SRI VENKATESA PERUMAL COLLEGE OF ENGINEERING & TECHNOLOGY, PUTTUR

(AUTONOMOUS)

(Approved by AICTE | Accredited by NAAC | Affiliated to JNTUA)

R.V.S Nagar, Puttur, Chittoor Dist - 517583, A.P (India)

OUTCOME BASED EDUCATION
WITH
CHOICE BASED CREDIT SYSTEM

BACHELOR OF TECHNOLOGY

ACADEMIC REGULATIONS
UNDER AUTONOMOUS STATUS

B.Tech Regular Four Year Degree Programme

(for the batches admitted from the academic year 2020 - 2021)

&

B.Tech (Lateral Entry Scheme)

(for the batches admitted from the academic year 2021 - 2022)

FAILURE TO READ AND UNDERSTAND THE REGULATIONS

IS NOT AN EXCUSE

CONTENTS

VISION AND MISSION OF THE INSTITUTE

VISION

To make Sri Venkatesa Perumal College of Engineering & Technology a centre for academic excellence where young innovative and inventive minds with novel ideas can interact to evolve new technologies relevant in meeting the societal needs and help rapid industrial growth with increased employment opportunities and changed life styles.

MISSION

To provide the students with high-quality knowledge and skills and thorough practical exposure in hot areas of technology and engineering so that they develop all the competence and confidence to take on the technological challenges of tomorrow. To foster human values and all-round personality development in the student community so that they not only excel as practitioners and entrepreneurs, but also become useful and responsible members of the industry and society that they serve and lead.

1. PRELIMINARY DEFINITIONS AND NOMENCLATURES

Academic Council: The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Autonomy: Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.

Academic Year: It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., (one odd + one even) and one supplementary semester.

AICTE: Means All India Council for Technical Education, New Delhi.

Autonomous Institute: Means an institute designated as autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (Jawaharlal Nehru Technological University, Ananthapuramu) and State Government.

Backlog Course: A course is considered to be a backlog course if the student has obtained a failure grade (F) in that course.

Basic Sciences: The courses offered in the areas of Mathematics, Physics, Chemistry, English etc., are considered to be foundational in nature.

Betterment: Betterment is a way that contributes towards improvement of the student's grade in any course(s). It can be done by either (a) re-appearing or (b) re-registering for the course.

Board of Studies (BoS): BoS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.

Branch: Means specialization in a program like B.Tech degree program in Mechanical Engineering, B.Tech degree program in Computer Science and Engineering etc.

Certificate Course: It is a course that makes a student gain hands-on expertise and skills required for holistic development in a specific area/field.

Choice Based Credit System: The credit based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

Compulsory course: Course required to be undertaken for the award of the degree as per the program.

Commission: Means University Grants Commission (UGC), New Delhi.

Continuous Internal Assessment (CIA): It is an examination conducted towards sessional assessment.

Course: A course is a subject offered by a department for learning in a particular semester.

Course Outcomes: The essential skills that need to be acquired by every student through a course.

Credit: A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

Credit point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student over all the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff and other resources in the process of study for a degree.

Dropping from the Semester: A student who doesn't want to register for any semester can apply in writing in prescribed format before commencement of that semester.

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

Evaluation: Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal assessment and semester end examinations.

Grade: It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

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

Institute: Means SRI VENKATESA PERUMAL COLLEGE OF ENGINEERING & TECHNOLOGY, Puttur, Chittoor Dist, Andhra Pradesh unless indicated otherwise by the context.

Massive Open Online Course (MOOC): MOOC courses inculcate the habit of self learning. MOOC courses would be additional choices in all the elective group courses.

Pre-requisite: A course, the knowledge of which is required for registration into higher level course.

Core: The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

Professional Elective: It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

Program: Means, Bachelor of Technology (B.Tech) degree program / PG degree program: Master of Technology (M.Tech) / Master of Business Administration (MBA) / Master of Computer Applications (MCA).

Program Educational Objectives: The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

Project work: It is a design or research based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit based course and is to be planned carefully by the student.

Re-Appearing: A student can reappear only in the semester end examination for the theory component of a course, subject to the regulations contained herein.

Registration: Process of enrolling into a set of courses in a semester of a Program.

Regulations: The regulations, common to all B.Tech programs offered by Institute are designated as "SVPCET Regulations R20" and are binding on all the stakeholders.

Semester: It is a period of study consisting of 15 to 18 weeks of academic work equivalent to normally 90 working days. The odd Semester starts usually in July and even semester in December.

Semester End Examinations (SEE): It is an examination conducted for all courses offered in a semester at the end of the semester.

S/he: Means "she" and "he" both.

Student Outcomes: The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioral.

University: Means the Jawaharlal Nehru Technological University Anantapur, Ananthapuramu.

2. FOREWORD

The autonomy is conferred to SRI VENKATESA PERUMAL COLLEGE OF ENGINEERING & TECHNOLOGY, (SVPCET) Puttur, Chittoor Dist, Andhra Pradesh by University Grants Commission (UGC), New Delhi based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like J N T University Anantapur (JNTUA), Ananthapuramu and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

SRI VENKATESA PERUMAL COLLEGE OF ENGINEERING & TECHNOLOGY is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the institute and recommendations of the JNTUA 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, in accordance with the vision and mission of the institute to order to produce a quality engineering graduate 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

SRI VENKATESA PERUMAL COLLEGE OF ENGINEERING & TECHNOLOGY, PUTTUR

(AUTONOMOUS)

(Approved by AICTE | Accredited by NAAC | Affiliated to JNTUA)

R.V.S Nagar, Puttur, Chittoor Dist - 524101, A.P (India)

ACADEMIC REGULATIONS

B.Tech. Regular Four Year Degree Programme
(For the batches admitted from the academic year 2020 - 21)
&
B.Tech. (Lateral Entry Scheme)
(For the batches admitted from the academic year 2021 - 22)

For pursuing four year undergraduate Bachelor Degree programme of study in Engineering (B.Tech) offered by SRI VENKATESA PERUMAL COLLEGE OF ENGINEERING & TECHNOLOGY under Autonomous status and herein after referred to as SVPCET(A).

3. 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 acquire more than the required credits, 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 / comprehensive Examination / seminars / assignments / alternative assessment tools / 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:

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

4. ELIGIBILITY FOR ADMISSION

The total seats available as per the approved intake are grouped into two categories viz. category A and Category B with a ratio of 70:30 as per the state government guidelines vide G.O No.52.

The admissions for category A and B seats shall be as per the guidelines of Andhra Pradesh State Council for Higher Education (APSCHE) in consonance with government reservation policy.

- Under Category A: 70% of the seats are filled through EAMCET counseling.
- Under Category B: 30% seats are filled based on 10+2 merits in compliance with guidelines of APSCHE.

Admission eligibility-Under Lateral Entry Scheme Students with diploma qualification have an option of direct admission into II year B. Tech. (Lateral entry scheme). Under this scheme 10% seats of sanctioned intake will be available in each course as supernumerary seats. Admissions to this three year B Tech later entry Programme will be through ECET. The maximum period to complete B. Tech. under lateral entry scheme is six consecutive academic years from the date of joining.

3.0 DURATION OF PROGRAMME

The course duration for the award of the Degree in **Bachelor of Technology** will be four academic years, with two semesters in each year. However if a student is unable to complete the course within 4 years, he/ she can do so by giving more attempts but within 8 consecutive academic years from the date of admission.

Academic Calendar

For all the eight semesters a common academic calendar shall be followed in each semester by having sixteen weeks of instruction, one week for the conduct of practical exams and with two weeks for theory examinations and evaluation. Dates for registration, sessional and end semester examinations shall be notified in the academic calendar of every semester. The schedule for the conduct of all the curricular and co-curricular activities shall be notified in the planner.

MEDIUM OF INSTRCTION

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.

BRANCHES OF STUDY

- Civil Engineering (CE)
- Electrical & Electronics Engineering (EEE)
- Mechanical Engineering (ME)
- Electronics & Communication Engineering (ECE)
- Computer Science & Engineering (CSE)

TYPES OF COURSES

Basic Science Course:

Basic Science courses are the courses based upon the content leads to enhancement of skill and knowledge as well as value based and are aimed at man making education. Skill subjects are those areas in which one needs to develop a set of skills to learn anything at all. They are basics to learning any subject.

Professional 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.

Professional Elective Course:

Professional Electives provide breadth of experience in respective branch and applications areas. Professional 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 unrelated discipline called as "Open Elective".

There are four professional elective groups; students can choose not more than two courses from each group. Overall, students can opt for four professional elective courses which suit their project work in consultation with the faculty advisor/mentor. Nevertheless, one course from each of the two open electives has to be selected.

Open Elective Course:

Open elective course by other department students will have learning awareness and job oriented benefits. Students require the opportunity to choose any open elective course from different departments and apply their knowledge to acquire jobs in that field of course. Learning and employment benefits are not only through their own course subjects but also through open elective courses.

Mandatory Course:

For mandatory courses like Induction Training, Environmental Sciences, Indian Constitution, Essence of Indian Traditional Knowledge, a student has to secure 16 marks out of 40 marks (i.e 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. For **Mandatory** courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

No marks or letter grade shall be allotted for all mandatory/non-credit courses

NCC / NSS Activities:

NSS/NCC training is compulsory for all the Undergraduate students. The activities shall be beyond class hours. The student participation shall be for a minimum period of 45 hours during the first year. Grades will be awarded as Very good, Good, Satisfactory in the mark sheet on the basis of participation, attendance, performance and behavior. If a student gets an Unsatisfactory grade, he/she has to repeat the above activity in the subsequent years, along with the first-year students.

SEMESTER STRUCTURE

Each academic year is divided into two semesters, TWO being MAIN SEMESTERS (one odd + one even). Main Semesters are for regular class work. However, the following cases are exempted:

Students admitted on transfer from JNTUA affiliated institutes, Universities and other institutes in the subjects in which they are required to earn credits so as to be on par with regular students as prescribed by concerned 'Board of Studies'.

Each main semester shall be of 21 weeks (Table 1) duration and this period includes time for registration of courses, course work, examination preparation and conduct of examinations.

Each main semester shall have a minimum of 90 working days; out of which number of contact days for teaching / practical are 75 and 15 days for conduct of exams and preparation.

The academic calendar shown in Table 1 is declared at the beginning of the academic year.

Table 1: Academic Calendar

FIRST SEMESTER (21 weeks)	I Spell Instruction Period	8 weeks	19 weeks
	I Mid Examinations	1 week	
	II Spell Instruction Period	8 weeks	
	II Mid Examinations	1 week	
	Preparation and Practical Examinations	1 week	
	Semester End Examinations		2 weeks
Semester Break and Supplementary Examinations			2 weeks
SECOND SEMESTER (21 weeks)	I Spell Instruction Period	8 weeks	19 weeks
	I Mid Examinations	1 week	
	II Spell Instruction Period	8 weeks	
	II Mid Examinations	1 week	
	Preparation & Practical Examinations	1 week	
	Semester End Examinations		2 weeks
Summer Vacation and Supplementary Examinations			8 weeks

REGISTRATION

Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar. It is absolutely compulsory for the student to register for courses in time. The registration will be organized departmentally under the supervision of the Head of the Department.

IN ABSENTIA registration will not be permitted under any circumstance.

At the time of registration, students should have cleared all the dues of Institute and Hostel in the previous semesters, paid the prescribed fees for the current semester and not involve in any in-disciplinary activities.

UNIQUE COURSE IDENTIFICATION CODE

Every course of the B.Tech program will be placed in one of the four groups of courses as listed in the Table 2. The various courses and their two-letter codes are given below,

Table 2: Group of Courses

S. No	Branch	Code
1	Civil Engineering	01
2	Electrical & Electronics Engineering	02
3	Mechanical Engineering	03
4	Electronics & Communication Engineering	04
5	Computer Science & Engineering	05

CURRICULUM AND COURSE STRUCTURE

The curriculum shall comprise Foundation / Skill Courses, Core Courses, Elective Courses, Open Electives, Laboratory Courses, Skill Oriented Courses, Summer Internship, Comprehensive Viva Voce, Project work, Seminar & Full Semester Internship in Industry, Induction Program and Mandatory Courses.

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

- Contact classes (Theory / Tutorial): 1 credit per lecture hour per week.
- Laboratory Hours (Practical): 0.5 credit for 1 Practical hour per week.
- Virtual Laboratory Hours (Practical): 0.5 credit for 1 Practical hour per week.
- Summer Internship : 1.5 credit
- Project Work, Seminar and Full Semester Internship(6 Months): 14 Credits
- MOOCS : 2 Credits
- Comprehensive Viva Voce : 1 Credit
- Mandatory Courses (MC) : Non Credit
- Induction Program : Non Credit

Credit distribution for courses offered is shown in Table 3.

Table 3: Credit distribution

S. No	Course	Hours	Credits
1	Theory Course (Core/Foundation/Elective)	3	3
2	Professional Core Courses	3	3
3	Professional Elective Courses	3	3
4	Open Elective Courses	3	3
5	Engineering Science courses (Engineering Graphics/Engineering Drawing)	1L+4P	3
6	Engineering Science courses	3	3
7	Laboratory Courses	3	1.5
8	Virtual Laboratory Courses	3	1.5
9	MOOC Courses	0	2
10	Skill Oriented Course / Certification Course	1L+2P	2
11	Skill Advanced Course / Certification Course	1L+2P	2
12	Soft Skill Course / Certification Course	1L+2P	2
13	Summer Internship (8 Weeks)	0	1.5
14	Comprehensive Viva Voce	0	1
15	Project Work, Seminar and Full Semester Internship in Industry (6 Months)	0	14
16	Mandatory Courses	2	0
17	Minor / Honors Degree Courses	4	4

Course Structure

Every program of study shall be designed to have 35 theory courses, 5 Skill Oriented / Certification Courses, Summer Internship, Comprehensive Viva Voce, 5 Mandatory Courses, 17 laboratory courses and 2 Virtual laboratory courses. Every course of the B.Tech program will be placed in one of the Nine categories with minimum credits as listed in the Table 4. In addition, a student has to carry out a Project Work, Full Semester Internship in Industry (6 Months)

Table 4: 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.	HS (05% to 10%)	**10**
2	Basic Sciences (BS) including Mathematics, Physics and Chemistry.	BS (10% to 15%)	**21**
3	Engineering Sciences (ES), including Workshop, Drawing, Basics of Electrical / Electronics / Mechanical / Computer Engineering.	ES (10% to 15%)	**24**
4	Professional Subjects - Core (PC), relevant to the chosen specialization/branch.	PC (30% to 40%)	**51**
5	Professional Subjects - Electives (PE), relevant to the chosen specialization/branch.	PE (5% to 10%)	**15**
6	Open Electives Subjects / MOOCs - Electives (OE), from other technical and/or emerging subject areas.	OE (5% to 10%)	**12**
7	Project Work, Full Semester Internship and Summer Internships	5% to 10%	**17**
8	Skill Oriented Courses/Certificate Course	SO (2% to 3%)	**04**
9	Skill Advanced Courses / Certificate Course	SA (3% to 4%)	**06**
10	Mandatory Courses(Induction Program, NCC/NSS, Constitution of India, Environmental Science, Social Values and Professional Ethics)	MC (0%)	**0**
TOTAL			**160**

For Four year Regular Programme:

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
B.Tech I Semester	2 Basic Science + 1 Humanities and Social Science + 2 Engineering Science	1 Humanities and Social Science Lab + 1 Basic Science Lab + 1 Engineering Science Lab + Induction Training (MC) + NCC / NSS (MC)	19.5
B.Tech II Semester	2 Basic Science + 3 Engineering Science	2 Engineering Science Lab + 1 Basic Science Lab + Environmental Science(MC)	19.5
B.Tech III Semester	1 Basic Science + 4 Professional Core	2 Professional Core Lab + 1 Professional Core Virtual Lab + Skill Oriented Course + Constitution of India (MC)	21.5
B.Tech IV Semester	3 Professional Core + 1 Engineering Science / Professional Core(Interdisciplinary) + Humanities and Social Science	Engineering Science / Professional Core(Interdisciplinary) Lab + 2 Professional Core Lab + Skill Oriented Course	21.5
B.Tech V Semester	3 Professional Core + Open Elective/ Job Oriented Elective -I + Professional Elective – I	2 Professional Core Lab + 1 Skill Advanced Course / Soft Skill Course + Summer Internship 2 Months after Second Year (To be Evaluated during V Semester)	21.5
B.Tech VI Semester	3 Professional Core + Professional Elective - II + Open Elective/ Job Oriented Elective – II	2 Professional Core Lab + 1 Professional Core Virtual Lab + 1 Skill Advanced Course / Soft Skill Course + Social Values and Professional Ethics(MC)	21.5
B.Tech VII Semester	3 Professional Elective-III,IV,V + Open Elective/ Job Oriented Elective –III, IV	2 Professional Core Lab + 1 Skill Advanced Course / Soft Skill Course + Comprehensive Viva Voce	21
B.Tech VIII Semester	Project Work , Seminar and Internship (6 Months)		14
Total	5 Basic Science + 2 Humanities and Social Sciences + 5 Engineering Science + 13 Professional Core + 1 Professional Core(Interdisciplinary) + 5 Professional Electives + 4 Open Electives / Job Oriented Electives + Project Work , Seminar and Internship (6 Months)	1 Humanities and Social Sciences Lab + 2 Basic Science Lab + 3 Engineering Science Lab + 1 Engineering Science / Professional Core (Interdisciplinary) Lab + 10 Professional Core Lab + 2 Professional Core Virtual Lab + 2 Skill Oriented Course + 3 Skill Advanced Course / Soft Skill Course + Summer Internship + Comprehensive Viva Voce + Induction Training (MC) + Constitution of India (MC) + Environmental Science(MC) + Social Values and Professional Ethics(MC) + NCC/NSS (MC)	160

For Three year lateral entry programme :

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
B.Tech III Semester	1 Basic Science + 4 Professional Core	3 Professional Core Lab + 1 Professional Core Virtual Lab + Skill Oriented Course + Constitution of India (MC)	21.5
B.Tech IV Semester	3 Professional Core + 1 Engineering Science / Professional Core(Interdisciplinary) + Humanities and Social Science	Engineering Science / Professional Core(Interdisciplinary) Lab + 2 Professional Core Lab + Skill Oriented Course	21.5
B.Tech V Semester	3 Professional Core + Open Elective/ Job Oriented Elective -I + Professional Elective – I	2 Professional Core Lab + 1 Skill Advanced Course / Soft Skill Course + Summer Internship 2 Months after Second Year (To be Evaluated during V Semester) + Environmental Science(MC)	21.5
B.Tech VI Semester	3 Professional Core + Professional Elective - II + 1Open Elective/ Job Oriented Elective – II	2 Professional Core Lab + 1 Professional Core Virtual Lab + 1 Skill Advanced Course / Soft Skill Course + Social Values and Professional Ethics(MC)	21.5
B.Tech VII Semester	3 Professional Elective- III,IV,V + Open Elective/ Job Oriented Elective –III, IV	2 Professional Core + 1 Skill Advanced Course / Soft Skill Course + Comprehensive Viva Voce	21
B.Tech VIII Semester	Project Work , Seminar and Internship (6 Months)		14
Total	1 Basic Science + 1 Humanities and Social Sciences + 13 Professional Core + 1 Professional Core(Interdisciplinary) + 5 Professional Electives + 4 Open Electives / Job Oriented Electives + Project Work , Seminar and Internship (6 Months)	1 Engineering Science / Professional Core(Interdisciplinary) Lab + 10 Professional Core Lab + 2 Professional Core Virtual Lab + 2 Skill Oriented Course + 3 Skill Advanced Course / Soft Skill Course + Summer Internship + Comprehensive Viva Voce + Constitution of India (MC) + Environmental Science (MC) + Social Values and Professional Ethics (MC)	121

Course wise break-up for Regular Program:

Total Theory Courses - 35 (5 Basic Science + 2 Humanities and Social Sciences + 5 Engineering Science + 13 Professional Core + 1 Professional Core(Interdisciplinary) + 5 Professional Electives + 4 Open Electives / Job Oriented Electives)	35 @ 3credits each	105
Laboratory Courses –19 (2 Basic Science Lab + 1 Humanities and Social Sceines Lab + 3 Engineering Science Lab + 1 Engineering Science / Professional Core(Interdisciplinary) Lab + 10 Professional Core Lab + 2 Professional Core Virtual Lab)	19 @ 1.5 credits each	28.5
Summer Internship	1 @ 1.5 credit	1.5
Comprehensive Viva Voce	1 @ 1 credit	01
Skill Oriented Courses / Certification Courses - 2	2 @ 2credits each	04
Skill Advanced Courses / Soft Skill Courses / Certification Courses - 3	3 @ 2 credit	06
Project Work, Seminar and Full Semester Internship in Industry (6 Months)	1 @ 14 credits	14
Mandatory Course	5 @ 0 credits	0
Total Credits		**160**

Course wise break-up for three year lateral entry program:

Total Theory Courses - 25 (1 Basic Science + 1 Humanities and Social Sciences + 13 Professional Core + 1 Professional Core(Interdisciplinary) + 5 Professional Electives + 4 Open Electives / Job Oriented Electives)	25 @ 3credits each	75
Laboratory Courses –13 (1 Engineering Science / Professional Core(Interdisciplinary) Lab + 10 Professional Core Lab + 2 Professional Core Virtual Lab)	13 @ 1.5 credits each	19.5
Summer Internship	1 @ 1.5 credit	1.5
Comprehensive Viva Voce	1 @ 1 credit	01
Skill Oriented Courses / Certification Courses - 2	2 @ 2credits each	04
Skill Advanced Courses / Soft Skill Courses / Certification Courses - 3	3 @ 2 credit	06
Project Work, Seminar and Full Semester Internship in Industry (6 Months)	1 @ 14 credits	14
Mandatory Course	4 @ 0 credits	0
Total Credits		**121**

EVALUATION METHODOLOGY

The performance of a student in each semester shall be evaluated through Continuous Internal Assessment (CIA) and / or an Semester End Examination (SEE) conducted semester wise.

S.No	Course	Marks	Examination and Evaluation	
1	Theory	60	Semester end examination of 3 hours duration (External Evaluation)	
		40	35	Midterm Examination
			05	Assignment
2	Laboratory	60	Semester end Lab Examination for 3 hours duration (External Evaluation)	
		40	20	Mid Term Examination
			20	Day to Day Evaluation
3	Summer Internship	100	Internal Evaluation	
4	Skill Oriented Courses / Skill Advanced Courses / Soft Skill Courses	40	20	Mid Term Examination
			20	Day to Day Evaluation
		60	Semester End Evaluation	
5	MOOC	100	Upon the submission of graded certificate from authorized MOOCS provider	
6	Engineering Drawing	40	30	Mid Term Examination
			10	Day to Day Evaluation
		60	Semester End Evaluation	
7	Comprehensive Viva Voce	100	Internal Evaluation	
8	Project Work, Seminar and Full Semester Internship (6 Months)	60	Internal Evaluation	
		140	Semester End Evaluation	
9	Mandatory Course	-	-	

Theory Course:

The performance of a student in every theory course shall be evaluated for total of 100 marks each, of which the relative weightage for Continuous Internal Assessment and Semester End Examination shall be 40 marks and 60 marks respectively.

Practical Course:

The performance of a student in every practical course shall be evaluated for total of 100 marks each, of which the relative weightage for Continuous Internal Assessment and Semester End Examination shall be 40 marks and 60 marks respectively.

Internal Evaluation for Theory Course:

The total internal weightage for theory courses is 40 marks with the following distribution.

- 30 marks for Mid-Term Examination (Descriptive)
- 5 marks for Mid-Term Examination (Objective)
- 5 marks for Alternative Assessment Tool

While the first mid-term examination shall be conducted on the 50% of the syllabus (Unit-I, Unit-II & 50% of Unit-III), the second mid-term examination shall be conducted on the remaining 50% of the syllabus (50% of Unit III, Unit-IV & Unit-V).

Two midterm examinations each for **35 marks** with the duration of 90 minutes each will be conducted for every theory course in a semester. The midterm examination marks shall be awarded giving a weightage of 80% in the midterm examination in which the student scores better performance and 20% in the remaining midterm examination.
The final mid-term marks obtain by the addition of these two (80% + 20%).
Example: If a student scores 23 marks and 24 marks in the first and second mid-term examinations respectively, then Weighted Average Marks = 24 x 0.8 + 23 x 0.2 = 23.8, rounded to 24 Marks.
Note: The marks of any fraction shall be rounded off to the next higher mark.

Alternative Assessment Tool (AAT): In order to encourage innovative methods while delivering a course, the faculty members are encouraged to use the Alternative Assessment Tool (AAT). This AAT enables faculty to design own assessment patterns during the CIA. The AAT enhances the autonomy (freedom and flexibility) of individual faculty and enables them to create innovative pedagogical practices. If properly applied, the AAT converts the classroom into an effective learning centre. The AAT may include tutorial hours/classes, seminars, assignments, term paper, open ended experiments, **METE** (Modeling and Experimental Tools in Engineering), five minutes video, MOOCs etc.

However, it is mandatory for a faculty to obtain prior permission from the concerned HOD and spell out the teaching/assessment pattern of the AAT prior to commencement of the classes.

Pattern of the Continuous Internal Assessment (CIA) question paper is as follows:

- A total of two Sections (Descriptive & objective)
- Descriptive examination contains six questions are to be designed taking two questions from each unit (Unit wise – Either or type) of the three units (3X10=30 Marks)

- Objective examination consisting of 10 multiple choice questions per subject and are to be answered by choosing the correct answer from a given set of choices (commonly four). Each multiple choice questions carries 0.5 marks (10X0.5=05). Such a question paper shall be useful in testing of knowledge, skills, application, analysis, evaluation and understanding of the students for competitive examinations like GATE / IES / UPSC / PSU etc.,.

- For Drawing Day to Day assessment carries 10 marks and Mid examination for 30 marks

Note: A student who is absent for any CIA, for any reason whatsoever, shall be deemed to have scored zero marks in that CIA and no make-up test shall be conducted.

Internal Evaluation for Practical Course:

For practical subjects there shall be a Continuous Internal Evaluation during the semester for 40 internal marks. Out of the 40 marks for internal evaluation, day-to-day assessment in the laboratory shall be evaluated for 20 marks and internal practical examination shall be evaluated for 20 marks conducted by the laboratory teacher concerned.

Virtual Laboratory Course

Virtual Labs are intended to augment the learning of science and engineering subjects through performing experiments. The experiments are designed either as simulations or as remote triggered. A remote triggered lab allows a user to connect to real equipment using a web browser.

The students can choose these laboratories from standard available course providers with the help of concerned department faculty Coordinator/Mentor. The department should allocate the faculty to the virtual labs after selection like conventional laboratories to monitor and evaluate the students.

After completion, the details of the virtual labs shall be displayed in the certificate provided by the competent authorities (virtual lab provider) as a proof and submits the same to the department through concerned Coordinator/Mentor. The departmental committee will assess the students based on the number of experiments performed should submit lab record and certificate of completion by the student through mentor as a part of the course. The Lab work should not be less than 8 experiments. It carry maximum of 100 marks. The same submitted to the controller of examination to obtain grading in semester end examination mark memo.

Internal Evaluation

For virtual practical subjects there shall be a Continuous Internal Evaluation during the semester for 40 internal marks. Out of the 40 marks for internal evaluation, 10 marks for lab record and 30 marks for Viva Voce conducted by the departmental committee.

External Evaluation

60 marks are allotted for external evaluation based on the certificate provided by the lab provider.

A candidate shall be declared to have passed in virtual lab course if he secures a minimum of 40% aggregate marks (40 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 40% marks (21marks) in the semester external examination.

Internal Evaluation for Design/ Drawing Courses:

For the subject having design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing, production drawing and building drawing) the internal marks distribution shall be 10 marks for day-to-day performance and 30 marks for Mid-Term Examinations.

Skill Oriented / Skill Advanced / Soft Skill Courses:

- For skill oriented/skill advanced /Soft skill Course, one theory and 2 practical hours may be allotted or two theory hours may be adopted as per the decision of concerned BoS.
- From the five skill courses two shall be skill-oriented programs related to the domain and shall be completed in 2nd year. The remaining 3 skill courses, one shall be necessarily a soft skill course and the remaining 2 skill-advanced courses can be in the same domain or Job oriented skills which can be inter disciplinary. Model only, can be extended to other courses/departments.

Skill, Job Oriented Tracks for Mechanical Engineering

1. **Design/Analysis/Simulation** - CAD, UGNX, Solid Works, Ansys, FEA, CATIA, CREO etc
2. **Production/Manufacturing -** CAM, Piping, A/QC, CNC

3. **Thermal/Computational -** Computational Fluid Dynamics, MATLAB etc
4. **Service Sector -** Industrial Safety and Management, Operation Research, Oil & Gas safety.

Skill, Job Oriented Tracks for Civil Engineering

1. **Structural Design** - AutoCAD 2D 3D, ANSYS Civil, ETABS, PRO Steel, etc.
2. **Building Design -** Revit Architecture, ANSYS Civil, STAAD.PRO, AECO sim etc.

3. **Land survey and Transportation Design -** Surveying, 2D Drafting, 3D Modeling, Analysis, Road & Transport Design etc.

Skill, Job Oriented Tracks for Computer Science &Engineering

1. **Animation course** - VFX, CARTOONING, ANIMATION DESIGN etc
2. **Mobile app development -** App design for IOS and Android etc.
3. **Data Science -** Natural language processing, sentiment analysis, fore casting, regression models etc
4. **Python programming** - Deep learning, IOT natural language processing, Game Graphics Programming etc..

- A pool of interdisciplinary job-oriented skill courses shall be prepared by joint Board of studies and the syllabus along with the pre requisites shall be prepared for each of the requirements of laboratory infrastructure. The list of such courses shall be included in the curriculum of each branch of Engineering, so as to enable the student to choose from the list.
- The student shall be given an option to choose between the skill advanced courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies.
- 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 skills based on industrial demand.
- The credits assigned to the skill advanced course shall be awarded to the student upon producing the certificate of skill from the agency/professional bodies as approved by the Board of studies.
- 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.

Evaluation Procedure

Evaluation of the Skill oriented / Skill advanced / Soft skills / Certificate course shall be through the departmental committee. A student will be registered for the courses being offered by the department or interdisciplinary. The evaluation procedure is,

Internal Examination - 40 Marks (CIA Mode)

External Examination - 60 Marks (SEE Mode)

A student will be registered for the course being offered by industries / Professional bodies / APSSDC or any other accredited bodies. The Merit / Pass certificate obtained from the course is considered for 2 credits.

Summer Internship

Summer Internship each of 8 weeks / 2 Months duration at the end of II B.Tech (i.e., IV Semester) are Mandatory with 2 credits. The internship can be done by the students at local industries, Govt. organizations, Constructional agencies, Industrial Estates, Hydel and Thermal Power plants and also in Software MNCs.

The internship after II year shall also be in the form of community service project as mentioned below,

Community Service Project

- 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 2 months of Summer Internships / Apprenticeships / On 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 incharge.
- 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

Suggestive List of Programmes Under Community Service Project:

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions and modifications. Colleges are expected to focus on specific local issues for this kind of projects. The students are expected to carry out these projects with involvement, commitment, responsibility and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of projects. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting shall be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages

38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling level- observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programmes are;

Programmes for School Children:

1. Reading Skill Programme (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Programme on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Programme on Socially relevant themes.

Programmes for Women Empowerment:

1. Government Guidelines and Policy Guidelines
2. Women's Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

General Camps:

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programmes on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days.

Programmes for Youth Empowerment:

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

Common Programmes:

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programmes in consonance with the Govt. Departments like
    i. Agriculture
    ii. Health

iii. Marketing and Cooperation
iv. Animal Husbandry
v. Horticulture
vi. Fisheries
vii. Sericulture
viii. Revenue and Survey
ix. Natural Disaster Management
x. Irrigation
xi. Law & Order
xii. Excise and Prohibition
xiii. Mines and Geology
xiv. Energy

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also with the Governmental Departments. If the programme is rolled out, the District Administration could be roped in for the successful deployment of the programme.
- An in-house training and induction programme could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity
Duration: 8 weeks

1. Preliminary Survey (One Week)

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.

2. Community Awareness Campaigns (Two Weeks)

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Four Weeks)

- **Along with the Community Awareness Programmes**, the student batch can also work with any one of the below listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to the experiential learning about the community and its dynamics. Programmes could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

- During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks work to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that particular habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University.
- Throughout the Community Service Project, a daily log-book need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher mentor, who is required to periodically visit the students and guide them.

Evaluation of Summer Internship / Community Service Project:

Evaluation of the Summer Internship / Community Service Project shall be through the departmental committee. A student will be required to submit a detailed project report to the concerned department and appear for an oral presentation before the departmental committee.

- Day to day assessment log book - 20 Marks
- Internship / Project Report - 40Marks
- Presentation and Viva-Voce - 40 Marks

A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

Comprehensive Viva-Voce Assessment:

There shall be a Comprehensive Viva-Voce in VII Semester for 1 credit. The Comprehensive Viva–Voce is aimed to assess the students understanding in various subjects he studies during the B. Tech course of study. The Comprehensive Viva–Voce shall be evaluated for 100 marks by the committee. The Comprehensive Viva-Voce will be conducted by the committee consisting of Head of the Department and two senior faculty members of the department nominated by the Principal. There are no external marks for the Comprehensive Viva–Voce. A student shall acquire 1 credit assigned to the Comprehensive Viva–Voce only when he secures 50% marks. In case, if a student fails in Comprehensive Viva–Voce, he shall reappear as and when VII Semester supplementary examinations are conducted.

Project Work, Seminar and Full Semester Internship at Industry (6 Months):

In the final semester, the student mandatorily undergo internship and parallelly he/she should work on a project with a well defined objectives. At the end of the semester the candidate submits a certificate of internship and a project report. The project report shall be evaluated by the departmental committee with an external examiner.

The college shall facilitate and monitor the student internship program. Completion of internship is mandatory if any student fails to complete internship, he / she will not be eligible for the award of degree. In such cases the student has to repeat the internship for a period of 6 months in the subsequent years.

Project Work, Seminar and Full Semester Internship carry 200 Marks which is split into 140 Marks for External Evaluation and 60 Marks for Internal Evaluation.

Internal Evaluation for Project Work, Seminar and Full Semester Internship at Industry:

The object of Project Work and internship is to enable the student to take up investigative study in the broad field of his branch of Engineering/Interdisciplinary, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the department on an individual basis or three/four students in a group under the guidance of a supervisor/ guide. This is expected to provide a good initiation for the student(s) in R&D work.

The total internal weightage for Project work, Internship course is 60 marks and will be evaluated as follows,

- Submission of Abstract (Identification of Problem & Literature Survey) Profile and Abstract –Student has to submit the industry profile and abstract of the project within four weeks from date of commencement of internship through mail or post – 10 Marks
- Company Profile and Abstract (Internship) – 10 Marks
- Review-1 – at 6th week from date of commencement of internship - 10 Marks
- Review-2 – at 12th week from date of commencement of internship - 15 Marks
- Review-3 – at 18th week from date of commencement of internship - 15 Marks

External Evaluation for Theory Course - Semester End Examination:

The Semester End Examination (SEE) in each theory subject shall be conducted for 3 hours duration at the end of the semester for 60 marks.

Pattern of the Semester End Examination question paper is as follows:

- A total of two Sections (Section-I & Section-II)
- Section-I contains five two mark questions. One question from each unit and a student has to be answered all the five questions compulsory (5x2=10 Marks)
- Section-II contains ten questions are to be designed taking two questions from each unit (Unit Wise - Either or type) of the total five units. (5x10=50 Marks)

A student has to secure not less than a minimum of 35% of marks (21 marks) exclusively at the Semester End Examinations in each of the theory subjects in which the candidate had appeared. However, the candidate shall have to secure a minimum of 40% of marks (40 marks) in both external and internal components put together to become eligible for passing in the subject.

The emphasis on the questions is broadly based on the following criteria:

50 %	To test the objectiveness of the concept
30 %	To test the analytical skill of the concept
20 %	To test the application skill of the concept

External Evaluation for Practical Course:

Out of 60 marks **40** marks are allocated for experiment (procedure for conducting the experiment carries 25 marks & readings, calculation and result-15) and **10** marks for viva-voce examination with **10** marks for the record.

Each Semester External Lab Examination shall be evaluated by an Internal Examiner along with an External Examiner appointed by the Principal.

A candidate shall be declared to have passed in individual lab course if he secures a minimum of 40% aggregate marks (40 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 40% marks (21 marks) in the semester external examination.

External Evaluation for Design/ Drawing Courses/BEEE:

The Semester End Examination in Design / Drawing Course shall be conducted for 3 hours duration at the end of the semester for 60 marks.

Pattern of the Semester End Examination question paper is as follows:

- It contains ten questions are to be designed taking two questions from each unit (Unit Wise - Either or type) of the total five units. (5x12=60 Marks)

A student has to secure not less than a minimum of 35% of marks (21 marks) exclusively at the Semester End Examinations in each of the theory subjects in which the candidate has appeared. However, the candidate shall have to secure a minimum of 40% of marks (40 marks) in both external and internal components put together to become eligible for passing in the subject.

- It contains TWO PARTS. Part-A contains (Electrical) Four questions are to be designed taking two questions from each unit (Unit Wise - Either or type) of the total two units (2X12=24) and Part-B contains (Electronics) six questions are to be designed taking two questions from each unit (Unit Wise - Either or type) of the total three units. (3x12=36 Marks)

A student has to secure not less than a minimum of 35% of marks (21 marks) exclusively at the Semester End Examinations in each of the theory subjects in which the candidate has appeared. However, the candidate shall have to secure a minimum of 40% of marks (40 marks) in both external and internal components put together to become eligible for passing in the subject.

External Evaluation for Project Work, Seminar and Full Semester Internship at Industry:

The external evaluation based on the report submitted and viva-voce exam for 140marks shall be conducted by a Project Review Committee (PRC). The committee comprises of an External Examiner appointed by the Principal, Head of the Department and Project Guide/Supervisor. The evaluation of project work shall be based on the report submitted and a viva-voce exam for 140 marks by a committee comprising the Head of the Department, the project supervisor and an external examiner nominated by the Principal. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

Project Work, Seminar and Full Semester Internship in the Industry carry 14 credits. During Full semester Internship, student has to spend one full semester (6 Months) in an identified industry /firm / organization and has to carry out the internship as per the

stipulated guidelines of that industry / firm / organization and the institute.

Distribution of Project Work, Seminar and Full Semester Internship Marks

- Internship Certificate is Mandatory
- Project Report - 30 Marks
- Project Presentation - 50 Marks
- Project Viva Voce - 60 Marks

Massive Open Online Courses (MOOCs):

Meeting with the global requirements, to inculcate the habit of self learning and incompliance with UGC guidelines, MOOC (Massive Open Online Course) courses have been introduced as electives. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion for the course from the MOOCs providers

Regulations for MOOCs

- The respective departments shall give a list of courses from NPTEL or any other standard providers, whose credentials are endorsed by the HOD.
- Each department shall appoint Coordinators/Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of thesame.
- A student shall choose an online course (relevant to his/her programme of study) from the given list of MOOCs providers, as endorsed by the teacher concerned, with the approval of the HOD.
- The details of MOOC(s) shall be displayed in Grade card of a student, provided he/she submits the proof of completion of it to the department concerned through the Coordinator/Mentor.
- Student can get certificate from SWAYAM/NPTEL or any other standard providers, whose credentials are endorsed by the HOD. The course work should not be less than 8 weeks.

Two credits will be awarded upon successful completion of each MOOC courses having minimum of 8 weeks duration.

Mandatory Courses:

Mandatory courses carry **"ZERO"** credits. There shall be **NO Semester-end** examination. However, ATTENDANCE in Mandatory courses shall be considered while calculating aggregate attendance in a semester. The internal examination shall be

conducted and evaluated similar to the THEORY courses for 30 Marks. The student shall be declared to have passed the mandatory courses only when He/She secures **40% (12 Marks) marks in the internal examination.** If the student FAILS, a re-examination shall be conducted for FAILED candidates in the Consecutive semester. The performance of the student shall be indicated in the grade sheets "**SATISFACTORY" (or) "NOT SATISFACTORY"** as given in 12.1**.** The student should pass all the mandatory courses, for the award of B.Tech degree.

For the Mandatory Courses, if the student obtained 40% or more marks, then his performance shall be indicated as "P" (SATISFACTORY), otherwise the performance shall be indicated as "F" (NOT SATISFACTORY) in the grade sheet.

GRADING PROCEDURE

Grades will be awarded to indicate the performance of students in each theory subject, laboratory / practical's, Skill oriented Course / Skill Advanced course / Soft Skill course, Summer Internships, Project Work, Seminar and Full Semester Internship in Industry (6 Months). Based on the percentage of marks obtained (Continuous Internal Assessment plus Semester End Examination, both taken together) as specified in item 11 above, a corresponding letter grade shall be given.

As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	A+ (Outstanding)	10
80-89	A (Excellent)	9
70-79	B+ (Very Good)	8
60-69	B (Good)	7
50-59	C (Above Average)	6
45-49	D (Average)	5
40-44	E (Pass)	4
Less than 40	F (Fail)	0
Absent	AB (Absent)	0
For Mandatory & Audit Courses		
Greater than or equal to 40%	P (Satisfactory)	-
Below 40%	F (Not Satisfactory)	-

A student who has obtained an 'F' grade in any subject shall be deemed to have 'failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

To a student who has not appeared for an examination in any subject, 'AB' grade will be allocated in that subject, and he is deemed to have 'failed'. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same

as those obtained earlier.

A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

A student earns grade point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

Credit points (CP) = grade point (GP) x credits …. For a course

A student passes the subject/ course only when GP ≥ 4 ('E' grade or above)

- A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered.
- For Mandatory courses "Satisfactory" or "Not satisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. 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, C_i is the number of credits of the i^{th} subject and G_i is the grade point scored by the student in the i^{th} course.

ii. 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 "S_i" is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester.

iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iv. While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

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

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

Example: Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade Point	Credit Point
Course-I	3	S	10	3x10=30
Course-II	3	A	9	3x9=27
Course-III	3	B	8	3x8=24
Course-IV	3	D	6	3x6=18
Course-V	2	B	8	2x8=16
Course-VI	1	C	7	1x7=7
	15			122

Thus, SGPA=$\frac{122}{15}$ = 8.13

Illustration for CGPA

I Semester	II Semester	III Semester	IV Semester
Credit: 19 SGPA: 8.13	Credit: 19.5 SGPA: 6.9	Credit: 21.5 SGPA: 7.3	Credit: 21.5 SGPA: 6.8
V Semester	**VI Semester**	**VII Semester**	**VIII Semester**
Credit: 22 SGPA: 8.2	Credit: 21.5 SGPA: 7.4	Credit: 21 SGPA: 7.2	Credit: 14 SGPA: 7.8

Thus, CGPA= $\frac{(19x8.13)+(19.5x6.9)+(21.5x7.3)+(21.5x6.8)+(22x8.2)+(21.5x7.4)+(21x7.2)+(14x7.8)}{160}$

= 7.45

AWARD OF CLASS

After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B.Tech. Degree he/she shall be placed in one of the following four classes:

CGPA ≥ 7.5	CGPA ≥ 6.5 and < 7.5	CGPA ≥ 5.5 and < 6.5	CGPA ≥ 4.0 and < 5.5	CGPA < 4.0
First Class with Distinction	**First Class**	**Second Class**	**Pass Class**	**Fail**

A student with final CGPA is < 4.00 will not be eligible for the Award of the Degree.

CONDUCT OF SEMESTER END EXAMINATIONS ANDEVALUATION

Semester end examination shall be conducted by the Controller of Examinations (CoE) by inviting Question Papers from the External Examiners

Question papers may be moderated for the coverage of syllabus, pattern of questions by a Semester End Examination Committee chaired by CoE and senior subject expert before the commencement of semester end examinations. Internal Examiner shall prepare a detailed scheme of valuation.

The answer papers of semester end examination should be evaluated by an external examiner immediately after the completion of exam and the award sheet should be submitted to CoE in a sealed cover.

CoE shall invite required number of external examiners to evaluate all the end-semester answer scripts on a prescribed date(s). Practical laboratory exams are conducted involving external examiners.

Examinations Control Committee shall consolidate the marks and award grades.

15.0 MAKEUP EXAMINATION

The make-up examination facility shall be available to students who may have missed to attend CIA exams in one or more courses in a semester for valid genuine reasons. The make-up examination shall have comprehensive online objective type questions. The syllabus for the make-up examination shall be the whole syllabus covered till the end of

the semester under consideration and will be conducted at the end of the semester.

SUPPLEMENTARY EXAMINATIONS

Apart from the regular End Examinations the institute may also schedule and conduct supplementary examinations for all subjects for the benefit of students with backlogs. Such students writing supplementary examinations as supplementary candidates may have to write more than one examination per day.

ATTENDANCE REQUIREMENTS AND DETENTION POLICY

A candidate shall put in a minimum required attendance of 75 % in that semester. Otherwise, she/he shall be declared detained and has to repeat semester.

For cases of medical issues, deficiency of attendance in a semester to the extent of 10% may be condoned by the College Academic Committee (CAC) on the recommendation of Head of the department if their attendance is between 75% and 65% in a semester, subjected to submission of medical certificates, medical case file and other needful documents to the concerned departments. The condonation is permitted maximum of two times during the entire course of study.

A prescribed fee shall be payable towards condonation of shortage of attendance.

A student shall not be promoted to the next semester unless he/she satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he/she shall not be eligible for readmission into the same class.

Any student against whom any disciplinary action by the institute is pending shall not be permitted to attend any SEE in that semester.

PROMOTION POLICIES

The following academic requirements have to be satisfied in addition to the attendance requirements

A student shall be promoted from IV Semester to V Semester only if he/she acquires 24 credits (i.e 40% of total credits) that have been studied up to III Semester from the following examinations, irrespective of whether the candidates takes the end examinations or not as per the normal course of the study

B.Tech I Semester - one Regular and two Supplementary
B.Tech II Semester - one Regular and one Supplementary
B.Tech III Semester - one Regular only

(OR)

A student shall be promoted from IV Semester to V Semester only if he/she acquires 33 credits (i.e 40% of total credits) that have been studied up to IV Semester from the following examinations, irrespective of whether the candidates takes the end examinations or not as per the normal course of the study

B.Tech I Semester - one Regular and three Supplementary
B.Tech II Semester - one Regular and two Supplementary
B.Tech III Semester - one Regular only and one Supplementary
B.Tech IV Semester - one Regular only

A student shall be promoted from VI Semester to VII Semester only if he/she acquires 41 credits (i.e 40% of total credits) that have been studied up to V Semester from the following examinations, irrespective of whether the candidates takes the end examinations or not as per the normal course of the study

B.Tech I Semester - one Regular and four Supplementary
B.Tech II Semester - one Regular and three Supplementary
B.Tech III Semester - one Regular and two Supplementary
B.Tech IV Semester - one Regular and one Supplementary
B.Tech V Semester - one Regular only

(OR)

A student shall be promoted from VI Semester to VII Semester only if he/she acquires 50 credits (i.e 40% of total credits) that have been studied up to VI Semester from the following examinations, irrespective of whether the candidates takes the end examinations or not as per the normal course of the study

B.Tech I Semester - one Regular and five Supplementary
B.Tech II Semester - one Regular and four Supplementary
B.Tech III Semester - one Regular and three Supplementary
B.Tech IV Semester - one Regular and two Supplementary
B.Tech V Semester - one Regular and one Supplementary
B.Tech VI Semester - one Regular only

A lateral entry student shall be promoted from VI Semester to VII Semester only if he/she acquires 26 of the credits (i.e 40% of the credits) from the courses that have been studied up to V Semester from all the regular and supplementary examinations until V Semester.

B.Tech III Semester - one Regular and two Supplementary
B.Tech IV Semester - one Regular and one Supplementary
B.Tech V Semester - one Regular only

(OR)

A lateral entry student shall be promoted from VI Semester to VII Semester only if he/she acquires 35 of the credits (i.e 40% of the credits) from the courses that have been studied up to VI Semester from all the regular and supplementary examinations until V Semester.

B.Tech III Semester - one Regular and three Supplementary
B.Tech IV Semester - one Regular and two Supplementary
B.Tech V Semester - one Regular and one Supplementary
B.Tech VI Semester - one Regular only

A student shall register and putup minimum attendance in all 160 credits and earn all the 160 credits. Marks obtained in all 160 credits shall be considered for the calculation of aggregate percentage of marks obtained. In the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. Course and their admission shall stand cancelled.

A lateral entry student shall register and put-up minimum attendance in all 121 credits and earns all the 121 credits. Marks obtained in all 121 credits shall be considered for the calculation of aggregate percentage of marks obtained. In the course structure within six academic years from the year of their admission shall forfeit their seat in B.Tech. Course and their admission shall stand cancelled.

MAJOR DEGREE WITH A MINOR:

1. Students, who are desirous 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/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering.

   Student can opt the Industry relevant tracks of any branch to obtain the Major degree with Minor, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.

2. A student shall be permitted to register for Minors program at the beginning of 4^{th} semester provided that the student must have acquired 8.0 CGPA (for SC/ST students CGPA of 7.5) up to the end of 2^{nd} semester without any history of backlogs. It is expected that the 3^{rd} semester results may be announced after the commencement of the 4^{th} semester, if a student fails to acquire 8.0 CGPA (for SC/ST students CGPA of 7.5) CGPA up to 3^{rd} semester or failed in any course, his registration for Minors program shall stand cancelled. An SGPA and CGPA of 7.5 (for SC/ST students CGPA of 7.0) has to be maintained in the subsequent semesters without any backlog in order to keep the Minor registration active.

3. Minor degree will cumulatively require additional 20 credits in the specified area in addition to the credits essential for obtaining the under graduate degree in Major discipline (i.e., 160 credits).

4. The BoS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / Demand, for example the minor

tracks can be the fundamental courses in CSE, CSE(AI), CSE(DS), ECE, EEE,CE,ME etc or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science(DS), Robotics, Electric vehicles, VLSI etc. The list of disciplines/ branches eligible to opt for an industry relevant minor specialisation shall be clearly mentioned in the respective BOS.

5. Student must complete 4 courses each of 4 credits by choosing from six courses mentioned in the course structure of the department.

6. In addition to acquiring 16 credits from courses, students shall have to pursue at least 2 courses for two credits each through MOOCS/NPTEL. The concerned BOS shall list the MOOCS/NPTEL courses to be pursued by the student. Attendance will not be monitored for this MOOCS course. A student has to acquire a certificate of MOOCS/NPTEL course from the agencies approved by the BOS in order to earn the required credits, and that should be evaluated by Department committee for the credits.

7. Student can opt the Industry relevant minor specialisations as approved by the concerned departmental BoS or he/she can opt the courses from skill development corporation (APSSDC) or he/she can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.

8. A committee should be formed at the level of College/Universities/department to evaluate the grades/ marks given by external agencies to a student which are approved by concerned BoS. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.

9. If a student prefers to take test from an external agency, he/she must take a comprehensive viva-voce conducted at University level and the marks assigned for the Viva-voce will be assigned to that course. However, if students wish to take the courses from the department, he/she should take examination conducted by the University only. Also, if a student completes courses from external agency without taking test are also eligible to get minor degree after fulfilling all the formalities assigned by the departmental committee.

10. It is the responsibility of the student to acquire prerequisite knowledge of the minor program domain before taking the course. The University/Institution BoS concerned shall prepare the list of subjects and pre requisites for each minor track.

11. If a student drops (or terminated) from the Minor program, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a “Pass (P)” grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript.

12. In case a student fails to meet the CGPA requirement for B.Tech Degree with Minor at any point after registration, he/she will be dropped from the list of

students eligible for Degree with Minors and they will receive B. Tech Degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

HONORS PROGRAM:

1. Students from same department are eligible for Honor program.
2. A student shall be permitted to register for Honors program at the beginning of 4th semester provided that the student must have acquired 8.0 CGPA (for SC/ST students CGPA of 7.5) CGPA upto the end of 2nd semester without any history of backlogs. It is expected that the 3rd semester results may be announced after the commencement of the 4th semester, if a student fails to acquire 8.0 CGPA (for SC/ST students CGPA of 7.5) CGPA upto 3rd semester or failed in any course, his registration for Honors program shall stand cancelled. An SGPA and CGPA of 7.5 (for SC/ST students CGPA of 7.0) has to be maintained in the subsequent semesters without any backlog in order to keep the Honors registration active
3. Students can select advanced subjects from their respective branch in which they are pursuing the degree. E.g. If Mechanical Engineering student completes the selected advanced subjects from the same branch under this scheme, he/she will be awarded B.Tech (Honors) in Mechanical Engineering.
4. Student must complete 4 courses @ 4 credits from each pool and 2 MOOC/NPTEL courses @ 2 credits (Total 20 credits)
5. The student who has registered for Honors shall choose one course from each pool. There shall be 4 pools with 5 courses each as mentioned in course structure of Honors program. The board of studies concerned will decide the courses under each pool for Honors programs.
6. For Honors program, all the courses offered in each pool shall be domain specific courses and advanced courses.
7. In addition to the 4 courses chosen, one from each pool, students shall have to pursue at least 2 courses through MOOCS/NPTEL. The concerned BoS shall list the MOOCS/NPTEL courses to be pursued by the student. Attendance will not be monitored for this MOOCS course. Student has to acquire a certificate of MOOCS/NPTEL course from the agencies approved by the BoS in order to earn 2 credits. BoS concerned shall prepare the list of advanced courses for each pool taking into consideration the core courses offered in the curriculum. If a course comes with a lab component, that component has to be cleared separately. The concerned BoS shall provide pre requisites to take the specific course by the student. It is the responsibility of the student to acquire/complete prerequisite before taking the course.
8. If a student drops (or terminated) from the Honors program, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a “Pass (P)” grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Honors will be shown in the transcript. None of the courses done under the dropped Honors will be shown in the transcript.

9. In case a student fails to meet the CGPA requirement for Degree with Honors at anypoint after registration, he/she will be dropped from the list of students

eligible for Degree with Honors and they will receive B.Tech Degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

GRADUATION REQUIREMENTS

The following academic requirements shall be met for the award of the B.Tech degree.

Student shall register and acquire minimum attendance in all courses and secure 160 credits for regular program and 121 credits for lateral entry program.

A student of a regular program, who fails to earn 160 credits within eight consecutive academic years from the year of his/her admission with a minimum CGPA of 4.0, shall forfeit his/her degree and his/her admission stands cancelled.

A student of a lateral entry program who fails to earn 121 credits within six consecutive academic years from the year of his/her admission with a minimum CGPA of 4.0, shall forfeit his/her degree and his/her admission stands cancelled.

22.0 REVALUATION

A student, who seeks the re-evaluation of the answer script, is directed to apply for the photocopy of his/her semester examination answer paper(s) in the theory course(s), within 5 working days from the declaration of results in the prescribed format with prescribed fee to the Controller of Examinations through the Head of the department. On receiving the photocopy, the student can consult with a competent member of faculty and seek the opinion for revaluation. Based on the recommendations, the student can register for the revaluation with prescribed fee. The Controller of Examinations shall arrange for the revaluation and declare the results. Revaluation is not permitted to the courses other than theory courses.

TEMPORARY BREAK OF STUDY FROM THE PROGRAMME

A candidate is normally not permitted to break the study. However, if a candidate intends to temporarily discontinue the program in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the program after the break from the commencement of the respective semester as and when it is offered , she/he shall apply to the Principal in advance. Such application shall be submitted before the commencement of the semester in question and forwarded through the Head of the department stating the reasons for such withdrawal together with supporting documents and endorsement of his / her parent / guardian.

The institute shall examine such an application and if it finds the case to be genuine, it may permit the student to rejoin. Such permission is accorded only to those who do not have any outstanding dues like tuition fee etc.

The total period for completion of the program reckoned from the commencement of the semester to which the candidate was first admitted shall not exceed the maximum period 8 years for regular and 6 years for lateral entry programme. The maximum period includes the break period.

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 I year/II year/III 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. An evaluation committee

shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for having the Gap Year.

TERMINATION FROM THE PROGRAMME

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

- The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.
- A student shall not be permitted to study any semester more than three times during the entire Program of study.
- The student fails to satisfy the norms of discipline specified by the institute from time to time.

26.0 WITH-HOLDING OF RESULTS

If the candidate has any dues not paid to the institute or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld and he/she will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

27.0 STUDENT TRANSFERS

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

GRADUATION DAY

The institute shall have its own annual Graduation Day for the award of Degrees 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 announce 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.

CONDUCT AND DISCIPLINE

- Students shall conduct themselves within and outside the premises of the Institute in a decent and dignified manner befitting the students of Sri Venkatesa Perumal College of Engineering & Technology.
- As per the order of the Honorable Supreme Court of India, ragging in any form is considered a criminal offence and is totally banned. Any form of ragging will be severely dealt with the following acts of omission and / or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures with regard to ragging.
  - (i) Lack of courtesy and decorum, indecent behavior anywhere within or outside the college campus.
  - (ii) Damage of college property or distribution of alcoholic drinks or any kind of narcotics to fellow students / citizens.
- Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.
- Mutilation or unauthorized possession of library books.
- Noisy and unruly behavior, disturbing studies of fellow students.
- Hacking in computer systems (such as entering into other person's areas without

prior permission, manipulation and / or damage of computer hardware and software or any other cyber crime etc.

- Usage of camera /cell phones in the campus.

- Plagiarism of any nature.
- Any other act of gross indiscipline as decided by the college academic council from time to time.
- Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute/ hostel, debarring from examination, disallowing the use of certain facilities of the Institute, rustication for a specified period or even outright expulsion from the Institute, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.
- For an offence committed in (i) the hostel (ii) department or in a class room and (iii) elsewhere, the chief Warden, the concern Head of the Department and the Principal respectively, shall have the authority to reprimand or impose fine.
- Cases of adoption of unfair means and/ or any malpractice in an examination shall be reported to the principal for taking appropriate corrective action.
- All cases of serious offence, possibly requiring punishment other than reprimand, shall be reported to the Academic council of the college.
- The Institute Level Standing Disciplinary Action Committee constituted by the academic council shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.
- The Principal shall deal with any problem, which is not covered under these rules and regulations.

30.0 GRIEVANCE REDRESSAL COMMITTEE

Grievance and Redressal Committee constituted by the Principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters. All the students must abide by the code and conduct rules prescribed by the college from time to time.

TRANSITORY REGULATIONS

Required to do all the courses in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such courses in the earlier semester(s) s/he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will befinal.

Four Year B.Tech Regular course:

A student who is under Jawaharlal Nehru Technological University Anantapur (JNTUA) curriculum and detained due to shortage of attendance at the end of the first semester shall join the autonomous batch of first semester. Such students shall study all

the courses prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUA curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUA for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUA regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

Three Year B.Tech program under Lateral Entry Scheme:

A student who is following JNTUA curriculum and detained due to shortage of attendance at the end of the first semester of second year shall join the autonomous batch of third semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with Lateral Entry regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUA curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of second year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUA for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUA regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

Transfer candidates (from non-autonomous college affiliated to JNTUA):

A student who is following JNTUA curriculum, transferred from other college to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption

will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in their place as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUA for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester under JNTUA regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

Transfer candidates (from an autonomous college affiliated to JNTUA):

A student who has secured the required credits upto previous semesters as per the regulations of other autonomous institutions shall also be permitted to be transferred to this institute. A student who is transferred from the other autonomous colleges to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester as per the regulations of the college from which he is transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

32.0 REVISION OF REGULATIONS AND CURRICULUM

The Institute from time to time may revise, amend or change the regulations, scheme of examinations and syllabi if found necessary and on approval by the Academic Council and the Governing Body shall come into force and shall be binding on the students, faculty, staff, all authorities of the Institute and others concerned.

FAILURE TO READ AND UNDERSTAND THE REGULATIONS IS NOT AN EXCUSE

B.TECH - PROGRAM OUTCOMES (POS)

PO-1 : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems (**Engineering Knowledge**).

PO-2 : Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences **(Problem Analysis).**

PO-3 : 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 **(Design/Development of Solutions).**

PO-4 : 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 **(Conduct Investigations of Complex Problems).**

PO-5 : 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 **(Modern Tool Usage).**

PO-6 : 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 **(The Engineer and Society).**

PO-7 : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development **(Environment and Sustainability).**

PO-8 : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice **(Ethics).**

PO-9 : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings **(Individual and Team Work).**

PO-10 : 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 **(Communication).**

PO-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.

PO-12 : 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 **(Life-long learning).**

FREQUENTLY ASKED QUESTIONS AND ANSWERS ABOUT AUTONOMY

1. Who grants Autonomy? UGC, Govt., AICTE or University

In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy but only after concurrence from the respective state Government as well as UGC. The State Government has its own powers to grant autonomy directly to Govt. and Govt. aided Colleges.

2 Shall Sri Venkatesa Perumal College of Engineering & Technology award its own Degree?

No. Degree will be awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu with a mention of the name Sri Venkatesa Perumal College of Engineering & Technology on the Degree Certificate.

3 What is the difference between a Deemed to be University and an Autonomy College?

A Deemed to be University is fully autonomous to the extent of awarding its own Degree. A Deemed to be University is usually a Non-Affiliating version of a University and has similar responsibilities like any University. An Autonomous College enjoys Academic Autonomy alone. The University to which an autonomous college is affiliated will have checks on the performance of the autonomous college.

4 How will the Foreign Universities or other stake – holders know that we are an Autonomous College?

Autonomous status, once declared, shall be accepted by all the stake holders. The Govt. of Andhra Pradesh mentions autonomous status during the First Year admission procedure. Foreign Universities and Indian Industries will know our status through our website.

5 What is the change of Status for Students and Teachers if we become Autonomous?

An autonomous college carries a prestigious image. Autonomy is actually earned out of our continued past efforts on academic performances, our capability of self- governance and the kind of quality education we offer.

6 Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?

There is a built in mechanism in the autonomous working for this purpose. An Internal Committee called Academic Programme Evaluation Committee, which will keep a watch on the academics and keep its reports and recommendations every year. In addition the highest academic council also supervises the academic matters. The standards of our question papers, the regularity of academic calendar, attendance of students, speed and transparency of result declaration and such other parameters are involved in this process.

7 Will the students of Sri Venkatesa Perumal College of Engineering & Technology as an Autonomous College qualify for University Medals and Prizes for academic excellence?

No. Sri Venkatesa Perumal College of Engineering & Technology has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural on co-curricular organized by the University the students shall qualify.

8 Can Sri Venkatesa Perumal College of Engineering & Technology have its own Convocation?

No. Since the University awards the Degree the Convocation will be that of the University, but there will be Graduation Day at Sri Venkatesa Perumal College of Engineering & Technology.

9 Can Sri Venkatesa Perumal College of Engineering & Technology give a provisional degree certificate?

Since the examinations are conducted by Sri Venkatesa Perumal College of Engineering & Technology and the results are also declared Sri Venkatesa Perumal College of Engineering & Technology, the college sends a list of successful candidates with their final Grades and Grade Point Averages including CGPA to the University. Therefore with the prior permission of the University the college will be entitled to give the provisional certificate.

10 Will Academic Autonomy make a positive impact on the Placements or Employability?

Certainly, the number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment. Also the autonomous status is more responsive to the needs of the industry. As a result therefore, there will be a lot of scope for industry oriented skill development built-in into the system. The graduates from an autonomous college will therefore represent better employabilit y.

11 What is the proportion of Internal and External Assessment as an Autonomous College?

Presently, it is 60 % external and 40% internal. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.

12 Is it possible to have complete Internal Assessment for Theory or Practicals?

Yes indeed, we define our own system. We have the freedom to keep the proportion of external and internal assessment component to choose.

13 Why Credit based Grade System?

The credit based grade system is an accepted standard of academic performance the world over in all Universities. The acceptability of our graduates in the world market shall improve.

14 What exactly is a Credit based Grade System?

The credit based grade system defines a much better statistical way of judging the academic performance. One Lecture Hour per week of Teaching Learning process is assigned One

Credit. One hour of laboratory work is assigned half credit. Letter Grades like S, A+, A, B+, B, C, F etc. are assigned for a Range of Marks. (e.g. 90% and above is S, 80 to 89 % could be A+ etc.) in Absolute Grading System while grades are awarded by statistical analysis in relative grading system. We thus dispense with sharp numerical boundaries. Secondly, the grades are associated with defined Grade Points in the scale of 1 to 10. Weighted Average of Grade Points is also defined Grade Points are weighted by Credits and averaged over total credits in a Semester. This process is repeated for all Semesters and a CGPA defines the Final Academic Performance

15 What are the norms for the number of Credits per Semester and total number of Credits for UG/PG programme?

These norms are usually defined by UGC or AICTE. Usually around 28 Credits per semester is the accepted norm.

16 What is a Semester Grade Point Average (SGPA)?

The performance of a student in a semester is indicated by a number called SGPA. The SGPA is the weighted average of the grade points obtained in all the courses registered by the student during the semester.

$$SGPA = \sum_{i=1}^{n}(C_i\, G_i)/\sum_{i=1}^{n} C_i$$

Where, C_i is the number of credits of the i^{th} course and $G_i$is the grade point scored by the student in the i^{th} course and i represent the number of courses in which a student registered in the concerned semester. SGPA is rounded to two decimal places.

17 What is a Cumulative Grade Point Average (CGPA)?

An up-to-date assessment of overall performance of a student from the time of his first registration is obtained by calculating a number called CGPA, which is weighted average of the grade points obtained in all the courses registered by the students since he entered the Institute.

$$CGPA = \sum_{j=1}^{m}(C_j S_j)/\sum_{j=1}^{m} C_j$$

Where, S_j is the SGPA of the j^{th} semester and $C_j$is the total number of credits upto the semester and m represent the number of semesters completed in which a student registered upto the semester. CGPA is rounded to two decimal places.

18 Is there any Software available for calculating Grade point averages and converting the same into Grades?

Yes, the institute has its own MIS software for calculation of SGPA, CGPA, etc.

19 Will the teacher be required to do the job of calculating SGPAs etc. and convert the same into Grades?

No, the teacher has to give marks obtained out of whatever maximum marks as it is. Rest is all done by the computer.

20 Will there be any Revaluation System?

Yes, there will Re-valuation of answer scripts..

21 How fast Syllabi can be and should be changed?

Autonomy allows us the freedom to change the syllabi as often as we need.

22 Will the Degree be awarded on the basis of only final yearperformance?

No, the CGPA will reflect the average performance of all the semester taken together.

23 What are Statutory Academic Bodies?

Governing Body, Academic Council, Examination Committee and Board of Studies are the different statutory bodies. The participation of external members in every body is compulsory. The institute has nominated professors from IIT, NIT, University (the officers of the rank of Pro-vice Chancellor, Deans and Controller of Examinations) and also the reputed industrialist and industry experts on these bodies.

24 Who takes Decisions on Academic matters?

The Governing Body of institute is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like Boards of Studies. Decisions taken at the Board of Studies level are to be ratified at the Academic Council and Governing Body.

25 What is the role of Examination committee?

The Examinations Committee is responsible for the smooth conduct of internal, End Semester and makeup Examinations. All matters involving the conduct of examinations spot valuations, tabulations preparation of Grade Cards etc, fall within the duties of the Examination Committee.

26 Is there any mechanism for Grievance Redressal?

The institute has grievance redressal committee, headed by Dean - Student affairs and Dean - IQAC.

27 How many attempts are permitted for obtaining a Degree?

All such matters are defined in Rules & Regulation

28 Who declares the result?

The result declaration process is also defined. After tabulation work wherein the SGPA, CGPA and final Grades are ready, the entire result is reviewed by the Moderation Committee. Any unusual deviations or gross level discrepancies are deliberated and

removed. The entire result is discussed in the Examinations and Result Committee for its approval. The result is then declared on the institute notice boards as well put on the web site and Students Corner. It is eventually sent to the University.

29 Who will keep the Student Academic Records, University or Sri Venkatesa Perumal College of Engineering & Technology?

It is the responsibility of the Dean, Academics of the Autonomous College to keep and preserve all the records.

30 What is our relationship with the JNT University?

We remain an affiliated college of the JNT University. The University has the right to nominate its members on the academic bodies of the college.

31 Shall we require University approval if we want to start any New Courses?

Yes, it is expected that approvals or such other matters from an autonomous college will receive priority.

32 Shall we get autonomy for PG and Doctoral Programmes also?

Yes, presently our PG programmes also enjoying autonomous status.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

S.No	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 and sent to the Controller of Examinations.
3.	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 semester end examinations. The continuation of the course by the candidate is subject to theacademic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

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 performance in that subject and all the 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 semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	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.
6.	Refuses to obey the orders of the Controller of Examinations /Additional Controller of Examinations/any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the COE 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 COE 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 of property in the examination hall or any part of the Institute premises 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.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	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 performance in that subject and all the 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 semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

8.	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 the seat.
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.	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 for the remaining examinations of the subjects of that semester/year.
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 University for further action to award suitable punishment.	

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

DEPARTMENT OF MECHANICAL ENGINEERING

CURRICULUM AND SYLLABUS UNDER R20 REGULATION

I B.Tech I Semester

S.No	Course Code	Course Title	Hours per Week			Credits
			L	T	P	
1	20BSBH01	Mathematics-I	2	1	0	3
2	20BSBH05	Engineering Physics	3	0	0	3
3	20ES0301	Engineering Graphics & Design	1	0	4	3
4	20ES0203	Basic Electrical & Electronics Engineering	3	0	0	3
5	20ES0501	Problem Solving Using 'C'	2	1	0	3
6	20BSBH06	Physics lab	0	0	3	1.5
7	20ES0502	Problem Solving Using 'C' lab	0	0	3	1.5
8	20ES0302	Engineering Workshop & IT Practice	0	0	3	1.5
		Total	**11**	**2**	**13**	**19.5**

I B.Tech II Semester

S.No	Course Code	Course Title	Hours per Week			Credits
			L	T	P	
1	20BSBH02	Mathematics-II	2	1	0	3
2	20BSBH07	Engineering Chemistry	3	0	0	3
3	20HSBH01	Technical English	3	0	0	3
4	20ES0503	Python Programming	3	0	0	3
5	20ES0303	Engineering Mechanics	2	1	0	3
6	20BSBH08	Engineering Chemistry lab	0	0	3	1.5
7	20HSBH02	English Language and communication skills lab	0	0	3	1.5
8	20ES0504	Python Lab	0	0	3	1.5
9	20MCBH02	Environmental Science (Mandatory Course)	0	0	0	0
		Total	**13**	**2**	**9**	**19.5**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

DEPARTMENT OF MECHANICAL ENGINEERING

B.Tech III Semester

S.No	Course Code	Course Title	Category	Hours per Week			Credits
				L	T	P	
1	20BSBH03	Numerical Methods & Probability Theory	BS	3	0	0	3
2	20PC0301	Material Science Engineering	PC	3	0	0	3
3	20PC0302	Mechanics of Solids	PC	3	0	0	4
4	20PC0303	Engineering Thermodynamics	PC	3	0	0	3
5	20PC0304	Kinematics of Machinery	PC	3	0	0	3
6	20PC0305	Material Science Engineering Lab	PC	0	0	3	1.5
7	20PC0306	Mechanics of Solids Lab	PC	0	0	3	1.5
8	20PC0307	Applied Mechanics Lab	PC	0	0	3	1.5
9	20SO0301	AUTOCAD	SO	0	0	4	2
10	20MCBH03	CONSTITUTION OF INDIA	MC	0	0	0	0
Total				**15**	**0**	**13**	**21.5**

B.Tech IV Semester – Mechanical Engineering

S.No	Course Code	Course Title	Category	Hours per Week			Credits
				L	T	P	
1	20BSBH04	Mathematics-IV	BS	3	0	0	3
2	20HM115	Economics for Engineers	HS	3	0	0	3
3	20PC0308	Dynamics of Machinery	PC	3	0	0	4
4	20PC0309	Air Compressor & IC Engines	PC	3	0	0	3
5	20PC0310	Manufacturing Technology	PC	3	0	0	3
6	20PC0311	Thermal Engineering Lab	PC	0	0	3	1.5
7	20PC0312	Manufacturing Technology Lab	PC	0	0	3	1.5
8	20ES0304	Machine Drawing Lab	ES	0	0	3	1.5
9	20SO0302	Computer Aided Engineering through ANSYS	SO	0	0	4	2
Total				**15**	**0**	**13**	**21.5**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

I B.Tech. I Sem

L	T	P	C
2	1	0	3

(20BSBH01)MATHEMATICS - I

(Common to all branches)

Course Objectives:

The course should enable the students to

- Learn the concept of a rank of the matrix and applying this concept to know the consistency and Solving the system of linear equations.
- Identify special properties of matrix and use this information to facilitate the calculation of matrix characteristics
- Find maxima and minima of function of two and three variables.
- Learn the Concept of multiple integrals and applications
- Expand the various functions as Fourier series

UNIT-I: Matrices

Matrices: Types of Matrices- Rank of a matrix by Echelon form and Normal form- System of linear equations: Gauss elimination method- Gauss Seidel Method- Consistency of system of linear equations (Rank method).

UNIT-II: Eigen values and Eigen vectors

Eigen values and Eigen vectors and their properties- Cayley-Hamilton Theorem (without proof)- finding inverse by Cayley-Hamilton Theorem- Diagonalization of a matrix- calculation of powers of matrix - Quadratic forms: Reduction of Quadratic form to canonical form and their nature .

UNIT-III: Differential Calculus and its applications

Rolle's theorem- Lagrange's Mean value theorem- simple examples of Taylor's and Maclaurin's series –Functions of several variables- Jacobian–maxima and minima functions of two variables - Lagrange's method of multipliers with three variables.

UNIT-IV: Multiple integrals

Double integrals - Cartesian & Polar form, Change of variables, Change of order of integration, Triple integrals-Change of variables. Applications: Areas (by double integrals) and Volumes (by double and triple integrals).

UNIT-V: Fourier Series

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd

functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

Course Outcomes:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Write the matrix representation of a set of linear equations and to analyses the solution of the System of equations	PO1,PO2,PO3
CO2	Develop the use of matrix algebra techniques that is needed by engineers for practical applications	PO1,PO2
CO3	Utilize mean value theorems to real life problems	PO1,PO2
CO4	Acquire the knowledge of multiple integrals in various coordinate systems.	PO1,PO2
CO5	Gain knowledge to tackle engineering problems using the concepts of fourier series	PO1,PO2,PO3

TEXTBOOKS:

1. Higher Engineering Mathematics, by B.S.Grewal, 44/e, Khanna Publishers, 2017.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, 10/e, John Wiley & Sons, 2011

REFERENCES:

1. A text book of Engineering Mathematics by N.P.Bali and Manish Goyal, Laxmi Publications, Reprint, 2008.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
3. Engineering mathematics, volume-I&II, E.Rukmangadachari & E.Keshava Reddy Pearson Publishers.
4. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	--	-	-	-	-
CO2	3	3	-	-	-	-	-	-	--	-	-	-
CO3	3	3	-	-	-	-	-	-	--	-	-	-
CO4	3	3	-	-	-	-	-	-	--	-	-	-
CO5	3	3	3	-	-	-	-	-	--	-	-	-
Average	**3**	**3**	**3**	-	-	-	-	-	--	-	-	-

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - I Semester

L	T	P	C
3	0	0	3

(20BSBH05) ENGINEERING PHYSICS
(Common to CIVIL & MECH)

Course Objectives

- To make a bridge between the physics in school and engineering courses.
- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications
- To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications.
- To familiarize the concepts of theoretical acoustics to practical use in engineering field. To explain the significance of ultrasound and its application in NDT for diversified engineering application.
- To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals related to structural analysis through powder diffraction method.

UNIT-I Wave Optics

Interference- Principle of superposition – Interference of light – Conditions for sustained interference-Interference in thin films (Reflection Geometry) – Newton's Rings- Determination of wavelength and refractive index.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction – Nicol's Prism – Half wave and Quarter wave plates with applications.

UNIT-II Lasers and Fiber optics

Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Semiconductor LASER– Applications of lasers.

Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Bloch diagram of optical fibre communication system – Propagation Losses (Qualitative) – Applications.

UNIT III Engineering Materials

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientation polarization (Qualitative) – Lorentz internal field – Clausius-Mossotti equation.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Classification of magnetic materials–Domain theory of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Nanomaterials- Introduction – Surface area and quantum confinement – Physical properties: electrical and magnetic properties – Synthesis of nanomaterials: Top-down: Ball Milling – Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

UNIT-IV Acoustics and Ultrasonics

Acoustics- Introduction – Requirements of acoustically good Auditorium – Reverberation – Reverberation time – Sabine's formula (Derivation using growth and decay method) – Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedies.

Ultrasonics- Introduction – Properties – Production by magnetostriction and piezoelectric methods – Detection – Acoustic grating – Non Destructive Testing – Pulse echo system through transmission and reflection modes – Applications.

UNIT-V Crystallography and X-ray diffraction

Crystallography- Space lattice, Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems – Packing fraction – Coordination number – Packing fraction of SC, BCC & FCC – NaCl crystal system – Miller indices – Separation between successive (hkl) planes.

X- Ray Diffraction- Bragg's law – Bragg's X-ray diffractometer – Crystal structure determination by Powder method– Determination by Rotating crystal method.

Course Outcomes

On successful completion of the course, students will be able to		POs related to COs
CO1	Study the different realms of physics and their applications in both scientific and technological systems through physical optics.	PO1,PO2
CO2	Identify the wave properties of light and the interaction of energy with the matter (L3).	PO1,PO2
CO3	Understands the response of dielectric and magnetic materials to the applied electric and magnetic fields.	PO1,PO2,PO3,PO7
CO4	Elucidates the importance of nano materials along with their engineering applications.	PO1,PO2
CO5	Study the important properties of crystals like the presence of long-range order, periodicity and structure determination using X-ray diffraction technique	PO1, PO7

Prescribed Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.

Reference Books:

1. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
2. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers
3. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
4. Engineering Physics – M.R. Srinivasan, New Age Publications

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3		-	-	-		-	-	-	-	-
CO3	2	2	2	--	--	--	3	-	--	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	--	-	-	-	-
Average	**2.6**	**2.25**	**2**	**-**	**-**	**-**	**3**		**-**	**-**	**-**	**-**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - I Semester **L T P C**

(20ES0301) ENGINEERING GRAPHICS & DESIGN **1 0 4 3**

(Common to all branches)

Course Objectives:

- *To gain and understanding of the basics of geometrical constructions of various planes and solids, understanding system of graphical representation of various objects and various views to draft and read the products to be designed and eventually for manufacturing applications.*
- *To learn about various projections, to understand complete dimensions and details of object.*
- *Ultimately student must get imaginary skill to put an idea of object, circuit, assembly of parts in black & white, to design a product and to understand the composition, which can be understood universally.*

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Dimensioning, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.

UNIT- II

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of regular Plane.—Auxiliary Planes.

UNIT – III

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

UNIT – IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder

UNIT – V

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –

Conventions

Auto CAD (for Practice only not for External Exam)

Introduction to CAD, Applications, commands, Tool bar, modeling of Simple parts, isometric problems.

Course Outcomes:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	understanding of the basics of geometrical constructions of various planes and solids	PO1,PO2,PO3,PO5,PO9,PO10
CO2	The knowledge to about various projections understand complete dimensions and details of object.	PO2,PO3,PO5,PO9,PO10
CO3	The understand the composition, which can be understood universally.	PO1,PO3,PO5,PO10
CO4	Preparing working drawings to communicate the ideas and information.	PO3,PO5,PO10
CO5	Read, understand and interpret engineering drawings.	PO2,PO3,PO5,PO10

TEXTBOOKS:

1. *Engineering Drawing* N.D. Bhatt / Charotar

2. *Engineering Drawing*, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai

3. *Engineering Drawing* / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:

1. *Engineering Drawing* / BasantAgrawal and McAgrawal/ McGraw Hill

2. *Engineering Drawing*/ M. B. Shah, B.C. Rane / Pearson.

3. *A text Book of Engineering Drawing and Graphic*, K.Venugopal New Age Publishin New Delhi,
2008.

4. *Computer Aided Engineering Drawing* – K Balaveera Reddy et al – CBS Publishers

CO-PO Mapping

PO / CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	2	2		2				1	1		
CO2		2	2		2				2	2		
CO3	2		3		2					2		
CO4			2		1					3		
CO5		1	2		2					2		
Average	**2.5**	**2.5**	**2.2**		**1.8**				**1.5**	**2**		

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - I Semester

L	T	P	C
3	0	0	3

(20ES0203) BASIC ELECTRICAL & ELECTRONICS ENGINEERING
(Mech & CE)

Course Objectives:

To help students develop an understanding on analyzing electrical circuits using various techniques. To make the student familiarize with the fundamental concepts of circuits, resonance, two port network and to analyze the response in electric circuits.

UNIT I DC Circuits:

Voltage-Current-Ohm's Law, Kirchoff Voltage and Kirchoff Current Law-Series and Parallel Resistors -Voltage Division and Current Division-Star to Delta and Delta to Star Transformation-Basic Nodal and Mesh Analysis-Source Transformation. Network Theorems- Superposition, Thevenin's, Norton's, Maximum Power Transfer Theorem.

UNIT II AC Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections

UNIT III DC GENERATORS

D.C. Generators – Principle of Operation – Constructional Features – E. M.F Equation– Numerical Problems – Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Load Characteristics of Shunt, Series and Compound Generators- Applications.

UNIT-IV SEMICONDUCTOR DEVICES AND APPLICATIONS:

Introduction to P-N junction Diode and V-I characteristics, Half wave and Full-wave rectifiers, capacitor filter. Zener diode and its characteristics, Zener diode as voltage regulator.

UNIT-V BIPOLAR JUNCTION TRANSISTOR

Introduction to BJT, its input-output and transfer characteristics, BJT as a single stage CE amplifier, frequency response and bandwidth.

Field Effect Transistor

Introduction to FET, its input-output and transfer characteristics, FET as a single stage CS amplifier, frequency response and bandwidth.

Course outcomes:

On successful completion of the course, students will be able to		POs related to COs
CO1	Given a network, find the equivalent impedance by using network reduction techniques	PO1,PO2,PO3,PO5,PO12
CO2	Determine the current through any element and voltage across any element	PO1,PO2,PO3,PO5,PO12
CO3	Apply the network theorems suitably	PO1,PO2,PO3,PO5,PO12
CO4	Identify Concepts of Semiconductor Devices and its Applications	PO1,PO2,PO3,PO5,PO12
CO5	Know the knowledge on Transistor	PO1,PO2,PO3,PO5,PO12

Text-Books:

1) Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.

2) Basic Electrical Engineering - D.C. Kulshreshtha, 2009, Tata McGraw Hill.

3) J. Millman, C. Halkias, "Electronic Devices and Circuits", Tata Mc-Graw Hill, 4thEdition,2010.

4) D. Roy Chowdhury, "Linear Integrated Circuits", New Age International (p) Ltd,

2nd Edition, 2003

References:

1) Fundamentals of Electrical Engineering, L.S. Bobrow, Oxford University Press, 2011

2) Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010

3) Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India,

4) Floyd ," Electronic Devices" Pearson Education 9th edit ion, 2012.

5) R.P. Jain , "Modern Digital Electronics", Tata Mc Graw Hill, 3rd Edit ion, 2007

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2		2							3
CO2	3	2	2		2							3
CO3	3	3	2		2							3
CO4	3	3	1		1							3
CO5	2	2	1		1							2
Average	**2.8**	**2.6**	**1.6**		**1.6**							**2.8**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - I Semester

L	T	P	C
2	1	0	3

(20ES0501) PROBLEM SOLVING USING C
(Common to all branches)

Course Objectives:

- To Understand the Hardware of the computer and the General form of a C program.
- To Understand the Decision Making and Loop statements of C Language.
- To Understand the Arrays and String concept of C Language.
- To understand the concept of Functions and Pointers in C Language.
- To Understand about Structures, Unions and Files in C Language.

UNIT I - INTRODUCTION TO C PROGRAMMING

Basics of C Programming: Introduction, Computer Languages, Algorithm, Flowchart, Structure of a C program, Concept of a variable, Data types in C, Program statement, Declaration, Storing the data in memory, Tokens, Operators and expressions, Type conversions

Input-Output Library Functions: Unformatted I-O Functions, Single Character Input-Output, String Input-Output, Formatted I-O Functions, printf() Width Specifier, scanf() Width Specifier

UNIT-II- CONTROL STATEMENTS

Conditional Control Statements, if. if-else ,nested if-else .else-if ladder ,Multiple Branching Control Statement ,switch-case ,Loop Control Statements, while ,do-while, for ,Nested Loops, Jump Control statements ,break ,continue ,goto,exit ,return

Function: Function and its uses, Function Prototype, Defining a function, Calling a function, Returnstatement, Types of functions,Recursion,Nested functions, main() function, LibraryFunction, Local and global variables

UNIT-III ARRAYS

Arrays- Definition, One-Dimensional Arrays- Declaration, Initialization, “for” loop for Sequential access, Example Programs. Two-Dimensional Arrays: Declaration, Initialization, Example Programs.

Strings- Introduction, Declaration and Initialization of String Variables, Reading Strings from Terminal, Writing Strings to screen, Arithmetic Operators on Characters, Putting Strings Together, Comparison of Two Strings, String Handling Functions, Table of Strings.

UNIT-IV ADVANCED FEATURES IN C :

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library.

Structure and Union. Defining C structures, giving values to members, Array of structure, Nestedstructure, passing strings as arguments

UNIT-VFile Management in C-
Introduction, Types of Files, Defining and Opening a File, Closing a File, Input/output Operation on Files, Error handling during I/O Operations, Random Access to Files, Command Line Arguments

Course Outcomes:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Able to describe the Hardware components of a computer.	PO1,PO2
CO2	Able to implement the 'if...else' statements and 'for', 'while', 'do…while' loop statements	PO1,PO2,PO3
CO3	Able to write programs using Arrays and Strings concept.	PO1,PO2
CO4	Able to implement Function and Pointer concepts on various applications.	PO1,PO2,PO4
CO5	Able implement File concepts of C Language.	PO1,PO2

Text Books

1. Programming In "C" and Data Structures- By Jeri. R. Hanly, Elliot. B. Koffman, Ashok Kamthane, A. AnandaRao, 5th Edition, Pearson Publication. (Units I and II).
2. Programming In "C" and Data Structures- By E. Balagurusamy, McGraw Hill Publication

CO-PO Mapping

CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	3	-	-	-	--	-	-	-	-	-	-
CO2	3	2	3	-	-	--	-	-	-	-	-	-
CO3	3	3	-	-	-	--	-	-	-	-	-	-
CO4	3	3	-	3	-	--	-	-	-	-	-	-
CO5	2	3	-	-	-	--	-	-	-	-	-	-
Average	**2.8**	**2.8**	**3**	**3**	**-**	**--**	**-**	**-**	**-**	**-**	**-**	**-**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - I Semester

L	T	P	C
0	0	3	1.5

(20BSBH06) PHYSICS LAB
(Common to CE, EEE, MECH & ECE)

Course Description:

It is meant for making the students to gain practical knowledge and skills to correlate with the theoretical studies.

Course Objectives:

- Elucidate the concepts of Physics through involvement in the experiment by applying theoretical knowledge.
- Illustrate the basics of mechanics, waves and optics to analyze the behaviour and characteristics of various materials for its optimum utilization.
- Develop an ability to apply the knowledge of physics experiments in the future studies.

List of Experiments: (Any eight experiments to be performed in a semester)

1. Determination of radius of curvature - Newton's Rings
2. Magnetic field along the axis of a current carrying coil - Stewart Gees' Apparatus
3. Determination of Energy gap of a material of p-n junction.
4. Dispersive power of prism – Spectrometer
5. Wavelength of a given laser source- Diffraction Grating
6. Optical fibre: Numerical Aperture and acceptance angle of an optical fibre
7. Diffraction grating: normal incidence method
8. Particle size determination -Laser
9. Study of B-H curve
10. Study of resonance – series and parallel LCR circuits

COURSE OUTCOMES	
CO1	Recognize the important radius of curvature - Newton's Rings (PO1, PO2) . (PO1, PO2,PO3)
CO2	Acquired the practical application knowledge of optical fiber, resonance – series and parallel LCR circuits (PO1, PO2, PO3)
CO3	Analyze the practical applications of dielectric and magnetic materials and crystal structure in various engineering feels. (PO1, PO2)
CO4	Understand of practical laser by the study of their relative parameters. (PO1, PO2)

CO5	Recognize power of prism – Spectrometer, material of p-n junction in various engineering tools (PO1,PO2,PO4)
CO6	Follow the ethical principles in implementing the experiments (PO8)
CO7	Do experiments effectively as an individual and as a team member in a group. (PO9)
CO8	Communicate verbally and in written form, the understanding about the experiments. (PO10)
CO9	Continue updating their skill related to optical fiber, p-n junction, laser and LCR circuits in implementing experiments in future. (PO12)

Reference books:

1. Engineering Physics practical-NU Age Publishing House, Hyderabad
2. Engineering practical Physics – Cengage Learning, Delhi.

CO-PO Mapping

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2										
CO2	2	3	3									
CO3	2	3										
CO4	3	2										
CO5	3	2		3								
CO6								3				
CO7									2			
CO8										3		
CO9												3
averag	**2.6**	**2.4**	**3**	**3**	**-**	**-**	**-**	**3**	**2**	**3**	**-**	**3**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - I Semester

L	T	P	C
0	0	3	1.5

(20ES0502) PROBLEM SOLVING USING 'C' LAB
(Common to CIVIL & MECH)

List of Experiments/Tasks

1. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, to read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
2. Write a program to find the roots of a Quadratic equation.
3. Write a program to compute the factorial of a given number.
4. Write a program to check whether the number is prime or not.
5. Write a program to find the series of prime numbers in the given range.
6. Write a program to generate Fibonacci numbers in the given range.
7. Write a program to find the maximum and minimum of a set of numbers.
8. Write a program to reverse the digits of a number.
9. Write a program to find the sum of the digits of a number.
10. Write a program to find the sum of positive and negative numbers in a given set of numbers.
11. Write a program to check for number palindrome.
12. Write a program to generate Pascal Triangle.
13. Write a program to read two matrices and print their sum and product in the matrix form.
14. Write a program to read matrix and perform the following operations.
    i. Find the sum of Diagonal Elements of a matrix.
    ii. Print Transpose of a matrix.
    iii. Print sum of even and odd numbers in a given matrix.
15. Write a program to accept a line of characters and print the number of Vowels, Consonants, blank spaces, digits and special characters.
16. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.
17. Write a program to split a „file" in to two files, say file1 and file2. Read lines into the file from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.
18. Write a program to merge two files.
19. Write a program to read a set of strings and sort them in alphabetical order.
20. Write a program to read two strings and perform the following operations without using Built in string Library functions and by using your own implementations of functions.

i. String length determination ii .Compare Two Strings
ii. Concatenate them, if they are not equal iv. String reversing

21. Write programs using recursion for finding Factorial of a number, GCD, LCM, and solving Towers of Hanoi problem.
22. Write a program to exchange two numbers using pointers.
23. Write a program to read student records into a file. Record consists of roll no, name and Marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
24. A file consists of information about employee salary with fields employee id, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employee id, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions are user specified. Compute the Gross and Net salary of the employee and update the file.
25. Write a program to perform Base (decimal, octal, hexadecimal,…) conversions.
26. Write a program to find the square root of a number without using built-in library function.
27. Write C program to convert a string to number.
28. Write C program to generate multiplication tables from 11 to 20.

COURSE OUTCOMES	
CO1	Design the algorithm and flowchart for the given problem. (PO1, PO2,PO3)
CO2	Develop the programs on control statements and arrays. (PO1, PO2, PO3)
CO3	Analyze the concepts on functions and strings. (PO1, PO2)
CO4	Solve the memory access problems by using pointers and design the programs on structures and unions. (PO1, PO2, PO4)
CO5	Analyze the basics of file handling mechanism that is essential for understanding the concepts of management systems. (PO1, PO2)
CO6	Follow the ethical principles in implementing the programs (PO8)
CO7	Do experiments effectively as an individual and as a team member in a group. (PO9)
CO8	Communicate verbally and in written form, the understanding about the experiments. (PO10)
CO9	Continue updating their skill related to loops, pointers and files implementing programs in future. (PO12)

References:

1. “How to Solve it by Computer”, R.G. Dromey, Pearson.
2. “The C Programming Language”, Brian W. Kernighan, Dennis M. Ritchie, Pearson.
3. “Let us C”, YeswantKanetkar, BPB publications
4. “Pointers in C”, YeswantKanetkar, BPB publications.
5. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.AnandaRao,Pearson Education.

CO-PO Mapping

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	2									
CO2	3	3	3									
CO3	2	3										
CO4	3	2		3								
CO5	3	3										
CO6								3				
CO7									2			
CO8										3		
CO9												3
average	**2.8**	**2.8**	**2.5**	**3**	**-**	**-**	**-**	**3**	**2**	**3**	**-**	**3**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - I Semester **L T P C**

(20ES0302) ENGINEERING WORKSHOP PRACTICE **0 0 3 1.5**

(Common to all branches)

Course Objectives:

- *To Study of different hand operated tools, uses and their applications*
- *To Know a basic working knowledge, team work, precision and safety on production of various engineering products.*
- *To Provide a hands on experience of different engineering materials, tools, equipments and processes those are commonly used in the engineering fields.*

1. TRADES FOR EXERCISES:

At least TWO exercises from each trade:

I. Carpentry : T-Lap Joint, Dovetail Joint, Mortise &Tenon Joint
II. Tin-Smithy : Square Tin, Rectangular Tray & Conical Funnel

At least ONE exercises from each trade:

III. Fitting : V-Fit, Dovetail Fit & Semi-circular fit
IV. Foundry :Preparation of Green Sand Mould using Single Piece and Split Pattern
V. Welding practice : Arc Welding & Gas Welding
VI. House-wiring : Parallel & Series, Two-way Switch and Tube Light
VII. Black Smithy : Round to Square, Fan Hook and S-Hook

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Tools in construction work and Wood Working.

NOTE: At least the total number of exercises must be SEVEN.

TEXT BOOKS:

1. *Workshop Practice* /B. L. Juneja / Cengage
2. *Workshop Manual* / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. *Work shop Manual* - P. Kannaiah/ K. L. Narayana/ SciTech
2. *Workshop Manual* / Venkat Reddy/ BSP

Part-BIT Workshop Lab

Course Objective:

_ To provide Technical training to the students on Productivity tools like Wordprocessors,

Spreadsheets, Presentations

_ To make the students know about the internal parts of a computer, assembling aComputer from the parts, preparing a computer for use by installing the operatingSystem

_ To learn about Networking of computers and use Internet facility for Browsingand Searching.

Learning Outcome:

_ disassemble and assemble a Personal Computer and prepare the computer readyto use.

_ Prepare the Documents using Word processors

_ Prepare Slide presentations using the presentation tool

_ Interconnect two or more computers for information sharing

_ Access the Internet and Browse it to obtain the required information

_ Install single or dual operating systems on computer

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals.

Represent the same in the form of diagrams including Block diagram of acomputer. Write specifications for each part of a computer including peripherals andspecification of Desktop computer. Submit it in the form of a report.

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

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

Networking and Internet Students should connect two computers directlyusing a cable or wireless connectivity and share information. Students shouldconnect two or more computers using switch/hub and share information. Crimplingactivity, logical configuration etc should be done by the student. The entire processhas to be documented.

Browsing Internet: Student should access the Internet for Browsing. Students shouldsearch the Internet for required information. Students should be able to create e-mailaccount and send email. They should get acquaintance with applications like Facebook,Skype etc. If Intranet mailing facility is available in the organization, then studentsshould share the

information using it. If the operating system supports sendingMessages to multiple users (LINUX supports it) in the same network, then it shouldbe done by the student. Students are expected to submit the information about differentbrowsers available, their features, and search process using different naturallanguages, and creating e-mail account.

Productivity tools

Task 5: Word Processor: Students should be able to create documents using the wordProcessor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer,Changing the font, changing the color, including images and tables in the word file,Making page setup, copy and paste block of text, images, tables, linking the imagesWhich are present in other directory, formatting paragraphs, spell checking, etc. Studentsshould be able to prepare project cover pages, content sheet and chapter pages atthe end of the task using the features studied. Students should submit a user manualof the word processor considered.

Task 6: Spreadsheet: Students should be able to create, open, save the applicationDocuments and format them as per the requirement. Some of the tasks that may bepracticed are Managing the worksheet environment, creating cell data, inserting and Deleting cell data, format cells, adjust the cell size, applying formulas and functions,Preparing charts,+ sorting cells. Students should submit a user manual of the Spreadsheet Application considered.

Task 7: Presentations:creating, opening, saving and running the presentations, Selectingthe style for slides, formatting the slides with different fonts, colors, creatingcharts and tables, inserting and deleting text, graphics and animations, bulleting andnumbering, hyper linking, running the slide show, setting the timing for slide show.Students should submit a user manual of the Presentation tool considered.

Task 8: Latex introduction, Document Structure, Typesetting Text, table of contents packages, math, adding pictures

Task 9: Laboratory Equipment: Students may submit a report on specificationsof various equipment that may be used by them for the laboratories in their curriculumstarting from I B.Tech to IV. B.Tech. It can vary from department to department.Students can refer to their syllabus books, consult staff members of the concerneddepartment or refer websites. The following is a sample list. Instructors may makemodifications to the list to suit the department concerned.

_ Desktop computer

_ Server computer

_ Switch (computer science related)

Course	COURSE OUTCOMES	
ENGINEERING AND IT WORK SHOP LAB	CO1	Understand the mechanical tools and there operations and practice on manufacture of components in different work shop trades. (PO1, PO2, PO4)
	CO2	Acquire suitable tools for different trades of engineering processes. (PO1, PO5, PO9)
	CO3	Recognize the dissemble and assemble a personal computer and prepare the computer ready to use. (PO1, PO3, PO12)
	CO4	Develop the documents using word processors and slides preparations using presentation tools (PO1, PO10, PO12)
	CO5	Access the internet and browse it be obtain the required information and install single or dual operating system and computer. (PO1, PO3, PO12).
	CO6	Follow the ethical principles in implementing the engineering materials and presentation tools. (PO8)
	CO7	Do practice effectively as an individual and as a team member in a group. (PO9)
	CO8	Communicate verbally and in written form, the understanding about the engineering tools. (PO10)
	CO9	Continue updating their skill related to trades for exercises, demonstration, productivity tools, networking and internet implementing skills in future. (PO12)

CO-PO Mapping

Course	PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ENGINEERING AND IT WORK SHOP LAB	CO1	2	3		2								
	CO2	3				2				2			
	CO3	2		3									3
	CO4	2									2		2
	CO5	3		2									3
	CO6								3				
	CO7									2			
	CO8										3		
	CO9												3
	AVEG	**2.4**	**3**	**2.5**	**2**	2	-	-	3	2	**2.5**	-	**2.7**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - II Semester

L	T	P	C
2	1	0	3

(20BSBH02) MATHEMATICS-II
(Common to all branches)

Course Objectives:

The course should enable the students to

- Solve the Methods of differential equations of first and higher order.
- Learn the basic properties of vector valued functions and their applications to line Surface and volume integrals.
- Know the concept of Laplace transforms and apply to solve the ordinary differential equations

UNIT – 1: First Order O.D.E

Introduction to Ordinary Differential equations- Exact - linear and Bernoulli's equations - Applications to Newton's law of cooling- law of natural growth and decay-Orthogonal trajectories.

UNIT –2: Ordinary Differential Equations of higher order

Homogeneous and Non homogeneous linear differential equations of second and higher order with constant coefficients with RHS terms of type e^{ax} - sin ax- cos ax- polynomials in x- e^{ax} v(x) - xv(x).

UNIT –3: Vector Calculus

Introduction-Vector differentiations-Vector differential operator- Gradient – Divergence-Curl and their properties - Vector integration - Line integral-Potential function – Area - Surface and volume integrals- Vector integrals theorems: Green's theorem - Stoke's and Gauss's Divergence theorem (without proof) – problems.

UNIT– 4 Laplace Transform-I

Laplace transform of standard functions– First shifting Theorem - Second shifting theorem- Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Laplace transform of periodic functions.

UNIT–5 Laplace Transform-II

Convolution theorem- Differentiation and integration of transform – Inverse laplace transform –Application of Laplace transforms to ordinary differential equations of first and second order.

Course Outcomes:

On successful completion of the course, students will be able to		Pos related to Cos
CO1	Identify whether the given differential equation of first order is exact or not.	PO1,PO2,PO3,PO4,PO5,PO12
CO2	Solve higher differential equation and apply the concept of differential equation to real world problems	PO1,PO2,PO3,PO4,PO5,PO12
CO3	Evaluate the line, surface and volume integrals and converting them from one to another	PO1,PO2,PO3,PO4,PO5,PO12
CO4	Analyze the engineering problems using the concept of Laplace transforms	PO1,PO2,PO3,PO4,PO5,PO12
CO5	Gain knowledge to tackle engineering problems using the concepts of Inverse Laplace transforms.	PO1,PO2,PO3,PO4,PO5,PO12

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics Volume-I &II by T.K.V. Iyengar, S.Chand publication.

Reference Books:

1. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
2. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. Engineering Mathematics, volume-I&II, E. Rukmangadachari& E.Keshava Reddy Pearson Publishers.

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3							3
CO2	2	2	2	3	3							2
CO3	3	2	2	2	2							2
CO4	2	3	3	2	2							2
CO5	3	2	3	2	2							2
Average	**2.6**	**2.2**	**2.4**	**2.2**	**2.4**							**2.2**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - II Semester

L	T	P	C
3	0	0	3

(20BSBH09) ENGINEERING CHEMISTRY

(Common to CIVIL & MECH)

Course Objectives:

- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To provide the information regarding hardness of water, effects of hard water in boilers and treatment methods to avoid bad effect on human health. To check the parameters of various water samples by experimental techniques.
- To make the properties and applications of polymers and engineering materials.
- To make students familiar with importance of electrochemical processes in nature and industry, like coating of objects with metals or metal oxides through electro deposition.

UNIT – I: WATER QULAITY AND ITS TREATMENT

INTRODUCTION: Introduction – hardness of water – Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness –Numerical problems on estimation of hardness.

CHEMICAL ANALYSIS OF WATER: Estimation of hardness of water by EDTA method, acidity, alkalinity and dissolved oxygen (BOD & COD).

BOILER TROUBLES: scales and sludges, caustic embrittlement, boiler corrosion and priming and foaming.

SOFTENING OF WATER: Internal Conditioning - Phosphate Conditioning, Calgon Conditioning; **External Treatment** - Zeolite process and Ion-exchange process, advantages and applications.

WATER FOR MUNICIPAL TREATMENT: Disinfection, Chlorination – Breakpoint Chlorination**,** Ozonization, UV Treatment – Reverse Osmosis: Desalination of Brakish water by Electrodialysis.

UNIT – II: ELECTROCHEMISTRY AND CORROSION

Electrodes-concepts, electrochemical cell, Nernst equation, cell potential calculations. Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium(Ni-Cd), and lithium ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen, methanol fuel cells-working of the cells.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, types of corrosion – Examples: Mechanism of Dry and Wet Corrosion, Factors influencing corrosion.

Factors affecting the corrosion, corrosion control cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT – III: POLYMER CHEMISTRY

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics – Thermoplastics and Thermosettings, Preparation, properties and applications of PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers – Buna-S, Buna-N preparation, properties and applications.

Conducting polymers – Polyacetylene, polyaniline, polypyrroles-mechanism of conduction and applications.

UNIT-IV: BUILDING MATERIALS

Cement : compositon of Portland cement, manufacturing of cement, settting and hardening of cement (reactions).
Refractories : definition, classification with examples, criteria of a good refractory material.
Steel – Types of steel, chemical composition, applications of alloy steels – high yield deformed steel(Tor), stainless Steel, high tensile steel and TMT steel.

UNIT – V: FUEL TECHNOLOGY AND LUBRICANTS

Definition and classification of fuels- solid, liquid and gaseous fuels, characteristics of a good fuel. metallurgical coke –manufacturing of coke (Otto-Halfmann). Petroleum – refining, synthetic Petrol- manufacturing methods and natural gas.
Lubricants- classification of lubricants –liquid, solid, semisolid with examples and Ionic liquids

On successful completion of the course, students will be able to		**POs related to COs**
CO1	The understanding the problem of water and its treatments.	PO1.PO2
CO2	The required principles and concepts of electrochemistry, corrosion	PO1,PO2
CO3	To make the properties and applications of polymers and engineering materials.	PO1,PO2,PO3
CO4	Understands the cement, manufacture of Portland cement, refractories	PO1,PO2
CO5	Understands the fuel technology and lubricants	PO1

SUGGESTED TEXT BOOKS:

1. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
2. G.V. Subba Reddy, K.N. Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.
3. Peter Atkins, Julio de Paula and James Keeler, Atkins Physical Chemistry, 10/e, Oxford University Press, 2010.

REFERENCES

1. G.V. Subba Reddy, K.N. Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.
2. Skoog and West, principles of Instrumental Analysis, 6/e, Thomson, 2007.

CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3		-	-	-		-	-	-	-	-
CO3	2	2	2	--	--	--	-	-	--	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	--	-	-	-	-
Average	**2.6**	**2.25**	**2**	-	-	-	-		-	-	-	-

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - II Semester

L	T	P	C
3	0	0	3

(20HSBH01) Technical English

(Common to all Branches)

Course Objective:

- To accelerate effective listening skills for better understanding of academic lectures and English spoken by native speakers
- Enable students to develop listening skills for better comprehension of academic presentations, lectures and speeches.
- To improve speaking skills through participation in activities such as role plays, discussion and structured talks/ oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- The ability to provide knowledge of grammatical structures and vocabulary and to encourage their appropriate use in

UNIT – I

Chapter entitled " MEDIA MATTERS" from Mindscapes English for Technologists and Engineers

L - Techniques – Importance of Phonetics and Correct Pronunciation
S - Meet & Greet and Leave taking, Introducing Oneself and others (Formal and Informal situations)
R - Reading strategies - Skimming and Scanning
W - Writing strategies – Sentence structures
G - Parts of Speech – Noun -number, Pronoun- Personal Pronoun – Verb –analysis
V - Affixes – Prefix and Suffix – Root words, derivatives and Articles

UNIT – II

Chapter entitled "LESSONS FROM THE PAST" from Mindscapes English for Technologists and Engineers

L - Listening to details: Types of Listening 1. Discriminative listening 2. Comprehension listening 3. Critical listening 4. Appreciative listening
S - Requesting, Making Polite Conversations and Role Play
R - Note Taking and Note Making Strategies
W - Paragraph Writing and Good qualities of Paragraph
G - Tenses – Present Tense, Past Tense and Future Tense
V - Homonyms, Homophones, Homographs, Synonyms and Antonyms

UNIT – III

Chapter entitled "TRAVEL AND TOURISM" from Mindscapes English for Technologists and Engineers

L - Listening to Speeches of Great leaders and Scientists

S - Accepting Invitations, Fixing a Time and Advising
R - Reading Tables, and Charts
W - Conversation, Role Play and autobiography
G- Types of Sentences (Simple, Complex and Compound)
V - Word formations and One –Word Substitutes

UNIT – IV

Chapter entitled "The Power of prayer" by A.P.J.Abdul Kalam from Paths to Skills in English, Orient black Swan Publication

L - Listening Dialogues and News
S - Expressing Ideas, Opinions and Telephone Skills
R - Reading Short Stories
W - Biography and Reporting Writing
G - Conditional Clauses and Voices
V - Fixed Expressions and Idioms

UNIT – V

Chapter entitled "The portrait of a Lady" by Khushwanth Singh from Paths to Skills in English, Orient black Swan Publication

L - Types of Listening Speeches: Informative, Demonstrative, Persuasive , Entertaining
S - Making Presentations (Mime and Guess, Mono action, Autobiography and Biography)
R - Reading for Entertainment (Humorous short skits)
W – Resume, CV and Cover letter
G - Direct Speech & Indirect Speech
V - Phrasal Verbs and Collocation

Course Outcomes:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Students communicate confidently in English in social and professional contexts with improved skills of fluency and accuracy	PO1,PO10
CO2	Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs	PO1,PO10,PO12
CO3	Form sentences using proper grammatical structures and correct word forms	PO1,PO9
CO4	Use key rhetorical concepts through analyzing and composing a variety of text	PO1,PO12
CO5	Develop competence to apply different reading methods to evaluate a mass of data on the net and to glean the necessary information	PO1,PO6

Text Book:

1. Mindscapes English for Technologists and Engineers Published by Orient Black Swan
2. Paths to Skills in English published by Orient Black Swan

References:

1. A. Textbook of English Phonetics for Indian Students by T. Balasubramanian, 2012
2. Communication Skills, Sanjay Kumar & Pushpalatha Oxford University Press
3. Every Day Dialogues in English – Robert J. Dixson, Prentice Hall of India
4. Raymond Murphy's English Grammar with CD, Murphy, Cambridge University Press,

2012
5. Technical Communication by Meenakshi Raman& Sangeetha Sharma,Oxford University Press 2009
6. Oxford Learners Dictionary 12th edition,2011
7. Norman Lewis Word Power Made Easy-The Complete Handbook for Builbing a Superior Vacabulary 2014
8. Practical English Usage:Michael Swan, Oxford Univercity Press 1995

Web Resources:

www.englishclub.com
www.easyworldofenglish.com
www.languageguide.org/english
www.bbc.co.uk/learningenglish
www.myenglishpages.com

CO-PO Mapping

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	3	-	-
CO2	3	-	-	-	-	-	-	-	-	2	-	2
CO3	3	-	-	-	-	-	-	-	3	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	3
CO5	3	-	-	-	-	3	-	-	-	-	-	-
Average	**3**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**3**	**2.5**	**-**	**2.5**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - II Semester

L	T	P	C
3	0	0	3

(20ES0503) PYTHON PROGRAMMING

(Common to all branches)

Course Objectives:

- Introduction to Scripting Language.
- Exposure to various problems solving approaches of computer science.

UNIT I

Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

UNIT II

Types, Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass.

UNIT III

Data Structures: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

UNIT IV

Functions: Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

Modules: Creating modules, import statement, from. Import statement, name spacing.

Python packages: Introduction to PIP, Installing Packages via PIP, Using Python Packages.

UNIT V

Object Oriented Programming OOP in Python: Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding,

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions.

Course Outcomes:

On successful completion of the course, students will be able to		POs related to COs
CO1	understanding of the Making Software easily right out of the box.	PO1,PO2,PO3,PO5,PO9,PO10,PO12
CO2	The knowledge to about Experience with an interpreted Language.	PO2,PO3,PO5,PO9,PO10
CO3	The understand the To build software for real needs.	PO1,PO3,PO5,PO10,PO12
CO4	Prior Introduction to testing software	PO3,PO5,PO10,PO12
CO5	understand Object Oriented Programming OOP in Python	PO2,PO3,PO5,,PO10

Text Books :

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
2. Learning Python, Mark Lutz, Orielly.

References:

1. Think Python, Allen Downey, Green Tea Press.
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage.

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2		2				1	1		2
CO2		2	2		2				2	2		
CO3	2		3		2					2		2
CO4			2		1					3		2
CO5		1	2		2					2		
Average	**1**	**1.0**	**2.2**		**1.8**				**0.6**	**2**		**2**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - II Semester **L T P C**

(20ES0303) ENGINEERING MECHANICS **2 1 0 3**

(Common to Mechanical and Civil)

Course Objectives:

The objective of this Course is to provide an introductory treatment of Engineering Mechanics to all the students of engineering, with a view to prepare a good foundation for taking up advanced courses in the area in the subsequent semesters. A working knowledge of statics with emphasis on force equilibrium and free body diagrams. Provides an understanding of the kinds of stress and deformation and how to determine them in a wide range of simple, practical structural problems, and an understanding of the mechanical behavior of materials under various load conditions. Lab should be taken concurrently

UNIT – I

INTRODUCTION OF ENGINEERING MECHANICS – Basic concepts -System of Forces – Moment of Forces and its Application – Couples and Resultant of Force System – Equilibrium of System of Forces - Degrees of Freedom – Free body diagrams –Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT – II

FRICTION : Types of friction–laws of Friction–Limiting friction- Cone oflimiting friction–static and Dynamic Frictions – Motion of bodies – Wedge, Ladder friction. Applications-Screw jack.

UNIT – III

PROPERTIES OF SECTIONS & CENTROID AND CENTER OF GRAVITY: Centroid of simple figures–Centroid of Composite figures – Centre of Gravity of bodies – Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures. Radius of gyration - Section modulus.

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

UNIT – IV

KINEMATICS: Rectilinear and Curvilinear motion–Velocity andAcceleration – Motion of A Rigid Body – Types and their Analysis in Planar Motion.

KINETICS OF PARTICLE & RIGID BODIES: Analysis in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies – Work

Energy Method.

Newton's law of motion, D-Alembert principle, Work energy method. Impulse - momentum equation.

UNIT – V

ANALYSIS OF PERFECT FRAMES: Types of frames–cantilever frames andsimply supported frames – Analysis of frames using method of joints, method of sections for vertical loads, horizontal loads and inclined loads

Course Outcomes:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Confidently tackle equilibrium equations, moments and inertia problems	PO1,PO2,PO4,PO5,PO10
CO2	Analysis calculator/computing basic skills to use to advantage in solving mechanics problems.	PO1,PO2,PO4,PO5,PO10
CO3	Understand the Centre of Gravity of bodies – Area moment of Inertia - Parallel axis and perpendicular axis theorems	PO1,PO2,PO4,PO10
CO4	Newton's law of motion, D-Alembert principle, Work energy method. Impulse - momentum equation	PO1,PO2,PO4,PO5,PO10
CO5	Analysis of frames using method of joints, method of sections for vertical loads, horizontal loads and inclined loads.	PO1,PO2,PO4,PO5,PO10

Text Books:

1. Engineering Mechanics by Bhavakatti, New age pubilishers
2. Engineering Mechanics by Shames &Rao – Pearson Education.

Reference Books:

1. Engineering Mechanics by SeshigiriRao, Universities Press, Hyderabad.
2. Engineering Mechanics – B. Bhattacharyya, Oxford University Publications.

CO-PO Mapping

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2		1	1					2		
CO2	3	2		3	2					1		
CO3	2	2		1						2		
CO4	1	2		3	1					2		
CO5	2	1		3	2					2		
Average	**2.2**	**1.8**		**2.2**	**1.2**					**1.8**		

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - II Semester

L	T	P	C
0	0	3	1.5

(20BSBH10) ENGINEERING CHEMISTRY LAB

(Common to CIVIL & MECH)

Course Objectives:

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The student will learn:

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

LIST OF EXPERIMENTS:

Choice of 10 experiments from the following:

1. Estimation of hardness of water by complexometric method using EDTA.
2. Determination of Alkalinity of water.
3. Estimation of Dissolved oxygen in water.
4. Preparation of standard $KMnO_4$ solution & Estimation of Iron by Potentiometry.
5. Determination of Viscosity of oil through Ostwald/Redwood Viscometer – I.
6. Determination of strength of an acid in pb-acid battery.
7. Preparation of polymer – bakalite.
8. Estimation of Manganese in Cement by Colorimetry.
9. Adsorption of acetic acid by charcoal.
10. Estimation of calcium in port land cement.

Course	COURSE OUTCOMES	
ENGINEERING CHEMISTRY LAB	CO1	Acquired the practical skill to handle the analytical methods with confidence.(PO1,PO2,PO3)
	CO2	The desirable limits of various constituents in water analysis and its importance. (PO1, PO2)
	CO3	Understand of practical molecular properties such as lead acid batteries, conductance of solutions, etc (PO1, PO2, PO3)
	CO4	Analyze the rate constant of a reaction from concentration – time relationships.(PO1,PO2,PO4)
	CO5	Analyze the preparations, properties of polymers and Cement by Colorimetry, port land cement in modern technology. (PO1, PO2, PO3,PO5).
	CO6	Follow the ethical principles in implementing the experiments (PO8)
	CO7	Do experiments effectively as an individual and as a team member in a group. (PO9)
	CO8	Communicate verbally and in written form, the understanding about the experiments. (PO10)
	CO9	Continue updating their skill related to analytical methods, lead acid batteries, Bakelite, port land cement in implementing experiments in future. (PO12)

REFERENCE BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.
2. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co.,Delhi).
3. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi).

CO-PO Mapping

Course	PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
ENGINEERING CHEMISTRY LAB	CO1	2	3	2									
	CO2	3	2										
	CO3	2	3	2									
	CO4	3	2		2								
	CO5	2	2	3		3							
	CO6								3				
	CO7									2			
	CO8										3		
	CO9												3
	AVG	**2.6**	**2.4**	**2.3**	**2**	3	-	-	3	2	**3**	-	**3**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - II Semester

L	T	P	C
0	0	3	1.5

(20ES0504) PYTHON PROGRAMMING LAB

(Common to all branches)

Exercise 1 - Basics

a) Running instructions in Interactive interpreter and a Python Script.

b) Write a program to purposefully raise Indentation Error and correct it.

Exercise 2 - Operations

a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem).

b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) Write a Program for checking whether the given number is a even number or not.

b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . ,1/10.

c) Write a program using a for loop that loops over a sequence. What is sequence?

d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow - Continued

a) Find the sum of all the primes below two million.

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89,...

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise - 5 - DS

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure

b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 6 DS - Continued

a) Write a program combine lists that combines these lists into a dictionary.

b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

a) Write a program to print each line of a file in reverse order.

b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued

a) Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

b) Write a function dups to find all duplicates in the list.

c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative product to compute cumulative product of a list of numbers.

b) Write a function reverse to reverse a list. Without using the reverse function.

c) Write function to compute gcd,lcm of two numbers. Each function shouldn't exceed one line.

Exercise 11 - Multi-D Lists

a) Write a program that defines a matrix and prints.

b) Write a program to perform addition of two square matrices.

c) Write a program to perform multiplication of two square matrices.

Exercise - 12 - Modules

a) Install packages requests, flask and explore them using (pip).

b) Write a script that imports requests and fetch content from the page Eg. (Wiki).

c) Write a simple script that serves a simple HTTP Response and a simple HTML Page.

Course	COURSE OUTCOMES	
Python Programming Lab	CO1	Design the algorithm and flowchart for the given problem. (PO1, PO2,PO3)
	CO2	Develop the programs on control statements and arrays. (PO1, PO2, PO3,PO5)
	CO3	Analyze the concepts on functions and strings. (PO1, PO2,PO9)
	CO4	Solve the memory access problems by using pointers and design the programs on structures and unions. (PO1, PO2, PO4,PO5)
	CO5	Analyze the basics of file handling mechanism that is essential for understanding the concepts of management systems. (PO1, PO2)
	CO6	Follow the ethical principles in implementing the programs (PO8)
	CO7	Do experiments effectively as an individual and as a team member in a group. (PO9)
	CO8	Communicate verbally and in written form, the understanding about the experiments. (PO10)
	CO9	Continue updating their skill related to loops, pointers and files implementing programs in future. (PO12)

References:

1. Think Python, Allen Downey, Green Tea Press.
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage.

CO-PO Mapping

Course	PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Python Programming Lab	CO1	3	3	2									
	CO2	3	3	3		2							
	CO3	2	3							3			
	CO4	3	2		3	3							
	CO5	3	3										
	CO6								3				
	CO7									2			
	CO8										3		
	CO9												3
	AVEG	2.8	2.8	2.5	3	2.5	-	-	3	2.5	3	-	3

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - II Semester

L	T	P	C
0	0	0	0

(20MCBH01) ENVIRONMENTAL SCIENCE

(common to all)

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

UNIT-I ECOSYSTEMS AND NATURAL RESOURCES:

Definition, Scope and Importance of ecosystem – Structure and function of an ecosystem – Energy flow in the ecosystem – Food chain, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.

b. Grassland ecosystem

c. Desert ecosystem

NATURAL RESOURCES:

Classification of Resources: Living and Non-Living resources, **Water resources:** use and over utilization of surface and ground water, Dams: benefits and problems. **Mineral resources:** use and exploitation, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources.

UNIT-II BIODIVERSITY :

Introduction Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III ENVIRONMENTAL POLLUTION AND CONTROL :

Definition, Cause, effects and control measures of:

a. Air Pollution.

b. Water pollution

c. Soil pollution

d. Noise pollution

SOLID WASTE MANAGEMENT: Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

E– WASTE MANAGEMENT: Definition of E-Waste, Effect of E-Waste on Humans and

Environment, Treating and management of E-Wastes.

UNIT – IV SOCIAL ISSUES AND THE ENVIRONMENT:

Water conservation, rain water harvesting, watershed management –its problems and concerns. Climate change, global warming, acid rain, ozone layer depletion,– 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 legislation – Public awareness.

UNIT – V HUMAN POPULATION AND THE ENVIRONMENT

Population growth, population explosion, Environment and human health- Relationship between Health, wellness and fitness, Human Rights and duties of a citizen, value education – definition of value, value education in the context of Environment, principles of value Education. Women and child welfare, role of Information Technology in Environment and Human Health.

Course Outcomes:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Students will get the sufficient information that will clarify modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.	PO5,PO7,PO8,PO9
CO2	Students will realize the need to change their approach so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning	PO5,PO9,PO11
CO3	Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action	PO5,PO7,PO11
CO4	By studying environmental sciences, students is exposed to the environment that enables one to find out solution of various environmental problems encountered on and often.	PO2,PO7,PO12
CO5	At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted	PO5,PO8,PO9,PO12

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela.2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.

5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BSPublications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS.Publications.

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							3	2	2			
CO2					3				2		2	
CO3					3		2				2	
CO4		3					2					3
CO5					3			3	3			3
Average		**3**			**3**		**2.3**	**2.5**	**2.3**		**2**	**3**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - III Semester

L	T	P	C
3	0	0	3

(20PC0301) MATERIAL SCIENCE ENGINEERING

Course Objectives:

To gain and understanding of the relationship between the structure, properties, processing, testing, heat treatment and applications of metallic, non metallic, ceramic and composite materials so as to identify and select suitable materials for various engineering applications.

UNIT-I

Structure of Metals - Bonds in Solids - crystallization of metals, Properties of Metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size. Alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT-II

Equilibrium of Diagrams - Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, and Fe-Fe_3C

UNIT-III

Ferrous and Non – Ferrous Metals and Alloys - Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure
and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels, Copper and its Alloys, Aluminium and its Alloys.

UNIT-IV

Heat Treatment of Metals - Effect of alloying elements on Iron – Iron carbon system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys. Heat treatment of plastics

UNIT-V

Ceramic Materials - Crystalline Ceramics, Glasses, Cermets and Composite materials classifications and applications. Basic steps of powder metallurgy, Characterization, Sintering, Sintered Products, Applications of powder metallurgy in Indian industries.

Course Outcomes:

On successful completion of the course, students will be able to		POs related to COs
CO1	Understands the grains in crystallization, its effect on the properties, and analyzing the microstructures of metals.	P01,P02,P03,P04
CO2	Apply the knowledge of mathematics, science, and engineering fundamentals of alloys and Phase diagram of various materials and the classification of micro structure in steel and cast iron.	P01,P02,P03,P04
CO3	Understand the engineering knowledge of ferrous and non-ferrous metal and its alloys. Identify, formulate the appropriate techniques and engineering application of ferrous and non-ferrous metal and alloys.	P01,P02,P03,P04
CO4	Acquire the knowledge of engineering fundamentals for heat treatment process. Identify, formulate, analysis and apply appropriate techniques used in all the heat treatment process with an understanding of its limitations.	P01,P02,P03,P04
CO5	Understand the engineering knowledge of polymers, ceramics and composites. Identify, formulate the appropriate techniques and engineering application of polymers, ceramics and composites.	P01,P02,P03,P04

Text Books:

1. Introduction to Physical Metallurgy, Sidney H. Avener.
2. Materials Science and Engineering, by Raghavan V, PHI Publisher.
3. Material Science and Metallurgy / Kodgire.

REFERENCES:

1. Science of Engineering Materials / Agarwal
2. Materials Science and Engineering / William and Callister.
3. An introduction to materials Science / W. G. Vinas& HL Mancini
4. Material science & material / C. D. Yesudian& Harris Samuel
5. Engineering Materials and their Applications – R. A Flinn and P K Trojan / Jaico Books.
6. Engineering materials and metallurgy / R. K. Rajput/ S. Chand

CO-PO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	2	2								
CO2	3	2	2	2								
CO3	3	3	2	2								
CO4	3	3	1	1								
CO5	2	2	1	1								
Average	**2.8**	**2.6**	**1.6**	**1.6**								

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - III Semester

L	T	P	C
3	0	0	3

(20PC0302) MECHANICS OF SOLIDS

Course Objectives:
Analysis of stresses and strains of mechanical and structural components; action of shear; bending and torsional stresses; deflection of beams due to axial and transverse loadings; thin and thick walled pressure vessels.

UNIT-I
Simple Stresses & Strains - Introduction, Types of stresses & strains, Hooke's law, Stress-Strain diagram for mild steel, Working stress, Factor of safety, Poisson's ratio, Volumetric strain, Elastic Moduli and relationship between them – Bars of varying section, Composite bars, Temperature stresses. Strain energy – Resilience – Gradual, Sudden, Impact loadings.
Principal Stresses & Strains - Plane stress, Plane strain, Computation of Principle Stresses and Strains on inclined planes, Mohr's circle of stresses.

UNIT-II
Shear Force and Bending Moment - Definition of beam, Types, Concept of Shear force and Bending moment – S.F and B.M diagrams for Cantilever, Simply supported and Overhanging beams subjected to point loads, U.D.L., U.V.L. and combination of these loads, Point of contra flexure, Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT-III
Bending Stresses and Shear Stresses - Theory of simple bending, Bending equation, Determination of Bending Stresses for simple cases, Section modulus, Shear stress formula, Shear stress distribution across various beams & sections - Rectangular, Circular, Triangular, I, T sections.
Torsion of Circular Shafts and Springs - Theory of pure torsion, Torsion Equation, Torsional moment of resistance, Polar section modulus.

UNIT-IV
Deflection of Beams - Bending into a circular arc – Slope, Deflection and Radius of curvature , Determination of Slope and Deflection for Cantilever and Simply supported beams subjected to Point loads, U.D.L & U.V.L. Double integration and Macaulay's methods.
Columns - Introduction, Failure of a Column, Columns with Hinged ends, Columns with other support Conditions, Limitations of Euler's Formula, Rankine's Formula.

UNIT-V
Thin Cylinders - Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses, Volumetric strains – changes in dia, and volume of thin cylinders ,Thin spherical shells.
Thick Cylinders - Lame's equation, Cylinders subjected to inside & outside pressures, Compound cylinders.

Course Outcomes:

On successful completion of the course, students will be able to		POs related to COs
CO1	Apply the knowledge of mathematics, basic theory of science, fundamental principles to attain the solution of complex engineering problems on deformation of materials.	PO1,PO2,PO3,PO4
CO2	Identify, formulate to perform the stress analysis of a beam under axial loading, torsion, transverse loading to provide valid conclusions.	PO1,PO2,PO3,PO4
CO3	Evaluate & interpreted the various stresses and deformation in circular and hollows shafts, sections to analyze complex engineering problems.	PO1,PO2,PO3,PO4
CO4	Analyze and understand the fundamental concepts of deflection of beam by various methods.	PO1,PO2,PO3,PO4
CO5	Apply reasoning informed by the contextual knowledge to perform stress and strain deformations in Thin , Thick Cylinders, spherical shells	PO1,PO2,PO3,PO4

Text Books:

1. Strength of Materials by R.Subramaniam, oxford publishers.
2. Strength of Materials by R.K. Bansal, Laxmi Publishers, 5th Edition,2012.
3. Mechanics of Materials,AndrewsPytel,JaanKiusallaas&M.M.M.Sarcar (Second Edition), Cengage Learning Publishers.

Reference Books:

1. Strength of Materials by S. Ramamrutham, DhanpatRai Publishers
2. Strength of Materials by R.K. Rajput, S.Chand& Company, 5th Edition,2012.
3. Strength of Materials by Dr. Sadhu Singh, Khanna Publishers, 10th Edition,2013.
4. Strength of Materials by M.Chakraborti, S.K.Kataria& Sons, 2nd Edition,2011.
5. Strength of Materials by S S Rattan, The McGraw-Hill Companies, 2nd Editon,2011.

CO-PO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	2	2								
CO2	3	2	2	2								
CO3	3	3	2	2								
CO4	3	3	1	1								
CO5	2	2	1	1								
Average	**2.8**	**2.6**	**1.6**	**1.6**								

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - III Semester

L	T	P	C
2	1	0	3

(20PC0303) ENGINEERING THERMODYNAMICS

Course Objectives:

- To understand the basic laws of thermodynamics and their application to the non-flow and flow processes.
- To understand the thermodynamic properties of ideal and real gases, gaseous mixtures.
- To get the awareness on thermodynamic principles, skills to perform the analysis and design of thermodynamic systems.

UNIT-I

Basic Concepts of Thermodynamics - Microscopic and Macroscopic approach, Thermodynamic systems, homogeneous & heterogeneous systems, control volume, property, point and path functions, Thermodynamic equilibrium, State, Path and process, Reversible and Quasi-static process, Concept of Continuum, Work transfer and Heat transfer, Zeroth law, Concept of temperature and heat

UNIT-II

First Law of Thermodynamics - First law, First Law applied to a process and a cycle, Energy - a property, Forms and transformation of Energy, Internal Energy and Enthalpy, PMM I. Control Volume, Steady Flow Process, Mass balance and Energy Balance, Applications of Steady Flow Processes.

UNIT-III

Second Law of Thermodynamics - Second law – Kelvin, Planck and Clausius statements, Heat engine, Refrigerator and Heat pump, Efficiency and COP, Thermodynamic temperature scale, Reversibility and Irreversibility, Carnot cycle, Clausius Inequality

Entropy - Concept of entropy, Entropy of ideal gases, Principle of increase of entropy, Quality ofenergy, Energy (Availability), Reversible work, Energy and Irreversibility for closed system and control volume, Second law efficiency.

UNIT-IV

Properties of pure substances -Introduction, P-V, P-T and T-S Diagrams for a Pure Substance, Quality and Dryness Fraction, Use of Steam Tables and Mollier Chart for thermodynamic properties.

Properties of gases and gas mixtures - Ideal gas, equation of state, Mole Fraction, Mass fraction, Gravimetric and volumetric Analysis, Dalton's Law of partial pressure, Equivalent Gas constant and Molecular Internal Energy, Enthalpy, Specific Heats and Entropy of Mixture of perfect Gases and Vapour.

UNIT-V

Air standard cycles - Carnot Cycle, Sterling Cycle, Ericson Cycle, Otto Cycle, Diesel Cycle, Dual Cycle, their applications, comparison of Otto, Diesel and Dual cycles,Second Law Analysis of Gas Power Cycles.

Refrigeration Cycles -Brayton and Rankine cycles – Performance Evaluation – combined cycles, Bell- Coleman cycle, Vapour compression cycle-performance Evaluation

Course Outcomes:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Demonstrate knowledge and understanding the concept of conservation of mass, energy, work interaction, heat transfer.	PO1, PO2, PO3, PO4
CO2	Identify, formulate and analyze various thermodynamic systems and provide analytical and numerical solutions.	PO1,PO2, PO3, PO4
CO3	Identify closed and open systems and/or apply the concept of second law to analyze simple systems and understand the various thermodynamic equations, functions and relations.	PO1, PO2, PO3, PO4
CO4	Evaluate properties of pure substances and gas mixtures and use steam tables and Mollier chart in solving complex problems.	PO1, PO2, PO3, PO4
CO5	Understand the various psychrometric relations, properties and analyze air standard cycles applied in enginesand identify methods to improve thermodynamic performance.	PO1, PO2,PO3, PO4

TEXT BOOKS:

1. Engineering Thermodynamics, P. K. Nag, TMH, 5th Edition, 2013.

2. Engineering Thermodynamics, Chatttopadhyay, Oxford Publishers, 1st edition, 2011.

REFERENCE BOOKS:

1. Thermodynamics–An EngineeringApproach, YunusCengel& Boles, TMH, 8th Edition, 2015

2. Fundamentals of Engineering Thermodynamics, Dr.R.Yadav, Central publishing House, 7th Edition, 2004.

CO-PO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	2	2								
CO2	3	2	2	2								
CO3	3	3	2	2								
CO4	3	3	1	1								
CO5	2	2	1	1								
Average	**2.8**	**2.6**	**1.6**	**1.6**								

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - III Semester

L	T	P	C
2	1	0	3

(20PC0304) KINEMATICS OF MACHINERY

Course Objectives:

- To understand the basic concepts of mechanisms, cam, gear train and their kinematics.
- To understand the effects of friction in the motion of machine components.

UNIT-I

Basics of Mechanisms - Classification of links and kinematic pairs – Sliding, Turning, Rolling, Screw and spherical pairs- Lower and higher pairs- Degree of freedom, Mobility – Kutzbach criterion, Grubler's criterion – Grashof's Law

Kinematic Inversions of four-bar chain, Single and double slider crank chains –Quick return mechanisms Straight line motion mechanisms, Peaucellier, Hart, Scottrussel, Grasshopper, Watt, Tchebicheff, Robert and pantograph.

UNIT-II

Steering Mechanisms - Conditions for correct steering – Davis Steering gear, Ackermanns steering gear. Hooke's Joint (Universal coupling) -Single and double Hooke's joint — applications – Simple problems.

Belt Drives - Introduction, Belt drives, selection of belt drive- types of belt drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt.

UNIT-III

Kinematics - Displacement, Velocity and acceleration analysis of simple mechanisms – Graphical method– Velocity and acceleration of polygons

Velocity Analysis using instantaneous centers – kinematic analysis of simple mechanisms – Coincident points – Coriolis component of Acceleration

UNIT-IV

Cams - Classification of cams and followers – Terminology and definitions – Displacement diagrams –Uniform velocity, Parabolic and Simple harmonic motions.

Cam Profiles – Specified contour cams – Circular arc and tangent cams – Pressure angle and undercutting – Sizing of cams.

UNIT-V

Gears - Law of toothed gearing – Involutes and Cycloidal tooth profiles –Spur Gear terminology and definitions –Gear tooth action – Contact ratio –Condition for constant

velocity ratio for transmission of motion - Interference and undercutting. Helical, Bevel, Worm, Rack and Pinion gears

Gear Trains – Introduction –Types of gears – Simple, compound, reverted and Epicyclic gear trains. Train value – Methods of finding train value or velocity ratio – Tabular column method for Epicyclic gear trains. Torque in epicyclic gear trains.Differential gear of an automobile.

Course Outcomes:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Define link, pairs, mechanisms, inversion, structure and machines. Explain various terminologies associated with theory of machine. Draw inversions of different mechanisms.	PO1, PO2, PO3, PO4
CO2	Explain steering geometry. Describe various steering mechanisms with its need and importance. Identify various linkages of steering mechanisms, steering gears.	PO1, PO2, PO3, PO4
CO3	Draw velocity and acceleration diagram for a given mechanism. Calculate velocity and acceleration from a given mechanism.	PO1, PO2, PO3, PO4
CO4	Explain different types of cams and cam followers and its motions. Construct different types of CAM profile for a given data.	PO1, PO2, PO3, PO4
CO5	Develop a practical approach to optimizing gear trains with spur gears based on a selection matrix of optimal materials, gear ratios and shaft axes positions.	PO1, PO2, PO3, PO4

Text Books:

1. Theory of Machines, S.S. Rattan, Tata McGraw-Hill, 3rd Edition, 2013.

2. Theory of Machines, R.S Khurmi,, S Chand Publications, 14th Edition, 2005 .

3. Kinematics and Dynamics of Machinery, R.L.Norton, Tata McGraw-Hill, 1st Edition, 2013.

References Books:

1. Theory of Machines and Mechanisms, J.E. Shigley 4rd Edition" Oxford International student Edition

2. Theory of Machines, Thomas bevan, Pearson (P), 3 rd Edition, 2012

3. Mechanics of Machines, Ramamurthy, V. Narosa Publishing House, 2002

CO-PO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	2	2								
CO2	3	2	2	2								
CO3	3	3	2	2								
CO4	3	3	1	1								
CO5	2	2	1	1								
Average	**2.8**	**2.6**	**1.6**	**1.6**								

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - III Semester (ME) **L P C**

(20PC0305) MATERIAL SCIENCE ENGINEERING LAB 0 3 1.5

COURSE DESCRIPTION:

Characterization of microstructures of steels, cast irons and non-ferrous metals; heat treatment procedures; data acquisition and recording; grain size analysis; phase segmentation; non-destructive tests.

LIST OF EXPERIMENTS:

(Note: Student shall perform minimum of Twelve experiments.)

1. Study of metallurgical instruments & microscope
2. a) Preparation of specimen using cold setting die
   b) Preparation of specimen using hydraulic press
3. Preparation and study of the microstructure of cast irons
4. Preparation and study of the microstructure of carbon steels
5. Preparation and study of the microstructure of Non-Ferrous Alloys
6. Study of the microstructures of heat treated steels
7. Measurement of hardness of heat treated and untreated steels
8. Determination of hardenability of steel by Jominey End Quench Test
9. Determination of grain size, and phase distribution of specimens (any four materials) by Material Plus software
10. Experiment on Ultrasonic flaw detection
11. Experiment on Magnetic particle inspection
12. Experiment on Die-penetration
13. Study on Eddy current testing

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Gain the knowledge on the microstructure with properties and principles of foundry, metal joining and forming processes.	**PO1**
CO2	Analyze the mechanical properties of materials by suitable testing and choose the appropriate metal joining processes.	**PO2**
CO3	Design and manufacturing components by adopting the concept of casting, forging, rolling and drawing operations.	**PO3**
CO4	Conduct investigation on the hardness of different materials	**PO4**
CO5	Evaluate the structure of the material by using modern microscope.	**PO5**
CO6	Follow the ethical principles while doing the experiments	**PO8**
CO7	Do the experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form pertaining to results of the experiments	**PO10**
CO9	Continue updating their skill related to materials and manufacturing in future.	**PO12**

CO-PO Mapping

CO\ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	3	-	-	-
CO7	-	-	-	-	-	-	-	-	-	3	-	-
CO8	-	-	-	-	-	-	-	-	-	-	-	3
AVG	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - III Semester **L P C**

(20PC0306) MECHANICS OF SOLIDS LAB **0 3 1.5**

COURSE DESCRIPTION:

Tests on strength of materials: Tension test; Compression test; Bending test; Shear test; Torsion test; Hardness test; Verification of Maxwell reciprocal theorem.

LIST OF EXPERIMENTS:

1. Tension test on mild steel/HYSD bar
2. Compression test on wood/bricks/mild steel
3. Compression test on coiled spring
4. Tension test on coiled spring
5. Bending test on carriage spring
6. Brinell and Rockwell hardness tests
7. Charpy and Izod impact tests
8. Shear test on mild steel
9. Bending test on simply supported beam
10. Bending test on cantilever beam
11. Bending test on fixed beam
12. Bending test on continuous beam
13. Bending test on overhanging beam
14. Verification of Maxwell‟s reciprocal theorem
15. Torsion test on mild steel

Note: Minimum 12 experiments shall be conducted.

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs**
CO1	Demonstrate the knowledge on the strength of materials	**PO1**
CO2	Analyze the mechanical properties of materials by suitable testing.	**PO2**
CO3	Design the materials strength using various impact and deflection test.	**PO3**
CO4	Conduct investigation on the hardness of different materials	**PO4**
CO5	Evaluate the material properties by computerized machine.	**PO5**

CO6	Follow the ethical principles while doing the experiments	**PO8**
CO7	Do the experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form pertaining to results of the experiments	**PO10**
CO9	Continue updating their skill related to material science in future.	**PO12**

CO-PO Mapping

CO\ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	3	-	-	-
CO7	-	-	-	-	-	-	-	-	-	3	-	-
CO8	-	-	-	-	-	-	-	-	-	-	-	3
AVG	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - III Semester **L P C**

(20PC0307) APPLIED MECHANICS LAB **0 3 1.5**

COURSE OBJECTIVE*:*

This lab is aimed at making the student understand the concepts of Engineering Mechanics through demonstrable experiments

LIST OF EXPERIMENTS

1. Polygon Law of Coplanar Forces
2. Bell Crank Lever
3. Friction Plane
4. Moment of Inertia of Flywheel
5. Compound Pendulum
6. Support Reactions of a Simply supported beam
7. Support Reactions of a overhanging supported beam
8. Support Reactions of a continuous supported beam

9. Course	COURSE OUTCOMES	
Applied Mechanics Lab	**CO1**	To analyze the polygon law of coplanar forces.(PO1,PO2,PO3) . (PO1, PO2, PO3)
	CO2	To analyze the bell crank lever. (PO1, PO2,PO3,PO4)
	CO3	Understand the friction plane, moment of inertia of flywheel, compound pendulum.(PO1, PO2, PO3,PO4)
	CO4	Describe the support reaction of a simply supported and overhanging supported beam.(PO1,PO2,PO4)
	CO5	Analyze the support reaction of a continuous supported beam. (PO1, PO2, PO3).
	CO6	Follow the ethical principles in implementing the experiments (PO8)
	CO7	Do experiments effectively as an individual and as a team member in a group. (PO9)
	CO8	Communicate verbally and in written form, the understanding about the experiments. (PO10)
	CO9	Continue updating their skill related to polygon law, crank lever, overhanging supported beam in implementing experiments in future. (PO12)

CO-PO Mapping

Course	PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Applied Mechanics Lab	**CO1**	2	3	2									
	CO2	3	2	2	3								
	CO3	2	3	2	2								
	CO4	3	2		2								
	CO5	2	2	3									
	CO6								3				
	CO7									2			
	CO8										3		
	CO9												3
	Avg	**2.4**	**2.4**	**2.2**	**2.3**	**-**	**-**	**-**	**3**	**2**	**3**	**-**	**3**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - III Semester **L T P C**

(20SO0301) AUTOCAD **0 0 4 2**

Out comes:

Students would be able to development of part drawings for various components in the form of orthographic and isometric. Determination of deflection and stresses in 2D and 3D diagrams

LIST OF EXPERIMENTS

I. 2D Drafting using Auto CAD or any drafting package
II. 3D Modeling :
1. Modeling of Component in 3D – V block
2. Modeling of Component in 3D – Open Bearing
3. Modeling of Component in 3D – Angular block
4. Modeling of Component in 3D – Dovetail Guide
5. Modeling of Component in 3D – Dovetail Bracket
6. Modeling of Component in 3D – Tool post

Geometric Modeling may be done Using Auto CAD or Pro-E or CATIA or Solid Works or Iron CAD

III. Assembly Modeling:
1. Assembly of a screw jack parts
2. Assembly of a knuckle joint
3. Assembly of a Oldham‟s coupling
4. Assembly of a footstep bearing
5. Assembly of a stuffing box
6. Assembly of a square tool post

Course Outcomes:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Apply the knowledge of engineering fundamentals to Understand the role of design of the mechanical engineering Components.	PO1
CO2	Analyze the components as per the drawing standard	PO2
CO3	Design and Development of mechanical part drawing and Assembly of components implemented in real time applications.	PO3
CO4	Apply appropriate techniques, resources use to Create Mechanical Components 3D modeling by modern engineering software tools.	PO5
CO5	Follow the ethical principles while creating the 2D, 3D modeling	PO8
CO6	Draw effectively as an individual drawing practice in laboratory.	PO9
CO7	Communicate verbally and in written form about the drawing	PO10

	procedure.	
CO8	Continue updating their skill related to drawing and modeling of the components in future.	PO12

CO-PO Mapping

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3											
CO2		3										
CO3			3									
CO4				3								
CO5								3				
CO6									2			
CO7										2		
CO8												2
Average	**3**	**3**	**3**	**3**				**3**	**2**	**2**		**2**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - III Semester

L	T	P	C
0	0	0	0

(20MCBH02) CONSTITUTION OF INDIA

Course Objectives:

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes:

Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

UNIT-I

- Meaning of the Constitution Law

UNIT-II

- Historical Perspective of the Constitution of India
- Salient features and characteristics of the Constitution of India

UNIT-III

- Scheme of the fundamental rights
- The scheme of the Fundamental Duties and its legal status
- The Directive Principles of State Policy – Its importance and implementation
- Federal structure and distribution of legislative and financial powers between the Union and the States

UNIT-IV

- Parliamentary Form of Government in India – The constitution powers and status of the President of India.
- Amendment of the Constitutional Powers and Procedure.
- The historical perspectives of the constitutional amendments in India.
- Emergency Provisions : National Emergency, President Rule, Financial Emergency

UNIT-V

- Local Self Government – Constitutional Scheme in India.
- Scheme of the Fundamental Right to Equality.
- Scheme of the Fundamental Right to certain Freedom under Article 19
- Scope of the Right to Life and Personal Liberty under Article 21

Course Outcomes:

On successful completion of the course the student will be able to		**POs related to COs**
CO1	Understand the functions of the Indian constitution	PO6, PO8,PO12
CO2	Recognize the structure, functions of Indian central government	PO6, PO8,PO12
CO3	Realize the structure and functions of State government in India	PO6, PO8,PO12
CO4	Explain the functions of local administration in rural and urban	PO6, PO8,PO12
CO5	Understand the role of state and chief election commission	PO6, PO8,PO12

Text Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Framing of Indian Constitution, Dr. S. N. Busi, Dr. B. R. Ambedkar 1st Edition, 2015

Reference Books:

1. Indian Constitution Law, M. P. Jain 7th Edn., Lexis Nexis, 2014.
2. Introduction to the Constitution of India, D.D. Basu, Lexis Nexis, 2015.

CO-PO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1						3		2				2
CO2						2		2				2
CO3						3		2				2
CO4						3		1				1
CO5						2		1				1
Average						**2.6**		**1.6**				**1.6**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - IV Semester

L	T	P	C
3	0	0	3

(20BSBH04) MATHEMATICS-IV
(Common to EEE, MECH & ECE)

Course Objectives:

Our emphasis will be more on conceptual understanding and application of Laplace transforms, Fourier transforms, Solution of Algebraic, Transcendental Equations and Numerical solutions of ordinary differential equations.

UNIT– I Laplace Transform-I

Laplace transform of standard functions– First shifting Theorem - Second shifting theorem- Transforms of derivatives and integrals – Unit step function –Dirac's delta function-Laplace transform of periodic functions.

UNIT– II Laplace Transform-II

Convolution theorem- Differentiation and integration of transform – Inverse laplacetransform –Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT – III Fourier Transform

Introdution–Fourier integral theorem (only statement) – Fourier sine and cosine integrals- Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

UNIT – IV Numerical Method-I

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method

Interpolation: Finite differences-Forward differences- Backward differences- Newton's forward and backward interpolation formulae – Lagrange's formulae.

UNIT – V Numerical Method-II

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method- Modified Euler's Method-Runge-Kutta Methods-Predictor-corrector method-Milne's Method.

Course Outcomes:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Analyze the engineering problems using the concept of laplace transforms.	PO1,PO2,PO3, PO5,PO12
CO2	Solve the engineering problems using concept of fourier transforms	PO1,PO2,PO3, PO5,PO12
CO3	Gain knowledge to tackle engineering problems using the concepts of Numerical methods	PO1,PO2,PO3, PO5,PO12
CO4	Analyze the engineering problems using the concept of Numerical method-I	PO1,PO2,PO3, PO5,PO12
CO5	Analyze the engineering problems using the concept of Numerical method-II	PO1,PO2,PO3, PO5,PO12

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.

REFERENCES:

1. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, McGraw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

CO-PO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2		3							1
CO2	3	2	2		2							1
CO3	3	2	2		3							1
CO4	3	1	1		3							1
CO5	3	1	1		2							1
Average	**3**	**1.6**	**1.6**		**2.6**							**1**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - IV Semester

L	T	P	C
3	0	0	3

(20HM115) ECONOMICS FOR ENGINEERS

Course Objectives:

The objective of this course is to equip the student with the basic inputs of Managerial Economics and
Economic Environment of business and to enrich analytical skills in helping them take sound financial decisions for achieving higher productivity.

UNIT - I
INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics - Definition, nature and scope –Role of Managerial Economics in Business Decisions- Demand Analysis: Determinants- Law of Demand - Elasticity of Demand.
Significance – types – measurement of elasticity of demand - Demand forecasting- factors governing
Demand forecasting- methods of demand forecasting

UNIT - II
THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Short-run and long- run production - Isoquants and Isocosts, MRTS, least cost
Combination of inputs - - laws of returns - Internal and External Economies of scale - **Cost Analysis**: Cost concepts- Time Value of Money - Break-Even Analysis (BEA) – Managerial Significance and limitations of BEA - Determination of Break Even Point (Simple Problems)

UNIT - III
INTRODUCTION TO MARKETS AND FORMS OF BUSINESS ORGANIZATIONS

Market structures: Types of Markets - Perfect and Imperfect Competition - Features, Oligopoly -
Monopolistic competition. Price-Output determination - Pricing Methods and Strategies. Forms of Business Organization – Sole Proprietorship- Partnership – Joint Stock Companies –National Income: Concepts-Inflation: Types – Business Cycle: Phases of business cycle

UNIT - IV
INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - emerging need and importance - Double-Entry Book Keeping-
Journal - Ledger – Trial Balance - Financial Statements - - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Techniques –
Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

UNIT - V

CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Sources of Short term and Long term capital - Estimating Working Capital requirement – Capital budgeting – Features of Capital budgeting proposals – Methods and Evaluation of Capital budgeting – Pay Back Method –Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Course Outcomes:

On successful completion of the course, Students will be able to		**POs related to COs**
CO1	Describe the Characteristics of successful product development in an organization	**PO1,PO2,PO3**
CO2	Evaluate the product planning and product specification of a product	**PO1,PO2,PO3**
CO3	Understand the generation, selection and testing of a product concept	**PO1,PO2,PO3**
CO4	Develop product architecture and design for manufacturing new product	**PO1,PO2,PO3**
CO5	Understand the principles of prototypes, economics and project management	**PO1,PO2,PO3,PO11**

Text Books:

1. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2009.
2. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2009.

Reference Books:

1. PremchandBabu, MadanMohan:Financial Accounting and Analysis,Himalaya, 2009
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International,. 2009.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2009.

CO-PO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2									
CO2	3	2	2									
CO3	3	2	2									
CO4	3	2	2									
CO5	3	2	2								2	
Average	**3**	**2**	**2**								**2**	

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - IV Semester **L T P C**

(20PC0308) DYNAMICS OF MACHINERY **2 1 0 3**

Course Objectives:

- To understand the method of static force analysis and dynamic force analysis of mechanism, undesirable effects of unbalance in rotors and engines.
- To understand the concept of vibratory systems and their analysis and also the principles of governors.

UNIT- I

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

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

BRAKES AND DYNAMOMETERS: Simple block brakes, Band brake, internal expanding brake, braking of vehicle. Dynamometers – absorption and transmission types. General description and methods of operation.

UNIT- II

PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aeroplanes and ships.

TURNING MOMENT DIAGRAMS AND FLY WHEELS: Turning moment diagrams for steam engine, IC Engine and multi cylinder engine. Crank effort - coefficient of Fluctuation of energy, coefficient of Fluctuation of speed – Fly wheels and their design, Fly wheels for Punching machines.

UNIT- III

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

UNIT- IV

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

BALANCING OF RECIPROCATING MASSES: Primary and Secondary balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples – V-engine, multi cylinder in-line and radial engines for primary and secondary balancing.

UNIT- V

VIBRATION: Free and forced vibration of single degree of freedom system, Role of damping, whirling of shafts and critical speeds. Simple problems on free, forced and damped vibrations. Vibration Isolation & Transmissibility. Transverse vibrations of beams with concentrated and distributed loads. Dunkerly‟s method, Raleigh‟s method. Torsional vibrations - two and three rotor systems.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Analyze the effects of friction in clutches, brakes and dynamometers.	PO1, PO2 ,PO3, PO4
CO2	Understand the gyroscopic effects on Aeroplane, ship, four wheel and two wheel vehicles, solving problems on gyroscopic effects and flywheels.	PO1, PO2, PO3, PO4
CO3	Understand and analyze the different types of governors.	PO1, PO2, PO3, PO4
CO4	Analyze the undesirable effects of unbalances resulting from prescribed motions in mechanism.	PO1, PO2, PO3, PO4
CO5	Understand free and forced vibrations and evaluate the critical speed of the shaft.	PO1, PO2, PO3, PO4

Text Books:

1. Theory of Machines, S.S. Rattan, MGH Publishers,3rd Edition,2013.
2. Kinematics and Dynamics of Machinery R.L. Norton, Tata McGraw Hill.

Reference Books:

1. Theory of Machines, Thomas Bevan, Pearson, 3rd Edition,2012.
2. The theory of Machines, Ballaney, Kanna Publishers
3. Theory of Machines and Mechanisms of Shigley et.al. Oxford International Student Edition.

NOTE: End Exam Should be conducted in Drawing Hall

CO-PO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2									
CO2	3	2	2									
CO3	3	2	1	1								
CO4	3	2	2	1								
CO5	2	2	2	1								
Average	**2.8**	**2**	**1.8**	**1**								

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - IV Semester

L	T	P	C
2	1	0	3

(20PC0309) AIR COMPRESSOR & IC ENGINES

Course Objectives:

Comparison of air-standard and actual cycles; Components and working of 2-stroke and 4-stroke engines; Combustion phenomena in spark ignition and compression ignition engines; Performance parameters of an internal combustion engine; Estimating heat losses in an engine;Components and working of reciprocating and rotary compressors.

UNIT-I

Air Compressors - Reciprocating Compressors, effect of Clearance volume in compressors, volumetric Efficiency, single stage and multi stage compressors, effect of inter cooling and pressure drop in multi stage compressors, working principles of Roots , Vane type Compressor, Centrifugal Compressor; Axial Flow Compressors.

UNIT-II

I.C. Engines - Basic engine components, Classification of I.C. Engines, working of two stroke and four stroke engines, comparison of two stroke and four stroke engines, comparison of SI and CI engines, valve and port timing diagrams, application of I.C. engines, fuel-air cycles: Composition of cylinder gases, variable specific heats, dissociation, number of moles, Actual cycle: heat loss, time loss, exhaust blow down factors and loss due to rubbing friction.

UNIT-III

Combustion in S.I. and C.I. Engines - Normal combustion and abnormal combustion in S.I. engines, flame propagation and effect of engine variables, stages of combustion, pre-ignition and knocking, types
of combustion chambers in S.I engines, fuel Requirements and fuel rating. Stages of combustion in C.I. Engines, factors affecting delay period, phenomenon of knock in C.I. Engine, comparison of knock in S.I. and C.I engine s, types of combustion chamber s in C. I. Engines, fuel requirements and fuel rating.

UNIT-IV

Engine Performance Parameters - Brake power, indicated power, friction power, mean effective pressure, engine efficiencies, performance calculations and heat balance.

Measurement of Brake power - Rope brake, Hydraulic, Eddy current and swinging field DC Dynamometers; Measurement of Friction Power: William's line method,

Testing - Morse test, Motoring Test and Retardation Test, air and fuel measurement.

UNIT-V

Non-Conventional Engines - Working principles of CRDI engine, Dual fuel and Multi fuel engines, GDI engine, HCCI engine, Lean burn engines, Stirling Engine, stratified charge engines, VCR engine and Wankel engines.

Course Outcomes:

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate the basic knowledge of an air compressor in developing the analytical models	PO1, PO2, PO3, PO4
CO2	Know the basic knowledge of an engine, identify the types, components of IC engines and explain the functions of each.	PO1, PO2, PO3, PO4
CO3	Demonstrate the basic knowledge and analyze the types and stages of combustion in SI and CI engines.	PO1, PO2, PO3, PO4
CO4	Investigation on IC engines for performance improvement and emission reduction to environment.	PO1, PO2, PO3, PO4, PO7
CO5	pply new combustion techniques to analyze the combustion in IC Engines.	PO1, PO2, PO3, PO4

Text Books:

1. Thermal Engineering,R.K.Rajput, Laxmi Publications, 8th Edition, 2010
2. I.C. Engines, V. Ganesan, TMH, 3rd Edition, 2008.

Reference Books:

1. Thermal Engineering,R.S.Khurmi& J.K. Guptha, S.Chand, 16thEdition, 2008.
2. I.C. Engines, Heywood, McGrawHIll. 1st Edition, 2013.
3. Engineering Fundamentals of IC Engines, Pulkrabek, Pearson, 2ndEdition, 2004.
4. Internal Combustion *Engines,* M.L Mathur&R.P.Sharma, DhanpatRai& Sons, 8th Edition, 2014.

CO-PO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	2	2								
CO2	3	2	2	2								
CO3	3	3	2	2								
CO4	3	3	1	1			2					
CO5	2	2	1	1								
Average	**2.8**	**2.6**	**1.6**	**1.6**			**2**					

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - IV Semester

L	T	P	C
3	0	0	3

(20PC0310) MANUFACTURING TECHNOLOGY

Course Objectives:

To understand the various manufacturing processes and machining related to casting, joining of metals, moulding and advanced processes.

- Metal forming, extrusion, processing of plastic materials and rapid manufacturing processes are highly nonlinear because they involve geometric, material and contact non linearity and hardening, hot and cold working process.

UNIT-I

Casting - Steps involved in making a casting– Types of patterns - Patterns and Pattern making — Materials used for patterns, pattern allowances and their Construction, Principles of Gating, Gating ratio and design of Gating

Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, special casting processes 1) Centrifugal 2) Die, 3) Investment.

Methods of Melting- Crucible melting and cupola operation, steel making processes

UNIT-II

Metal Welding Processes -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 Non-destructive Testing of Welds, Soldering and Brazing.

UNIT-III

Metal forming processes - Introduction, Hot Working and Cold Working, Forging, Extrusion – Direct, Indirect and Tube Extrusion; Rolling – Types of Rolling Mills;
Principles of forging –Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects, Forces in forging of strip, disc and power requirements, applications, Equipment and their selection

UNIT-IV

Sheet Metal Operations - Economical Considerations - Stamping, forming and other cold working processes: Blanking and piercing – Bending and forming – Drawing and its types – Cup drawing and Tube drawing – coining – Hot and cold spinning. Force and power requirement in sheet metal operations, defects in sheet metal products – Equipment, tooling and their

UNIT-V

Plastic Processing - Introduction, Plastics – Properties of Plastics, Additives in Plastics; Types of Plastics- Thermoforming Plastics, Thermosetting Plastics; Injection Moulding, Blow Moulding, Compression Moulding, Transfer Moulding, Extrusion Process, Calendering, Casting of Plastics, Sheet Forming Processes.

Course Outcomes:

On successful completion of the course the student will be able to		**POs related to COs**
CO1	Illustrate principles of foundry and recognize the different types of casting processes for manufacturing components and design the gating and riser system.	PO1, PO3
CO2	Demonstrate various types of joining processes and choose the appropriate one according to the application.	PO1, PO3
CO3	Explain the concept of forging, rolling and drawing operations.	PO1,PO3
CO4	Illustrate the various sheet metal forming processes for a specific application.	PO1, P03
CO5	Acquire the knowledge of metal powder production methods and classify different molding process and select suitable manufacturing process for the typical component with the aim of reducing cost and manpower.	PO1, P03, PO12

Text Books:

1. *Manufacturing Technology*, P.N. Rao, Vol.1, TMH, 4th Edition, 2013
2. *Manufacturing Engineering and Technology*, Kalpakjian, Serope, Pearson Education, 7th Edition, 2014.
3. *Elements of Workshop Technology*, HazraChoudary S.K. and HazraChoudary A.K., Vol I, Media Promoters, 12th Edition, 2007.

Reference Books:

1. *Production Technology*, R.K.Jain, Khanna Publishers, 17th Edition, 2010.
2. *Principles of Metal Castings*, Rosenthal, McGraw-Hill Professional Publishing, 3rd Edition, 2013.
3. *Fundamentals of Modern Manufacturing,Materials,* MikellP.Groover, *Processes and Systems*, John Wiley and Sons, 9th Edition, 2007.

CO-PO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3		2									
CO2	3		2									
CO3	3		2									
CO4	3		1									
CO5	2		2									2
Average	**2.8**		**1.8**									**2**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - IV Semester

L	T	P	C
0	0	3	1.5

(20PC0311) THERMAL ENGINEERING LAB

Course Objectives:

Calculating the performance parameters of 2-stroke and 4- stroke I.C. Engines; Heat balancing of an engine; Practicing the valve and port timing diagrams; Determining frictional power for single and multicylinder engines; Compressor performance. Assembly and disassembly of an automobile models; Determining the Fuel properties.

LIST OF EXPERIMENTS

1. Valve / Port Timing Diagrams of an I.C. Engines
2. Performance Test on a 4 -Stroke Diesel Engines
3. Performance Test on 2-Stroke Petrol engine
4. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Engine
5. Retardation and motoring test on 4- stroke engine
6. Heat Balance of an I.C. Engine.
7. Air/Fuel Ratio and Volumetric Efficiency of an I.C. Engines.
8. Performance Test on Variable Compression Ratio Engines for CI Engines
9. Performance Test on Reciprocating Air – Compressor Unit
10. Study of Boilers
11. Dismantling / Assembly of Engines to identify the parts and their position in an engine.
12. Engine Emission Measurement for SI & CI Engines.

Course Outcomes:

On successful completion of the course, students will be able to:		**POs related to COs**
CO1	Demonstrate the knowledge on Automobile system, engines and air compressor.	PO1
CO2	Identify and analyse various performance parameters of engines and compressors.	PO2
CO3	Develop systems to identify the performance parameters of engines and compressors and Dismantle and assemble various parts of transmission systems in automobile system.	PO3
CO4	Conduct investigation on performance of various engines, air compressors and provide valid conclusion about its efficiency, heat balance, engine friction, speed and retardation.	PO4
CO5	Follow ethical principle in conduction of experiments.	PO8
CO6	Perform individually and also in a team to complete the process	PO9
CO7	Communicate in verbally or in written form, their understanding about the experiments.	PO10

CO8	Continue updating their knowledge on various testing methods evolve in future for the identification of performance parameters of engines and compressors.	PO12

CO-PO Mapping

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	2									
CO2	3	3	3									
CO3	2	3										
CO4	3	2		3								
CO5	3	3										
CO6								3				
CO7									2			
CO8										3		
average	**2.8**	**2.8**	**2.5**	**3**				**3**	**2**	**3**		

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - IV Semester

L	T	P	C
0	0	3	1.5

(20PC0312) MANUFACTURING TECHNOLOGY LAB

Course Objectives:

• To understand the various manufacturing processes and machining related to casting, forming, joining of metals, moulding and extrusion processes of plastic materials.

LIST OF EXPERIMENTS

I. METAL CASTING LAB:

a. Pattern Design and making - for one casting drawing.
b. Sand properties testing - Exercise -for strengths, and permeability – 1
c. Moulding: Melting and Casting - 1 Exercise

II. WELDING LAB:

a. Arc Welding: Lap & Butt Joint - 2 Exercises
b. Spot Welding - 1 Exercise
c. TIG Welding - 1 Exercise
d. Plasma welding and Brazing - 2 Exercises (Water Plasma Device)

III. MECHANICAL PRESS WORKING:

a. Blanking & Piercing operation and study of simple, compound and progressive press tool.
b. Hydraulic Press: Deep drawing and extrusion operation.
c. Bending and other operations

IV. PROCESSING OF PLASTICS:

a. Injection Moulding
b. Blow Moulding

Course Outcomes:

On successful completion of the course, students will be able to		POs related to COs
CO1	Gain the knowledge on the principles of foundry, the metal joining, forming processes	PO1
CO2	Analyze and choose the appropriate metal joining and forming processes.	PO2
CO3	Design and manufacturing components by adopting the concept of forging ,rolling and drawing operations.	PO3
CO4	Develop the plastic components using modern machine tools.	P05
CO5	Follow the ethical principles while doing the experiments	PO8
CO6	Do the experiments effectively as an individual and as a team member in a group.	PO9

CO7	Communicate verbally and in written form pertaining to results of the experiments	PO10
CO8	Continue updating their skill related to manufacturing process in future.	PO12

CO-PO Mapping

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3											
CO2		3										
CO3			3									
CO4					2							
CO5								3				
CO6									2			
CO7										3		
CO8												2
average	**3**	**3**	**3**		**2**			**3**	**2**	**3**		**2**

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - IV Semester

L	T	P	C
0	0	3	1.5

(20ES0304) MACHINE DRAWING LAB

Course Objectives:
To make the students to understand the concepts of I.S. conventions, methods of dimensioning, draw the surface developments and draw assemblies of machine parts and to draw their sectional views.

UNIT-I
Machine Drawing Conventions - Need for drawing conventions- introduction to IS conventions Conventional representation of material, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs. Parts not usually sectioned.
Perspective Projections - Perspective View of simple Solids, Visual Ray Method, Vanishing point method.
Ex. 01: Material and Machine Elements Representation
Ex. 02: Perspective Projections

UNIT-II
Drawing of Machine Elements and simple parts - Selection of Views, additional views for the following machine elements and parts with drawing proportions: Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws, Keys, cottered joints and knuckle joint, Rivetted joints for plates, flanged & protected flanged joint. Shaft coupling, spigot and socket pipe joint. Journal, and foot step bearings.
Ex. 03: Machine Parts Representation
Ex. 04: Couplings

UNIT-III
Drawings of assembled views for the part drawings of the following. Engine parts - Stuffing boxes, Eccentrics, Petrol Engine-connecting rod, Screw jack, Single tool post.
Conversion of assemble drawing to Part Drawing:
Ex. 05: Assembly Drawing (Stuffing box)
Ex. 06: Assembly Drawing (Eccentric)
Ex. 07: Assembly Drawing (Connecting rod)
Ex. 08: Assembly Drawing (Screw jack)
Ex. 09: Assembly Drawing (Single tool post)
Ex. 10: Part Drawing
Note: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

Course Outcomes:

On successful completion of the course, students will be able to:		POs related to COs
CO1	Understand the importance of engineering and working drawings with dimensions and bill of material during design and development.	PO1, PO2, PO3, PO4
CO2	Demonstrate knowledge and understanding the selection of section planes, drawing of sections and auxiliary sectional views	PO1, PO2, PO3, PO4
CO3	Design and Develop the simple mechanical, coupling parts	PO1, PO2, PO3, PO4
CO4	Develop the skill of assembling the reciprocating engine parts	PO1, PO2, PO3, PO4
CO5	Demonstrate knowledge on the assembly the machine parts	PO1, PO2, PO3, PO4

Text Books:

1. Machine Drawing – N Siddeswar, P. Kannaiah, VVS Sastry, McGraw Hill,2015
2. Machine Drawing- K.L. Narayana, P.Kannaiah&K.Venkata Reddy, New Age Publishers, 4th Edition, 2012.

Reference Books:

1. Machine Drawing- P.S. Gill, S.K. Kataria& Sons, 17th Edition, 2012.
2. Machine Drawing- Dhawan, S.Chand Publications, 1st Revised Edition,1998.
3. Machine Drawing – Ajeet Singh, McGraw Hill, 2012
4. Machine Drawing- Luzzader, PHI Publishers,11th Edition.
5. Textbook of Machine Drawing-K.C.John,2009, PHI learning, 1st Edition.

NOTE:

- The End exam will be for 4 hrs in the following format
- All answers should be on the drawing sheet only. Answers on the drawing sheet only will valued.

CO-PO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	2	2								
CO2	3	2	2	2								
CO3	3	3	2	2								
CO4	3	3	1	1								
CO5	2	2	1	1								
Average	**2.8**	**2.6**	**1.6**	**1.6**								

SRI VENKATESA PERUMAL
COLLEGE OF ENGINEERING & TECHNOLOGY
| AUTONOMOUS | ACCREDITED BY NAAC |
RVS Nagar, K.N Road, Puttur, Chittoor dist, AP. I www.svpcet.org

B.Tech - IV Semester **L T P C**

(20SO0302) COMPUTER AIDED ENGINEERING THROUGH ANSYS **0 0 4 2**

LIST OF EXPERIMENTS

I. Introduction to Analysis Software Package

II. Structural analysis: (Any Six exercises)

1. Analysis of a rectangular plate with a hole.
2. Analysis of a truss member under loading.
3. Analysis of a bracket plate with axial loading
4. Analysis of a bracket plate with eccentric loading
5. Static Analysis of Prismatic bar
6. Static Analysis of a Corner Bracket
7. Static Analysis of beam
8. Analysis of Thermally Loaded support Structure
9. Analysis of Hinged support member
10. Analysis of Tapered plate under transverse load

III. Thermal analysis:(Any two exercises)

1. Analysis of a square plate considering conduction.
2. Analysis of a square plate considering conduction and convection.
3. Analysis of a compound bodies considering conduction and convection.

IV. Computational Fluid Dynamics (Any four exercises)

1. Determine the flow of incompressible gas through an S-bend for laminar flow.
2. Determine the flow of incompressible gas through an S-bend for turbulent flow.
3. Determine that of incompressible water flowing over a cylinder.
4. Determine air flow over a simple geometry (aerofoil) in a wind tunnel (2-D).
5. Determine heat transfer from the heated fin within a rectangular enclose containing air.
6. Determine how to solve a natural convection problem
7. Determine liquid enters through two inlets with different temperatures (multiphase flow) and leaves one outlet.

Software can be used: ANSYS, ALG Nastran, Star-CCM+, Fluent, FIRE. CFX.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Explain the practical experience in FEA software systems	**PO1**
CO2	Determine the deflection and stresses in 2D and 3D trusses and beams	**PO2**
CO3	Determine the thermo-mechanical stresses of a 3D component	**PO3**
CO4	Estimate the natural frequencies and mode shapes, harmonic response of 2D beam	PO4
CO5	write Part programming exercise on turning, milling, drilling	**PO5**
CO6	Follow the ethical principles while doing the experiments	**PO8**
CO7	Do the experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form pertaining to results of the experiments	**PO10**

CO-PO Mapping

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3											
CO2		3										
CO3			3									
CO4				3								
CO5					3							
CO6								3				
CO7									2			
CO8										2		
Average	**3**	**3**		**3**	**3**			**3**	**2**	**2**		