angular Measurements 10 hours

measurement of angles and tapers: 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, Auto-collimator, optical flat, Interferometer-NPL flatness interferometer.

Computer-Aided Inspection: Coordinate Measuring Machine- Construction, principle, types, advantages and limitations.

UNIT: III Lathe and Drilling processes 10 hours

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.

Drilling and Boring: Specifications, types, operations performed, tool holding devices, twist drill and types. Boring machines – Fine boring machines, Jig Boring machines.

UNIT: IV Shaping and Milling Process 10 hours

Shaping, Slotting and Planning: Their Principles of working, Principle parts, specification, classification, Operations performed.

MILLING: Specifications, classifications of milling machines, Principle features of horizontal, vertical and universal milling machines, machining operations, Types and geometry of milling cutters, methods of indexing.

UNIT: V Finishing process 10 hours

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 and Honing.

Text Book(s)

1. Mahajan, Engineering Metrology, New Delhi, 4th Edition, Dhanpat Rai, 2009. 3. R.K. Jain and S.C. Gupta Production Technology, New Delhi, 5th Edition, Kanna Publishers, 2010.
2 P.N. Rao, Manufacturing Technology, II Noida, 4th Edition, Tata Mc Graw hill, 2013.

Reference Books

1 K.L.Narayana, Engineering Metrology, Hyderabad, 1st Edition, Sci Tech Publication, 2010.
2 I.C.Gupta, A Text Book of Engineering Metrology, New Delhi,4th Edition, Dhanpat Rai,2009. 3. H.M.T. Production Technology, Noida-India, 2nd Edition, Tata Mcgraw Hill,1986.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2					3						3	2
CO2	3	3					3						3	2
CO3	3	2					3						3	2
Average	3	2.6					3						3	2
Level of correlation	3	3					3						3	2

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech - II - Semester

20AME86	**Computer Integrated Manufacturing**	**L T P C**
		3 0 2 3

Course Outcomes:

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

1. Apply the principles of Computer integrated manufacturing to control and foster the production process.
2. Analyze the architecture of numerical control and apply the Numerical control programming techniques for the machining process.
3. Analyze different part families through grouping and construe different machine cell designs and flexible manufacturing systems.
4. Demonstrate different approaches and techniques for computer-aided process planning in automation.
5. Demonstrate knowledge of Adaptive control systems for different applications.

UNIT: I Fundamentals Of CIM 10 hours

Introduction to Manufacturing; CIM - Types, Manufacturing Systems, CIM Definition, CIM wheel, CIM components, Evolution of CIM - Development of computers, needs of CIM, Benefits of CIM, CIM Hardware & Software, Fundamentals of CAD / CAM, Product cycle.

UNIT: II Fundamentals Of NC And CNC 10 hours

Numerical control machines: Introduction, basic components of an NC system, the NC procedure, NC coordinate system, NC motion control system, application of numerical control and Economics of Numerical control.

Computer controls in NC: Principle of CNC, types of CNC machine tools, programming and applications of CNC machine tools, Direct Numerical control (DNC), Database and DBMS-requirement, features and architecture of DBMS.

UNIT: III Group Technology And FMS 10 hours

Group Technology: Group Technology - Part families, Parts classification and coding, Production flow analysis, Composite part concept, Machine cell design and Benefits of GT.

Flexible Manufacturing Systems: FMS - Components of FMS, FMS Work stations, Material Handling Systems, Computer Control system, FMS layout configurations and Benefits of FMS.

UNIT: IV Computer Aided Planning Systems 10 hours

Computer aided planning systems - Approaches to Computer aided Process Planning (CAPP), Generative and Retrieval CAPP systems, Benefits of CAPP, Material Requirement Planning (MRP), Mechanism of MRP, Benefits of Capacity Planning.

UNIT: V Adaptive Control Systems: 10 hours

Adaptive control machining system - Adaptive control optimization system, Adaptive control constraint system, Applications to machining processes, Computer process monitoring, Hierarchical structure of computers in manufacturing, and computer process control.

Text Book(s)

1. Mikel.P.Groover, Automation, Production systems and Computer Integrated Manufacturing Systems, Pearson Education; 4th Edition,2016.
2 P.N.Rao, CAD/CAM: Principles and Applications, McGraw Hill Education, 3rd edition, 2017.

Reference Books

1 Radhakrishnan and Subramanian, CAD/CAM/CIM, New Age International Pvt Ltd, 4th Edition, 2018.
2 M. Groover, CAD/CAM, Pearson Education; 1st Edition, 2003.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	3	3	2										3	2
CO3	3	3	2										3	2
CO4	3	3											3	
CO5	3	3											3	
Average	3	3	2										3	2
Level of correlation	3	3	2										3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech - I - Semester

20AME87	**Robotics**	**L T P C**
		3 0 2 4

Course Outcomes:

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

1. Design appropriate end effectors for various applications.
2. Analyze kinematics of various manipulator configurations
3. Compute required trajectory planning for the given task.
4. Select the suitable sensors for real time working of robotic arm.

UNIT: I Introduction to Industrial robot 10 hours

History of Robotics –Basics components of Robotics system – DOF and types of joints – Work space – Robot precession - Types of robotics configurations – Types of robotics drives – Basic motion of robot manipulator – Harmonics drives – Economics aspects of robotics system in industrial automations.

UNIT: II Effectors and Grippers 10 hours

Types of end effector - Mechanical gripper – types of mechanical grippers – magnetic gripper – Vacuum gripper – Adhesive gripper – other special grippers – RCC –Tools – painting gun – welding torch – design of mechanical gripper.

UNIT: III Robot control system and Robot kinematics 10 hours

Basic control system concepts – Control system analysis – Robot actuation and feedback -Manipulators - Position analysis and finite rotation and translation – Homogeneous matrices – forward and inverse kinematics – DH representation.

UNIT: IV Sensor in robotics 10 hours

Range sensing, Triangulation, structured light approach, Light-of-flight range finder – Proximity sensing: Inductive, Hall-effect, capacitive and ultrasonic sensor –Touch sensing – Force and Torque sensing

UNIT: V Machine vision system 10 hours

Introduction to Machine vision – functional block diagram of machine vision system - Sensing and Digitizing – Image processing and analysis

Text Book(s)

1. Mikell P. Groover, Mitchell Weiss, Industrial Robotics Technology – Programming and Applications, 2nd edition, McGraw Hill, 2013.
2 Niku, Saeed. B, Introduction to Robotics: Analysis, Systems, Applications, Prentice Hall of India Pvt. Ltd , New Delhi, 2011.

Reference Books

1 S. R. Deb, Sankha Deb, Robotics Technology And Flexible Automation, 2nd edition, McGraw Hill Education, 2017.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	2										3	2
CO3	3	3											3	2
CO4	3	3											3	2
Average	3	3	2.5										3	2.25
Level of correlation	3	3	3										3	2

3-High Mapping 2- Medium Mapping 1-Low Mapping

Minor degree with specialized industrial tracks

Tracks-1 Design

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B. Tech - II - Semester

20AME88	**Human Factors and Ergonomics**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Describe the importance of ergonomics and its role in the human body and work environment.
2. Illustrate musculoskeletal disorders in the work environment and behavioral aspects of workplace posture
3. Apply the anthropometry concepts in designing workstations to prevent work related musculoskeletal disorders and risk assessment.
4. Apply the principles in designing displays, controls and virtual environment.

UNIT: I Introduction 10 hours

Introduction to Human Factors and ergonomics, ergonomics and its areas of application in the work system, a brief history of ergonomics, scientific management and work study, human relations and occupational psychology, Fitting task to the man, attempts to humanize work, modern ergonomics.

UNIT: II Human Body as a Mechanical System 10 hours

Posture stability, Body Mechanics, anatomy of the spine and pelvis related to posture, lumbo- pelvic mechanism, low back pain and muscular fatigue, psychosocial factors and physical stressors, tolerance for collisions and shocks, spinal compression, measurement of musculoskeletal pain in the workplace, system integration, role of occupational factors.

UNIT: III Anthropometry and Workstation Design 10 hours

Anthropometry and its uses in ergonomics, sources of human variability, factors influencing the change in body size of populations, anthropometric surveys, design to fit a target population, cost-benefit analysis and trade-offs, digital human models, workstation design and reach, design adjustable products, space planning for offices, industrial workplace layout.

Anatomy of human posture, Fundamental aspects of standing and sitting, effective workstation design, visual, postural and temporal requirements, holding times for static postures, footrests and foot rails, ergonomics of seated work, dynamic postures, visual display terminals, guidance for office workstation design, work surface design, static work- risk assessment.

UNIT: IV Repetitive Risk Assessment and Design of Manual Handling 10 hours

Risk factors associated with pain and injury, models of the development of work related musculoskeletal disorders (WMSDs), hand tools and handle design, limits for hand/wrist exertions in repetitive work, key board design, cell phones and E-games, cursor control devices, strain index, prevention of WMSDs.

Biomechanics of human walking (Gait), postural control in dynamic tasks, anatomy and biomechanics of manual handling, back injuries, foot-floor interface, slips, trips and falls, design of manual handling and carrying tasks, NIOSH lifting equation.

UNIT: V Display, Controls and Virtual Environments 10 hours

Visual design, measurement of light, avoidance of glare, key principles for display design, head mounted displays, auditory displays, Designing Displays and Controls, Key Principles for Display Design, Guiding Visual Search in Complex Displays, Auditory Displays, Design of Controls, Voice Control, System Integration.

Text Book(s)

1. R.S. Bridger, Introduction to Ergonomics, 2nd Edition, Taylor &Francis, 2003
2 Sanders, M.S. and McCormick E.J. Human Factors in Engineering and Design (7th Ed.). McGraw-Hill, Inc, 1997.

Reference Books

1 Kroemer, K.H.E., Kroemer, H.B., and Kroemer-Elbert, K.E. Ergonomics: How to Design for Ease and Efficiency (2nd Ed.). Upper Saddle River, New Jersey: Prentice Hall, 2001.
2 Wickens, C.D., Lee, J.D., Liu, Y., Gordon Becker, S.E. An Introduction to Human Factors in Engineering (2nd Ed.). Upper Saddle River, New Jersey: Pearson Prentice- Hall, 2004.
3 Dul, J. and Weerdmeester,B. Ergonomics for beginners, a quick reference guide, Taylor & Francis, 1993.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	-	3	-	-	-	-	-	-	3	3
CO2	3	3	3	-	-	3	-	-	-	-	-	-	3	3
CO3	3	3	3	-	-	3	-	-	-	-	-	-	3	3
CO4	3	3	3	-	-	3	-	-	-	-	-	-	3	3
Average	3	3	3	-	-	3	-	-	-	-	-	-	3	3
Level of correlation	3	3	3	-	-	3	-	-	-	-	-	-	3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - I - Semester

20AME89	**Vibration Analysis & Condition Monitoring**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Describe the vibrations in machine elements and how to control them.
2. Analyze the mathematical model of linear vibratory system to determine its response
3. Obtain linear mathematical models of real-life engineering systems.
4. Determine vibratory responses of single and multi degree of freedom systems to harmonic, periodic and non-periodic excitation.

UNIT: I Vibration 10 hours

Causes and effects of vibration, Vibration of single Degree and Multi Degree of freedom systems. Steady state and transient characteristics of Vibration.

UNIT: II Condition Monitoring 10 hours

Introduction to Condition Monitoring, Failures types, investigation and occurrences. Causes of failure, Characteristics of vibration ~SHM, Periodic motion, Displacement, Velocity and acceleration. Peak to peak & RMS, Linear and logarithmic scales and phase angle.

UNIT: III Vibration Measurements 10 hours

Vibration measuring instruments, vibration transducers, signal conditioning elements. Display and recording elements. Vibration meters and analyzers.

UNIT: IV Condition Monitoring 10 hours

Condition monitoring through vibration analysis. Frequency analysis, Filters, Vibration signature of active systems, vibration limits and standards. Contaminant analysis, SOAP and other contaminant monitoring techniques.

UNIT: V Special vibration measuring techniques 10 hours

Special vibration measuring techniques Change in sound method, Ultrasonic measurement method, Shock pulse measurement, Kurtosis, Acoustic emission monitoring, Cepstrum analysis, Modal analysis, critical speed analysis, shaft -orbit & position analysis.

Text Book(s)

1. Mechanical Fault Diagnosis and Condition Monitoring/ Collacott. R.A./ Chapman & Hall, London, 1982
2 Vibration Measurement and Analysis/ Nakra. B.C. Yadava, G. S. and Thuested L./ National Productivity Council, New Delhi, 1989.

Reference Books

1 Theory of vibrations with applications by W. T. Thompson, Pearson publications.
2 Mechanical Vibrations by SS Rao, PHI Publications

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2										2	2
CO2	3	3	3										3	3
CO3	3	3	2										3	2
CO4	3	3	3										3	3
Average	3	2.75	2.5										2.75	2.5
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II - Semester

20AME90	**Product Design for Manufacturing**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Evaluate constraints of manufacturing processes that limit design possibilities with respect to cycle time, material handling and other factory costs
2. Apply various design rules in manufacturing processes
3. Evaluate the process by design guidelines for optimum design and analyze the design alternatives in the manufacture of components
4. Apply quantitative methods to assess DFA between different designs Contents

UNIT: I Product Design **10 hours**

Introduction to Product design: Asimow's Model - Product design practice in Industry - Industrial design - Aesthetics in product design. Need Identification and Problem Definition, Concept Generation and Evaluation, Embodiment Design.

UNIT: II Material Selection **10 hours**

Physical and Mechanical Properties of Engineering Materials, Selection of Materials, Selection of Shapes, Strength consideration in product design, Design for stiffness and rigidity: Material savings in design - Ribs, corrugations, Laminates and Members. Case Studies- I.

UNIT: III Manufacturing Process Selection **10 hours**

Review of Manufacturing Processes, Design for Casting, Design for Bulk Deformation Processes, Design for Sheet Metal Forming Processes, Design for Machining, Design for Powder Metallurgy, Co-selection of Materials and Processes, Case Studies.

UNIT: IV Assembly Process Selection **10 hours**

Review of Assembly Processes, Design for Welding, Design for Brazing and Soldering, Design for Adhesive Bonding, Design for Joining of Plastics, Design for Heat Treatment. Case Studies.

UNIT: V New Product Development 10 hours

Supporting techniques for new product development processes such as quality function deployment and quality engineering and Taguchi Method.

Text Book(s)

1. A.K. Chitale, R.C. Gupta, Product Design and Manufacturing, 6th Edition, Prentice –Hall of India, 2013.
2 Boothroyd, G.,Peter Dewhurst, Winston A. Knight, Product Design for Manufacture and Assembly, 3rd Edition, CRC Press, Taylor & Francis, 2010.
3 Michael Ashby., Materials Selection in Mechanical Design, 5th edition, Butterworth-Heinemann, U.K, 2016.

Reference Books

1 Karl T. Ulrich, Ateven D. Eppinger, Product Design and Development, 6th edition, Tata McGraw-Hill.
2 O. Molloy, S. Tilley and E. A. Warman., Design for Manufacturing and Assembly: Concepts, Architectures and Implementation. Springer. USA, 2012.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II - Semester

20AME91	**Computer Applications in Design**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Explain the application of computer graphics in designing of components.
2. Apply reinforces the knowledge on curves to solve CAE problems that arise in engineering.
3. Apply the solid modelling commends to create the 3D components.
4. Apply the GD&T to the engineering components for assembly.

UNIT: I Introduction to Computer Graphics Fundamentals 10 hours

Output primitives (points, lines, curves etc.,), 2-D & 3-D transformation (Translation, scaling, rotators) windowing - view ports - clipping transformation.

UNIT: II Curves and Surfaces Modelling 10 hours

Introduction to curves - Analytical curves: line, circle and conics – synthetic curves: Hermite cubic spline- Bezier curve and B-Spline curve – curve manipulations. Introduction to surfaces - Analytical surfaces: Plane surface, ruled surface, surface of revolution and tabulated cylinder – synthetic surfaces: Hermite bicubic surface- Bezier surface and B-Spline surface- surface manipulations.

UNIT: III Nurbs and Solid Modeling 10 hours

NURBS- Basics- curves , lines, arcs, circle and bi linear surface. Regularized Boolean set operations - primitive instancing - sweep representations - boundary representations - constructive solid Geometry - comparison of representations - user interface for solid modeling.

UNIT: IV Visual Realism 10 hours

Hidden – Line – Surface – solid removal algorithms shading – coloring. Introduction to parametric and variational geometry based software’s and their principles creation of prismatic and lofted parts using these packages.

UNIT: V Assembly of Parts and Product Data Exchange 10 hours

Assembly modeling - interferences of positions and orientation - tolerances analysis - mass property calculations - mechanism simulation. Graphics and computing standards– Open GL Data Exchange standards – IGES, STEP etc– Communication standards.

Text Book(s)

1. William M Neumann and Robert F.Sproul "Principles of Computer Graphics", Mc Graw Hill Book Co. Singapore, 1989.
2 Donald Hearn and M. Pauline Baker "Computer Graphics", Prentice Hall, Inc., 1992.
3 David F. Rogers, James Alan Adams "Mathematical elements for computer graphics" second edition, Tata McGraw-Hill edition.

Reference Books

1 Ibrahim Zeid Mastering CAD/CAM – McGraw Hill, International Edition, 2007.
2 Foley, Wan Dam, Feiner and Hughes – Computer graphics principles & practices, Pearson Education – 2003.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech - I - Semester

20AME92	**Precision Engineering**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Apply fits and tolerances for parts and assemblies according to ISO standards.
2. Apply selective assembly concept for quality and economic production.
3. Assign tolerances using principles of dimensional chains for individual features of a part or assembly.
4. Evaluate the part and machine tool accuracies.
5. Analyze the causes for dimensional and geometrical errors prior to and during machining and suggest remedies

UNIT: I Geometric Dimensioning and Tolerance 10 hours

Concepts of Accuracy: Introduction – Concept of Accuracy of Machine Tools – Spindle and Displacement Accuracies – Accuracy of numerical Control Systems – Errors due to Numerical Interpolation Displacement Measurement System and Velocity Lags.

Tolerance Zone Conversions – Surfaces, Features, Features of Size, Datum Features – Datum Oddly Configured and Curved Surfaces as Datum Features, Equalizing Datum –Datum Feature of Representation – Form Controls, Orientation Controls– Logical Approach to Tolerance.

UNIT: II Datum Systems 10 hours

Design of freedom, Grouped Datum Systems – different types, two and three mutually perpendicular grouped datum planes; Grouped datum system with spigot and recess, pin and hole; Grouped Datum system with spigot and recess pair and tongue – slot pair – Computation of Transnational and rotational accuracy, Geometric analysis and application.

UNIT: III Tolerance Analysis 10 hours

Process Capability, Mean, Variance, Skewness, Kurtosis, Process Capability Metrics, Cp, Cpk, Cost aspects, Feature Tolerances, Geometric Tolerances.

Tolerance Charting Techniques: Operation Sequence for typical shaft type of components, Preparation of Process drawings for different operations, Tolerance worksheets and central analysis, Examples.

Design features to facilitate machining; Datum Features – functional and manufacturing. Components design – Machining considerations, Redesign for manufactured parts examples

UNIT: IV Surface finish 10 hours

Surface finish, Review of relationship between attainable tolerance grades and different machining process. Cumulative effect of tolerances sure fit law, normal law and truncated normal law.

UNIT: V Measuring Systems Processing 10 hours

In process or in-situ measurement of position of processing point- Post process and on-machine measurement of dimensional features and surface-mechanical and optical measuring systems.

Text Book(s)

1. Precision Engineering in Manufacturing by Murthy R. L., New Age International (P) limited, 1996.
2. Geometric Dimensioning and Tolerancing by James D. Meadows, Marcel Dekker Inc. 1995.

Reference Books

1. Engineering Design – A systematic Approach by Matousek, Blackie & Son Ltd, London.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
CO5	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

Tracks-2

Materials and Manufacturing

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B. Tech - II - Semester

20AME93	**Materials Characterization Techniques**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Select and apply appropriate diffraction techniques to identify the characterization of material based on crystal structure.
2. Apply principle of microscopic and spectroscopic techniques to identify materials characterization.
3. Apply working modes of SEM and TEM in materials characterization study.
4. Choose and apply appropriate advanced characterization techniques in materials testing.

UNIT: I Materials Characterization 8hours

Basic crystallography and Need for Material Characterization - Unit cells, Crystal structure, Primitive and Non- primitive cells, Symmetry elements and point group notations, Streographic projections - Need for Material Characterization - Methodology for Material Characterization and Analysis.

UNIT: II Diffraction and Imaging 8 hours

Phenomena of diffraction; Radiation-matter Interactions and response signals; X-ray diffraction: powder diffraction, phase identification, Scherrer formula, strain and grain size determination; Fundamentals of Imaging: magnification, resolution, depth of field and depth of focus, aberration and astigmatism; X-Ray reflectivity.

UNIT: III Optical Microscopic and Spectroscopic techniques 12 hours

Special microscopy techniques and applications: Bright field and dark field imaging; confocal microscopy; interference microscopy; polarized light microscopy; phase contrast microscopy. Scanning near field laser microscopy; Image processing and quantification.

Optical Spectroscopic techniques: Principle, Working and Result Analysis of Fourier Transformation Infra-Red Spectroscopy; Raman Spectroscopy; UV-Vis Absorption Spectroscopy; Photoluminescence Spectroscopy - Ellipsometer Spectroscopy.

UNIT: IV Electron Microscopic Techniques 10 hours

Basics of Electron Microscopy - Introduction - Principle of SEM, Instrumentation, Contrast formation, Operational variables, Specimen preparation, imaging modes, Applications, Limitations – FE-SEM , FIB, EDAX. TEM - Introduction, Instrumentation, Specimen preparation: Mechanical thinning, electrochemical thinning, ion milling, sputter coating and carbon coating, replica methods. Image modes - mass density contrast, diffraction contrast, phase contrast, Applications, Limitations

UNIT: V Advanced Characterization Techniques 10 hours

Rutherford back scattering (RBS), Scanning Tunneling Microscopy (STM), Atom Force Microscopy (AFM) and different operational modes, X-ray Photoelectron Spectroscopy (XPS): Auger Electron Spectroscopy (AES), Dynamic SIMS and static SIMS. Characterization of Fluids - Viscosity, Relative density, thermal conductivity.

Text Book(s)

1. P.R. Khangaonkar, An introduction to Materials Characterization, Reprint 2013, Penram International Publishing (India) PVT Ltd., 2010.
2 Yang Leng, Materials Characterization: Introduction to Microscopic and Spectroscopic Methods, 2nd edition, ISBN: 978-3-527-33463-6, Wiley Publications, 2013.

Reference Books

1 E.J. Mittemeijer, Fundamentals of Materials Science - the microstructure-property relationship using metals as model systems, Springer, 2010.
2 Cullity, Elements of X-Ray Diffraction, by.. Pearson Education India; 3rd edition, 2014

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	
CO2	3	3											3	
CO3	3	3											3	
CO4	3	3											3	
Average	3	3											3	
Level of correlation	3	3											3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech - I - Semester

20AME94	**Advanced Tool Design**	**L T P C**
		3 1 0 4

Course Outcomes:

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

1. Describe the properties of tool material and influence of heat treatment.
2. Apply the design procedures in different types of cutting tools, jigs and fixtures problems
3. Design of dies used in sheet metal works such as blanking, piercing, bending, forming and drawing.

UNIT: I Tool Materials 8 hours

Prosperities of materials: Tools steels, Cast Iron, Mild or low carbon steels, Non metallic and nonferrous materials, Heat treating.

UNIT: II Design of Cutting Tools 8 hours

Single Point cutting tools: Milling cutters, Drills, Selection of carbide steels – Determination of shank size for single point carbide tools, Determining the insert thickness for carbide tools.

UNIT: III Design of Jigs and Fixtures 10 hours

Basic principles of location and clamping: Locating methods and devices, Jigs-Definition Types, General considerations in the design of Drill jigs, Drill bushing, Methods of Construction. Fixtures-Vice fixtures, Milling, Boring Lathe Grinding fixtures.

UNIT: IV Design of Sheet Metal Blanking and Piercing Dies 10 hours

Fundamentals of Die cutting operation, Power press types, General press information, Materials Handling equipment. Cutting action in Punch and die operations. Die clearance, Types of Die construction. Die design fundamentals-Banking and piercing die construction, pilots, stripper and pressure pads presswork material, Strip layout, Short run tooling for piercing.

UNIT: V Design of Sheet Metal Bending, Forming and Drawing Dies 10 hours

Bending dies, drawing dies, forming dies, drawing operations, Variables that effect metal flow during drawing. Determination of blank size, Drawing force, Single, and double action draw dies.

Text Book(s)

1. Donaldson “Tool Design”/ Tata McGraw Hill
2. Production Technology/HMT/Tata McGraw Hill/

Reference Books

1. Production Technology by R.K. Jain and S.C. Gupta
2. Mechanical Metallurgy/ George F Dieter/ Tata McGraw Hill
3. Principles of Machine Tools, Bhattacharya A and Sen. G. C. New Central Book Agency.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II - Semester

20AME95	**Micro and Nano Machining**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Classify the appropriate micro and nano machining process based on material removal mechanism.
2. Recognize the traditional micro and nano machining process and their process parameters.
3. Identify various advanced mechanical energy based Micro-Nano Machining processes, and their process parameters on the desired product.
4. Demonstrate the material removal mechanism of various Advanced Thermo-electric Micro-Nano machining Processes
5. Extend the mechanism of High Energy Advanced Thermo-electric Micro-Nano machining Processes and their process parameters for required output.

UNIT: I Introduction to Micro and Nano machining 10 hours

Classification and types of machining processes, Fundamentals of Micro and Nano machining processes, Nano materials and their applications in various industrial applications.

Traditional Micro and Nano machining Processes: Theory of micromachining, Operating principles and process parameters of Micro turning, Micro-milling, Micro-grinding, Applications and Limitations of micro machining.

UNIT: II Advanced Mechanical Micro-Nano Machining processes 10 hours

Introduction -Classification of advanced Mechanical Micro - Nano Machining processes, Operating principles and process parameters of Abrasive Jet Micromachining (AJM), Water jet micro machining (WJM), Abrasive Water Jet Machining (AWJM), Ultrasonic Micromachining (USM), Abrasive Flow Nano finishing, Magnetic Abrasive Nano finishing.

UNIT: III Advanced Thermo-electric Micro-Nano machining Processes 10 hours

Operating principles and process parameters of Electric Discharge Micromachining, Electric Discharge Grinding and Electric Discharge Diamond Grinding, Wire Electric Discharge Micromachining.

High Energy Advanced Thermo-electric Micro-Nano machining Processes: Operating principles and process parameters of Laser Beam Micromachining (LBM), Electron Beam Micromachining (EBM), Focused Ion Beam Machining (IBM)

UNIT: IV Advanced Electro-chemical Micro-Nano Machining Processes 10 hours

Operating principles and process parameters of Electrochemical Micromachining, Electrochemical Micro Grinding, Electro stream Micro drilling, Electro-chemical Micro deburring.

UNIT: V Modern Finishing Processes 10 hours

Advanced finishing processes (AFPs), abrasive flow machining (AFM), magnetic abrasive finishing (MAF), magnetorheological finishing (MRF), magnetorheological abrasive flow finishing (MRAFF), magnetic float polishing (MFP), elastic emission machining (EEM), ion beam machining (IBM), and chemical mechanical polishing (CMP).

MEMS and Actuators - Sensors and Actuators, MEMs, Wet and Dry Etching-Surface Micromachining, Metrology For Micro manufactured Products.

Text Book(s)

1. Golam Kibria, B. Bhattacharyya, J. Paulo Davim, Non-traditional micro machining processes: Fundamentals and applications, Springer International publishing, 2017.
2 V.K.Jain, Micro manufacturing processes, CRC press Taylor & Francis group, 2013. (e-book)

Reference Books

1 H. El-Hofy, Fundamentals of Machining Processes: conventional and non-conventional, 2ndedition, CRC press, Taylor & Francis group, 2014.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	3	3											3	
CO3	3	3											3	
CO4	3	3											3	
CO5	3	3											3	
Average	3	3											3	
Level of correlation	3	3											3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech - II - Semester

20AME96	**Geometric Dimensioning and Tolerance**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Apply geometric dimensioning and tolerancing (GD&T) based on ASME standards, as well as the essentials of surface roughness measurements in both 2D and 3D including filtering techniques.
2. Analysis Vectorial dimensioning and tolerancing, dimensional chains, measurement uncertainty, etc.
3. Apply knowledge in profession as metrologists as well as product designers.
4. Apply the surface and coordinate measuring device to analysis of quality of the manufacturing components.

UNIT: I Basic Concepts 10 hours

General terms and definitions of geometrical features - General principle of sizes - System of limits and fits - Inspection of dimensional and geometrical deviations - Datums, datum systems, and selection of datums. Restraining degrees of freedom, DOF, Simulators. Rule #1(Boundary principle) and Rule #2.

UNIT: II Form and Orientation Tolerances 10 hours

Principles of dimensioning - Introduction to geometric dimensioning and tolerancing (GD&T); Form tolerances: types, specifications and interpretations - measurement and evaluation of straightness, flatness and roundness - Orientation tolerances: types, specifications and interpretations, and verification of orientation tolerances. Exercises on each group. RFS, MMC and LMC concepts.

UNIT: III Location, Runout and Profile Tolerances 10 hours

Tolerances of location: types, specifications and interpretations - verification techniques - Tolerances of profiles of lines and surfaces with or without datums - Tolerances of runout - Tolerancing of angles and cones. Exercises on each group. RFS, MMC and LMC concepts.

UNIT: IV Surface Roughness 10 hours

Various parameters and their measurements in two dimensions - filtering and filtering techniques - areal parameters. symbology

UNIT: V Inspection of GD&T call-outs 10 hours

Vectorial dimensioning and tolerancing - Statistical tolerancing of mechanical assemblies - Dimensional chains - Measurement uncertainty - Computer-aided tolerancing and verification. Inspection techniques- conventional and CMM.

Text Book(s)

1. Drake, P. J., Dimensioning and Tolerance Handbook, McGraw-Hill, Inc., New York. 1999.
2 Meadows, J. D., Geometric Dimensioning and Tolerancing: Applications and Techniques for use in Design, Manufacturing and Inspection, Marcel Dekker, Inc., New York. 1995.
3 Gill, P. S., Geometric Dimensioning and Tolerancing, S. K. Kataria & Sons, New Delhi. ASME 14.5 - 2009 standards
4 Alex Krulikowski, Fundamentals of geometric dimensionining and tolerancing.
5 James D Meadows, —Measurement of Geometric Tolerances in Manufacturing.

Reference Books

1 Gupta, I. C., A Textbook of Engineering Metrology, Dhanpat Rai Publications, New Delhi.
2 Galyer, J. F. W. and C. R. Shotbolt, Metrology for Engineers, Cassell Publishers, London.
3 Henzold, G., Handbook of Geometrical Tolerancing: Design, Manufacturing and Inspection, John Wiley & Sons, Chichester.
4 Muralikrishnan, B. and J. Raja, Computational Surface and Roundness Metrology, Springer, USA.

Online Learning Resources:

- https://nptel.ac.in/courses/112/106/112106179/
- https://www.youtube.com/watch?v=X_VepJhq_vk
- https://www.youtube.com/watch?v=cjzSXPDBA_Q&t=1s
- https://www.youtube.com/watch?v=-tLq1wXio0U
- https://digitaldefynd.com/best-gdt-courses/

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B. Tech - I - Semester

20AME97	**Intelligent Manufacturing Systems**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Summarize the concepts of computer integrated manufacturing systems and manufacturing communication systems
2. Understand the basic components of robots and its industrial applications.
3. Demonstrate the concepts of artificial intelligence in automated process control.
4. Select the manufacturing equipment using knowledge-based system for equipment selection.
5. Apply various methods to solve group technology problems and demonstrate the structure for knowledge-based system for group technology.

UNIT: I Computer Integrated Manufacturing Systems 10 hours

Computer Integrated Manufacturing Systems – Structure and functional areas of CIM system - CAD, CAPP, CAM, CAQC, ASRS. Advantages of CIM.

Manufacturing Communication Systems – MAP/TOP, OSI Model, Data Redundancy, Top-down and Bottom-up Approach, Volume of Information. Intelligent Manufacturing – System Components, System Architecture and Data Flow, System Operation.

UNIT: II Knowledge Based Systems 10 hours

Components of Knowledge Based Systems – Basic Components of Knowledge Based Systems, Knowledge Representation, Comparison of Knowledge Representation Schemes, Interference Engine, Knowledge Acquisition.

UNIT: III Machine Learning 10 hours

Machine Learning – Concept of Artificial Intelligence, Conceptual Learning, Artificial Neural Networks - Biological Neuron, Artificial Neuron, Types of Neural Networks, Applications in Manufacturing.

UNIT: IV Automated Process Planning 10 hours

Automated Process Planning – Variant Approach, Generative Approach, Expert Systems for Process

Planning, Feature Recognition, Phases of Process planning.

Knowledge Based System for Equipment Selection (KBSES) – Manufacturing system design, Equipment Selection Problem, Modeling the Manufacturing Equipment Selection Problem, Problem Solving approach in KBSES, Structure of the KBSES.

UNIT: V Group Technology 10 hours

Group Technology: Models and Algorithms – Visual Method, Coding Method, Cluster Analysis Method, Matrix Formation – Similarity Coefficient Method, Sorting-based Algorithms, Bond Energy

Algorithm, Cost Based method, Cluster Identification Method, Extended CI Method. Knowledge Based Group Technology - Group Technology in Automated Manufacturing System, Structure of Knowledge based system for group technology (KBSGT) – Data Baswe, Knowledge Base, Clustering Algorithm.

Text Book(s)

1. Intelligent Manufacturing Systems/ Andrew Kusiak/Prentice Hall.
2 Artificial Neural Networks/ Yagna Narayana/PHI/2006
3. Automation, Production Systems and CIM / Groover M.P./PHI/2007

Reference Books

1 Neural networks/ James A Freeman David M S kapura/ Pearson education/2004
2 Introduction to Artificial Neural Systems/Jacek M. Zurada/JAICO Publishing House Ed. 2006.
3 Artificial neural networks/ B. Vegnanarayana/PHI

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-					2						3	3
CO2	3	-					2						3	3
CO3	3	-					2						3	3
CO4	3	3					2						3	3
CO5	3	3					2						3	3
Average	3	3					2						3	3
Level of correlation	3	3					2						3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

Tracks-3

Automobile Engineering

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B. Tech - II - Semester

20AME98	**Fuels and Combustion**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Use various methods for determination and analysis of fuel properties.
2. Choose the right type of fuel for various industrial applications depending on various fuel production processes. availability, storage and handling.
3. Apply the principles of combustion for analysis of combustions and methods of combustion.

UNIT: I Classification and Properties of Fuels 10 hours

Fuels-Types and characteristics of fuels-Determination of properties of fuels-Fuel analysis-Proximate and ultimate analysis-Calorific value (CV)-Gross and net calorific values (GCV, NCV) - Bomb Calorimetry - empirical equations for CV estimation

UNIT: II Solid Fuels 10 hours

Origin of coal-Ranking of coal-Washing, cleaning and storage of coal-Renewable Solid Fuels-comparative study of Solid, liquid and gaseous fuels-selection of coal for different industrial applications-carbonization of coal.

UNIT: III Liquid Fuels 10 hours

Origin of crude oil-composition of crude petroleum-classification of crude petroleum-Removal of salt from crude oil-processing of crude petroleum-Fractionation distillation-ADU and VDU-Cracking-Hydrotreatment and Reforming.

UNIT: IV Gaseous Fuels 10 hours

Rich and lean gas-Wobbe index-Natural gas-Dry and wet natural gas-Foul and sweet NG-LPG-LNG-CNG-Methane-Producer Gas-Water gas-Coal Gasification-Gasification Efficiency.

UNIT: V Combustion and Combustion Equipment 10 hours

General principles of combustion-types of combustion processes-Combustion chemistry-Combustion Equations-Kinetics of combustion-combustion of solid fuels- Combustion calculations-air fuel ratio-Excess air calculations.

Analysis of flue gases by Orsat apparatus-Combustion of solid fuels-grate firing and pulverized fuel firing system-Fluidized bed combustion-Circulating fluidized bed boiler- Burners-Factors affecting burners and combustion.

Text Book(s)

1. Kenneth K.K., Principles of Combustion, 2nd ed., Wiley Publications, USA, 2012
2 Phillips H.J., Fuels-solid, liquid and gases–Their analysis and valuation, 1st ed., Foster Press, USA, 2010

Reference Books

1 Speight J.G., The Chemistry and Technology of Coal, 3rd ed., Taylor and Francis Ltd., USA, 2016
2 Sarkar S., Fuels and combustion, 3rd ed., Universities Press, India, 2009

CO's Mapping with program Outcomess

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-
Average	3	3	3	-	-	-	-	-	-	-	-	-	3	-
Level of correlation	3	3	3	-	-	-	-	-	-	-	-	-	3	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech - I - Semester

20AME99 **Design of Automotive Components** **L T P C**

3 1 0 4

Course Outcomes:

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

1. Design Cylinder, Piston, connecting rod, crankshaft and Center and overhung cranks for automobile vehicles considering safety standards.
2. Design Power drive lines and calculate performance parameters.
3. Design Bearings and Brakessystems for automobile vehicles considering safety standards.
4. Design gearbox for automobile vehicles and calculate its performance characteristics.
5. Design front axle and steering linkages and determine optimum dimensions and proportions for steering linkages ensuring minimum error in steering

UNIT: I Design of IC Engine Parts 10 hours

Introduction to I.C engine parts, design of cylinder, design of piston, piston rings, piston pin; Connecting rod, Working Principle and Essential loads on the connecting rod; Crankshaft, Working Principle and design of Crankshaft, determination of loads at centre and overhung cranks.

UNIT: II Power Drive Line 10 hours

Introduction to Clutch – Types and Construction, Fluid Coupling, Transmissions, design details of roller and sprag type of clutches – Manual, Semi and Automotive Transmission, Continuously Variable Transmission, Overdrives, Torque Converter, Propeller Shaft, Differential and Axles, Front and All Wheel Drive Vehicles.

UNIT: III Design of Bearings and Braking Systems 10 hours

Introduction to Lubrication, Viscosity, Classification; Introduction to Bearings, Hydrodynamic & Hydrostatic Lubrication, Pressure distribution – eccentricity and minimum film thickness, Thick & Thin film lubrication, Bearing materials, choice of bearings, determination of loads at kingpin bearings, wheel spindle bearings.

Braking Systems – Hydraulic, Pneumatic Brakes and Power Brakes; Anti-Lock Brake system.

UNIT: IV Design of Gear Box 10 hours

Introduction to gearbox, Performance of vehicle, total resistance to motion, Forces and Couples, traction and tractive effort, acceleration, calculation of gear ratio, design of three speed gearbox, design of four speed gear boxes.

UNIT: V Design of Front Axle and Steering 10 hours

Types of Front Axle, Analysis of loads, moments and stresses at different sections of the front axle; Differential and Axles, Front and All Wheel Drive Vehicles. Steering Geometry and Types, Steering Linkages, Power Assisted Steering; Determination of optimum dimensions and proportions for steering linkages ensuring minimum error in steering.

Text Book(s)

1. Bhandari V, Design of Machine Elements, 5th Edition, Tata McGraw-Hill Book Co, 2020.
2 Harald Naunheimer , Bernd Bertsche , Joachim Ryborz , Wolfgang Novak "Automotive Transmission: Fundamentals, Selection, Design and Application", 2nd Edition, Springer, 2011.

Reference Books

1 Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett "Mechanical Engineering Design", 11th Edition, Tata McGraw-Hill, 2020.
2 Judge A. W., "Modern Transmission", 3rd ed., Chapman & Hall Std., London, 1989.
3 CDX Automotive, "Fundamentals of Automotive Technology, Principles and practice", Jones &Barlett Publishers, 2013.
4 Newton Steeds & Garrot, "Motor Vehicles", SAE International and Butterworth Heinemann, 2001.
5 Mahadevan, k, Reddy, K. Balaveera, "Design Data Handbook for Mechanical Engineering in SI and Metric Units", CBS; 4th edition,2019.

Mapping of Cos with Pos & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3										3	3
CO4	3	3	3										3	3
CO5	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II - Semester

20AMEA0	**Autotronics & Vehicle Intelligence**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Describe the basic of automotive fundamentals and automotive sensor types and its application.
2. Classify the various methods of fuel injection and ignition system used in the automobiles.
3. Explain the working and system layout of electrical and hybrid vehicle.
4. Describe about the autonomous based vehicle integrating with vehicle information system.

UNIT: I Automotive 10 hours

Automotive fundamentals: The engine components drive train starting & charging systems operation ignition system, suspension systems, brakes, ABS steering systems.

UNIT: II Automotive Sensors 10 hours

Automotive Sensors: Temperature sensor, gas sensor, knock sensor, pressure sensor, flow sensor, torque sensor, crash sensor, speed sensor and acceleration sensor, micro sensor, smart sensor, operation, types, characteristics, advantage and their applications.

UNIT: III Fuel injection and Ignition system 10 hours

Fuel injection and Ignition system: Introduction, fuel system components, electronic fuel system, fuel injection, types, throttle body versus port injection, electronic control fuel injection, operation, different types, fuel injectors, idle speed control, continuous injection system, high pressure diesel fuel injection, MPFI system, electronic ignition system, operation, types, electronic spark timing control.

UNIT: IV Electrical Vehicles and Hybrid Vehicles 10 hours

Electrical Vehicles and Hybrid Vehicles: Introduction, electric vehicle development, system layout, basic system components, electric battery solar cells, rapid charging system, motor drive system, fuel cell electric vehicle, hybrid vehicle, series hybrid vehicle, parallel hybrid vehicle, CNG electric hybrid vehicle.

UNIT: V Vehicle Intelligence 10 hours

Vehicle Intelligence: Introduction, based structure, vision based autonomous road vehicles, architecture for dynamics vision system, features, applications, a visual control system using image processing and fuzzy theory, an application of mobile robot vision to a vehicle information system, objective detection, collision warming and avoidance system, low type pressure warming systems.

Text Book(s)

1. Understanding automotive electronics, William B Ribben, 6th Edition Elsevier science, 2003.
2 Sensor and Transducers, Ronald k jurgen, SAE-2003.

Reference Books

1 Automotive technology by jack Erjavec, Robert Scharff Delmar Publications, Inc 1992.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2											3	
CO2	3	2											3	
CO3	3	2					3						3	
CO4	3	2											3	
Average	3	2					3						3	
Level of correlation	3	2					3						3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II - Semester

20AMEA1	**Vehicle Maintenance**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

After successful completion of this course, the students 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.

UNIT: I Maintenance of Records and Schedules 10 hours

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, Operations and procedures, safety precautions in maintenance.

UNIT: II Engine Maintenance – Repair and Overhauling 10 hours

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 10 hours

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 10 hours

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generators and alternators, ignition system, Ignition coil Tester, 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 **10 hours**

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, Engine Oil Rating. Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

Text Book(s)

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.

Reference Books

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 & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	3	3	2										3	2
CO3	3	3	2										3	2
CO4	3	3	2			3							3	2
Average	3	3	2			3							3	2
Level of correlation	3	3	2			3							3	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech - I - Semester

20AMEA2	**Automotive Electrical Systems**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Apply the basic electrical principles to solve problems encountered in professional career in the automotive industry.
2. Utilize different Batteries and advanced systems in an automobile.
3. Install the electrical systems & circuits in an automobile to identify, formulate and solve complex automobile engineering problems.
4. Apply the starting systems in automobiles contribute effectively and Lighting systems in automobiles.

UNIT: I Electrical Principles 10 hours

Basic Electrical Principles, Electron flow and conventional flow, Effects of current flow, Fundamental quantities, Factors affecting the resistance of a conductor, Resistors and circuit networks, Magnetism and electromagnetism, Electromagnetic induction and Mutual induction, Definitions and laws. Digital to analog conversion, Analog to digital conversion.

UNIT: II Batteries 10 hours

Vehicle batteries, Requirements of a vehicle battery, Positioning the vehicle battery, Lead acid batteries, Construction , battery rating, Maintenance and charging, Charging the Lead- Acid battery, Diagnosing lead-acid battery faults, Testing batteries, Advanced battery technology, Developments in electrical storage, Alkaline battery, Zebra battery, Ultra capacitors, Fuel cells.

UNIT: III Electrical Systems & Circuits 10 hours

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 Starting Systems **10 hours**

Requirements of the starting system ,Starter motors and circuits, Types of starter motor, Principle of operation, Heavy vehicle starters, Electronic starter control and Integrated starters. Diagnosing starting system faults, Advanced starting system technology.

UNIT: V Lighting **10 hours**

Lighting fundamentals, Bulbs, capless bulb, Headlight reflectors, Parabolic reflector, Bi-focal reflector, Homifocal reflector, Headlight lenses, headlight levelling, headlight beam setting, lighting circuits, basic lighting circuit, Dim-dip circuit, Gas discharge and LED lighting.

Text Book(s)

1. Tom Denton, Automobile Electrical and Electronic Systems, 4th Edition,British Library Publication,2012.
2 Barry Hollembeak, Jack Erjavec, Automotive Electricity and Electronics - Today's Technician, 2nd Edition, Delmar Publisher,2002.

Reference Books

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 & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2										3	
CO2	3	3											3	
CO3	3	3	2										3	
CO4	3	3											3	
Average	3	3	2										3	
Level of correlation	3	3	2										3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

Tracks-4 Robotics and Automation

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B. Tech - II - Semester

20AMEA3	**Manufacturing Automation**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Describe the basic automation principles and strategies to model manufacturing systems.
2. Use the robots for automated handling and storage systems.
3. Use the appropriate sensors, machine vision, measuring equipment and PLC's used in the flexible manufacturing system.
4. Choose the production lines with smart sensors and applying artificial intelligence to the manufacturing system.

UNIT: I Basics of Automation 10 hours

Introduction: Automation in production systems, automation principles and strategies, basic elements of automated systems, levels automation, CNC programming. Smart manufacturing and intelligent manufacturing.

UNIT: II Automated Handling and Storage System 10 hours

Automated Handling system: Overview of material handling, Automated material handling systems, Automated guided vehicles, Robots in material handling.

Introduction to storage systems, Buffer storage, Automated storage and Retrieval Systems (AS/RS) - carousel storage, Automatic data capture, overview of automatic identification systems, bar code technology

UNIT: III Automated Manufacturing System 10 hours

Overview and types of manufacturing systems, Flexible manufacturing systems, cellular manufacturing, automated assembly system, Group Technology, part family and machine groups, Sensor technologies, automated inspection and testing, Transfer mechanism, Analysis of transfer lines, Coordinate measuring machines, Machine vision, Rapid prototyping.

UNIT: IV Programmable and Advanced Control Strategies 10 hours

Programming methods, modes of operation, PLC Architecture, Instructions, Instruction addressing, latches, timers and counters, SCADA, DCS, Integration of PLC, SCADA and DCS with manufacturing systems, Man-machine interfaces, Introduction to PLM.

UNIT: V Smart and Intelligent Manufacturing 10 hours

Real-time production monitoring techniques with smart sensors, Configuration of smart shop floor, traceability and call back of defective products, Industry 4.0- Standard, Artificial Intelligence based systems, Virtual Business, e-Commerce Technologies, Global Manufacturing Networks, IOT in manufacturing.

Text Book(s)

1. Mikell P. Groover, Automation, Production Systems and Computer-Integrated Manufacturing, 2016, Fourth edition, Pearson Education, New Delhi.

2 Yusuf Altintas, Manufacturing Autmation, 2012, Cambridge University Press, USA

Reference Books

1 P. Radhakrishnan, S. Subramanyan, V. Raju, CAD/CAM/CIM, New age International, New Delhi.

2 David Bedworth, Computer Integrated Design and Manufacturing, TMH, New Delhi.

3 Rajesh Mehra, Vikrant Vij, PLSc & SCADA Theory and Practice, 2011, First Edition, University Science Press, New Delhi.

4 Gupta A. K., Arora S. K., Industrial Automation and robotics, 2013, Third Edition, University Science Press, New Delhi.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	
CO3	3	2	-	-	-	-		-	-	-	-	-	3	
CO4	3	2	-	-	-	-	2	-	-	-	-	-	3	
Average	3	2	-	-	-	-	2	-	-	-	-	-	3	
Level of correlation	3	2	-	-	-	-	2	-	-	-	-	-	3	

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech - I - Semester

20AMEA4	**Principles of Robotics**	**L T P C**
		3 1 0 4

Course Outcomes:

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

1. Demonstrate knowledge of robotics, its specifications, functions and different applications.
2. Demonstrate knowledge of various robot manipulators
3. Demonstrate knowledge of sensors, work cells and programming languages.
4. Analyze functional characteristics of robot end effectors through design considerations.
5. Analyze the economic aspects of robots by considering different safety parameters.

UNIT: I Basic Concepts 10 hours

Brief history, Robot - Definition, Anatomy; Co-ordinate Systems, Work Envelope types and Classification, Robotic Specifications, Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load, Robot Parts and their Function; Need for Robots, Applications.

UNIT: II Robot Manipulators 10 hours

Various robot manipulators, Linear and angular velocities, Manipulator Jacobian, Prismatic and rotary joints, Robotic Inverse, Wrist and arm singularity.

UNIT: III Robot Sensors 10 hours

Desirable features of Sensors; Tactile, proximity and range sensors; Uses of sensors in robotics; work cell; Introduction to Programming languages.

UNIT: IV Robot End Effectors 10 hours

End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT: V Implementation and Robot Economics 10 hours

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

Text Book(s)

1. R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi,4th Reprint, 2005.
2 M.P.Groover, M.Weiss, R.N. Nageland N. G.Odrej, Industrial Robotics, McGraw-Hill Singapore, 1996.

Reference Books

1 JohnJ.Craig ,Introduction to Robotics Mechanics and Control, Pearson Education, Third edition, 2009.
2 Ashitava Ghoshal, Robotics-Fundamental Concepts and Analysis, Oxford University Press, Sixth impression, 2010.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	3												3	
CO3	3												3	
CO4	3	3	3										3	3
CO5	3	3	3										3	3
Average	3	3	3										3	3
Level of correlation	3	3	3										3	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech - II - Semester

20AMEA5	**Robot Dynamics**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Discuss the specifications of various types of Industrial Robots and design appropriate end effectors for various applications.
2. Analyze the robot kinematics of various manipulator configurations.
3. Understand the static and dynamic force analysis and singularity check of robot manipulators
4. Compute required trajectory planning for the given task
5. Analyse the dynamics of manipulator using forward and inverse kinematics problems.

UNIT: I Introduction to Robot manipulator 10 hours

Components of Industrial robot – Basic classifications – DOF of serial and parallel manipulator – Specifications of industrial robots – Singularity in robot work envelop – Dexterity – Introduction to redundant manipulator.

Robot Kinamatics : Representing Position and orientation – Homogeneous matrices - Forward kinematics – Inverse Kinematics – Denavit hartenberg representation – case study: Puma 500, standford arm and SCARA robot

UNIT: II Velocity kinematics 10 hours

Velocity propagation – Velocity transformation – angular and linear velocity - Static force analysis – Derivation of Jacobian – inverse velocities and acceleration – wrist and arm singularity

UNIT: III Trajectory planning 10 hours

Trajectory Vs path planning – Cartesian space and joint space interpolation – third and fifth polynomial equation for trajectory planning.

UNIT: IV Advance robot control 10 hours

Disturbance rejection – PD and PID control – Computer torque control – Adaptive control – Feedback linearization for under actuated systems.

UNIT: V Industrial application and social robots 10 hours

Welding – Assembly – Material handling –Loading and Unloading – Pressing – fettling – paining.

Mobile robot – types of wheeled mobile robot – Underwater robot – space robot - service robot – surgical robot.

Text Book(s)

1. Mark W. Spong, Seth Hutchinson, and M. Vidyasagar ‘Robot Dynamics and Control’ John Wiley & Sons.
2 S. R. Deb, Sankha Deb , (2009)Robotics Technology And Flexible Automation, McGraw Hill Edition.

Reference Books

1 Fu, K.S., Gonzalez, R.C. and Lee, C.S.G., “Robotics: Sensing, Vision and Intelligence”, Tata McGraw-Hill, New Delhi, 2008.

2 Craig, John. J., “Introduction to Robotics: Mechanics and Control”, Second Edition, Pearson Education, New Delhi, 2002.

3 Niku, Saeed.B “Introduction to Robotics: Analysis, Systems, Applications”, New Delhi: Prentice Hall of India Pvt Ltd , 2005

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										3	3
CO2	3	3											3	3
CO3	3												3	
CO4	3	3											2	
CO5	3	3											3	3
Average	3	3	3										2.8	3
Level of correlation	3	3	3										3	3

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech - II - Semester

20AMEA6	**Applied and Industrial Robotics**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Demonstrate knowledge of robotic material handling and assembly systems.
2. Demonstrate the knowledge of expert systems in robotic performance testing and safety
3. Demonstrate knowledge of various cooperative and SWARM robots and their applications.
4. Analyze robotic configurations and specifications for field and service applications.
5. Demonstrate the core concepts of robots in medical applications

UNIT: I Robot Material Handling 10 hours

General considerations in Robot material handling, material transfer application, machine loading and unloading, CNC machine tool loading, Robot centered cell Assembly and parts presentation methods, Assembly operation, Compliance and the Remote center compliance (RCC) Device, Assembly system configurations, Adaptable programmable assembly system, Designing for robotic assembly, Inspection automation - vision inspection system, robot - manipulated inspection.

UNIT: II Expert Systems 10 hours

Factors influencing the choice of a robot, Robot performance testing - Path/point accuracy and repeatability, Maximum working envelop, Kinematic and State values. Robot safety Considerations, Factors affecting robot safety measures, Safety features built into the industrial robot, Safety barriers and other devices.

UNIT: III Cooperative and Swarm Robots 10 hours

Cooperative manipulation, Challenges in cooperative manipulation- Case studies for Cooperative manipulation for Industrial and Service applications; Introduction to swarm Robots, Comparison with other multi-agent systems, challenges and benefits of swarm systems- Algorithms for swarm Robots, application, case study of swarm Robots.

UNIT: IV Field Robots 10 hours

Forestry, Robot locomotion, Forestry automation, Broadacre Applications- Automatic guidance, sowing, weeding, spraying and broad-acre harvesting; Horticulture, Picking of fruits, Robot milking, Sheep shearing, Slaughtering, livestock inspection, Robots in construction, Future directions; Robots for hazardous applications, Enabling technologies- Search and Rescue robotics: Disaster characteristics-Impact on Robots, Robots actually used at disaster, Promising robots, open issues – Case studies; Cleaning Robots, lawn moving Robots- Smart appliances and smart homes.

UNIT: V Robots in Health Care 10 hours

Medical robotics, Core concepts, Technology- Medical robotic systems, Research areas and applications; Rehabilitation and Health care robotics- Overview, physical therapy and training Robots; Robotic aid for people with disabilities- Smart prostheses and orthoses, diagnosis and monitoring.

Text Book(s)

1. Mikell P. Groover, Mitchell Weiss, Roger N. Nagel and Nicholas G. Odrey, Industrial Robotics Technology, Programming and Applications, Mc Graw Hill Book company, 4th edition, 2016.
2 Bernard Hodges, Industrial Robotics, Second Edition, Jaico Publishing House, 1993.
3 L Marques,A de Almeida,Mo Tokhi, GSVirk, ―Advances in Mobile Robotics, World Scientific Publishing Co. Pte. Ltd. 2008.

Reference Books

1 Yangsheng Xu Huihuan Qian Xinyu Wu, Household and Service Robots, Elsevier Ltd, 2015.
2 Aleksandar Lazinica, ―Mobile Robots Towards New Applications, Advanced Robotic Systems International, 2006.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												2	
CO2	3												2	
CO3	3												2	
CO4	3	3	2										2	2
CO5	3												2	
Average	3	3											2	2
Level of correlation	3	3											2	2

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech - I - Semester

20AMEA7	**Robotic Programming**	**L**	**T**	**P**	**C**
		3	1	0	4

Course Outcomes:

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

1. Demonstrate the knowledge of basic planning schemes involved in the development of robotic programming.
2. Develop Programmes for robots based on the techniques of pendent and command control.
3. Demonstrate the knowledge of robotic languages for operations and control.
4. Develop Programs for robots on VAL II platform with complete command-based control.
5. Develop Programs for robots on AML platform with complete command-based control.

UNIT: I Fundamentals of Robot Programming 10 hours

Robot software functions - coordinate systems, Position control, Oher control functions, sub-routines, Planning of robotic programming using flowcharting - examples.

UNIT: II Methods of Robot Programming 10 hours

Online programming, off-line programming advantages of off-line programming; lead through methods - powered lead through, manual lead through, Teach pendant; Robot program as a path in space, defining position in space, motion interpolation, WAIT, SIGNAL and DELAY commands, Branching capabilities and Limitations of lead through methods.

UNIT: III Robot Languages 10 hours

Textual robot Languages, first-generation and Second-generation languages, Structure of a robot language - Operating Systems, Elements and Functions, Constants, Variables and Other data objects, Motion commands, Points in workspace, End effectors and sensor commands, Computations and operations, Program control and subroutines, Communications and Data processing.

UNIT: IV Variable Assembly Language 10 hours

Variable Assembly Language II - Introduction, Monitor commands, motion command, Hand Control, Configuration control, interlock commands, INPUT/OUTPUT Controls, Program Control, Examples

UNIT: V Manufacturing language 10 hours

A Manufacturing Language (AML) - Introduction, AML statements, Constant and Variables, Program control statements, motion commands, Sensor commands; Grip sensing capabilities, Data processing, Examples.

Text Book(s)

1. Mikell P. Groover, Mitchell Weiss, Roger N. Nagel and Nicholas G. Odrey, Industrial Robotics Technology, Programming and Applications, McGraw Hill Book company, 1986

2 Bernard Hodges, Industrial Robotic, Jaico Publishing House, 2nd Edition, 1993.

3 S.R. Deb and S.Deb Robotic Technology and Flexible Automation, Second Edition McGraw Hill Education India., 2012

Reference Books

1 JJ Craig, Introduction to Robotic Mechanics and Control, Pearson, 3rd edition, 2004.

2 Fu, Lee and Gonzalez, Robotics, control vision and intelligence, McGraw Hill International, 2nd edition, 1987.

Mapping of COs with POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	3	3	2										3	2
CO3	3												3	
CO4	3	3	2										3	2
CO5	3	3	2										3	2
Average	3	3	2										3	2
Level of correlation	3	3	2										3	2

3-High Mapping 2- Medium Mapping 1-Low Mapping