

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

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

Gudur, Nellore Dist - 524101, A.P (India)



OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM

BACHELOR OF TECHNOLOGY

ACADEMIC REGULATIONS UNDER AUTONOMOUS STATUS

DEPARTMENT OF MECHANICAL ENGINEERING

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**

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One best book is equal to hundred good friends, but one good friend is equal to a library.

All of us do not have equal talent, but all of us have an equal opportunity to develop our talents

“This is the way to success”

Dr.A.P.J.Abdul Kalam

VISION AND MISSION OF THE INSTITUTE

VISION

To make Audisankara 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.

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 AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY, Gudur, Nellore 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 “ASCET 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.

FOREWORD

The autonomy is conferred to AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY, (ASCET) Gudur, Nellore 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.

AUDISANKARA 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



AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
Gudur, Nellore 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 AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY under Autonomous status and herein after referred to as ASCET.

1.0 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.

2.0 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.

2.1 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.

2.2 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 three 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.

4.0 MEDIUM OF INSTRUCTION

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

5.0 BRANCHES OF STUDY

- Civil Engineering (CE)
- Electrical & Electronics Engineering (EEE)
- Mechanical Engineering (ME)
- Electronics & Communication Engineering (ECE)
- Computer Science & Engineering (CSE)
- Computer Science and Engineering (Artificial Intelligence) (CSE-AI)
- Computer Science and Engineering (Data Science) (CSE-DS)

6.0 TYPES OF COURSES

6.1 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.

6.2 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.

6.3 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.

6.4 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.

6.5 Mandatory Course:

For mandatory courses like Induction Training, Environmental Sciences, Indian Constitution, Essence of Indian Traditional Knowledge, a student has to secure 40 marks out of 100 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.

6.6 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 behaviour. 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		
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		
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 been debarred from institute for a specified period on disciplinary or any other ground.

9.0 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
6	Computer Science and Engineering (Artificial Intelligence)	XX
7	Computer Science and Engineering (Data Science)	XX

10.0 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 Table3.

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	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) + Environmental Science(MC)	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 –18 (2 Basic Science Lab + 1 Humanities and Social Sciences 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		Scheme of Examination
1	Theory	60	Semester end examination of 3 hours duration (External Evaluation)		Shall be evaluated as given in 11.13
		40	Midterm Examination		Shall be evaluated as given in 11.3
2	Laboratory	60	Semester end Lab Examination for 3 hours duration (External Evaluation)		Shall be evaluated as given in 11.14
		40	15	Day to Day Evaluation for performance in Laboratory experiments and Record	Shall be evaluated as given in 11.4 & 11.5
			25	Practical Test (Internal Evaluation)	
3	Summer Internship	100	Internal Evaluation		The evaluation shall be done by the Department Evaluation Committee (DEC) as given in 11.8 & 11.9
4	Skill Oriented Courses / Skill Advanced Courses / Soft Skill Courses	40	Internal Evaluation		Shall be evaluated as given in 11.7
		60	Semester End Evaluation		
5	MOOC	100	Semester End Evaluation		Shall be evaluated as given in 11.17
6	Engineering Drawing	40	30	Mid Term Examination	Continuous evaluation shall be done by the Project Evaluation Committee (PEC) as given in 11.6 & 11.15
			10	Day to Day Evaluation	
		60	Semester End Evaluation		
7	Comprehensive Viva Voce	100	Internal Evaluation		Shall be evaluated as given in 11.10
8	Project Work, Seminar and Full Semester Internship (6 Months)	60	Internal Evaluation		Continuous evaluation shall be done by the Project Evaluation Committee (PEC) as given in 11.11 & 11.12
		140	Semester End Evaluation		Project Work Viva-Voce Examination shall be conducted by a Committee at the end of the semester as given in 11.16
9	Mandatory Course	-	-		Shall be evaluated as given in 11.18

11.1 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.

11.2 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.

11.3 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
- 5 marks for Quiz
- 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 **30 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 = $24 \times 0.8 + 23 \times 0.2 = 23.8$, rounded to 24 Marks.

Note: The marks of any fraction shall be rounded off to the next higher mark.

5 marks are allotted for Quiz - While the first Quiz examination shall be conducted on the 50% of the syllabus (Unit-I, Unit-II & 50% of Unit-III), the second Quiz examination shall be conducted on the remaining 50% of the syllabus (50% of Unit III, Unit-IV & Unit-V).

Two Quiz examinations **5 marks** for each theory subject with the duration of 50 / 60 minutes for all theory courses in a semester. There shall be online / offline 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. 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., Marks shall be awarded considering the average of two quiz examinations for every subject.

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 (Section-I & Section-II)
- Section-I contains three two mark questions. One question from each unit and a student has to be answered three questions ($3 \times 2 = 6$ Marks)
- Section-II contains six questions are to be designed taking two questions from each unit (Unit wise – Either or type) of the three units ($3 \times 8 = 24$ 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.

11.4 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 15 marks and internal practical examination shall be evaluated for 25 marks conducted by the laboratory teacher concerned.

11.5 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 50% aggregate marks (50 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 50% marks (30 marks) in the semester external examination.

11.6 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.

11.7 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, forecasting, 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.

11.8 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. Flourey 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.

11.9 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.

11.10 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.

11.11 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.

11.12 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 50% aggregate marks (50 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 50% marks (30 marks) in the semester external examination.

11.15 External Evaluation for Design/ Drawing Courses:

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:

- 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 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.

11.16 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
- Seminar on Internship - 50 Marks
- Project Viva Voce - 60 Marks

11.17 Massive Open Online Courses (MOOCs):

Meeting with the global requirements, to inculcate the habit of self learning and in compliance 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 the same.
- 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.

11.18 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 50 Marks. The student shall be declared to have passed the mandatory courses only when He/She secures **40% 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.

12.0 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.

- 12.1** 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)	-

- 12.2** 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.
- 12.3** 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.
- 12.4** 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.
- 12.5** 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
- 12.6** A student passes the subject/ course only when $GP \geq 5$ (‘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.
- 12.7 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.,

$$SGPA = \frac{\sum (C_i \times G_i)}{\sum C_i}$$

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.,

$$CGPA = \frac{\sum (C_i \times S_i)}{\sum C_i}$$

where “S_i” is the SGPA of the ith 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, $CGPA = \frac{(19 \times 8.13) + (19.5 \times 6.9) + (21.5 \times 7.3) + (21.5 \times 6.8) + (22 \times 8.2) + (21.5 \times 7.4) + (21 \times 7.2) + (14 \times 7.8)}{160} = 7.45$

13.0 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.

13.1 In order to extend the benefit to the students with one/two backlogs after either VI semester or VIII semester, GRAFTING option is provided to the students enabling their placements and fulfilling graduation requirements. Following are the guidelines for the Grafting:

- Grafting will be done among the courses within the semester shall draw a maximum of 7 marks from the any one of the cleared courses in the semester and will be grafted to the failed course in the same semester.
- Students shall be given a choice of grafting only once in the 4 years program, either after VI semester (Option #1) or after VIII semester (Option #2).
- Option#1: Applicable to students who have maximum of TWO theory courses in V and / or VI semesters.

Option#2: Applicable to students who have maximum of TWO theory courses in VII and / or VIII semesters.

- Eligibility for grafting:
 - Prior to the conduct of the supplementary examination after the declaration of VI or VIII semester results.
 - S/he must appear in all regular or supplementary examinations as per the provisions laid down in regulations for the courses s/he appeals for grafting. iii. The marks obtained by her/him in latest attempt shall be taken into account for grafting of marks in the failed course(s).

13.2 Student, who clears all the courses upto VII semester, shall have a chance to appear for Quick Supplementary Examination to clear the failed courses of VIII semester.

14.0 CONDUCT OF SEMESTER END EXAMINATIONS AND EVALUATION

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

14.2 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.

14.3 The answer papers of semester end examination should be evaluated by the first examiner immediately after the completion of exam and the award sheet should be submitted to CoE in a sealed cover before the same papers are kept for second evaluation by external examiner.

14.4 In case of difference is more than 15% of marks, the answer paper shall be re-evaluated by a third examiner appointed by the Examination Committee and the marks awarded by third examiner is compared with first and second evaluation marks and higher marks of minimum difference pair will be considered as final marks.

14.5 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.

14.6 Examinations Control Committee shall consolidate the marks awarded by both the examiners 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.

16.0 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.

17.0 ATTENDANCE REQUIREMENTS AND DETENTION POLICY

17.1 A candidate shall put in a minimum required attendance of 75 % in that semester.

Otherwise, s/he shall be declared detained and has to repeat semester.

17.2 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.

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

17.4 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.

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

18.0 PROMOTION POLICIES

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

18.1 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

18.2 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

18.3 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

18.4 A student shall register and put up 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.

18.5 A lateral entry student shall register and put up minimum attendance in all 121.5 credits and earn all the 121.5 credits. Marks obtained in all 121.5 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.

19.0 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 4th semester provided that the student must have acquired 7.5 CGPA (Cumulative Grade point average) up to 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 7.5 CGPA up to 3rd semester or failed in any course, his registration for Minors program shall stand cancelled. An SGPA of 7.5 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, Robotics, 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. None of the courses done under the dropped Minor 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.

20.0 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 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 7.5 CGPA upto 3rd semester or failed in any course, his registration for Honors program shall stand cancelled.
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 MOOC/NPTEL. The concerned BoS shall list the MOOC/NPTEL courses to be pursued by the student. Attendance will not be monitored for this MOOC course. Student has to acquire a certificate of MOOC/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 any point 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.

21.0 GRADUATION REQUIREMENTS

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

- 21.1** Student shall register and acquire minimum attendance in all courses and secure 160 credits for regular program and 121 credits for lateral entry program.
- 21.2** 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.
- 21.3** 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.

23.0 TEMPORARY BREAK OF STUDY FROM THE PROGRAMME

- 23.1** 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, s/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.
- 23.2** 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.
- 23.3** 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.

24.0 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.

25.0 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:

- 25.1** The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.
- 25.2** A student shall not be permitted to study any semester more than three times during the entire Program of study.
- 25.3** 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.

28.0 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 institute prizes and medals to meritorious students and award them annually at the Graduation Day. This will greatly encourage the students to strive for excellence in their academic work.

29.0 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 Audisankara 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.

31.0 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 be final.

31.1 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.

31.2 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.

31.3 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.

31.4 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 Audisankara 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 Audisankara 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 Audisankara College of Engineering & Technology as an Autonomous College qualify for University Medals and Prizes for academic excellence?

No. Audisankara 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 Audisankara 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 Audisankara College of Engineering & Technology.

9 Can Audisankara College of Engineering & Technology give a provisional degree certificate?

Since the examinations are conducted by Audisankara College of Engineering & Technology and the results are also declared Audisankara 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 employability.

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.

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

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.

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

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 SGPA's 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 or Re-Examination System?

No, there will double valuation of answer scripts. There will be a makeup Examination after a reasonable preparation time after the End Semester Examination for specific cases mentioned in the Rules and Regulations. In addition to this, there shall be a 'summer term' (compressed term) followed by the End Semester Exam, to save the precious time of students.

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 year performance?

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 Audisankara 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
	<i>If the candidate:</i>	
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 the academic 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.	



AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

Gudur, Nellore Dist, A.P (India)

COURSE STRUCTURE

MECHANICAL ENGINEERING

B.TECH – I SEMESTER

S.No	Course Code	Course Title	Category	Contact Period per Week				C	Scheme of Examination Max. Marks		
				L	T	P	Total		IM	EM	T
1	20BS101	Calculus and Numerical Techniques	BS	3	-	-	3	3	40	60	100
2	20BS102	Engineering Physics	BS	3	-	-	3	3	40	60	100
3	20EE102	Basic Electrical and Electronics Engineering	ES	3	-	-	3	3	40	60	100
4	20CS101	Problem Solving and C Programming	ES	3	-	-	3	3	40	60	100
5	20ME101	Engineering Graphics	ES	1	-	4	5	3	40	60	100
6	20BS105	Physics Lab	BS	-	-	3	3	1.5	40	60	100
7	20CS102	C Programming Lab	ES	-	-	3	3	1.5	40	60	100
8	20ME104	Engineering Workshop	ES	-	-	3	3	1.5	40	60	100
9	20MC101	Induction Program	*MC	-	-	-	-	-	-	-	-
10	20MC102	NCC/NSS(22 hours)	*MC	-	-	-	-	-	-	-	-
Total				13	-	12	25	19	320	480	800

* Mandatory Induction Program	03 Weeks Duration
Induction program offered before commencement of the I semester course work	Physical Activity
	Creative Arts
	Universal Human Values
	Literary
	Proficiency Modules
	Lectures by Eminent People
	Visits to local Areas
Familiarization to Department / Branch and Innovations	

B.Tech – II Semester

S.No	Course Code	Course Title	Category	Contact Period per Week				C	Scheme of Examination Max. Marks		
				L	T	P	Total		CIA	SEE	Total
1	20BS201	Integral Transforms and Matrix Theory	BS	3	-	-	3	3	40	60	100
2	20BS204	Engineering Chemistry	BS	3	-	-	3	3	40	60	100
3	20HS101	English for Engineers	HS	3	-	-	3	3	40	60	100
4	20ME201	Engineering Mechanics	ES	3	-	-	3	3	40	60	100
5	20CS201	Data Structures	ES	3	-	-	3	3	40	60	100
6	20BS106	Chemistry Lab	BS	-	-	3	3	1.5	40	60	100
7	20HS107	English Lab	HS	-	-	2	2	1	40	60	100
8	20CS202	Data Structures Lab	ES	-	-	3	3	1.5	40	60	100
9	20MC102	NCC/NSS(23 hours)	*MC	-	-	-	-	-	-	-	-
Total				13	-	13	26	19.5	320	480	800

B.Tech – III SEMESTER

S.No	Course Code	Course Title	Category	Contact Period per Week				C	Scheme of Examination Max. Marks		
				L	T	P	Total		CIA	SEE	Total
1	20BS302	Probability, Statistics and Numerical Methods	BS	3	-	-	3	3	40	60	100
2	20ME301	Material Science and Metallurgy	PC	3	-	-	3	3	40	60	100
3	20ME302	Mechanics of Solids	PC	3	-	-	3	3	40	60	100
4	20ME303	Fluid Mechanics and Hydraulic Machinery	PC	3	-	-	3	3	40	60	100
5	20ME304	Engineering Thermodynamics	PC	3	-	-	3	3	40	60	100
6	20ME305	Strength of Materials Lab	PC	-	-	3	3	1.5	40	60	100
7	20ME306	Fluid Mechanics and Hydraulic Machinery Lab	PC	-	-	3	3	1.5	40	60	100
8	20ME307	Material Science and Metallurgy Lab	PC	-	-	3	3	1.5	40	60	100
9	20ME308	Auto CAD	SO	1	-	2	3	2	40	60	100
10	20MC301	Constitution of India	MC	2	-	-	2	-	-	-	-
Total				18	-	11	29	21.5	360	540	900

B.Tech – IV SEMESTER

S.No	Course Code	Course Title	Category	Contact Period per Week				C	Scheme of Examination Max. Marks		
				L	T	P	Total		IM	EM	T
1	20ME401	Manufacturing Technology	PC	3	-	-	3	3	40	60	100
2	20BS401	Industrial Engineering and Management	BS	3	-	-	3	3	40	60	100
3	20ME402	Thermal Engineering	PC	3	-	-	3	3	40	60	100
4	20ME403	Kinematics of Machinery	PC	3	-	-	3	3	40	60	100
5	20HS401	Economics for Engineers	HS	3	-	-	3	3	40	60	100
6	20ME404	Manufacturing Technology Lab	PC	-	-	3	3	1.5	40	60	100
7	20ME405	Thermal Engineering Lab	PC	-	-	3	3	1.5	40	60	100
8	20ME406	Virtual Lab	PC	-	-	3	3	1.5	40	60	100
9	20ME407	ANSYS	SO	1	-	2	3	2	40	60	100
Total				16	-	11	27	21.5	360	540	900
10		Honors / Minor Courses	PC	4	-	-	4	4	40	60	100

B.Tech – V SEMESTER

S.No	Course Code	Course Title	Category	Contact Period per Week				C	Scheme of Examination Max. Marks		
				L	T	P	Total		IM	EM	T
1	20ME501	Design of Machine Elements	PC	3	-	-	3	3	40	60	100
2	20ME502	Dynamics of Machinery	PC	3	-	-	3	3	40	60	100
3	20ME503	Metrology and Measurements	PC	3	-	-	3	3	40	60	100
4	Open Elective /Job Oriented Elective-I		OE / JE	2	-	2	4	3	40	60	100
Professional Elective - I											
5	20ME504	Renewable Energy Sources	PE	3	-	-	3	3	40	60	100
	20ME505	Composite Materials									
	20ME506	Applied Hydraulics & Pneumatics									
	20ME507	Tool design									
6	20ME508	Dynamics of Machinery Lab	PC	-	-	3	3	1.5	40	60	100
7	20ME509	Metrology and Measurements Lab	PC	-	-	3	3	1.5	40	60	100
8	20ME510	CATIA	SO	1	-	2	3	2	40	60	100
9	20MC501	Environmental Science	MC	2	-	-	2	-	-	-	-
10	20ME511	Summer Internship 2 Months after Second Year (To be Evaluated during V Semester)	SI	-	-	-	-	2	100	-	100
Total				17	-	10	27	22	420	480	900
11		Honors / Minor Courses	PC	4	-	-	4	4	40	60	100

B.Tech – VI SEMESTER

S.No	Course Code	Course Title	Category	Contact Period per Week				C	Scheme of Examination Max. Marks		
				L	T	P	Total		IM	EM	T
1	20ME601	Heat and Mass Transfer	PC	3	-	-	3	3	40	60	100
2	20ME602	CAD/CAM	PC	3	-	-	3	3	40	60	100
3	20ME603	Automobile Engineering	PC	3	-	-	3	3	40	60	100
Professional Elective - II											
4	20ME604	Advanced Metal Forming theory and Practice	PE	3	-	-	3	3	40	60	100
	20ME605	Operations Research									
	20ME606	Computational Fluid Dynamics									
	20ME607	Process Planning and Cost Estimation									
5	Open Elective /Job Oriented Elective-II		OE / JE	2	-	2	4	3	40	60	100
6	20ME608	Heat Transfer Lab	PC	-	-	3	3	1.5	40	60	100
7	20ME609	CAD/CAM Lab	PC	-	-	3	3	1.5	40	60	100
8	20ME610	Automobile Engineering Lab	PC	-	-	3	3	1.5	40	60	100
9	20ME611	MAT LAB Tools	SA	1	-	2	3	2	40	60	100
10	20MC601	Social Values and Professional Ethics	MC	2	-	-	2	-	-	-	-
Total				17	-	13	30	21.5	360	540	900

B.Tech – VII SEMESTER

S.No	Course Code	Course Title	Category	Contact Period per Week				C	Scheme of Examination Max. Marks		
				L	T	P	Total		IM	EM	T
1	Professional Elective - III										
	20ME701	Instrumentation and Control Systems	PE	3	-	-	3	3	40	60	100
	20ME702	Additive Manufacturing									
	20ME703	Refrigeration and air conditioning									
	20ME704	Quality Control and Reliability Engineering									
2	Professional Elective - IV										
	20ME705	Finite Element Methods	PE	3	-	-	3	3	40	60	100
	20ME706	Power Plant Engineering									
	20ME707	Engineering Failure Analysis									
	20ME708	Design and Analysis of Experiments									
3	Professional Elective - V										
	20ME709	Non Destructive Testing and Evaluation	PE	3	-	-	3	3	40	60	100
	20ME710	Gas dynamics and Jet propulsion									
	20ME711	Nano Technology									
	20ME712	Cogeneration and Waste Heat Recovery									
4	Open Elective /Job Oriented Elective-III		OE/ JE	2	-	2	4	3	40	60	100
5	Open Elective /Job Oriented Elective-IV		OE / JE	2	-	2	4	3	40	60	100
6	20ME713	Instrumentation and Control Systems Lab	PC	-	-	3	3	1.5	40	60	100
7	20ME714	Virtual Lab	PC	-	-	3	3	1.5	40	60	100
8	20SS701	Advanced English Communication Skills	SS	1	-	2	3	2	40	60	100
9	20ME714	Comprehensive Viva Voce	CV	-	-	-	-	1	100	-	100
Total				17	-	6	23	21	380	420	800
10		Honors / Minor Courses	PC	4	-	-	4	4	40	60	100

B.Tech – VIII SEMESTER

S.No	Course Code	Course Title	Category	Contact Period per Week				C	Scheme of Examination Max. Marks		
				L	T	P	Total		CIA	SEE	Total
				1	20ME801	Project Work, Seminar and Internship in Industry	Major Project		-	-	-
Total				-	-	-	-	14	60	140	200

Note: Internship in Industry – 6 Months

SKILL ORIENTED COURSES

S.No	Code	Course
1	20ME308	Auto CAD
2	20ME407	ANSYS
3	20ME510	CATIA
4	20ME614	MAT LAB Tools
5	20SS701	Advanced English Communication Skills

OPEN ELECTIVE / JOB ORIENTED ELECTIVE (OE/ JE)

S.No	Code	Course
Open Elective / Job Oriented Elective-I		
1	20EE501	Electrical Drives and Controls
2	20ME511	Fundamentals of Mechatronics
3	20CS501	Artificial Intelligence
4	20EC501	Fundamentals of Embedded Systems
Open Elective / Job Oriented Elective-II		
1	20CS601	IOT and Applications
2	20ME612	Micro- Electromechanical Systems [MEMS]
3	20CS505	OOPS Through Java
4	20CS603	Database Management Systems
Open Elective / Job Oriented Elective-III		
1	20CS701	Web Page Design
2	20ME708	Electric Automotive Vehicles
3	20EE701	Neural Networks and Fuzzy Logic
4	20CS702	Soft Computing Techniques
Open Elective / Job Oriented Elective-IV		
1	20CS703	Cloud Computing
2	20ME712	Advanced Computer Graphics and Solid Modeling
3	20ME713	Advanced Welding Technologies
4	20CS704	Machine Learning

DEPARTMENT OF MECHANICAL ENGINEERING
SUBJECTS FOR OBTAINING HONORS DEGREE

S.No	Course Code	Course Title	Category	Contact Period per Week				C	Scheme of Examination Max. Marks		
				L	T	P	Total		IM	EM	T
POOL-1											
1	20ME901	Automobile vehicle Design	PC	4	-	-	4	4	40	60	100
2	20ME902	Alternative Energy Sources for Automobiles	PS	4	-	-	4	4	40	60	100
3	20ME903	Automotive vehicle Safety analysis	PS	4	-	-	4	4	40	60	100
4	20ME904	Economic Analysis of Automobile vehicles	PS	4	-	-	4	4	40	60	100
5	20ME905	Vehicle stability and design considerations	PS	4	-	-	4	4	40	60	100
POOL-2											
6	20ME906	Theory and design of Plates and Vessels	PS	4	-	-	4	4	40	60	100
7	20ME907	Reverse Engineering	PS	4	-	-	4	4	40	60	100
8	20ME908	Engineering System Analysis & Design	PS	4	-	-	4	4	40	60	100
9	20ME909	Concurrent Engineering	PS	4	-	-	4	4	40	60	100
10	20ME910	Micro electro mechanical systems	PS	4	-	-	4	4	40	60	100
POOL-3											
11	20ME911	Production & Operation Management	PS	4	-	-	4	4	40	60	100
12	20ME912	Flexible Manufacturing Systems	PS	4	-	-	4	4	40	60	100
13	20ME913	Engineering System Modeling and Simulation	PS	4	-	-	4	4	40	60	100
14	20ME914	Solid waste management and Pollution Control	PS	4	-	-	4	4	40	60	100

15	20ME915	Automatic machining algorithms	PS	4	-	-	4	4	40	60	100
POOL-4											
16	20ME916	Industrial Automation and Controls	PS	4	-	-	4	4	40	60	100
17	20ME917	Supply Chain Management	PS	4	-	-	4	4	40	60	100
18	20ME918	Engineering Risk–Benefit Analysis	PS	4	-	-	4	4	40	60	100
19	20ME919	Planning for Sustainable Development	PS	4	-	-	4	4	40	60	100
20	20ME920	Design of Thermal Systems	PS	4	-	-	4	4	40	60	100

COMPULSORY MOOC/NPTEL COURSES FOR 04 CREDITS (02 COURSES @ 2 CREDITS EACH)

MINOR DEGREE IN COMPUTER SCIENCE & ENGINEERING

(Any 4 subjects) For the Branches Other than Computer Science & Engineering

S.No	Course Code	Subject	L-T-P	Credits
1	20ME001	Basic Engineering Thermodynamics	3-1-0	4
2	20ME002	Material Science and Metallurgy	3-1-0	4
3	20ME003	Manufacturing Technologies	3-1-0	4
4	20ME004	Fundamentals of Automobile Engineering	3-1-0	4
5	20ME005	Production Planning and control	3-1-0	4
6	20ME006	Energy conversion Systems	3-1-0	4

COMPULSORY MOOC/NPTEL COURSES FOR 04 CREDITS (02 COURSES@ 2 CREDITS EACH)

BS	-	Basic Science Course
HS	-	Humanities and Social Science
ES	-	Engineering Science Course
PC	-	Professional Core Course
SO	-	Skill Oriented Course
PE	-	Professional Elective Course
OE/JE	-	Open Elective Course / Job Oriented Elective
SA/SS	-	Skill Advanced Course / Soft Skill Course
MC	-	Mandatory Course
PROJ	-	Major Project, Seminar and Internship in Industry

CALCULUS AND NUMERICAL TECHNIQUES

B.Tech I Semester: Common to CIV,EEE,ME,ECE,CSE,AI & DS								
Course code	Category	Hours/week			Credits	Maximum Marks		
20BS101	BS	L	T	P	C	CIA	SEE	TOTAL
		2	1	0	3	40	60	100
Contact Classes:40		Tutorial Classes: 10		Practical Classes: Nil		Total Classes:50		
OBJECTIVES:								
The course should enable the students to:								
1. Find maxima and minima of function of two and three variables.								
2. Solve the methods of differential equations of first and higher order.								
3. Learn the concept of multiple integrals and their applications								
4. Know the basic properties of vector valued functions and their applications to line, surface and volume integrals								
5. Understand the process of solving algebraic ,Transcendental and system of linear equations								
UNIT-I	Function of Several Variables						Classes:10	
Introduction-Functions of several variables - partial differentiation; total differentiation; Jacobians ; Taylor's and Maclaurin's theorems(without Proof) for the function of two and three variables; maxima and minima of functions of several variables (2 and 3 variables) - Lagrange's method of multipliers.								
UNIT-II	Ordinary Differential Equations						Classes:10	
Exact-Integrating factors, Linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay. Second and higher order linear differential equations with constant coefficients: Non-homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax} v(x)$ and $xv(x)$; Method of variation of parameters.								
UNIT-III	Multiple Integrals						Classes:10	
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-IV	Vector Calculus						Classes:10	
Introduction- Differentiation of vector point function, Scalar and Vector field, Gradient of a scalar field; Divergence and Curl of a vector field; Directional derivative and scalar potential. Vector integration: Line and Surface integrals; Green's theorem in a plane, Stoke's,Gauss Divergence theorems (without proof).								
UNIT-V	Solutions of Algebraic, Transcendental and Systems of Linear Equations						Classes:10	
Numerical solution of algebraic and transcendental equations by Bisection method, Regula-Falsi method, Newton-Rapson's method, System of linear equations - Gauss elimination – LU decomposition, Gauss – Seidel Iteration.								
Text Books:								
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.								

2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill.

Reference Books:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
2. T.K.V. Iyengar, B. Krishna Gandhi and Others, Engineering Mathematics (Vol – I & II) – S. Chand & Company
3. Erwin Kreyszig, Advanced Engineering Mathematics-John Wiley & Sons..
4. S.S.Sastry, Introductory methods of Numerical analysis - PHI, Fourth Edition

Web References:

1. www.mathplanet.com
2. www.mathworld.com

E-Text Books:

1. W W L Chen-“**Multivariable and Vector Analysis**”.
2. Jeff Knisley- “Multivariable calculus”.

Outcomes:

At the end the student will be able to

1. Determine the maxima and minima of several variable function.
2. Solve the ordinary linear differential equations with constant coefficients
3. Acquire the knowledge of multiple integrals in various coordinate systems
4. Convert line integrals into surface integrals and surface integrals into volume integrals
5. Gain the knowledge on the process of solving algebraic , Transcendental and system of linear equations

ENGINEERING PHYSICS

B.Tech I Semester: Common to CE & ME								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
20BS102	BS	3	0	0	3	40	60	100
Contact Classes: 50		Tutorial Classes: 0		Practical Classes: 0		Total Classes:50		
Objectives:								
The course should enable the students to:								
1. Demonstrate skills and scientific inquiry in interference, diffraction.								
2. Demonstrate competency and understanding of the concepts found in Quantum Mechanics, and lasers, acoustics and ultrasonic's broad base of knowledge in physics.								
3. Demonstrate the use of Newton's laws.								
4. Study engineering applications of interference, diffraction and fiber optics,								
5. Enrich knowledge in principles of quantum mechanics and mechanics								
UNIT-I:	Wave Optics					Classes:10		
Interference : Huygens's principle, Superposition of waves and interference of light by wave front splitting and amplitude splitting, Young's double slit experiment, Interference in thin film, Newton's rings, Engineering applications of interference.								
Diffraction: Types of diffraction, Fraunhofer diffraction due to a single slit, Double slit, Diffraction grating and grating spectrum. Engineering applications of diffraction.								
UNIT-II	Laser and Fiber Optics					Classes:10		
Lasers: Characteristics of Laser, Principle of Laser, Population Inversion, Pumping Mechanism, Types of Lasers: Ruby laser, He-Ne laser, Applications of lasers.								
Fiber Optics: Introduction, Optical fiber as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Types of Optical fibers: Step and Graded index fibers, Optical fiber communication system, Applications of optical fibers.								
UNIT-III	Mechanics					Classes:10		
Basic laws of vectors and scalars, conservative and non – conservative forces, Newton's laws, Form of invariance of Newton's second law, Gradient explanation and significance, Equipotential surfaces, Conservation of angular momentum, Centripetal and Coriolis accelerations, Foucault pendulum, Motion of rigid body, Euler's equations of motion for a rigid body.								
UNIT-V	Quantum Mechanics					Classes:8		
Introduction to quantum physics, Wave-particle duality, de-Broglie's hypothesis, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Physical significance of wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.								
UNIT-V	Acoustics & Ultrasonics					Classes:12		
Introduction – Reverberation - Reverberation time - Sabine's formula (Derivation using growth and decay method)–absorption coefficient, factors affecting acoustics of buildings, acoustic requirement of good auditorium.								
Production of ultrasonics by Magnetostriction and piezoelectric methods, Detection of ultrasonics, properties of ultrasonics, Non-destructive testing, pulse echo system through transmission and								

reflection modes, Applications.

Text Books:

1. "Engineering Mechanics " by Manoj Harbola Cengage publications 2nd Eds.
2. "Sensor and Transducers" by Iran R. sinclair, Elsevier 3rd Eds
3. K. Thyagarajan Engineering Physics ,McGraw Hill Education 2019.

Reference Books:

- 1.M.N.Avadhanulu P G . Kshirsagar"A.Text book of Engineering Physics",11/e S.Chand publications 2019.
- 2.Engineering Physics B K Pandey S Chaturvedi , Cengage learning.
- 3.Engineering Physics by R K Gaur and S L Gupta, Dhanpat Rai publications.

Web References:

1. www.physics.org.com
2. <https://en.wikiboos.org>

E-Text Books:

- 1.Classical mechanics by Radovan dermi
2. Physics of atomic and molecuels -Prof K Heyne
3. Quantum mechanics- Wengcho chew

Outcomes:

At the end of the course students able to:

1. Understand the super position effects like Interference, Diffraction.
2. Explain the basic concepts of lasers along with its Engineering applications- Types of optical fibres for various engineering applications.
3. Explore the knowledge of mechanics in various engineering applications.
4. Study the concept of Quantum Mechanics and how Quantum Mechanics is carried out in the fields.
5. Apply the principle of acoustics in designing of buildings.
6. Use of Ultrasonics in flaw detection using NDT method.

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

B. Tech I Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
20EE102	ES	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	40	60	100
Contact Classes:60	Tutorial Classes: 0	Practical Classes:0			Total Classes:60			
Objectives:								
<p>The course should enable the students to:</p> <ol style="list-style-type: none"> 1. Understand Kirchhoff laws and their application in series and parallel electric circuits. 2. Discuss principle and operation of measuring instruments. 3. Analyze the characteristics of alternating quantities, DC machines and AC machines. 4. Illustrate the V-I characteristics of various diodes and bi-polar junction transistor. 								
UNIT-1	ELECTRIC CIRCUITS, ELECTROMAGNETISM AND INSTRUMENTS						CLASSES:10	
<p>Electrical Circuits: Basic definitions, types of elements, Ohm's Law, resistive networks, inductive networks, capacitive networks, Kirchhoff's Laws, series, parallel circuits and star delta transformations, simple problems, Faradays law of electromagnetic induction; Instruments: Basic principles of indicating instruments, permanent magnet moving coil and moving iron instruments.</p>								
UNIT-2	DC MACHINES						CLASSES:15	
<p>DC Machines: Principle of operation of DC generator, EMF equation, principle of operation of DC motors, torque equation, types of DC machines, applications, three point starter.</p>								
UNIT-3	ALTERNATING QUANTITIES AND AC MACHINES						CLASSES:15	
<p>Alternating quantities: Sinusoidal AC voltage, average and RMS values, form and peak factor, concept of three phase alternating quantity; Transformer: Principle of operation, EMF equation, losses, efficiency and regulation. Three phase induction motor: Principle of operation, slip, slip torque characteristics, efficiency, applications;</p>								
UNIT-4	SEMICONDUCTOR DIODE AND APPLICATIONS						CLASSES:10	
<p>Semiconductor diode: P-N Junction diode, symbol, V-I characteristics, half wave rectifier, full wave rectifier, bridge rectifier and filters, diode as a switch, Zener diode as a voltage regulator.</p>								
UNIT-5	BIPOLAR JUNCTION TRANSISTOR AND APPLICATIONS						CLASSES:10	
<p>Bipolar junction transistor: Working principle of transistors, DC characteristics, CE, CB, CC configurations, biasing, load line, applications.</p>								
Text Books:								

1. A Chakrabarti, "Circuit Theory", Dhanpat Rai Publications, 6th Edition, 2004.
2. K S Suresh Kumar, "Electric Circuit Analysis", Pearson Education, 1st Edition, 2013.
3. Williamm Hayt, Jack E Kemmerly S M Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, 7th Edition, 2010.
4. J P J Millman, C C Halkias, Satyabrata Jit, "Millman"s Electronic Devices and Circuits", Tata McGraw Hill, 2nd Edition, 1998.
5. R L Boylestad, Louis Nashelsky, "Electronic Devices and Circuits", PEI / PHI, 9th Edition, 2006.
6. V K Mehta, Rohit Mehta, "Principles of electrical engineering", S CHAND, 1st Edition, 2003.

Reference Books:

1. David A Bell, "Electric Circuits", Oxford University Press, 9th Edition, 2016.
2. M Arshad, "Network Analysis and Circuits", Infinity Science Press, 9th Edition, 2016.
3. A Bruce Carlson, "Circuits", Cengage Learning, 1st Edition, 2008.
4. M Arshad, "Network Analysis and Circuits", Infinity Science Press, 9th Edition, 2016.

Web References:

1. <https://www.kuet.ac.bd/webportal/ppmv2/uploads/1364120248DC%20Machines2.pdf>
textofvideo.nptel.iitm.ac.in
2. <https://www.eleccompengineering.files.wordpress.com/2014/08/a-textbook-of-electrical-technologyvolume-ii-ac-and-dc-machines-b-l-thferaja.pdf>
3. https://www.geosci.uchicago.edu/~moyer/GEOS24705/Readings/Klempner_Ch1.pdf
4. <https://www.ibiblio.org/kuphaldt/electricCircuits/DC/DC.pdf>
5. <https://www.users.ece.cmu.edu/~dwg/personal/sample.pdf>.
6. https://www.djm.cc/library/Principles_of_Alternating_Current_Machinery_Lawrence_edited.pdf

E-Text Books:

1. <https://www.kisi.deu.edu.tr/aytac.goren/ELK2015/w10.pdf>
www.bookboon.com.
2. https://www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-071j-introduction-toelectronics-signals-and-measurement-spring-2006/lecture-notes/19_bjt_1.pdf.
3. <https://www.google.co.in/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF8#q=half+and+full+wave+rectifier+pdf>.
4. <https://www.leka.lt/sites/default/files/vaizdai/concepts-in-electric-circuits.pdf>.
5. <https://www.ktustudents.in>

Outcomes:

At the end of the course students able to:

1. Understand the basic principle of various electric circuits and its instruments.
2. Explain the basic concepts of D.C machines and its applications.
3. Explore the knowledge of mechanics in AC machines and its various engineering applications.
4. Study the concept of semi conductor diode and its applications.
5. Apply the principle of bipolar junction transistor and its applications

PROBLEM SOLVING AND 'C' PROGRAMMING

B.Tech I Semester: Common to All Branches								
Course code	Category	Hours/week			Credits	Maximum Marks		
20CS101	ES	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	40	60	100
Contact Classes:60		Tutorial Classes: 0		Practical Classes: Nil		Total Classes:60		
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. Provide exposure to problem-solving through programming. 2. Train the student to the basic concepts of the C-programming language. 3. Design programs involving decision structures, loops for problem solving 4. Learn string handling and string manipulation operations 5. Know about derived data types like structures and unions. 6. To learn problem solving techniques. 								
UNIT-I	Introduction to Computers and C							Classes:12
Introduction to Computers: Definition of a Computer, Block diagram of a Computer, Types of Programming Languages, Algorithms, Flow-charts. Introduction to C: History of C, General form of a C Program, C-Tokens, Data types, Operators and Expressions, Formatted Input and Output.								
UNIT-II	Decision Making, Looping and Jump Statements							Classes:12
Decision Making – Branching: if, if-else, Nested if, Ladder if and switch statement. Looping: While statement, do-while statement, for statement. Jump Statements: break, continue, goto.								
UNIT-III	Arrays and Functions							Classes:12
Arrays: Introduction, Declaration, Initialization and Accessing of 1-Dimensional and 2-dimensional arrays. Functions: Introduction, Categories of a function, Recursive functions, Storage Classes: auto, extern, static and register.								
UNIT-IV	Pointers and Strings							Classes:12
Pointers: Definition, Declaration, initialization & accessing of a pointer variable, Pointers to Pointers, Array of Pointers, Parameter Passing methods. Strings: Declaring and initializing String variables, String handling functions.								
UNIT-V	Structures, Unions and Files							Classes:12
Structures and Unions: Introduction, Declaration and Initialization of Structure, Structure within Structure, Array of Structures, Pointer to Structure, Union. Files: Introduction, Basic operations of files.								
Text Books:								
<ol style="list-style-type: none"> 1. E. Balagurusamy, “Programming with ANSI-C”, Fourth Edition,2008, Tata McGraw Hill. 2. Byron S Gottfried “Programming with C” Second edition, Tata McGrawhill, 2007 3. ISRD Group, “Programming and Problem Solving Using C”, Tata McGraw Hill, 2008. 								
Reference Books:								

1. R.G. Dromey, “How to solve it by Computer”, Pearson Education, 2008.
2. Kanetkar Y, “Let us C”, BPB Publications, 2007.
3. Hanly J R &Koffman E.B, “Problem Solving and Programm design in C”, PearsonEducation, 2009.

Web References:

1. <https://www.toptal.com/c/the-ultimate-list-of-resources-to-learn-c-and-c-plus-plus>
2. <https://hackr.io/tutorials/learn-c>

Outcomes:

At the end of the course students able to

1. Understand the fundamentals of C programming.
2. Read, understand and trace the execution of programs written in C language.
3. Choose the loops and decision-making statements to solve the problem.
4. Implement different Operations on arrays.
5. Use functions to solve the given problem.
6. Understand pointers, structures and unions.
7. Implement file Operations in C programming for a given application.

ENGINEERING GRAPHICS

B.Tech I/ II Semester: Common to All Branches								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
20ME101	ES	1	-	4	3	40	60	100
Contact Classes: 12		Tutorial Classes:		Practical Classes: 48		Total Classes:60		
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. Convey visual perception information regarding relative locations of objects through an orthographic/isometric view. 2. Analyze a drawing and bring out any inconsistencies to put forth inferences graphically. 3. Create feasible designs of simple objects with drawing tools and/or free-hand. 4. Get training in the transformation of the imagined data to present as drawings so that the communication skill will be increased especially in technical subjects. 								
UNIT-I	Plane Curves and Freehand Sketching						Classes:12	
<p>Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of polygons and circle – Drawing of tangents and normal to the above curves.</p> <p>Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects</p>								
UNIT-II	Projection of Points, Lines and Plane Surface						Classes:12	
<p>Orthographic projection-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method - Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.</p>								
UNIT-III	Projection of Solids						Classes:12	
<p>Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.</p>								
UNIT-IV	Section of Solids and Development of Surfaces						Classes:12	
<p>Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.</p>								
UNIT-V	Isometric and Orthographic Projections						Classes:12	
<p>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. Introduction to AUTOCAD</p> <p>COMPUTER AIDED DRAFTING (Demonstration Only) Introduction to drafting packages and demonstration of their use.</p>								
Text Books:								
1. N.D. Bhat, Engineering Drawing, Charotar Publishers, 52nd Revised and Enlarged: 2013								

2. K.L. Narayana, P. Kanniah, Engineering Drawing, Publisher, Scitech

Reference Books:

1. Venugopal, K., A Textbook of Engineering Graphics, New age Publishers, 2009
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.
3. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
4. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

Web References:

1. <https://nptel.ac.in/courses/112103019/>
2. <http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html>

E-Text Books:

1. http://web.iitd.ac.in/~achawla/public_html/201/lectures/sp46.pdf
2. https://books.google.co.in/books/about/Engineering_Drawing.html?id=_hdOU8kRb2AC

Outcomes:

At the end of the course students able to

1. Impart the training in multi-view representations and its conversion into pictorial views and the reverse also
2. Ability to understand the different standards in technical drawing and to help in reaching future engineering positions especially in research and design.
3. Draw orthographic projections of lines and planes
4. Draw development of the surfaces of objects
5. To get a clear idea about isometric projection.

PHYSICS LAB

B.Tech I /II Semester: For All Branches								
Course code	Category	Hours/week			Credits	Maximum Marks		
20BS105	BS	L	T	P	C	CIA	SEE	TOTAL
		0	0	3	1.5	40	60	100
Contact Classes:0		Tutorial Classes:0		Practical Classes:32		Total Classes: 32		
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. make the students gain practical knowledge to co-relate with the theoretical studies 2. achieve perfectness in experimental skills and the study of practical applications will bring more confidence and ability 3. Develop and fabricate engineering and technical equipments. 								
Experiment-1	Determine radius of curvature of Plano convex lens by Newton's rings.						Classes:02	
Experiment-2	Determine Dispersive power of the prism- Spectrometer.						Classes:02	
Experiment-3	Determination of wavelength of a laser source- Diffraction grating.						Classes:02	
Experiment-4	Determination of particle size by using laser source.						Classes:02	
Experiment-5	Determine Numerical aperture of an Optical fiber.						Classes:02	
Experiment-6	Magnetic field along the axis of a current carrying coil- Stewart and Gee's method.						Classes:02	
Experiment-7	Determine Energy gap of a material of a p-n junction.						Classes:02	
Experiment-8	Determination of Rigidity modulus of a wire material- Torsional pendulum.						Classes:02	
Experiment-9	Determination of frequency of an electrically vibrating fork- Melde's method.						Classes:02	
Experiment-10	Determination of Plank's constant.						Classes:02	
Experiment-11	Determination of Hall Coefficient of semiconductor.						Classes:02	
Experiment-12	Determine resonant frequency and quality factor of LCR circuit.						Classes:02	
Reference Books:								
<ol style="list-style-type: none"> 1. Manual cum Record for Engineering Physics Lab1&2 ,by Prof.Sri M. Ramarao Acme Learning. 2. Physics lab manual - Department of Freshman and engineering, ASCET (Autonomous). 3. S Balasubramaniam, M N Srinivasan" A Text book of Practical physics" ,S Chand Publishers,2017. 								
Web References:								
<ol style="list-style-type: none"> 1. www.physics.org.com 2. https://en.wikiboos.org 								

E-Text Books:

1. Classical mechanics by Radovan dermi
2. Physics of atomic and molecules–prof K Heyne

OUT COMES:**At the end of the course, a student will be able to:**

1. Examine the super position effects like Interference, Diffraction and to list the types of optical fibers and using optical fibers in modern communication system.
2. Evaluate the wavelength of laser source and particle size by diffraction technique.
3. Observe the stationary waves and determine the frequency of tuning fork.
4. Compare the experimental values of magnetic induction along a circular coil with theoretical values.
5. Investigate the radius of curvature of planoconvex lens using Newton's rings.
6. Study the voltage current characteristics of semiconductor.

C PROGRAMMING LAB

B.Tech I Semester: Common to All Branches								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
20CS102	ES	L	T	P	C	CIA	SEE	Total
		-	-	3	1.5	40	60	100
Contact Classes: Nil	Tutorial Classes: -	Practical Classes: 45			Total Classes: 45			
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. To develop primary programming skills upto the higher end in order solve the different programming logics... 2. To write different type of logics at the end of the sessions. After learning the C course, the student can able get all the fundamental knowledge in all the languages. 3. To Understand the student can able to attend any MNC Company interview and can solve the technical rounds both theoretically and Practically 4. To Provide lot of logical examples to make as good as. 								
LIST OF EXPERIMENTS								
Expt. 1	Expressions							
Programs on Expressions.								
Expt. 2	Operators							
Programs on Operators.								
Expt. 3	Decision Control Statements							
Programs on decision control statements.								
Expt. 4	Loop Statements							
Programs on loop statements.								
Expt. 5	Nested Loops							
Programs on Nested Loops.								
Expt. 6	Arrays							
Programs using arrays.								
Expt.7	Functions							
Programs to implement on functions.								
Expt. 8	Recursion							
Programs using recursion.								

Expt. 9	String Handling Functions
Programs to implement string handling functions.	
Expt. 10	Pointers
Programs to implement on pointers.	
Expt. 11	Structures
Programs to implement on structures.	
Expt. 12	Files
Programs on files.	
Reference Books:	
<ol style="list-style-type: none"> 1. E. Balagurusamy, "Programming with ANSI-C", Fourth Edition, 2008, Tata McGraw Hill. 2. Byron S Gottfried "Programming with C" Second edition, Tata McGrawhill, 2007 3. ISRD Group, "Programming and Problem Solving Using C", Tata McGraw Hill, 2008.. 	
Web References:	
<ol style="list-style-type: none"> 1. www.sanfoundry.com/c-programming-examples 2. www.geeksforgeeks.org/c 3. www.cprogramming.com/tutorial/c 4. www.cs.princeton.edu 	
SOFTWARE AND HARDWARE REQUIREMENTS FOR STUDENTS:	
SOFTWARE: Dev C++, Turbo C	
HARDWARE: Desktop Computers	
Course Outcome:	
At the end of the course, a student will be able to:	
<ol style="list-style-type: none"> 1. To Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming. 2. To Use of conditional expressions and looping statements and to solve problems associated with conditions and repetitions. 3. To Know the Functions involving the idea of modularity. 	

ENGINEERING WORKSHOP

B.Tech I/II Semester: Common to CE, ME, EEE, ECE , CSE & DS								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
20ME104	ES	-	-	3	1.5	40	60	100
Contact Classes: Nil		Tutorial Classes: - Nil		Practical Classes: 45		Total Classes:45		
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. To familiarize with the basic manufacturing processes and to study the various tools and equipment used, hands-on training is given in different sections. 2. Essentially student should know the labor involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. 								
LIST OF EXPERIMENTS								
Expt. 1	Carpentry Shop							
<ol style="list-style-type: none"> 1. Cross Lap Joint 2. Mortise and Tenon Joint 								
Expt. 2	Fitting Shop							
<ol style="list-style-type: none"> 1. Square Fitting 2 .V- Fitting 								
Expt. 3	Sheet Metal Shop							
<ol style="list-style-type: none"> 1. 3-Sided Tray (Trapezoidal Tray) 2 .Cylinder (Circular Tin) 								
Expt. 4	House Wiring							
<ol style="list-style-type: none"> 1 .Wiring for two lamps (bulbs) with independent switch controls with or without looping 2 .Wiring for stair case lamp 								
Expt. 5	Foundry							
<ol style="list-style-type: none"> 1 .Single Piece Pattern 2 .Double Piece Pattern 								
Expt. 6	Welding							
<ol style="list-style-type: none"> 1 .Lap Joint 2 .T – Joint 								
Expt.7	Soldering Practice							
Components Devices and Circuits – Using general purpose PCB.								

Expt.8	Trades for Demonstration
1. Machine Shop (Lathe Machine, Grinding Machine and Drilling Machine) 2 .Metal Cutting 3 .Plumbing	
Reference Books:	
1. Engineering Work shop practice, V. Ramesh Babu, VRB Publishers Private Limited, 2009 2. Work shop Manual, P.Kannaiah and K.L.Narayana, SciTech Publishers, 2009	
Web References:	
1. Engineering workshop Lab manual, Department of Mechanical Engineering, GMRIT Rajam 2. Workshop Practice Manual, K. Venkata Reddy, BS Publications	
Course Outcome:	
At the end of the course, a student will be able to: <ol style="list-style-type: none"> 1. Utilize workshop tools for engineering practice 2. Analyze and find out suitable method of fabrication of a given simple component. 3. Employ skills acquired to provide quick fixes for routine domestic and/or industrial problems. 4. Appreciate the hard work and intuitive knowledge of the manual workers. 	

INTEGRAL TRANSFORMS AND MATRIX THEORY

B.Tech II Semester: Common to CE, EEE, ME, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
20BS201	BS	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	40	60	100
Contact Classes:50	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:50			
OBJECTIVES:								
The course should enable the students to:								
1. Know the concept of Laplace transforms and apply to solve the ordinary differential equations								
2. Expand the various functions as Fourier series								
3. Equip the knowledge of Fourier transforms								
4. Learn the concept of Z-Transforms and use to solve the difference equations								
5. Learn the concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.								
UNIT-I	Laplace Transforms						Classes:10	
Introduction-Laplace transforms; Properties, Laplace transforms of unit step function, impulse function, periodic function. Inverse Laplace transforms; Properties ,Convolution theorem, Application: Solution of ordinary differential equation by Laplace transforms.								
UNIT-II	Fourier Series						Classes:10	
Introduction-Expansion of a function in Fourier series for a given range - Half range sine and cosine expansions, Complex form of Fourier series.								
UNIT-III	Fourier Transforms						Classes:10	
Introduction-Fourier transformation and inverse transforms - sine, cosine transformations and inverse transforms - simple illustrations.								
UNIT-IV	Z-Transforms						Classes:10	
Introduction, Z-Transforms of some standard functions, Properties, Initial & Final value theorems. Inverse Z-Transforms , Inversion by partial fractions, Convolution theorem and applications to difference equation.								
UNIT-V	Matrices						Classes:10	
Rank of a matrix: Echelon and Normal form; Consistency of the system of linear equations; Eigen values and eigenvectors of a matrix; Cayley-Hamilton theorem(without proof) and inverse and power of a matrix using Cayley-Hamilton theorem.								
Text Books:								
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.								
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill.								
Reference Books:								
1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.								
2. T.K.V. Iyengar, B. Krishna Gandhi and Others, Engineering Mathematics (Vol – I & II) –								

S. Chand & Company.

3. Erwin Kreyszig, Advanced Engineering Mathematics-John Wiley & Sons.

Web References:

1. www.mathplanet.com
2. www.mathworld.com

E-Text Books:

1. [Baidyanath Patra](#)-“An introduction to integral transforms”.
2. Jeffrey R. Chasnov-“Introduction to Numerical Methods”.

Outcomes:

At the end the student will be able to

1. Understand to solve physical problems arising in engineering by using Laplace transforms
2. Gain the ability in expansion of Fourier series of a given function
3. Attain the knowledge of Fourier transforms
4. Apply the concept of Z-Transforms for solving difference equations
5. Understand the concept of Rank of a matrix and the consistent system of linear equations

ENGINEERING CHEMISTRY

B.Tech II Semester: Civil and Mechanical Engineering									
Course code	Category	Hours/week			Credits	Maximum Marks			
		L	T	P		C	CIA	SEE	TOTAL
20BS204	BS	3	0	0	3	40	60	100	
Contact Classes:50		Tutorial Classes: 0		Practical Classes: Nil		Total Classes:50			
OBJECTIVES:									
<p>The course should enable the students to :</p> <ol style="list-style-type: none"> 1. Bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer. 2. Impart the basic knowledge of atomic, molecular and electronic modifications which makes the students to understand the technology based on them. 3. Acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the engineers and in industry. 4. Impart the knowledge of fuels and lubricants useful for understanding engineering applications. 5. Learn about building materials and its applications. 									
UNIT-I		WATER TECHNOLOGY						Classes:12	
<p>Water Technology-I: Sources and impurities of water, hardness of water, units of hardness, estimation of hardness by EDTA method, dissolved oxygen, alkalinity. concept of P^H, boiler troubles –priming and foaming, scales, sludge's, caustic embrittlement and boiler corrosion-causes, disadvantages and prevention, internal conditioning methods, external treatment methods- ion-exchange method.</p> <p>Water Technology-II: water treatment for drinking purpose-disinfection methods, desalination of brackish water- principle and process of electro-dialysis and reverse osmosis.</p>									
UNIT-II		MOLECULAR STRUCTURE AND THEORIES OF BONDING						Classes:10	
<p>Atomic and Molecular orbitals: Linear combination of atomic orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2, O_2 and F_2 molecules. π molecular orbitals of butadiene, benzene.</p> <p>Crystal field theory (CFT): Salient features of CFT – The energy level diagrams for transition metal ions with respect to tetrahedral, octahedral and square planar geometries.</p>									
UNIT-III		BATTERY TECHNOLOGY AND CORROSION						Classes:12	
<p>Electrochemical cell: single and standard electrode potential, conductometric titration –acid vs. base.</p> <p>Battery Technology: classification of batteries -primary cell, secondary cell-Ni-Cd cell, lithium cells (lithium primary batteries and lithium ion batteries), fuel cells- hydrogen – oxygen fuel cell, methanol-oxygen fuel.</p> <p>Corrosion- definition, examples, effects- mechanism of wet corrosion, factors influencing corrosion, corrosion, control - cathodic protective coatings - metal coatings; hot dipping, metal cladding, cementation.</p>									
UNIT-IV		FUEL TECHNOLOGY AND LUBRICANTS						Classes:10	

<p>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.</p> <p>Lubricants- classification of lubricants –liquid, solid, semisolid with examples and Ionic liquids</p>		
UNIT-V	BUILDING MATERIALS	Classes:6
<p>Cement: composition of portland cement, manufacturing of cement, setting and hardening of cement (reactions).</p> <p>Refractories : definition, classification with examples, criteria of a good refractory material .</p> <p>Steel – types of steel, chemical composition, applications of alloy steels -high yield deformed steel (Tor), stainless Steel, high tensile steel and TMT steel.</p>		
<p>Text Books:</p> <ol style="list-style-type: none"> 1. P.C.Jain and Monika Jain, <i>Engineering Chemistry</i>, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013. 2. K.N.Jayaveera, G.V.Subba Reddy and C.Ramachandriah, <i>Engineering Chemistry</i> Mc.Graw Hill Publishers, New Delhi. 3. Text book of Engineering chemistry by Y.Bharathi Kumari and Jyotsna.Chelukuri ,VGS publications. 		
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Text book of engineering chemistry by Shashi Chawla. 2. Text book of engineering chemistry by A.Jayashree,Wiley publications, New Delhi 3. Text book of Advanced chemistry by Phillip Mathews. 		
<p>Web References:</p> <ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/105/106/105106119/ 2. https://youtu.be/KHh_IX1G6uA 3. https://www.youtube.com/watch?v=MfbxR9ZDs0s&feature=youtu.be 4. https://nptel.ac.in/courses/113/104/113104082/ 5. https://nptel.ac.in/courses/113/105/113105028/ 		
<p>Outcomes:</p> <p>After undergoing this course the students will be able to:</p> <ol style="list-style-type: none"> 1. Acquire the knowledge of various water purification methods in industries 2. Apply the corrosion technology methods in various fields. 3. Understand the working principles in batteries in engineering applications. 4. Explore types of fuels, lubricants and their characteristics. 5. Know the properties and use of building materials in engineering applications.\ 		

ENGLISH FOR ENGINEERS

B.Tech I/II Semester: Common to All Branches								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
20HS101	HS	3	0	0	3	40	60	100
Contact Classes:50		Tutorial Classes: 0		Practical Classes: Nil		Total Classes:50		
OBJECTIVES:								
The course should enable the students to:								
1. Acquaint the students with effective strategies of paragraph and essay writing, and formal correspondence such as letters, resume and reports.								
2. Provide students with the critical impetus necessary to forge a path in an academic environment, on the job, and in an increasingly complex, interdependent world.								
3. Enable learners to understand the universality of human experience in literary texts and have a more significant insight into human values.								
4. Expose learners to key Reading techniques such as Skimming and Scanning for comprehension of different texts.								
5. Enable students to develop listening skills for better comprehension of academic presentations, lectures and speeches.								
UNIT-I						Classes:10		
Listening: Listening to Short Audio Texts and identifying the Topic. Reading : “The Boy Who Broke the Bank” by Ruskin Bond Writing: Principles of Writing: Clarity, Simplicity, Brevity, Single Focus, Organization of Thoughts. Grammar and Vocabulary: Parts of Speech, Common Errors in English with Reference to Articles & Prepositions, Interesting Origin of Words, Prefixes & Suffixes.								
UNIT-II						Classes:10		
Listening: Listening to Telephonic Conversation Reading : “Scientist in Training: The Oxford Years” Stephen Hawking’s Biography Writing : Sentence, Types of Sentences, Guided Composition, Paragraph Writing-Organization: Topic Sentence, Supporting Sentences, The Concluding Sentence, Creating Coherence Grammar and Vocabulary: Tenses, If-Clauses, Subject-Verb Agreement, Synonyms and Antonyms.								
UNIT-III						Classes:10		
Listening: Listening to Longer Texts and Filling up the Table – Product Descriptions Reading : “Silent Spring” by Rachel Carson Writing : Note Making- Organizing Techniques: Providing a Suitable Title, Headings & Sub Headings; Methods of Sequencing.								

Grammar and Vocabulary: Active & Passive Voice, Direct & Indirect Speech, Homonyms and Homophones		
UNIT-IV		Classes:10
<p>Listening: Listening to Dialogues or Conversations and Exercises. Reading : “Unlock Your Own Creativity” by Robert Von Oech Writing : Letter Writing: Parts of a Letter - Formats of Letters- Types of Letters-Formal Letter Writing (enquiry, complaints, seeking permission, seeking internship etc.) Grammar and Vocabulary: Redundancies & Cliches in Written and Oral Communication and One Word Substitutions</p>		
UNIT-V		Classes:10
<p>Listening: Making Predictions while Listening to Conversations/Transactional Dialogues without Video Reading : “A Talk on Advertising” by Herman Wouk Writing : Report Writing : Parts of a Report – Formats of Reports – Types of Reports – Formal Report Writing Exercises Grammar and Vocabulary: Common Errors in English and Idioms & phrases</p>		
Text Books:		
1.Avenues: Course Book I for Enhancing English Language and Communication Skills by Orient Black Swan Private Limited, India, 2019.		
Reference Books:		
1.C Muralikrishna and Sunita Mishra, Communication Skills for Engineers, Dorling Kindesley Pearson Education, India, 2014.		
2,Mamta Bhatnagar and Nitin Bhatnagar, Communicative English for Engineers and Professionals, Dorling Kindesley Pearson Education, India, 2010.		
3. Adair, John. Effective Communication. London: Pan Macmillan Ltd., 2003.		
4. Andrea J. Rutherford, Basic Communication Skills for Technology, 2nd Edition, Pearson India,		
Web References:		
1. www.englishpractice.com		
2. www.better-english.com		
3. www.bbc.co.uk/learningenglish		
4. www.world-english.org		
5. www.talkenglish.com		
Outcomes:		
At the end of the course students will be able to		
1. Communicate confidently in English in social and professional contexts with improved skills of fluency and accuracy.		
2. Write grammatically correct sentences employing appropriate vocabulary suitable to different contexts.		

3. Comprehend and analyze different academic texts.
4. Effectively handle academic writing tasks such as paragraph writing, précis writing, paraphrasing and essay writing.
5. Effectively handle formal correspondence like letter writing and report writing.
6. Think critically, analytically, creatively and express ideas and content meaningfully.

ENGINEERING MECHANICS

B.Tech I Semester: Common to CE & ME								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
20ME201	ES	3	0	0	3	40	60	100
Contact Classes: 60	Tutorial Classes: - Nil	Practical Classes: Nil			Total Classes: 60			
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. Applying the various methods of evaluating kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces. 2. Applying the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D plane. 3. Understand the process of determining centroid and moment of inertia of different objects. 4. Applying the concepts of frictional forces at the contact surfaces of various engineering systems. 								
UNIT-I	Basics of Engineering Mechanics						Classes:12	
Basics of Engineering Mechanics: Basic Concepts of Engineering Mechanics: Characteristics of a force – various types of force systems – Resultant – Composition and resolution of forces – Principles of moments of force – Couples. Resultants of Force System: Resultants of different types of force systems. Equilibrium of Forces: Free body diagrams – Equations of equilibrium for different force systems								
UNIT-II	Equilibrium of Rigid Bodies						Classes:12	
Free body diagram – Types of supports – Action and reaction forces – stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions.								
UNIT-III	Centroid						Classes:12	
Centroid: Centroids of Simple Figures (From Basic Principles) – Centroids of Composite Figures. Centre of gravity: Centre of Gravity of Simple Body -Centre of Gravity of Composite Bodies- Pappus Theorem. Moment of inertia: Definition – Parallel Axis Theorem and Perpendicular Axis Theorem – Polar Moment of Inertia – Radius of Gyration – Moment of Inertia of Basic Shapes - Composite Sections - Simple Solids.								
UNIT-IV	Dynamics of Particles						Classes:12	
Introduction, Rectilinear kinematics: Continuous motion, General curvilinear motion, Curvilinear motion: Rectangular components, Motion of a projectile, curvilinear motion: Normal and tangential components, Absolute dependent motion analysis of two particles.								
UNIT-V	Friction and Rigid Body Dynamics						Classes:12	
Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction –wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.								

Text Books:

1. A Textbook of Engineering Mechanics, 3rd Edition, Bhavikatti S S , New Age International, 2016
2. Engineering Mechanics, Dr. R. K. Bansal, 4th Edition, Laxmi Publications, 2011

Reference Books:

1. Engineering Mechanics, D.S. Kumar, 3rd Edition, S.K. KATARIA & SONS
2. Singer's Engineering Mechanics: Statics and Dynamics, 3rd Edition, K. Vijaya Kumar Reddy, J. Suresh Kumar, B.S. Publications, 2011.
3. Engineering Mechanics: Statics, 6th Edition, J L Meriam, L G Kraige, Wiley India Pvt. Ltd, 2001.

Web References:

1. <https://nptel.ac.in/courses/122104015/>
2. <https://nptel.ac.in/courses/112103109/>

E-Text Books:

1. <https://books.google.co.in/books?isbn=8122423744>
2. <https://books.google.co.in/books?isbn=8122406173>
3. <https://books.google.co.in/books?isbn=8122427669>

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

1. Construct free body diagrams
2. Develop appropriate equilibrium equations
3. Determine the centroid of composite sections
4. Determine moment of inertia for composite sections
5. Understand the concept of friction and apply in real life problems
6. Understand kinetics and kinematics of bodies.

DATA STRUCTURES

B.Tech II Semester: Common to All Branches									
Course code	Category	Hours/week			Credits	Maximum Marks			
		L	T	P		C	CIA	SEE	TOTAL
20CS201	ES	3	0	0	3	40	60	100	
Contact Classes:60		Tutorial Classes: -		Practical Classes: Nil		Total Classes:60			
OBJECTIVES:									
The course should enable the students to :									
<ol style="list-style-type: none"> 1. Demonstrate familiarity with major algorithms and data structures. 2. Choose the appropriate data structure and algorithm design method for a specified application. 3. Determine which algorithm or data structure to use in different scenarios. 4. To improve the logical ability. 									
UNIT-I	Introduction to Algorithms and Data Structures							Classes:12	
Algorithms: Definition, Properties, Performance Analysis-Space Complexity, Time Complexity, Asymptotic Notations.									
Data structures: Introduction, Data Structures types, Data Structure Operations.									
UNIT-II	Stacks and Queues							Classes:12	
Stacks: Introduction, Stack Operations, Applications: Infix to Postfix Conversion, Evaluation of Postfix Expression.									
Queues: Introduction, Operations on queues, Circular queues, Priority queues.									
UNIT-III	Linked Lists and Applications							Classes:12	
Linked lists: Introduction, Singly linked lists, Circular linked lists, Doubly linked lists, Multiply linked lists, Applications: Polynomial Representation. Implementation of Stack and Queue using linked list.									
UNIT-IV	Sorting and Searching							Classes:12	
Sorting: Introduction, Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, HeapSort.									
Searching: Introduction, Linear search, Binary search, Fibonacci search.									
UNIT-V	Trees and Binary Trees							Classes:12	
Trees: Introduction, Definition and basic terminologies, Representation of trees.									
Binary Trees: Basic Terminologies and Types, Binary Tree Traversals, Binary Search Trees.									
Text Books:									
<ol style="list-style-type: none"> 1. G.A.V PAI, Data Structures and Algorithms, Concepts, Techniques and Applications, Volume1, 1stEdition, Tata McGraw-Hill, 2008. 2. Richard F. Gilberg& Behrouz A. Forouzan, Data Structures, Pseudo code Approach with C, 2ndEdition, Cengage Learning India Edition, 2007. 									
Reference Books:									
<ol style="list-style-type: none"> 1. Langsam,M. J. Augenstein, A. M. Tanenbaum, Datastructures using C and C++, 2nd Edition, PHI Education, 2008. 2. Sartaj Sahni, Ellis Horowitz, Fundamentals of at Structures in C, 2nd Edition, Orientblackswan, 2010. 									
Web References:									
<ol style="list-style-type: none"> 1. https://www.geeksforgeeks.org/data-structures/ 									

- | | |
|----|---|
| 2. | https://www.programiz.com/dsa |
| 3. | https://www.w3schools.in/data-structures-tutorial/intro/ |

Outcomes:

At the end of the course students able to

1. Apply Concepts of Stacks, Queues, Linked Lists.
2. Develop Programs for Searching and Sorting, Trees.
3. Interpret concepts of trees.
4. Develop programs for Sorting and Searching.

CHEMISTRY LAB

B.Tech I / II Semester: Common to All Branches								
Course code	Category	Hours/week			Credits	Maximum Marks		
20BS106	BS	L	T	P	C	CIA	SEE	TOTAL
		0	0	3	1.5	40	60	100
Contact Classes:0	Tutorial Classes: 0	Practical Classes: 30			Total Classes:30			
OBJECTIVES:								
The course should enable the students to:								
1. Test the parameters like hardness, alkalinity and chloride content in water								
2. Understand the various lubricant oils its viscosity by using red wood viscometer								
3. Acquire Strength of various acids by using conductometer.								
4. Understand the separation of mixtures by Chromatography.								
EXPERIMENT-1	Preparation of standard EDTA solution and estimation of hardness of water							Classes:03
EXPERIMENT-2	Estimation of Dissolved oxygen in water sample by Winklers method							Classes:03
EXPERIMENT-3	Determination of alkalinity of water							Classes:03
EXPERIMENT-4	Estimation of chloride ion in water sample by mohr's method							Classes:03
EXPERIMENT-5	Determination of strength of strong acid and strong base solution by conductometric titrations							Classes:03
EXPERIMENT-6	Determination of strength of Acetic acid and strong base solution by conductometric titrations							Classes:03
EXPERIMENT-7	Determination of viscosity of the oil through redwood viscometer-1							Classes:03
EXPERIMENT-8	Determination of viscosity of the oil through redwood viscometer-2							Classes:03
EXPERIMENT-9	Determination of surface tension of given liquid using stalagno meter							Classes:03
EXPERIMENT-10	Separation of mixtures by paper chromatography							Classes:03
Text Book:								
1. Text book on Experiments and calculations in Engineering Chemistry-S.S.Dara								
2. Senior practical physical chemistry ,B.D.Khosla, A.Gulati and V.Garg (R.Chand&co.,Delhi)								
Reference books :								
1. Vogel's text book of Practical Organic Chemistry 5 th edition.								
2. An Introduction to practical chemistry ,K.K.Sharma and D.S.Sharma(Vikas Publishing,New Delhi)								
Web References:								
1. http://sciencenotes.org								
2. http://scifysolution.com								
Outcomes:								
At the end of the course students able to								
1. Determination of parameters like hardness, alkalinity and chloride content in water.								

2. Relate the various lubricant oils its viscosity by using red wood viscometer.
3. Predict the strength of various acids by using conductometer.
4. Know the separation of mixtures by Chromatography.

ENGLISH LAB

B.Tech I /II Semester: Common to All Branches								
Course code	Category	Hours/week			Credits	Maximum Marks		
20HS107	HS	L	T	P	C	CIA	SEE	TOTAL
		0	0	3	1.5	40	60	100
Contact Classes:0	Tutorial Classes: 0	Practical Classes:30			Total Classes: 30			
COURSE OBJECTIVES								
<ol style="list-style-type: none"> 1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning. 2. To sensitize students to the nuances of English speech sounds, word accent and intonation. 3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking. 4. To improve the fluency of the students in spoken English and neutralize their mother tongue influence. 								
ACTIVITY 1	Introduction to Phonetics, Vowels, Diphthongs and Consonants						Classes:06	
ACTIVITY 2	Stress & Intonation						Classes: 06	
ACTIVITY 3	Just a Minute (JAM)						Classes: 06	
ACTIVITY 4	Situational Dialogues						Classes: 06	
ACTIVITY 5	Group Discussion						Classes:06	
Reference Books:								
<ol style="list-style-type: none"> 1. Daniel Jones, English Pronouncing Dictionary, Current Edition with CD. 2.R.K.Bansal and J. B. Harrison, Spoken English, Orient Longman 2006 Edn. 3. Krishna Mohan & NP Singh, Speaking English Effectively (Macmillan) 4. Meenakshi Raman &Sangeeta Sharma, Technical Communication, Oxford University Press 2009. <p>K R Lakshminarayan and T. Muruguvel, Managing Soft Skills, SciTech Publication, 2010.</p>								
Web References:								
<ol style="list-style-type: none"> 1. www.sanskaarvalley.org/prangan/pdf/jam-topics 2. www.indiabix.com/group-discussion/topics-with-answers/ 								
E-Text Books:								
<ol style="list-style-type: none"> 1. A Complete Kit for Group Discussion 2. English Conversation Practice 								
Outcomes:								
<p>After the completion of the course, the students will be able to</p> <ol style="list-style-type: none"> 1. Gain better understanding of nuances of English language through audio-visual experience and group activities. 								

2. Developed ability on various language functions to fulfill the purpose of speaking and writing in academic and professional context.
3. Ability to communicate effectively in different formal and informal situations.
4. Demonstrate various language functions
5. Gained the ability to effectively communicate with members of society in general and engineering community in particular.
6. Learn speaking skills with clarity and confidence which in turn enhances their employability skills.

DATA STRUCTURES LAB

B. Tech II Semester: Common to All Branches								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
20CS202	ES	L	T	P	C	CIA	SEE	Total
		-	-	3	1.5	40	60	100
Contact Classes: Nil		Tutorial Classes: -		Practical Classes: 45		Total Classes: 45		
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. To develop skills to design and analyze simple linear and nonlinear data structures 2. To Strengthen the ability to identify and apply the suitable data structure for the given real-world problem 3. To Gain knowledge in practical applications of data structures 4. To make the student write ADTS for all data structures. 								
LIST OF EXPERIMENTS								
Expt. 1	Stack							
Write C program to implement the stack using arrays.								
Expt. 2	Queue							
Write C program to implement the Queue using arrays.								
Expt. 3	Postfix Evaluation							
Write C program to Evaluation a postfix expression.								
Expt. 4	Singly Linked list							
Write C program to implement the Singly linked list.								
Expt. 5	Bubble Sort							
Write C programs to implement Bubble Sort Algorithm.								
Expt. 6	Selection Sort							
Write C programs Selection Sort Algorithm.								
Expt.7	Insertion sort							
Write C programs to implement Insertion Sort Algorithm.								
Expt. 8	Merge Sort							
Write C programs to implement Merge Sort Algorithm.								
Expt. 9	Quick Sort							
Write C programs to implement Quick Sort Algorithm.								

Expt. 10	Linear Search
Write C programs to implement Linear Search Algorithm.	
Expt. 11	Binary Search
Write C programs to implement Binary Search Algorithm.	
Expt. 12	Binary Tree
Write a C program to implement binary tree using Arrays.	
Reference Books:	
<ol style="list-style-type: none"> 1. G.A.V PAI, Data Structures and Algorithms, Concepts, Techniques and Applications, Volume1, 1stEdition, Tata McGraw-Hill, 2008. 2. Richard F. Gilberg& Behrouz A. Forouzan, Data Structures, Pseudo code Approach with C, 2ndEdition, Cengage Learning India Edition, 2007. 3. Langsam,M. J. Augenstein, A. M. Tanenbaum, Datastructures using C and C++, 2nd Edition, PHI Education, 2008. 4. Sartaj Sahni, Ellis Horowitz, Fundamentals of at Structures in C, 2nd Edition, Orientblackswan, 2010. 	
Course Home Page:	
SOFTWARE AND HARDWARE REQUIREMENTS FOR STUDENTS:36	
SOFTWARE: Dev C++, Turbo C	
HARDWARE: Desktop Computers	
Course Outcome:	
At the end of the course, a student will be able to:	
<ol style="list-style-type: none"> 1. Implement Stacks and Queues Using Arrays. 2. Develop Programs for Searching and Sorting Algorithms 3. Develop Programs Using Concepts of Trees. 4. Choose appropriate data structure as applied to specified problem definition. 	

PROBABILITY, STATISTICS AND NUMERICAL METHODS

B.Tech III Semester: CE, ME, CSE, CSE(DS) & CSE(AI)								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
20BS302	BS							
		3	0	0	3	40	60	100
Contact Classes: 60		Tutorial Classes: -		Practical Classes: Nil		Total Classes:60		
OBJECTIVES:								
The course should enable the students to:								
1. know the concepts of random variables and distributions.								
2. Identify the hypothesis of various engineering problems.								
3. Learn the techniques of large and small sample tests.								
4. Improve the skills in numerical methods by Numerical differentiation and Integration.								
5. Use different numerical methods to solve first order differential equations.								
UNIT-I	Probability Distributions						Classes:10	
Probability: Review of probability concepts-Bayes's theorem Distributions: Discrete & Continuous Probability Distributions, Expectation, Moment Generating function- Binomial, Poisson & Normal distributions –Evolution of Statistical parameters for these three distributions; Poisson Approximation to the Binomial Distributions.								
UNIT-II	Test of Hypothesis and Large Sample Tests						Classes:10	
Statistical hypothesis– Test of significance – Null and Alternative hypothesis-Types of errors – Level of significance critical values and region – one and two tailed tests – Procedure of hypothesis testing – Testing of significance of single mean & difference of means; Single proportion & difference of proportions.								
UNIT-III	Small Sample Tests						Classes:10	
Chi-square (χ^2) test for goodness of fit – Independence of attributes– student's t-distribution – testing of single mean and difference of means; F- test.								
UNIT-IV	Interpolation, Numerical differentiation and integration						Classes:10	
Finite Differences - Newton's Forward, backward difference interpolation formulae - Lagrange interpolation. Newton's formula for derivatives at given points - Numerical Integration with Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.								
UNIT-V	Numerical solutions of differential equations						Classes:10	
Solving first order differential equations –Taylor's series method, Euler's method, modified Euler's method, Runge-Kutta method of 4th order- Milne's Predictor – Corrector method.								
Text Books:								
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.								
2. S.S.Sastry, Introductory methods of Numerical analysis – PHI, Fourth Edition								
Reference Books:								
1. S.C.Gupta , Fundamentals of Statistics -Himalaya Publications								
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill.								

3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
4. Erwin Kreyszig, Advanced Engineering Mathematics-John Wiley & Sons..

Web References:

1. www.mathplanet.com
2. www.mathworld.com

E-Text Books:

1. Hossein Pishro-"Introduction to probability, Statistics and random processes".
2. Jeffrey R. Chasnov-"Introduction to Numerical Methods".

Outcomes:

At the end of the course students able to

1. Analyze the concepts of random variables and distributions
2. Characterize the hypothesis of various engineering problems
3. Apply the techniques of large and small sample tests in various engineering problems
4. Acquire the skills in numerical methods by Numerical differentiation and Integration
5. Compute the solutions of first order differential equations using different numerical techniques

MATERIAL SCIENCE AND METALLURGY

B.Tech III Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
20ME301	CORE	3	-	-	3	40	60	100
Contact Classes:60	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. To develop the knowledge on structure of materials including crystallography, microstructure, defects and phase diagrams. 2. To provide an understanding to students on the correlation between structure, processing, mechanical properties and performance of materials. 3. To develop the knowledge on mechanical properties of materials and strengthening mechanism. 4. To give insight in to mechanical behavior of materials for different applications. 5. To give insight in to advanced materials such as polymers, ceramics and composite and their applications. 								
UNIT-I	Structure of Materials						Classes:12	
Introduction to engineering materials – significance of structure property correlations in all classes of engineering materials, Unit Cells, Metallic Crystal Structures, Crystal Systems, Crystallographic Points, Crystallographic Directions, Crystallographic Planes, Close-Packed Crystal Structures, Crystalline and Non-crystalline Materials, Single Crystals, Polycrystalline Materials, Imperfection in solids – Point, Line, Surface and Volume defects - Polymorphism and Allotropy.								
UNIT-II	Constitution of Alloys						Classes:12	
Mechanism of Crystallization- Nucleation-Homogeneous and Heterogeneous Nucleation- Growth of crystals- Planar growth – dendritic growth – Cooling curves - Diffusion - Construction of Phase diagram -Binary alloy phase diagram – Cu-Ni alloy; Cu-Zn alloy and Pb-Sn alloy; Iron-Iron carbide phase diagram – Invariant reactions – microstructural changes of hypo and hyper-eutectoid steel- TTT and CCT diagram.								
UNIT-III	Ferrous Metals and Non Ferrous Metals						Classes:12	
Steels – Types of Steels – HSLA – TRIP – White, Grey, Malleable and Nodular – Properties and application of cast irons, Effect of alloying elements on structure and properties of steels - Properties and uses of Silicon and Hadfield Manganese steels, High speed steels - Stainless steel and Types. Properties and Applications of Aluminum, Magnesium, Copper, Nickel, Titanium and their alloys.								
UNIT-IV	Heat Treatment						Classes:12	

Heat treatment - Overview - Objectives - Annealing and types, normalizing, quenching, austempering and martempering - microstructure changes -Surface hardening processes - Carburizing - nitriding - cyaniding and carbonitriding, induction and flame hardening, Laser and Electron beam hardening- principles and case depths.

UNIT-V	Introduction to Advanced Materials	Classes:12
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Properties and Applications of Engineering polymers- Ceramics - properties and applications of various ceramics - Composites - and their types; properties and processing of composites - Manufacture of fibers, shape memory alloys, NiTi alloy, applications - nanomaterials: preparation (bottom up and top down approaches), properties and applications - carbon nanotubes: types.

Text Books:
 1. W.D. Callister, David G. Rethwisch, Materials Science and Engineering: An Introduction, 9th ed., Wiley & Sons, 2013.
 2. W Bolton, Materials for Engineering, 2nd Edition, Routledge Publishers, USA, 2011.

Reference Books:
 1. Donald R. Askeland, Pradeep P. Fulay, Wendelin J. Wright, The Science and Engineering of Materials 6th Edition, Cenage Publications, 2010.
 2. G. F. Carter, Giles F. Carter and Donald E. Paul, Materials Science and Engineering, Digital Printing Edition, ASM International, 2011.
 3. William D. Callister, Jr., David G. Rethwisch, Fundamentals of Materials Science and Engineering: An Integrated Approach, 5th Edition International Student Version, Wiley & Sons, 2016.

Web References:
 1. <https://nptel.ac.in/downloads/112108150/>
 2. <https://nptel.ac.in/courses/113106032/1%20-%20Intro%20&%20History.pdf>
 3. <https://nptel.ac.in/courses/112108150/>

E-Text Books:
 1. <http://dl4a.org/uploads/pdf/Engineering%20Materials.pdf>
 2. https://books.google.co.in/books/about/A_Textbook_of_Electrical_Engineering_Materials.html?id=Ee8ruUXkJeMC

Outcomes:
At the end of the course students are able to:
 1. Suggest suitable engineering materials for different application.
 2. Identify various phases of metals and alloys through appropriate phase diagrams.
 3. Apply suitable heat treatment process based on material properties.
 4. Evaluate the effect of alloying elements, properties and application of ferrous and non-ferrous metals.
 5. Apply advanced materials such as polymers, ceramics and composites in product design.

MECHANICS OF SOLIDS

B.Tech III Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
20ME301	CORE	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	40	60	100
Contact Classes: 60	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. Get knowledge on simple stress and strains. 2. Computing the deflection on beams and shear force and bending moment diagram. 3. To evaluate the flexural of beams. 4. To understand and evaluate the torsion and strain energy. 5. To understand the concept of stress in thin cylinders. 								
UNIT-I	Simple Stresses and Strains						Classes:12	
Elasticity and plasticity – Types of stresses & strains – Hooke’s law – stress & strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson’s ratio & volumetric strain – Elastic moduli & the relationship between them – Deformation of simple and compound bars – Bars of varying section – composite bars – Thermal stresses.								
UNIT-II	Shear Force and Bending Moment Diagrams						Classes:12	
Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, 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	Flexural Stress						Classes:12	
Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis –Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections								
UNIT-IV	Torsion of Circular Shafts						Classes:12	
Theory of pure torsion- Derivation of torsion equations; $T/J=q/r=N\theta/L$ – Assumptions made in the theory of pure torsion- a torsional moment of resistance- polar section modulus. STRAIN ENERGY – Definition-Resilience – Gradual, sudden, impact and shock loadings.								
UNIT-V	Thick ,Thin Shells and Principal Stresses						Classes:12	
Stresses in thin cylindrical shell due to internal pressure, circumferential and longitudinal stresses and deformation in thin cylinders – spherical shells subjected to internal pressure – Deformation in spherical shells – Lamé’s theory – Application of theories of failure – Stresses on inclined planes – principal stresses and principal planes – Mohr’s circle of stress.								
Text Books:								
1. Strength of Materials by R.Subramaniam, oxford publishers.								

2. Strength of Materials by R.K. Bansal, Laxmi Publishers, 5th Edition,2012.

Reference Books:

1. Strength of Materials by S. Ramamrutham, Dhanpat Rai 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

Web References:

1. <https://nptel.ac.in/courses/112/107/112107146/>
2. <https://youtu.be/geqRGNIZGq8?list=PL9RcWoqXmzaLlfmNg2Ku1SdZtvXnYrLbc>

E-Text Books:

1. <https://wp.me/p2Mn3S-Pc>
2. <http://bit.ly/2T5Lzea>
3. <https://wp.me/p2Mn3S-OO>

Outcomes:

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

1. Explain the basic concepts of stress, strain and relation between them.
2. To understand the SFD and BMD and its importance in evolution of beams.
3. To understand the role of flexure stress and its influence on mechanical parts.
4. To understand and evaluate the torsions, in circular shafts.
5. To calculate the hoops and circumferential stress in thin cylinders.

FLUID MECHANICS AND HYDRAULIC MACHINERY

B.Tech III Semester: Common to ME & EEE								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
20ME303	Core	3	-	-	3	40	60	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. Know the basic properties and calculations of pressure measurement. 2. Understand the Kinematic and dynamic properties of fluids. 3. To understand the importance of dimensional analysis. 4. To understand the importance of various types of flow in pumps. 5. Learn Evaluation and performance of turbines. 								
UNIT-I	Basic Concepts and Properties						Classes:12	
Fluid – definition, the distinction between solid and fluid - Modules and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapor pressure, capillary and surface tension. Fluid statics concept of fluid static pressure, absolute and gauge pressures – pressure measurements by manometers and pressure gauges.								
UNIT-II	Flow Through Circular Conduits						Classes:12	
Hydraulic and energy gradient - Laminar flow through circular conduits and circular annuli- Boundary layer concepts – types of boundary layer thickness – Darcy Weisbach equation – friction factor- Moody diagram- commercial pipes- minor losses – Flow through pipes in series and parallel.								
UNIT-III	Fluid Dynamics and Dimensional Analysis						Classes:12	
Equations of motion - Euler's equation along a streamline - Bernoulli's equation, applications - Venturimeter, Orifice meter, Pivot tube. Need for dimensional analysis – methods of dimensional analysis – Similitude –types of similitude - Dimensionless parameters- application of dimensionless parameters – Model analysis..								
UNIT-IV	Pumps						Classes:12	
Centrifugal pumps– working principle – casing types, work done by the impeller - pumps in series and parallel-performance characteristic curves, Reciprocating pump- working principle - Discharge, slip, indicator diagrams Rotary pumps –classification- working principle-cavitation & NPSH.								
UNIT-V	Performances of Turbines						Classes:12	
Classification of turbines – heads and efficiencies – velocity triangles. Axial, radial and mixed flow turbines. Pelton wheel, Francis turbine and Kaplan turbines- working principles - work done by water on the runner – draft tube. Specific speed - unit quantities – performance curves for turbines – governing of turbines								
Text Books:								
1. Som, S. K., & Biswas, G. Introduction to fluid mechanics and fluid machines: Tata McGraw-								

Hill.

2. Bansal, R. K. A textbook of fluid mechanics and hydraulic machines: (in S.I. units): Laxmi Publications.

3. Massey, B. S., & Ward-Smith, J. Mechanics of fluids: Stanley Thornes.

Reference Books:

1. R. W., McDonald, A. T., & Pritchard, P. J. Introduction to fluid mechanics: Wiley.

2. A. K. Jain; Fluid Mechanics, Khanna Publishers, Delhi.

3. D.S. Kumar Kataria , Fluid Mechanics & Fluid Power Engineering, Publishers: D.S. Kumar, Kataria & Sons.

4. Kumar K.L., Engineering Fluid Mechanics, Eurasia Publishing House (P) Ltd., New Delhi.

Web References:

1. <https://nptel.ac.in/courses/112104117/>

2. <https://easyengineering.net/a-textbook-of-fluid-mechanics-and-and-hydraulic-machines-bansal/>

3. <https://lecturenotes.in/subject/95/fluid-mechanics-and-hydraulic-machines-fmhm>

4. <https://nptel.ac.in/downloads/112106200/>

E-Text Books:

1. <https://www.pdfdrive.com/fluid-mechanics-and-hydraulic-machines-e18705469.html>

2. <https://insightgovtexam.com/basic-fluid-mechanics-and-hydraulic-machines-pdf-free-download/>

OUTCOMES:

At the end of the course students able to

1. Employ the basic knowledge of hydraulics in finding fluid properties, performance parameters of hydraulic turbines and pumps.
2. To study 1-D viscous and non-viscous flow through pipes. Bernoulli's equation, laminar and turbulent flow.
3. Critically analyse the performance of pumps.
4. Critically analyse the performance of turbines

ENGINEERING THERMODYNAMICS

B.Tech III Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
20ME304	CORE	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	40	60	100
Theory Classes: 60	Tutorial Classes:	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
At the end of the course, the students are able to								
1. Gain the knowledge on heat and work conversion systems								
2. Employ the fundamental knowledge of conservation of mass, energy and work interactions.								
3. Can understand the first law of thermodynamics in design of thermal equipments.								
4. Derive the mathematical equations for reversible and irreversible phenomena and provide analytical and numerical solutions								
5. Apply the concept of second law to design simple heat energy conversion equipments								
6. Assess the performance of engineering systems and processes based on laws of thermodynamics								
7. Apply the concepts of entropy and energy in engineering analysis								
UNIT-I	Basics of Thermodynamics						Classes:12	
Basic Concepts: Definition, Macroscopic and Microscopic Approaches, Thermodynamic System, State, Properties, Process and Cycles, Quasi Static Process, Thermodynamic Equilibrium, Zeroth Law of Thermodynamics, reversible and irreversible processes.								
Work & Heat Conversions: Energy, Work and Heat transfers, types of work transfers, Point and Path Functions.								
First Law of Thermodynamics: First Law applied to a process and a cycle, Forms and transformation of Energy, Internal Energy, Enthalpy, PMM-I.								
Flow Systems: Control Volume, Open, closed and isolated systems, Steady and unsteady Flow Process, Mass and Energy Balance, Applications of Steady Flow Processes, Simple numerical problems								
UNIT-II	Second Law of Thermodynamics						Classes:12	
Heat Engines, Statements of Second law and their equivalence, Refrigeration and Heat Pump, Reversibility and Irreversibility, Carnot Cycle and Carnot's Theorem, Thermodynamic Temperature Scale, Efficiency of Reversible Heat Engines, PMM-II,								
Entropy: Entropy as a property, Entropy and irreversibility, T-S Plot, Clausius Theorem, Clausius Inequality, Principle of Entropy increase and its applications. Third law of thermodynamics, Available and unavailable Energy, Helmholtz and Gibbs functions, irreversibility, Numerical problems								
UNIT-III	Properties of Pure Substances						Classes:12	
Pure substance, Property of Pure Substance (steam), Triple point, Critical point, Saturation states, Subcooled liquid state, Superheated vapour state, Phase transformation process of water, Graphical representation of pressure, volume and temperature, P-T, P-V and P-h diagrams, T-S and H-S diagrams, Steam-Tables & Mollier chart, Dryness factor and its measurement,								
Thermodynamic Relations: Maxwell's equations, TDS equations, Joule-Kelvin Effect, Clausius-clapeyron equation								
UNIT-IV	Properties of Gases and Gas Mixtures						Classes:12	

Ideal Gas, Equation of State, Avogadro's Law, Internal Energy and Enthalpy of Ideal Gas, Entropy Change of Ideal Gas, Mixture of Gases- Dalton's Law of Partial Pressure , Specific Heats, Internal Energy and Enthalpy of Gas Mixtures		
UNIT-V	Psychrometry	Classes:12
Air-water vapour mixture and Psychrometry: Properties of Atmospheric air Psychrometric terms and their definitions, Psychrometric chart, Different Psychrometric processes, Dehumidification and Humidification and their representation on Psychrometric chart. Evaporative Cooling, Adiabatic mixing of two moist air streams.		
Text Books: 1. Engineering Thermodynamics, P.K Nag, TMH Publishers, New Delhi.		
Reference Books: 1. Engineering Thermodynamics by P. Chattopadhyaya, Oxford. 2. Fundamentals of Thermodynamics – Sonntag, Borgnakke and van wylen, John Wiley & sons (ASIA) Pvt Ltd. 3. Thermodynamics – An Engineering Approach – YunusCengel& Boles, TMH. 4. Thermodynamics – J.P.Holman, McGrawHill. 5. An introduction to Thermodynamics, YVC Rao, Universities press. 6. Engineering Thermodynamics – J.B. Jones & R.E.Dugan, PHI.		
OUTCOMES: At the end of the course students able to: 1. The students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions. 2. Students can evaluate changes in thermodynamic properties of substances. 3. The students will be able to evaluate the performance of energy conversion devices. 4. The students will be able to differentiate between high grade and low-grade energies. 5. Apply mathematical fundamentals to study the properties of steam, gas and gas mixtures.		

STRENGTH OF MATERIALS LABORATORY

B.Tech III Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
20ME305	CORE	L	T	P	C	CIA	SEE	TOTAL
		0	0	3	1.5	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. Evaluate deflection in beams 2. Evaluate compressive strength of cube 3. calculate surface hardness of metals 4. calculate stiffness of helical spring 5. calculate twist in cast iron rod 6. Evaluate impact strength of material 								
LIST OF EXPERIMENTS								
Expt. 1	Deflection test on cantilever beam							
To determine deflection on cantilever beam								
Expt. 2	Deflection test on simply supported beam							
To determine deflection on simply supported beam								
Expt. 3	Deflection test on fixed beam							
To determine deflection on fixed beam								
Expt. 4	Deflection test on helical spring							
To determine the deflection on helical spring to find stiffness in spring								
Expt. 5	Torsion test on cast iron bar							
To perform torsion test on cast iron bar to find twist in it								
Expt. 6	Hardness test on Rockwell hardness testing machine							
To perform hardness test on steel, aluminum, copper to find Rockwell hardness number								
Expt. 7	Compression test on cube							
To perform compression test on cube to find compressive strength of concrete cube.								
Expt. 8	Tension test on HYSD bar							
To observe the behavior of HYSD specimen when subjected to uni-axial tensile load								
Expt. 9	Charpy and Izod impact test							
To determine the impact strength of given material by conducting Charpy impact test								
Web References:								
1. https://en.wikipedia.org/wiki/strength of materials								
2. https://en.wikipedia.org/wiki/strength								
Course Home Page								
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:								
SOFTWARE: NO								
HARDWARE: Torsion testing machine, Universal testing machine, spring testing apparatus,								

izod and charpy testing apparatus, Rockwell hardness testing machine, Universal frame, weight carrier, set of weights, Dial gauge and Vernier callipers

OUTCOMES:

At the end of the course students able to:

1. The Flexural rigidity of the beams by conducting deflection test.
2. To evaluate the Rockwell and Brinell hardness numbers of different materials
3. Evaluate the stiffness of spring
4. Evaluate the impact strength of materials
5. Can be able evaluate compression strength of cube
6. Evaluate the torsion of MS rod modulus of rigidity

FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

B.Tech III Semester: Mechanical Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
20ME306	Core	L	T	P	C	CIA	SEE	Total
		-	-	3	1.5	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. Use various flow measurement instruments. 2. Calculate the losses and discharge in pipes and conduct performance tests on pumps and turbines to find the efficiency. 3. Demonstrate a systematic approach in conducting experiments. 4. Prepare reports on the data collected and draw inferences. 								
LIST OF EXPERIMENTS								
Expt. 1	VENTURI METER							
Calibration of Venturi meter.								
Expt. 2	ORIFICEMETER							
Calibration of Orificemeter.								
Expt. 3	FRICITION FACTOR IN FLOW THROUGH PIPES							
Determination of Friction Factor in Flow through Pipes.								
Expt. 4	MINOR LOSSES IN FLOW THROUGH PIPES							
Determination of various minor losses in Flow through Pipes.								
Expt. 5	IMPACT OF JET ON VANES							
Impact of Jet on Vanes								
Expt. 6	TURBINE FLOW METER							
Calibration of turbine flow meter.								
Expt.7	SINGLE STAGE CENTRIFUGAL PUMP							
Performance Test on single stage Centrifugal Pump.								
Expt. 8	MULTISTAGE CENTRIFUGAL PUMP							
Performance Test on Multistage Centrifugal Pump.								
Expt. 9	RECIPROCATING PUMP							
Performance Test on Reciprocating Pump.								

Expt. 10	PELTON WHEEL
Performance Test on pelton wheel	
Reference Books:	
<ol style="list-style-type: none"> 1. H Modi, Seth, “Hydraulics, Fluid Mechanics and Hydraulic Machinery”, Rajsons Publications, 20th Edition, 2013 2. Rajput, “Fluid Mechanics and Hydraulic Machines”, S.Chand & Co, 6th Edition, 1998 	
Web References:	
<ol style="list-style-type: none"> 1. https://nptsel.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/fluid_mechanics/index.htm 2. D.S. Kumar, “Fluid Mechanics and Fluid Power Engineering”, Kotaria & Sons, 2013. 	
Course Home Page:	
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:	
SOFTWARE: NO	
HARDWARE: Venturi meter, Orificemeter, Flow through Pipes, Jet on Vanes, turbine flow meter, single stage Centrifugal Pump, Multistage Centrifugal Pump, Reciprocating Pump and pelton wheel.	
Course Outcome:	
At the end of the course, a student will be able to:	
<ol style="list-style-type: none"> 1. Find out coefficient of discharge on Venturi meter and Orifice meter. 2. Loss of energy due to friction. 3. Displacement of vanes by water jet. 4. Performance of Multistage Centrifugal Pump. 	

MATERIAL SCIENCE AND METALLURGY LABORATORY

B.Tech III Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
20ME307	CORE	L	T	P	C	CIA	SEE	TOTAL
		-	-	3	1.5	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes:45			
OBJECTIVES: The course should enable the students to:								
<ol style="list-style-type: none"> 1. Prepare Metallographic samples for microscopic examinations 2. Analyze the microstructure and estimate the amount of porosity and grain size of the 3. Apply the knowledge of phase diagrams and testing methods to suit design specification. 								
Experiment:1	Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al							
Experiment:2	Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C Steels							
Experiment:3	Study of the Micro Structures of Cast Irons							
Experiment:4	Study of the Micro Structures of Non-Ferrous alloys							
Experiment:5	Study of the Micro structures of Heat treated steels							
Experiment:6	Hardeneability of steels by Jominy End Quench Test							
Experiment:7	To find out the hardness of various treated and untreated steels							
Experiment:8	To find out the hardness of various heat treated and untreated plain carbon Steels							
Experiment:9	Preparation and study of crystal models for simple cubic, body centred cubic, Face centred cubic and hexagonal close packed structured							
Experiment:10	Study of the Microstructure of different alloy steels.							
Reference Books:								
<ol style="list-style-type: none"> 1. https://www.amazon.in/Reference-Computer-Aided-Design-Laboratory/dp/8131806014. 2. http://noteskhan.blogspot.com/2016/06/me6711-simulation-and-analysis.html 								
Web References:								
<ol style="list-style-type: none"> 1. https://studentsfocus.com/me6711-simulation-and-analysis-laboratory-lab-manual-download-mech-7th-sem-anna-university/ 								
Course Home Page:								
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:								
SOFTWARE: NO								
HARDWARE: Jominy End Quench, Muffle furnace, Microscope.								
Course Outcome:								
At the end of the course, a student will be able to:								
<ol style="list-style-type: none"> 1. Upon completion of this course, the Students can model, analyse and simulate 								

experiments to meet real world system and evaluate the performance.

Auto CAD
(SKILL ORIENTED COURSE-I)

B.Tech III Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
20ME308	SO	L	T	P	C	CIA	SEE	TOTAL
		-	-	3	1.5	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes:45			
OBJECTIVES: The course should enable the students to:								
1. To develop skill to use software to create 2D and 3D models								
Experiment:1	Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.							
Experiment:2	Drawing of a Title Block with necessary text and projection symbol.							
Experiment:3	Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.							
Experiment:4	Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.							
Experiment:5	Drawing front view, top view and side view of objects from the given pictorial views (eg. Vblock, Base of a mixie, Simple stool, Objects with hole and curves).							
Experiment:6	Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)							
Experiment:7	Drawing of a simple steel truss.							
Experiment:8	Drawing sectional views of prism, pyramid, cylinder, cone, etc,							
Experiment:9	Drawing isometric projection of simple objects.							
Experiment:10	Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.							
Reference Books:								
1. https://www.amazon.in/Reference-Computer-Aided-Design-Laboratory/dp/8131806014 .								
2. https://www.abebooks.com/9788183714365/Computer-Aided-Drafting-Modeling-Lab-8183714366/plp								
Web References:								
1. https://mrcet.com/pdf/Lab%20Manuals/ANE%20II-I%20SEM.pdf								
2. https://www.scribd.com/document/319146615/ME6261-Computer-Aided-Drafting-and-Modeling-Lab-pdf								
Course Home Page:								
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:								
SOFTWARE: Licensed software for Drafting and Modeling								
HARDWARE: Pentium IV computer or better hardware, with suitable graphics facility, Laser Printer or Plotter to print / plot drawings.								

Course Outcome:

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

1. ability to use the software packers for drafting and modelling
2. ability to create 2D and 3D models of Engineering Components

CONSTITUTION OF INDIA

B.Tech III Semester : Common to All Branches								
Course code	Category	Hours/week			Credits	Maximum Marks		
20MC301	MC	L	T	P	C	CIA	SEE	TOTAL
		2	0	0	0	0	40	60
Contact Classes: 24	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:24			
OBJECTIVES:								
<p>The course should enable the students to:</p> <ol style="list-style-type: none"> 1. Understand the premises informing the twin themes of liberty and freedom from a civil right perspective. 2. 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. 3. 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. 								
UNIT-I	HISTORY OF MAKING OF THE INDIAN CONSTITUTION & PHILOSOPHY OF THE INDIAN CONSTITUTION						Classes: 08	
History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution: Preamble, Salient Features								
UNIT-II	CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES						Classes: 04	
Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.								
UNIT-III	ORGANS OF GOVERNANCE						Classes: 04	
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive President, Governor, Council of Minister. Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions								
UNIT-IV	LOCAL ADMINISTRATION						Classes: 04	
District’s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grassroot democracy								
UNIT-V	ELECTION COMMISSION						Classes: 04	
Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.								
Text Books:								
1. Dr. S. N. Busi, “Dr. B. R. Ambedkar framing of Indian Constitution”, 1 st Edition, 2015.								

2. M. P. Jain, “Indian Constitution Law”, Lexis Nexis, 7th Edition, 2014.

E-Text Books:

1. <https://www.india.gov.in/my-government/constitution-india/constitution-india-full-text>

Web References:

1. <http://www.constitution.org/cons/india/p18.html>

Outcomes:

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

1. Understand the premises informing the twin themes of liberty and freedom from a civil right perspective.
2. Address the growth of Indian opinion regarding modern Indian intellectuals.
3. “ Constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
4. 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.
5. Understand the fundamental rights and Local Administration
Knowing about Election Commission.

MANUFACTURING TECHNOLOGY

B.Tech IV Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
20ME401	CORE	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	40	60	100
Contact Classes: 60	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to:								
1. To give an exposure to different techniques of casting and molds required.								
2. To give an understanding of welding metallurgy and weldability and to introduce various metal joining techniques.								
3. To understand the concept and basic mechanics of metal cutting, working of standard machine tools such as lathe, shaping and allied machines, milling, drilling and allied machines, grinding and allied machines and broaching.								
4. To understand the basic concepts of Computer Numerical Control (CNC) of machine tools and CNC Programming								
UNIT-I	Metal Casting Processes						Classes:14	
Sand Casting : Sand Mould – Type of patterns - Pattern Materials – Pattern allowances – Moulding sand Properties and testing – Cores –Types and applications – Moulding machines– Types and applications; Melting furnaces : Blast and Cupola Furnaces; Principle of special casting processes : Shell - investment – Ceramic mould – Pressure die casting - Centrifugal Casting - CO2 process – Stir casting; Defects in Sand casting								
UNIT-II	Joining Processes						Classes:12	
Operating principle, basic equipment, merits and applications of: Fusion welding processes: Gas welding - Types – Flame characteristics; Manual metal arc welding – Gas Tungsten arc welding - Gas metal arc welding – Submerged arc welding – Electro slag welding; Operating principle and applications of: Resistance welding - Plasma arc welding – Thermit welding – Electron beam welding – Friction welding and Friction Stir Welding; Brazing and soldering; Weld defects: types, causes and cure.								
UNIT-III	Manufacture of Plastic Components						Classes:10	
Types and characteristics of plastics – Moulding of thermoplastics – working principles and typical applications – injection moulding – Plunger and screw machines – Compression moulding, Transfer Moulding – Typical industrial applications – introduction to blow moulding – Rotational moulding – Film blowing – Extrusion – Thermoforming – Bonding of Thermoplastics.								
UNIT-IV	Theory of Metal Cutting and Turning Machines						Classes:12	
Mechanics of chip formation, single point cutting tool, forces in machining, Types of chip, cutting tools– nomenclature, orthogonal metal cutting, thermal aspects, cutting tool materials, tool wear, tool life, surface finish, cutting fluids and Machinability. Centre lathe, constructional features, specification, operations – taper turning methods, thread cutting methods, special attachments, Capstan and turret lathes– automatic lathes								

UNIT-V	Shaper, Drilling, Milling, Gear Cutting Machines and CNC Machine	Classes:12
<p>Shaper – Types of operations. Drilling, reaming, boring, Tapping. Milling operations-types of milling cutter. Gear cutting – forming and generation principle and construction of gear milling, hobbing and gear shaping processes –finishing of gears</p> <p>Numerical Control (NC) machine tools – CNC types, constructional details, special features, machining centre, part programming fundamentals CNC –manual part programming.</p>		
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Manufacturing Technology, Kalpak Jian, Pearson education 2. Rao. P.N “Manufacturing Technology - Metal Cutting and Machine Tools”, 3rd Edition, Tata McGraw-Hill, New Delhi, 2013. 		
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Richerd R Kibbe, John E. Neely, Roland O. Merges and Warren J.White “Machine Tool Practices”, Prentice Hall of India, 1998 2. Geoffrey Boothroyd, "Fundamentals of Metal Machining and Machine Tools", Mc Graw Hill, 1984 3. HMT, "Production Technology", Tata McGraw Hill, 1998. 4. Roy. A.Lindberg, “Process and Materials of Manufacture,” Fourth Edition, PHI/Pearson Education 2006. 		
<p>Web References:</p> <ol style="list-style-type: none"> 1. https://nptel.ac.in/downloads/112105129/ 2. https://nptel.ac.in/syllabus/112105129/ 		
<p>E-Text Books:</p> <ol style="list-style-type: none"> 1. <u>EEF, the manufacturers' organisation – industry group representing uk manufacturers</u> 		
<p>Course Outcome:</p> <p>At the end of the course, a student will be able to:</p> <ol style="list-style-type: none"> 1. Explain the mechanism of material removal processes. 2. Describe the constructional and operational features of centre lathe and other special purpose lathes 3. Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines. 4. Explain different metal casting processes, associated defects, merits and demerits 5. Summarize numerical control of machine tools and write a part program. 6. Distinguish various methods of manufacturing plastic components 		

INDUSTRIAL ENGINEERING AND MANAGEMENT

B.Tech IV Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
20BS401	CORE	3	-	-	3	40	60	100
Contact Classes:60	Tutorial Classes:	Practical Classes:			Total Classes:60			
<p>OBJECTIVES: The course should enable the students to :</p> <ol style="list-style-type: none"> 1. Understand the Levels, Functions and importance of Management. 2. Understand the concepts related to Organizational Structures. 3. Design Plant Location and Plant Layout. 4. Understand the working principle of Human Resource Management& marketing management. 								
UNIT-I	Introduction to Management						Classes:12	
<p>Introduction to Management: Definition, Levels of Management, Functions of Management, Role and Importance of Management, Types of Management, Social responsibility of Management - Evolution of Management Thought : Taylor's Scientific Management, Fayol's Principles of Management, Douglas Mc-Gregory's Theory X and Theory Y, Hertzberg's Two Factor Theory of Motivation, Maslow's Hierarchy of Human Needs - Systems Approach to Management.</p>								
UNIT-II	Organizational Structures						Classes:12	
<p>Organizational Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff Organization, functional organization, Committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundary less organization, inverted pyramid structure, lean and flat Organization structure) and their merits, demerits and suitability</p>								
UNIT-III	Plant Location, Plant Layout and Project Management						Classes:12	
<p>Plant Location and Plant Layout: Types of production, Plant location, definition, factors affecting the plant location, comparison of rural and urban sites-methods for Selection of plant. Plant Layout - definition, objectives, types of plant Layout - Principles of material handling.</p> <p>Function of Production Planning and Control: Phases, Forecasting, Planning, Scheduling, Controlling, Follow up and expediting.</p>								
UNIT-IV	Project Management						Classes:12	
<p>Project Management: Introduction to PERT / CPM, GANTT charts, Uses of Network analysis, Rules for Network Construction, Difference between PERT and CPM, Determination of Critical Path-probability of completing the Project, critical path calculation, Types of floats, introduction to crashing.</p>								
UNIT-V	Introduction to Human Resource Management and Marketing Management						Classes:12	

Introduction to Human Resource Management: Functions of HRM, Job Evaluation, different types of evaluation Methods. Job description, Merit Rating, Performance Appraisal, Wage and Salary Administration.

Marketing Management: Selling, Marketing, Marketing Functions, Centralization and Decentralization, marketing strategies, distribution channels..

Text Books:

1. Amrine, Manufacturing Organization and Management, Pearson, 2nd Edition, 2004
2. Industrial Engineering and Management O.P. Khanna Dhanpatrai Rai.
3. Management Science – A.R.Aryasri, TMH

Reference Books:

1. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2005
2. Panner Selvam, Production and Operations Management, PHI, 2004.
3. Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Reliability Engineering & Quality Engineering, Galgotia Publications, Pvt., Limited.

Web References:

1. <https://ssmengg.edu.in/weos/weos/upload/EStudyMaterial/Mechanical/6thSem/industrial%20engineering%20Unit1/INDUSTRIAL-ENGINEERING.pdf>
2. https://mrcet.com/downloads/digital_notes/ECE/II%20Year/Management%20Science.pdf
3. [https://nscpolteksby.ac.id/ebook/files/Ebook/Hospitality/Production%20and%20Operations%20Management%20\(2008\)/3.%20Chapter%202%20%20PLANT%20LOCATION%20AND%20LAYOUT.pdf](https://nscpolteksby.ac.id/ebook/files/Ebook/Hospitality/Production%20and%20Operations%20Management%20(2008)/3.%20Chapter%202%20%20PLANT%20LOCATION%20AND%20LAYOUT.pdf)

E-Text Books:

1. <https://mechzoneblog.files.wordpress.com/2017/08/industrial-engg-mgmt-o-p-khanna.pdf>
2. http://www.opentextbooks.org.hk/system/files/export/18/18769/pdf/Operations_Management_18769.pdf

Outcomes:

At the end of the course students are able to:

1. Design organization structure and implement management principles in real time business environment
2. Design layouts for different types of industries, manufacturing, process and service sectors
3. Elaborate productivity and profitability by implementing work-study and SQC
4. Select and maintain skilled and sufficient manpower for various business proposals
5. Find sites for all kinds of industries
6. Design a best method of making a product

THERMAL ENGINEERING

B.Tech IV Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
20ME402	CORE	3	-	-	3	40	60	100
Contact Classes:60	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. To understand Classification of engines is studied 2. Student will be known about combustion in different types of engines 3. The student will be known solutions for better carburetion, fuel injection, ignition and lubrication. 4. The student will be known to minimize harmful emissions and to maximize. 5. To apply the thermodynamic concepts into various thermal application like IC engines, Steam. 								
UNIT-I	I.C. Engines					Classes:12		
I.C. Engines: Definition of Engine and Heat Engine, I.C Engine Classification – Parts of I.C.Engines, Working of I.C. Engines, Two Stroke & Four Stroke I.C.Engines S.I and C.I Engines, Valve and Port Timing Diagrams. Engine System: Fuel Supply Systems, simple carburetor, Fuel Injection Systems. Cooling Systems Lubrication Systems. Ignition System.								
UNIT-II	Testing and Performance					Classes:12		
Testing and Performance: Parameters of Performance - Measurement of Cylinder Pressure, Fuel Consumption, Air Intake, Exhaust Gas Composition, and Brake Power – Determination of Frictional Losses and Indicated Power – Performance Test – Heat Balance Sheet- Sankey diagram and pie diagram.								
UNIT-III	Power Cycles					Classes:12		
Air Standard Cycles , Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericsson Cycle, Joule Cycle – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis, Rankine cycles – Performance Evaluation, Refrigeration Cycles- Bell-Coleman cycle, Vapour compression cycle-performance Evaluation.								
UNIT-IV	Air Compressor					Classes:12		
Classification and working principle of various types of compressors, work of compression with and without clearance, Volumetric efficiency, Isothermal efficiency and Isentropic efficiency of reciprocating compressors, Multistage air compressor and inter cooling –work of multistage air Compressor.								
UNIT-V	Steam Nozzles and Turbines					Classes:12		
Flow of steam through nozzles, shapes of nozzles, effect of friction, critical pressure ratio, supersaturated flow. Impulse and Reaction principles, compounding, velocity diagram for simple and multi-stage turbines, speed regulations –Governors.								
Text Books:								

1. Internal Combustion Engines / V. Ganesan- TMH, 4th Edition,2012
2. Rajput. R. K., "Thermal Engineering" S.Chand Publishers, 2000
3. Kothandaraman.C.P., Domkundwar. S,Domkundwar. A.V., "A course in thermal Engineering", Fifth Edition, "Dhanpat Rai & sons , 2002.

Reference Books:

1. Engineering fundamentals of IC Engines – Pulkrabek, Pearson, PHI, 2nd Edition,2009
2. Thermal Engineering, Rudramoorthy – TMH, 10th Edition,2010
3. Thermodynamics & Heat Engines, B. Yadav, Central publishing house., Allahabad
4. I.C. Engines fundamentals, Heywood, McGraw-Hill, 1st Edition,2011

Web References:

1. <https://nptel.ac.in/courses/112103262/>
2. <https://nptel.ac.in/courses/101101001/28>

E-Text Books:

1. <https://easyengineering.net/a-textbook-of-internal-combustion-engines-by-r-k-rajput/>
2. <https://easyengineering.net/internal-combustion-engines-ganesan/>
3. <http://krishikosh.egranth.ac.in/bitstream/1/2049284/1/24478.pdf>

Outcomes:

At the end of the course students are able to:

1. Employ the basic knowledge of an engine and compressor in developing the analytical models
2. Analyse the parameters used to increase the performance and reducing the knock in spark ignition and compression ignition engines
3. Design solutions for better carburetion, fuel injection, ignition and lubrication
4. List design considerations favorable for minimizing harmful emissions and maximizing the power output.
5. Calculate performance parameters of IC Engines.

KINEMATICS OF MACHINERY

B.Tech IV Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
20ME403	CORE	L	T	P	C	CIA	SEE	TOTAL
		3	-	-	3	40	60	100
Contact Classes:60	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. The objective is to study the relative motion, velocity, and accelerations of the various elements in a mechanism 2. In Mechanical Engineering, we come across a number of mechanisms such as four bar/slider crank/double slider crank/straight line motion mechanism etc. 3. Study of Mechanism deals with only relative motions 4. To understand the gears and cam mechanics 								
UNIT-I	Basics of Mechanisms						Classes:12	
Mechanisms and Machines: Elements or Links – Classification, Types of kinematic pairs, constrained motion – completely, partially or successfully constrained and incompletely constrained. Classification of mechanisms and machines – kinematic chain – inversion of mechanisms – inversions of quadric cycle chain – single and double slider crank chain, Mobility of mechanisms., Straight Line Motion Mechanisms- Exact and approximate, Pantograph								
UNIT-II	Belt, Rope and Chain Drives						Classes:12	
Belt, Rope and Chain Drives : Belt and rope 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, Chains- length, angular speed ratio, classification of chains.								
UNIT-III	Friction in Machine Elements						Classes:12	
Surface contacts – Sliding and Rolling friction – Friction drives – Friction in screw threads – Bearings and lubrication – Friction clutches – Band and Block brakes. Friction aspects in brakes– Friction in vehicle propulsion and braking.								
UNIT-IV	Kinematics						lasses:12	
Kinematics: Velocity and Acceleration Diagrams- Velocity and acceleration – Motion of link in the machine –Determination of Velocity and acceleration – Graphical method – Application of relative velocity method – Slider-crank mechanism, four bar mechanism. Acceleration diagrams for simple mechanisms, Coriolis acceleration, and determination of the Coriolis component of acceleration. Kleins construction. Analysis of the slider-crank mechanism for displacement, velocity, and acceleration of slider using analytical method Instantaneous Centre Method: Instantaneous center of rotation, centroid, and axode – relative motion between								
UNIT-V	Gears and Gear Trains						Classes:12	
Law of toothed gearing – Involute and cycloidal tooth profiles –Spur Gear terminology and definitions –Gear tooth action – contact ratio – Interference and undercutting. Helical, Bevel, Worm, Rack and Pinion gears [Basics only]. Gear trains – Speed ratio, train value – Parallel								

axis gear trains – Epicyclic Gear Trains.

Text Books:

1. Theory of Machines, S.S. Rattan, Tata McGraw Hill Publishers, 3rd Edition, 2013.
2. Kinematics and dynamics of machinery, R.L Norton, Tata McGraw Hill Publishers, 1st Edition, 2009.
3. Theory of Machines and Mechanisms, 3rd Edition, J.E. Shigley et., Oxford International Student Edition

Reference Books:

1. Theory of Machines and Mechanisms, 3rd Edition, J.E. Shigley et., Oxford International Student Edition.
2. Theory of Machines, Thomas Bevan, Pearson (P) 3rd Edition, 2012.

Web References:

1. <https://nptel.ac.in/courses/112104121/>
2. <https://nptel.ac.in/syllabus/112104121/>
3. <https://www.btechguru.com/GATE--mechanical-engineering--theory-of-machines-video-lecture--23--189.html>

E-Text Books:

1. <http://royalmechanicalbuzz.blogspot.com/2015/04/theory-of-machines-by-rs-khurmi-ebookpdf.html>
2. <https://easyengineering.net/me6401-kinematics-of-machinery/>
3. <https://wifigyan.com/theory-of-machines-rs-khurmi-pdf/>

Outcomes:

At the end of the course students are able to:

1. Familiarize the motion of mechanism- to define a mechanism and to do kinematic construction for a variety of mechanism used in the application
2. Introduce basic mechanisms such as slider-crank linkages, a four-bar linkage, gear, and cam, perform the motion analysis using both graphical and analytical methods
3. Apply the knowledge gained in the earlier course engineering mechanics to a system of rigid bodies which are interconnected with constraints
4. Trouble-shoot problems associated with simple machine components such as cams, gears, gear trains, belt and chain drives

ECONOMICS FOR ENGINEERS

B.Tech IV Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
20HS401	HS	L	T	P	C	CIA	SEE	TOTAL
		3	-	-	3	40	60	100
Contact Classes:60	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to:								
1. To create knowledge over economic aspects								
2. To understand modern principles and methods of microeconomics of real-world business problems.								
3. To master the knowledge over the basic tools of micro economics and real world business problems.								
4. To understand various accounting concepts and its applications in managerial decision-making.								
UNIT-I	Introduction to Managerial Economics						Classes:10	
Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics– Demand Analysis: Determinants, Law of Demand and its exceptions. Elasticity of Demand: Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, methods, (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)								
UNIT-II	Theory of Production						Classes:12	
Theory of Production: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts, Opportunity cost, fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-Even Analysis : (BEA)-Determination of Break-Even Point (simple problems) Market: Types of competition, Price-Output Determination in case of Perfect Competition and Monopoly, Monopolistic competition. Methods of Pricing: Cost, competition, strategy based pricing								
UNIT-III	Business and Capital Types						Classes:10	
Business Types: Business, features, Sole Proprietorships, Partnerships, Joint Stock Companies, Public Enterprises and their types. Capital and Capital Budgeting: Capital and its significance, Types and sources of raising finance. Nature and scope of Capital Budgeting, Features, Methods: Payback Method, Accounting Rate of Return Method (ARR) and Net Present Value Method (simple problems)								
UNIT-IV	Financial Accounting						Classes:14	
Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts. (Simple Problems)								
UNIT-V	Financial Analysis Through Ratios						Classes:14	
Financial Analysis through Ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS), (Simple								

Problems).

Text Books:

1. Managerial Economics and Financial Analysis, J.V.Prabhakar Rao, Maruthi Publications, 2011
2. Managerial Economics and Financial Analysis, N. Appa Rao. & P. Vijaya Kumar, Cengage Publications, New Delhi, 2011

Reference Books:

1. Managerial Economics and Financial Analysis, A R Aryasri, TMH, 2011
2. Managerial Economics, Suma damodaran, Oxford, 2011

Web References:

1. <http://www.economicdiscussion.net/production-function/least-cost- and-maximum-output-combinations- of-input/23264>.
2. <https://www.ilearnlot.com/capital-budgeting-nature-importance-and- limitations/>

E-Text Books:

1. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE _ MEFA_ LECTURE _ NOTES_1.pdf
2. https://mrcet.com/downloads/digital_notes/EEE/MEFA %20DIGITAL%20NOTES. pdf

OUTCOMES:

At the end of the course students able to

1. Micro as well as macro, economic concepts that are useful in business decision making.
2. To help students better recognize the application of modern principles and methods of microeconomics to real-world business problems in different contexts.
3. To master the basic tools of microeconomics: supply and demand analysis; firms' production and pricing decisions, market equilibrium and market structure analysis.
4. The objective of this course is to acquaint the students regarding various accounting concepts and its application in managerial decision making.

MANUFACTURING TECHNOLOGY LAB

B.Tech IV Semester – Mechanical Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
20ME404	Core	L	T	P	C	CIA	SEE	Total
		-	-	3	1.5	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
OBJECTIVES:								
The course should enable the students to:								
1. To Study and practice the various operations that can be performed in lathe, shaper, drilling, milling machines etc. and to equip with the practical knowledge required in the core industries.								
LIST OF EXPERIMENTS								
Experiment:1	Pattern design and making of single piece pattern							
Experiment:2	Preparing of moulds with wooden patterns							
Experiment:3	Fabricating simple structural shapes using Gas Metal Arc Welding machine.							
Experiment:4	Taper Turning and Eccentric Turning on circular parts using lathe machine.							
Experiment:5	Knurling, external and internal thread cutting on circular parts using lathe machine.							
Experiment:6	Shaping – Square and Hexagonal Heads on circular parts using shaper machine.							
Experiment:7	Plastic Moulding of Injection Moulding							
Experiment:8	Drilling and Reaming using vertical drilling machine.							
Experiment:9	Press Working Operations of Blanking and cup drawing.							
Experiment:10	Milling contours on plates using vertical milling machine.							
Experiment:11	Cutting spur and helical gear using milling machine.							
Experiment:12	Job on cylindrical and surface grinding							
Experiment:13	Job on Keyway cutting by slotting machine.							
Reference Books:								
1. Manufacturing Technology, R.K. Rajput, Laxmi Pub, 1 st Edition,2007,.								
2. Production Technology, K.L Narayana, I.K. International Pub, 3 rd Edition,2013								

3. Principles of Metal Castings, Rosenthal, Tata Mc Graw Hill, 2nd Edition,2001
4. Manufacturing Process Vol. I, H.S.Shah Pearson, 2013,

Web References:

1. <http://kgr.ac.in/beta/wp-content/uploads/2018/09/Manufacturing-Process-Lab-Manual.pdf>
2. <https://www.vvitengineering.com/lab/odd/ME6311-Manufacturing-Technology-Lab-I.pdf>

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

SOFTWARE:NO

HARDWARE: Single Piece Pattern, Split Piece Pattern, arc welding, Injection moulding, press working, lathe machine, drilling machine , milling machine, shaping machine, slotting machine, surface and cylindrical grinding machines.

Course Outcome:

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

1. Able to make wooden pattern for casting mould
2. Make the work piece as per given shape and size using Lathe.
3. Hands on experience on various arc welding processes
4. Can perform various plastic moulding process.
5. Using hydraulic press forging techniques applied on sheet metal

THERMAL ENGINEERING LAB

B.Tech IV Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
20ME405	CORE	L	T	P	C	CIA	SEE	TOTAL
		-	-	3	1.5	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes:45			
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 2. Gain the knowledge about Working principle of two stroke and four stroke SI and CI Engines 3. Gain the knowledge about engine associated systems such as lubricating system, cooling system, fuel feed system, ignition system, their necessity, requirements, construction details, different types and their working. 4. Gain the knowledge the concept of combustion in Spark ignition engine, Pressure Vs crank angle diagrams, and pre-ignition 5. Gain the knowledge about performance calculations in I.C.Engine 6. Gain the knowledge about engine pollution and working of catalytic converter 								
Experiment:1	I.C. Engines valve / port timing diagrams							
Experiment:2	I.C. Engines performance test (4 - Stroke diesel engines)							
Experiment:3	Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine							
Experiment:4	I.C. Engines heat balance.							
Experiment:5	Economical speed test of an IC engine							
Experiment:6	Measure quality of steam by using throttling and separating calorimeter							
Experiment:7	Performance test on reciprocating air compressor unit							
Experiment:8	COP of Refrigeration Unit							
Experiment:9	Performance of A/C System							
Experiment:10	Study of Boilers							
Experiment:11	Determination of Flash & Fire points of Liquid fuels/ Lubricants							
Experiment:12	Determination of the cloud and pour points of a given sample of oil.							
Experiment:13	Determination of Calorific value of Gaseous Fuels							
Experiment:14	Determination of kinematic and dynamic Viscosity of Liquid lubricants and Fuels using Saybolt Viscometer							
Experiment:15	Determination of the cloud and pour points of a given sample of oil.							
Reference Books:								
<ol style="list-style-type: none"> 1.Internal combustion engines by V.Ganeshesan 2. Engine Testing 4th Edition, The Design, Building, Modification and Use of Power train Test Facilities 								

Web References:

1. https://www.iitg.ac.in/mech/lab_ice.php
2. <http://www.jiscollege.ac.in/me/pdf/ic-laboratory.pdf>

Course Home Page:**SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:****SOFTWARE:**NO**HARDWARE:** I.C. Engines, 4-stroke multi cylinder petrol engine, boiler, Refrigeration Unit, A/C System, reciprocating air compressor unit, throttling and separating calorimeter, 4-stroke multi cylinder petrol engine.**Course Outcome:**

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

1. Evaluate the performance of IC engines.
2. Perform heat balance analysis of IC engines.
3. Evaluate the performance of a reciprocating air compressor.
4. Evaluate the performance of refrigeration and air conditioning systems.
5. Plot Valve and Port timing diagrams of 4-stroke and 2-stroke engines.
6. Compile and present specifications of two and four wheelers.

**ANSYS
(SKILL ORIENTED COURSE-II)**

B.Tech IV Semester: Mechanical Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
20ME407	SO	L	T	P	C	CIA	SEE	TOTAL
		-	-	3	1.5	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes:45			
OBJECTIVES:								
The course should enable the students to:								
1. To give exposure to software tools needed to analyze engineering problems.								
2. To expose the students to different applications of simulation and analysis tools.								
Experiment:1	Force and Stress analysis using link elements in Trusses, cables etc.							
Experiment:2	Stress and deflection analysis in beams with different support conditions.							
Experiment:3	Stress analysis of flat plates and simple shells.							
Experiment:4	Stress analysis of axi – symmetric components.							
Experiment:5	Thermal stress and heat transfer analysis of plates.							
Experiment:6	Thermal stress analysis of cylindrical shells.							
Experiment:7	Vibration analysis of spring-mass systems.							
Experiment:8	Model analysis of Beams.							
Experiment:9	Harmonic, transient and spectrum analysis of simple systems							
Experiment:10	Thermal stress and heat transfer analysis of composite materials.							
Reference Books:								
1. https://www.amazon.in/Reference-Computer-Aided-Design-Laboratory/dp/8131806014 .								
2. http://noteskhan.blogspot.com/2016/06/me6711-simulation-and-analysis.html								
Web References:								
1. https://studentsfocus.com/me6711-simulation-and-analysis-laboratory-lab-manual-download-mech-7th-sem-anna-university/								
Course Home Page:								
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:								
SOFTWARE: Licensed software for Modeling.								
HARDWARE: Pentium IV computer or better hardware, with suitable graphics facility, Laser Printer or Plotter to print / plot drawings.								
Course Outcome:								
At the end of the course, a student will be able to:								
1. Upon completion of this course, the Students can model, analyse and simulate experiments to meet real world system and evaluate the performance.								