ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

MECHANICAL ENGINEERING

B.Tech - Four Year Degree Course

(Applicable for the Batches Admitted from 2019 - 2020)

R-19

(Choice Based Credit System)

NEC
NARASARAOPETA
ENGINEERING COLLEGE
(AUTONOMOUS)

Kotappakonda Road, Yellamanda (P),
Narasaraopet - 522 601, Guntur Dist.,
Andhra Pradesh, INDIA.

Academic Regulations, Course Structure and Syllabus

B.TECH
Mechanical Engineering
(4 Year Program)

NARASARAOPETA ENGINEERING COLLEGE

(*Autonomous*)

Kotappakonda Road, Yellamanda (Post), Narasaraopet – 522601, Guntur District, AP

Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada, Code: 47,
Accredited by NBA&NAAC, RTA Approved Pollution test Centre, ISO 9001 : 2008 Certified Institution

Phone No. : 08647-239905 **Website:www.nrtec.ac.in**

ACADEMIC REGULATIONS R-19 FOR B.TECH

(Applicable for the students of B.Tech admitted from the academic year 2019-20)

1. PREAMBLE

The rapid transformation in every sphere of life is augmenting the need to prepare the present fast-paced generation to adapt to the changing knowledge & skill requirement on a life-long basis, in the fields of science, engineering, technology and humanities to influence society positively. The future looks up to multi-disciplinary, competent leaders who are Information and Communication Technology ready and driven by strong ethical values.

NEC envisions to nurture knowledge, skills, attitude and values of the aspiring youth to enable them to become global citizens and towards that process, the institution has evolved a flexible integrated academic curriculum.

NEC introduced Outcome Based Education (OBE) and Choice Based Credit System (CBCS), which emphasized on honing the skills and knowledge of the graduates.

NEC is ambitious to develop a new academic regulation, curricular framework and syllabi for its UG programmes. This effort is undertaken to address the present challenges in the educational system and also to be ahead of the curve with respect to innovative practices.

2. PROGRAMS OFFERED BY THE COLLEGE

Narasaraopeta Engineering College (NEC) offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) for the following branches of Engineering.

S. No.	Name of the Program	Program Code
1.	Civil Engineering (CE)	01
2.	Electrical and Electronics Engineering (EEE)	02
3.	Mechanical Engineering (ME)	03
4.	Electronics and Communication Engineering (ECE)	04
5.	Computer Science and Engineering (CSE)	05
6.	Information Technology (IT)	12

3. ELIGIBILITY FOR ADMISSION

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

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

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

Admission eligibility - Under Lateral Entry Scheme

Students with diploma qualification have an option of direct admission into 2nd 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.

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. AWARD OF B.TECH. DEGREE

A student will be declared eligible for the award of the B.Tech. degree if he/she fulfils the following academic regulations:

i) Pursue a course of study for not less than four academic years and not more than eight academic years.
ii) Registers for 160 credits and secures all 160 credits.

Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall **forfeit** their seat in B.Tech. course and their admission stands cancelled.

The medium of instruction for the entire undergraduate programme in Engineering and Technology will be in English only.

5. ABOUT PROGRAM RELATED TERMS

i. **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

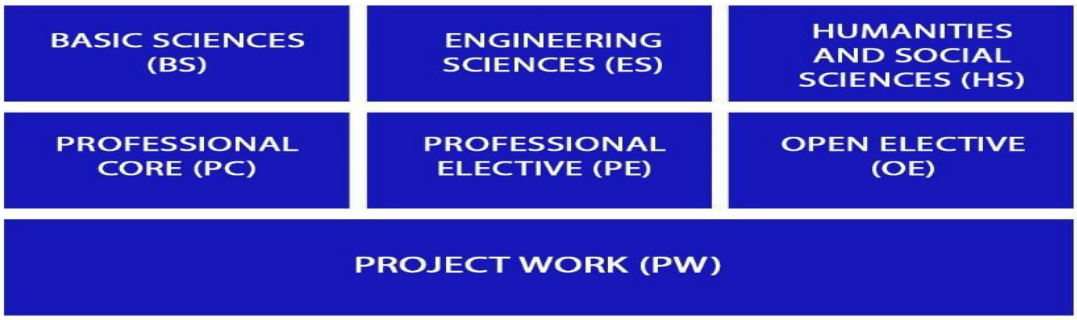
ii. **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.

iii. **Choice Based Credit System (CBCS):** The CBCS provides choice for students to select from the prescribed courses.

iv. Each course is assigned certain number of credits based on following criterion:

	Semester	
	Periods / Week	Credits
Theory (Lecture/Tutorial)	02	02
	03	03
	04	04
Practical	02	01
	03	1.5
	04	02
Project	14	07

v. Every B. Tech. Programme will have a curriculum consisting of theory, practical, project courses that shall be included in any of the following categories. The typical curriculum structure for UG degree programmes are based on AICTE and University norms and is given below.



5.1 SUBJECT / COURSE CLASSIFICATION

All subjects/ courses offered for the under graduate programme in B.Tech. degree are broadly classified as follows. NEC has followed almost all the guidelines issued by JNTUK/AICTE/UGC

S.No.	Broad Course Classification	Course Group/Category	Course Description	No. of Credits
1	FOUNDATION COURSES	BS – Basic Sciences	Includes Mathematics, Physics and Chemistry Subjects	25
2		ES – Engineering Sciences	Includes fundamental engineering subjects like Engineering Practices, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Computer Engineering, etc.	24
3		HS – Humanities and Social Sciences	Includes subjects related to Humanities, Social Sciences and Management Courses like English, Professional Ethics and Human Values, Communication skills and Environmental Science and Engineering	12
4	Core Courses	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.	48
5	Electives	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.	18
6		OE – Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering	18
7	Project Work	PR-Project Work	B.Tech. Project or UG Project or UG Major Project	15
8		Industrial training/ Internship	Industrial training/ Summer Internship	
9		Mini- project	Industrial Oriented Mini-project/ Mini-project	
10		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.	
11	Mandatory Courses (MC)	Mandatory Courses (non-credit)		0
			Total	160

5.2. Induction Program

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

A two-week induction program for first year B.Tech students is to be held in zero semester. Regular classes will start after the induction program.

The objectives of the program are as follows:

1. Assimilation in the ethos and culture of the institution

2. Exposure to a larger vision of life

3. Bonding among students and teachers

4. Learning a creative skill in arts

5. Regular lifestyle and professional discipline

6. Special assistance for needy students for improving proficiency in English and Mathematics

The above objectives will be achieved through the following activities:

1. Physical activity: Yoga, Mild Exercise, Games and sports etc.

2. Creative arts: Painting, Photography, music, dance etc.

3. Literary activity: General reading, writing summaries, debating, enacting a play etc.

4. Human Values: Discussion/Lectures in small groups of students with a faculty member

5. Lectures by eminent people: From industry, entrepreneurs, public life, social activists, alumni

6. Exposure to department/branch, Innovation, Exploring Engineering.

6. DISTRIBUTION AND WEIGHTAGE OF MARKS

The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for Theory, 50 marks for Practical Subject / Mini Project and 50 marks for Practical Training / Internship. The Project Work shall be evaluated for 200 marks.

6.1. THEORY

For all theory subjects consisting of 5 units in each subject, the assessment shall be for 40 marks through internal evaluation and 60 marks through external end semester examination of 3 hours duration.

6. 1.a. INTERNAL EVALUATION

The internal evaluation will be based on two cycle tests conducted in each semester. The 40 internal marks will be awarded as sum of 75% of the best cycle and 25% of the least cycle examinations, where each cycle of examination contains

Descriptive test	- 20 Marks
Objective test	- 10 Marks
Assignment test	- 10 Marks

Syllabus is framed for 5 Units. **First descriptive** test question paper contains 3 questions from 50% of the syllabus i.e. 1st, 2nd and half of 3rd unit. **Second descriptive** test in remaining half of 3rd Unit, 4th Unit and 5th Units of each subject in a semester. The student has to answer all the 3 questions (10 marks questions from 1st and 2nd units and 5 marks question from half of the 3rd unit totalling to 25 marks). These 25 marks will be scaled down to 20 marks. The descriptive examination will be conducted in 1½ hour duration.

Each Objective type test 1 question paper (Online examination) contains 20 objective Multiple-choice questions for 10 marks covering the syllabus of 1st ,2nd and half of 3rd unit. The Objective Examination (online) will be conducted for a duration of the 20 minutes on the day of descriptive exam. Objective test 2 shall contains 20 Multiple choice questions for 10 marks covering the syllabus from the remaining half of the 3rd unit, 4th and 5th Units.

Two assignments will be conducted for each cycle. In first cycle first assignment will be from 1st unit for 10 marks. 5 or 6 questions will be given in the classroom at least one week in advance. Student must answer two questions in classroom which are given at random as per the schedule given by exam cell. Second assignment test for 10 marks of first cycle will be conducted from 2nd unit. 5 or 6 questions will be declared in the class room at least one week in advance. Student has to answer two questions in class room which are given at random as per the schedule given by exam cell.

First cycle assignment marks (10 marks) is calculated from the two assignments (1&2) i.e. 75% of best assignment and 25% of the least assignment.

Similarly, for second cycle assignment test 3 for 10 marks will be conducted from remaining half of the 3rd unit (after first mid syllabus) and half of the 4th unit. 5 or 6 questions will be given in the classroom at least one week in advance. Student must answer two questions in classroom which are given at random as per the schedule given by exam cell.

Assignment test 4 will be from remaining half the fourth unit and half of the 5th unit for 10 marks. 5 or 6 questions will be declared in the classroom at least one week in advance. Student has to answer two questions in class room which are given at random as per the schedule given by exam.

Second cycle assignment marks (10 marks) is calculated from the two assignments (3 &4) i.e. 75% of best assignment and 25% of the least assignment

First cycle (Descriptive, objective and assignment) is conducted for 1st ,2nd and half of 3rd Unit and second cycle is remaining half of 3rd unit, 4th & 5 units of each subject in semester.

Final internal semester marks shall be arrived at by considering the marks secured by the student in both the cycle examinations with 75% weightage given to the best cycle exam and 25% to the other.

Final internal marks = 75% of best cycle and 25% of the least cycle.
=(0.75 x best cycle) + (0.25 x least cycle)

If the student is absent for any one internal examination, the final internal semester marks shall be arrived at by considering 75% weightage to the marks secured by the student in the appeared examination and zero to the other.

Final internal marks = 75% of best cycle and 25% of the least cycle.
= (0.75 x best cycle) + (0.25 x 0)

6.1.b. EXTERNAL EVALUATION

End semester examinations will be conducted for 60 marks. The Question paper consists of five questions and each question carries 12 marks from all the five units. Each of the question is from one unit and may contain sub-questions. There will be two questions from each unit and student should answer any one of the two questions. The examination duration is 3 hours

6.2. PRACTICALS

For practical subjects there shall be continuous evaluation during the semester.

6.2.a. INTERNAL EVALUATION

There shall be continuous evaluation during the semester for 20 internal marks.
The internal marks shall be awarded as follows:

i) Day to day performance: Record (4M) +Experiment (4M) + Viva (2M) - 10Marks
ii) Internal Lab Test : 10 Marks

Total =i +ii =10+10 = 20 Marks.

6.2.b. EXTERNAL EVALUATION

For practical subjects there shall be an external examination at the end of the semester for 30 marks in the presence of an external examiner. The examination duration is 3 hours.

6.3. DRAWING SUBJECTS

For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, etc.,) and estimation, the distribution shall be 40 marks for Internal Evaluation and 60 marks for End Examination.
The 40 internal marks will be evaluated as follows:

Internal Tests : 20 marks. (1½ hour duration)
Day – to – day work: 20 marks (evaluation of charts)

In the internal test, 3 questions will be given to the student and he has to answer all the three questions (2 x10 =20 marks from 1st and 2nd units and 5 marks from half of the 3rd unit totalling 25 marks scaled down to 20 marks)

There shall be two internal tests in a semester. The sum of 75% of the best and 25% of the least of two internal tests shall be considered for the award of internal marks.

The syllabus for the subject "**Machine drawing and CAD Lab**" consists of two major portions:

1. Unit 1, 2 –Conventional drawing pattern.
2. Unit 3 and 4 - CAD lab using drafting packages

The distribution of internal and external marks is 40 and 60 marks respectively.

Internal Evaluation: Max Marks: 40

The total internal evaluation marks are distributed in the following two components:

1. Day-to-day work : 20 Marks (Evaluation of Charts)
2. Descriptive Test : 20 Marks

Cycle–I Examination – Conventional drawing pattern

In Cycle-I examination the 40 marks will be awarded as follows:

Day-to-day evaluation - 20 Marks
Internal Test - 20 Marks

In the Descriptive Test of duration 2 hours, one question for 20 marks will be given to the student.

Cycle–II Examination – Computer lab pattern using any drafting packages for duration of 2 hours.

In Cycle-II examination the 40 marks will be awarded as follows:

Day-to-day evaluation - 20 Marks
Internal Test - 20 Marks

Of two cycle examinations conducted during the semester, sum of 75% of the best and 25% of the least of two cycle examinations shall be considered for the award of internal marks.

End Examination (Total Duration: 4 hours, Max, marks: 60) in the presence of external examiner

Conventional drawing pattern (Duration: 2 Hours, Marks: 30)

Computer lab pattern using any drafting packages (Duration: 2 Hours, Max:30)

(Note: Both Conventional drawing pattern and Computer lab pattern using any drafting packages are compulsory and are to be conducted in separate sessions)

6.4. MANDATORY NON-CREDIT COURSES

A student is required to take up Non-Credit / Mandatory courses (zero credit), viz. Environmental Science, Constitution of India, Community service, Advanced Communication Skills (ACS), Quantitative Aptitude and Reasoning (QAR), MOOCs (Massive Open Online Courses) etc., as and when the courses are offered. The B.Tech degree shall only be awarded only if a student gets satisfactory grade in each of the mandatory non-credit courses besides acquiring 160 credits.

A student has to repeat the course if he does not get satisfactory grade in each non- credit course for getting the degree awarded.

MOOCS:

Meeting with the global requirements, to inculcate the habit of self-learning and in compliance with AICTE/ UGC guidelines, MOOC (Massive Open Online Course) have been introduced, Student has to complete an on-line course to fulfil the academic requirement of B.Tech course. He/she can start doing the course from II Year II semester and submit the MOOCs certificate before the commencement of the end examinations wherever the MOOCs course is offered. The student shall register on-line Course offered by any reputed organization like NPTEL, SWYAM, JNTUK MOOCS, COURSERA, edX, Udacity, etc., approved by Departmental Committee constituted by HOD. Student has to submit the progress of the MOOC's course (such as assignment submission etc.,) to the mentor or departmental committee. B.Tech. degree shall be awarded only upon submission of MOOC's certificate. If a student fails to submit in that semester, he/she has to submit the certificate in the subsequent semesters for getting the degree awarded.

Advanced Communication Skills (ACS) & Quantitative Aptitude & Reasoning (QAR) :

There will be two online internal examinations of 40 marks of each and another 20 marks will be awarded based on day to day evaluation. The student has to secure a minimum of 40 marks out of the above mentioned 100 marks to secure satisfactory report.

Community Service:

Community service gives an opportunity to explore the leadership skills, Team work and develop empathy in real world. Students have to spend time in hospitals, temples, at traffic signals, old age homes, orphanage homes at least 24 hours during that semester.

Old age homes: The students will go to old age homes and fulfil the special needs and requirements that are unique to senior citizens. They help the old people by taking them to hospitals.

Hospitals: in hospitals the students help them to maintain hygiene, help the people who cannot understand the medical terms, give directions to the old people who are unable to read the signs, serve them by distributing food.

Traffic clearance: Help the people understand the traffic rules, help the disabled persons, Children and old people to cross the roads.

Temple services: During the festivals the students give the directions to pilgrims, distribute the food and help the old and disabled people to get their darshan in the temple.

6.5 PRACTICAL TRAINING / INTERNSHIP

As a part of curriculum in all branches of Engineering, it is mandatory for all students to undergo summer internship Programme at industries (core or allied) / R & D organization to get practical insight of their subject domain during summer break after the 6^{th} semester. This internship Programme shall be availed by the students in a duration of minimum 2 weeks or maximum of 4 weeks and the assessment shall be carried out by internal experts.

After the completion of internship, the student shall submit a certificate, a technical report and presentation to the concerned departmental committee constituted by the HOD for evaluation. 50 marks shall be awarded for the submission of certificate, technical report, presentation and Viva-Voce examination.

Students are advised to take up Industrial Internship. In case, the student is unable to obtain the internship, they can opt for Practical Training at College.

Assessment for Practical Training:

The practical training gained by student shall be assessed for 50 marks. The time duration for Practical Training shall be 2 to 4 weeks during the inter-semester break. The training shall be evaluated through continuous assessment. After the completion of Practical Training the student shall submit a report and presentation to the Departmental Committee constituted by HOD for evaluation. A total of 50 marks shall be awarded for day to day performance, submission of report, presentation and Viva-Voce examination.

6.6. MINI PROJECT

Mini Project shall be evaluated for a total of 50 marks. Out of a total of 50 marks, 20 marks shall be awarded for internal evaluation consisting of day-to-day work, reviews, the assessment of the project report and 30 marks will be awarded for the external evaluation. The external evaluation shall be conducted by the committee. The committee consists of an External Examiner, Head of the Department and Supervisor of the Project. The evaluation of mini project work shall be conducted as and when offered.

Mini Project:
Continuous Assessment (Internal Evaluation): 20 Marks
Distribution

Literature Survey	: 04 Marks
Innovativeness of the Project	: 04 Marks
Review 1	: 04 Marks
Review 2	: 04 Marks
Marks Final Presentation	: 04 Marks

6.7. PROJECT WORK

Out of a total of 200 marks for the project work, 80 marks shall be awarded for Internal Evaluation consisting of day-to-day work, reviews, the assessment of the project report and 120 marks are for the external evaluation. The external evaluation shall be conducted by the committee. The committee consists of an External Examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted at the end of the IV year II semester.

Continuous Assessment (Internal Evaluation): 80 Marks

Distribution

Innovativeness of the Project	: 05 Marks
Literature Survey	: 05 Marks
Experimentation / Simulation	: 10 Marks
Result Analysis	: 05 Marks

Review 1 : 15 Marks
Review II : 20 Marks
Final Presentation : 10 Marks
Project Report : 10 Marks

6.8. Technical Seminar:

For the Technical Seminar the student shall collect information on an advanced topic, prepare a technical report and submit it to the department. It shall be evaluated by the departmental committee consisting of HOD, supervisor and senior faculty. The seminar report and his/her presentation shall be evaluated for 50 internal marks.

Student has to secure a minimum of 40% of marks to pass the Technical Seminar.

If he/she fails, he/she has to repeat the Technical Seminar and get the pass grade for the award of the degree.

7. PASS MARK CRITERIA

A student shall be deemed to have satisfied the pass mark, if he secures not less than 35% of marks in the end examinations and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together as detailed below.
On passing a course of a program, the student shall earn the credits as assigned to that course.

S.No	Category of Subject	Max. Marks	Internal Marks	External Marks	External pass %	External pass mark	Over all pass %	Over all pass mark
1	Theory/ Drawing	100	40	60	35	21	40	40
2	Practical	50	20	30	35	11	40	20
3	Mini Project	50	20	30	35	11	40	20
4	Project work	200	80	120	35	42	40	80
5	Practical Training/ Internship	50	50	-	-	-	40	20

8. PROMOTION POLICY

8.1. ATTENDANCE REQUIREMENTS

(1) A student shall be eligible to appear for the end examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

(2) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester for genuine medical reasons shall be approved by a committee duly appointed by the college. A fee stipulated by the college shall be payable towards condonation of shortage of attendance. However, the number of condonations is restricted to **four** for the entire course.

(3) A student who is short of attendance in a semester may seek re-admission into that semester when offered next time within 4 weeks from the date of commencement of class work.

(4) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for re-admission into the same semester.

8.2. CREDIT REQUIREMENTS

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

(1) A student shall be promoted from I to II year, if he puts up the minimum attendance requirement in I year II semester, irrespective of credits earned.

(2) A student shall be promoted from II year to III year, only if he fulfils the academic requirement of 40% of the credits up to II year II semester from all the examinations, irrespective of whether the candidate takes the examination or not.

(3) A student shall be promoted from III to IV year, only if he fulfils the academic requirements of 40% of the credits up to III year II semester from all the examinations, irrespective of whether the candidate takes the examination or not.

(4) A candidate, who is not promoted either to III year or IV year due to lack of required credits can seek admission into III / IV year in subsequent years after obtaining the required credits as stipulated above.

(5) A student registers for all 160 credits and earns all 160 credits. Marks obtained in the all the courses shall be considered for the calculation of grade points/division.

(6) The registrations in mandatory courses i.e. CI, ES, MOOCS, CS is compulsory and student should get a satisfactory report.

8.3. COURSE PATTERN

(1) The entire course of study is of FOUR academic years and each year will have TWO Semesters (Total EIGHT Semesters).

(2) A student is eligible to appear for the end examination in a subject, but absent for it or has failed in the end examinations may appear for that subject in supplementary examinations, when conducted next.

(3) When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted in to the same semester / year in which he has been detained.

Re-admission Criteria:

i) A candidate, who is detained in a semester due to lack of attendance has to obtain written permission from the Principal for readmission into the same semester after duly fulfilling the required norms stipulated by the college and by paying the required tuition fee .
ii) A candidate, who is not promoted either to III year or IV year due to lack of required credits can seek admission into III / IV year in subsequent years after obtaining the required credits as stipulated in regulation by paying the required tuition fee.

9. METHOD FOR AWARDING OF GRADE POINTS FOR A SUBJECT:

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Theory/ Drawing / Laboratory / Practical Training / Internship / Mini Project / Project (% of marks in a subject)	Corresponding Grade Points	Letter Grade
91 - 100	10	O (Outstanding)
81 - 90	9	A (Excellent)
71 - 80	8	B (Very Good)
61 - 70	7	C (Good)
51 - 60	6	D (Satisfactory)
40 - 50	5	E (Pass)
<40	0	F (Fail)

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

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

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

10. CRITERIA FOR AWARD OF GRADES/DIVISION

10.1.Calculation of Semester Grade Point Average (SGPA)* for semester

The performance of each student at the end of each semester is indicated in terms of SGPA. The SGPA is calculated by dividing the sum of credit points secured from all subjects registered in a semester by the total no.of credits of that semester.

The SGPA is calculated as given below:

$$SGPA = \frac{\sum(CR \times GP)}{\sum CR}$$

Where CR = Credits of a subject
GP = Grade Points awarded for a subject
*SGPA is calculated for a candidate who passed all the subjects in that semester.

10.2. Calculation of Cumulative Grade Point Average (CGPA) for Entire Program:

The CGPA is a measure of the overall cumulative performance of a student in all semesters considered for a registration. CGPA is the ratio of the total credit points secured by a student in all registered courses in all semesters and the total no.of credits in all semesters.

The CGPA is calculated as given below:

$$CGPA = \frac{\sum(CR \times GP)}{\sum CR}$$

Where CR= Credits of a subject
GP = Grade Points awarded for a subject

- The SGPA and CGPA shall be rounded off to 2 decimal point and reported in the transcripts.
- Equivalent percentage = (CGPA – 0.75) x 10

CGPA is calculated for a candidate who passed all the subjects of all previous and current semester.

10.3 Award of Division:

After satisfying the requirements prescribed for the completion of the program, the student shall be eligible for the award of B.Tech Degree and shall be placed in one of the following classes:

CGPA	Class	
≥ 7.75	First Class with Distinction *(with no subject failures)	From the CGPA secured from 160 credits
≥ 6.75	First Class (with subject failures)	
≥ 5.75 & < 6.75	Second Class	
≥ 4.75 to < 5.75	Pass Class	

***First Class with Distinction:** A candidate who qualifies for the award of the Degree having passed all the courses of study of all the eight semesters (six semesters for lateral entry candidates) at the first attempt, within eight consecutive semesters (six consecutive semesters for lateral entry candidates) after the commencement of his /her study and securing a CGPA of 7.75 and above shall be declared to have passed in First Class with Distinction.

10.4. CONSOLIDATED GRADE MEMO

A Consolidated Grade Memo containing credits and grades obtained by the candidate will be issued after the completion of the four year B.Tech program.

11. REVALUATION/CHALLENGE EVALUATION

1. Student can submit the application for revaluation, along with the prescribed fee for revaluation of his answer script(s) of theory subject(s) as per the notification issued by the Controller of Examinations.
2. The Controller of Examinations shall arrange for revaluation of such answer script(s).
3. An External evaluator, other than the first evaluator shall revaluate the answer script(s).

12. MINIMUM INSTRUCTION DAYS

The minimum instruction days for each semester shall be **90 working days.**

13. There shall be **no branch transfer** after the completion of admission process.

14. WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the college or if any case of indiscipline/malpractice is pending against him, the result of such student will be kept withheld. His degree will be withheld in such cases.

15. TRANSITORY REGULATIONS

Discontinued or detained candidates are eligible for readmission as and when next offered. A candidate, who is detained or discontinued in a semester, on readmission shall be required to do all the subjects 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 subjects in the earlier semester(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.

15.1 A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of first year shall join the autonomous batch of first year first semester. Such students shall study all the subjects 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.

15.2 A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of first 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 subjects 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 subjects of the semester(s) of the batch which he had passed earlier and substitute subjects will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree will be sum of the credits up to previous semester under JNTUK 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.

15.3 Transfer candidates (from non-autonomous college affiliated to JNTUK)

A student who is following JNTUK curriculum, transferred from other college to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects 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 subjects 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 student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK 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 up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

15.4 Transfer candidates (from an autonomous college affiliated to JNTUK)

A student who has secured the required credits up to previous semester as per the regulations of other autonomous institutions shall also be permitted to be transferred to this college.

A student who is transferred from the other autonomous colleges to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects 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 subjects 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 up to previous semester as per the regulations of the college from which he has transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

16. Scope

1. The academic regulations should be read as a whole, for the purpose of any interpretation.

2. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

3. The college may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the date notified by the College Authorities.

ACADEMIC REGULATIONS (R-19) FOR B. TECH. (LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year from the Academic Year 2020- 21 and onwards)

1. AWARD OF B. TECH. DEGREE

A student will be declared eligible for the award of the B. Tech. Degree if he fulfils the following academic regulations.

(a) Pursue a course of study for not less than three academic years and not more than six academic years counted from the academic year of admission.

(b) The candidate registers for 120 credits and secures all the 120 credits.

CGPA	Class	
≥ 7.75	First Class with Distinction *(with no subject failures)	From the CGPA secured from 120 credits from 2nd year to 4th year
≥ 6.75	First Class (with subject failures)	
≥ 5.75 & < 6.75	Second Class	
≥ 4.75 to < 5.75	Pass Class	

2. The attendance regulations of B.Tech (Regular) shall be applicable to B.Tech (LES), whereas the number of condonations are restricted to 3.

3. PROMOTION RULE:

(a) Attendance requirement is same as regular course.

(b) A lateral entry student will be promoted from II to III year if he puts up the minimum required attendance in II year II semester irrespective of credits earned.

(c) A student shall be promoted from III to IV year only if he fulfils the academic requirements of 40% of the credits up to III Year II semester from all the examinations, whether the candidate takes the examinations or not.

4. TRANSITORY REGULATIONS:

4.1 A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of second year shall join the autonomous batch of second year first semester. Such students shall study all the subjects 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.

4.2 A student who is following JNTUK 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 subjects 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 subjects of the semester(s) of the batch of them as decided by the Board of Studies.

The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK 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 JNTUK 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.

5. All the other regulations as applicable for B. Tech. Four- year degree course (Regular) will be applicable for B. Tech. (Lateral Entry Scheme).

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT INEXAMINATIONS

- The Principal shall refer the cases of Malpractices in Internal Assessment Test and Semester end examinations to a malpractice prevention committee constituted by him for the purpose. Such committee shall follow the approved levels of punishment. The Principal shall take necessary action against the students based on the recommendations of the committee.
- Any action by the candidate trying to get undue advantage in the performance or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder:

	Nature of Malpractices/ Improper conduct	**Punishment**
	If the candidate:	
1(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
1(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,	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already

	palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	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 college.
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 practical's and to 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 college 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 college 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 Chief Superintendent/Assistant – Superintendent /any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty	In 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.

	in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
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 college 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 6to 8.	Student of the college 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 college for further action to award suitable punishment.	

OTHER MATTERS:

1. Physically challenged candidates who have availed additional examination time and a scribe during their intermediate / EAMCET examinations will be given similar concessions on production of relevant proof / documents.
2. The Principal shall deal in an appropriate manner with any academic problem which is not covered under these rules and regulations, in consultation with the Heads of the departments and subsequently such actions shall be placed before the Academic Council for ratification. Any emergency modification of regulation, approved in the meetings of the Heads of the departments shall be reported to the Academic Council for ratification.

GENERAL:

1. The academic council may, from time to time, revise, amend or change the regulations, schemes of examinations and / or syllabi.
2. Where ever the words ‘’he’’ ‘’him’’ ‘’his’’, occur in the regulations, they include ‘’she’’, ’’her’’, ’’hers’’.
3. The academic regulation should be read as a whole for the purpose of any interpretation.
4. In the case of any doubt or ambiguity in the interpretation of the above rules,

   the decision of the Principal is final.

R19 B.Tech FOUR YEAR COURSE STRUCTURE

&

SYLLABUS (First and Second Year)

R19 COURSE STRUCTURE

I B.TECH- I SEMESTER

S.No	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Communicative English -I	19BCC1TH01	HS	40	60	100	2	-	-	2
2	Engineering Physics	19BCC1TH02	BS	40	60	100	2	1	-	3
3	Linear Algebra & Calculus	19BCC1TH03	BS	40	60	100	3	-	-	3
4	Engineering Drawing	19BCC1TH04	ES	40	60	100	1	-	4	3
5	C Programming	19BCC1TH10	ES	40	60	100	2	1	-	3
6	English Communication Skills Lab - I	19BCC1LB01	HS	20	30	50	-	-	3	1.5
7	Engineering Physics Lab	19BCC1LB02	BS	20	30	50	-	-	3	1.5
8	C Programming Lab	19BCC1LB07	ES	20	30	50	-	-	3	1.5
9	Engineering Workshop Practice	19BCC1LB04	ES	20	30	50	-	-	3	1.5
10	Environmental Studies (MC)	19BCC1MC01	BS	-	-	-	3	-	-	0
Total										**20.0**

I B.TECH – II SEMESTER

S.No.	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Communicative English -II	19BCC2TH01	HS	40	60	100	2	-	-	2
2	Differential Equations & Vector Calculus	19BCC2TH02	BS	40	60	100	3	-	-	3
3	Engineering Mechanics	19BCC2TH11	ES	40	60	100	2	1	-	3
4	Engineering Chemistry	19BCC2TH03	BS	40	60	100	3	-	-	3
5	Elements of Electrical & Electronics Engineering	19BCC2TH14	ES	40	60	100	3	-	-	3
6	Mechanical Workshop Practice	19BME2LB01	ES	20	30	50	-	-	3	1.5
7	Elements of Electrical & Electronics Engineering Lab	19BCC2LB02	ES	20	30	50	-	-	3	1.5
8	Engineering Chemistry Lab	19BCC2LB03	ES	20	30	50	-	-	3	1.5
9	IT workshop	19BCC2LB07	BS	20	30	50	-	-	3	1.5
10	Constitution of INDIA(MC)	19BCC2MC01	MC	-	-	-	3	-	-	0
	Total									**20**

II B.TECH – I SEMESTER

S.No.	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Fluid Mechanics & Hydraulic Machinery	19BME3TH02	PC	40	60	100	2	1	-	3
2	Materials Science and Metallurgy	19BME3TH04	PC	40	60	100	3	-	-	3
3	Thermodynamics	19BME3TH05	PC	40	60	100	2	1	-	3
4	Mechanics of Solids	19BME3TH06	PC	40	60	100	2	1	-	3
5	Numerical Methods & Transformations	19BCC3TH01	BS	40	60	100	2	1	-	3
6	Machine Drawing & Basic Design Engg. Soft. Lab.	19BME3TH03	ES	40	60	100	1	-	4	3
7	Fluid Mechanics & Hydraulic Machinery Lab	19BME3LB01	PC	20	30	50	-	-	3	1.5
8	Mechanics of Solids & Metallurgy Lab	19BME3LB02	PC	20	30	50	-	-	3	1.5
9	Quantitative Aptitude & Reasoning	19BCC3MC01	MC	-	-	-	3	-	-	0
10	Community Service	19BCC3MC02	MC	-	-	-	-	-	-	0
	Total									**21**

II B.TECH– II SEMESTER

S.No.	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Kinematics of Machinery	19BME4TH01	PC	40	60	100	2	1	-	3
2	Manufacturing Technology	19BME4TH02	PC	40	60	100	3	-	-	3
3	Metrology & Instrumentation	19BME4TH03	PC	40	60	100	3	-	-	3
4	Applied Thermo Dynamics-I	19BME4TH04	PC	40	60	100	2	1	-	3
5	**Open Elective-1**		OE	40	60	100	3	-	-	3
6	Applied Thermo Dynamics Lab	19BME4LB01	PC	20	30	50	-	-	3	1.5
7	Metrology & Instrumentation Lab	19BME4LB02	PC	20	30	50	-	-	3	1.5
8	Manufacturing Technology Lab	19BME4LB03	PC	20	30	50	-	-	3	1.5
9	English Communication Skills Lab - II	19BCC4LB01	HS	20	30	50	-	-	3	1.5
	Total									**21**

III B.TECH– I SEMESTER

S.No.	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Business Management Concepts for Engineers	19BME5TH01	HS	40	60	100	3	-	-	3
2	Metal Cutting & Machine Tools	19BME5TH02	PC	40	60	100	3	-	-	3
3	Heat Power Engineering	19BME5TH03	PC	40	60	100	2	1	-	3
4	Design of Machine Elements -1	19BME5TH04	PC	40	60	100	2	1	-	3
5	Entrepreneurship and Innovation	19BCC5TH01	HS	40	60	100	2	-	-	2
6	**Open Elective-2**		OE	40	60	100	3	-	-	3
7	Engineering Skills Lab	19BME5LB01	PR	20	30	50	-	-	3	1.5
8	Metal Cutting & Machine Tools Lab	19BME5LB02	PC	20	30	50	-	-	3	1.5
9	Heat Power Engineering Lab	19BME5LB03	PC	20	30	50	-	-	3	1.5
10	MOOCS	19BME5MO01	MC	-	-	-	-	-	-	00
Total										**21.5**

III B.TECH– II SEMESTER

S.No.	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Design of Machine Elements -2	19BME6TH01	PC	40	60	100	2	1	-	3
2	Heat Transfer	19BME6TH02	PC	40	60	100	2	1	-	3
3	Dynamics of Machinery	19BME6TH03	PC	40	60	100	2	1	-	3
4	Complex Variables, Probability & Statistics	19BCC6TH01	BS	40	60	100	2	1	-	3
5	**Professional Elective-1**		PE	40	60	100	2	1	-	3
	Automobile Engineering	19BME6PE11								
	Refrigeration and air conditioning	19BME6PE12								
	Operations Research	19BME6PE13								
	Unconventional Machining Processes	19BME6PE14								
6	**Open Elective-3**		OE	40	60	100	3	-	-	3
7	Heat Transfer Lab	19BME6LB01	PC	20	30	50	-	-	3	1.5
8	Machine Dynamics Lab	19BME6LB02	PC	20	30	50	-	-	3	1.5
9	Mini Project	19BME6MP01	PR	20	30	50	-	-	3	1.0
10	Advanced Communication Skills	19BCC6MC01	MC	-	-	-	3	-	-	0
	Total									**22.0**

IV B.TECH– I SEMESTER

S.No.	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Mechatronics	19BME7TH01	PC	40	60	100	3	-	-	3
2	Finite Element Methods	19BME7TH02	PC	40	60	100	2	1	-	3
3	Industrial Engineering and management	19BME7TH03	PC	40	60	100	2	1	-	3
4	**Professional Elective-2**		PE	40	60	100	2	1	-	3
	Advanced Mechanics of Solids	19BME7PE21								
	Nonconventional source of energy	19BME7PE22								
	Quality concepts in design	19BME7PE23								
	CAD/CAM	19BME7PE24								
5	**Professional Elective-3**		PE	40	60	100	2	1	-	3
	Design for manufacturing	19BME7PE31								
	Power plant Engineering	19BME7PE32								
	Advanced Optimization Techniques	19BME7PE33								
	Smart manufacturing	19BME7PE34								
6	**Open Elective-4**		OE	40	60	100	3	-	-	3
7	Mechatronics & Simulation lab	19BME7LB01	PC	20	30	50	-	-	3	1.5
8	Technical Seminar	19BME7TS01	PR	-	50	50	-	-	2	1
9	Internship / Practical	19BME7IN01	PR	50	-	50	-	-	-	1
	Total									**21.5**

IV B.TECH– II SEMESTER

S.No.	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	**Professional Elective-4**		PE	40	60	100	2	1	-	3
	Experimental stress analysis	19BME8PE41								
	Solar energy systems	19BME8PE42								
	Total Quality Manufacturing	19BME8PE43								
	Robotics and Applications	19BME8PE44								
2	**Professional Elective-5**		PE	40	60	100	2	1	-	3
	Advanced mechanical vibrations	19BME8PE51								
	Waste heat recovery systems	19BME8PE52								
	Production Planning and Control	19BME8PE53								
	Automation in Manufacturing	19BME8PE54								
3	PROJECT	19BME8PW01	PR	80	120	200	-	-	14	7
Total										**13**

Distribution of Credits

S.No.	Year/Sem	HS	BS	ES	PC	PE	OE	PR	MC	TOTAL
1	I-I	3.5	7.5	9	-	-	-	-	ES	**20**
2	I-II	2	7.5	10.5	-	-	-		CI	**20**
3	II-I	-	3	3	15	-	-		QAR,CS	**21**
4	II-II	1.5	-	-	16.5	-	3			**21**
5	III-I	5	-	-	12	-	3	1.5	MOOCS	**21.5**
6	III-II	-	3	-	12	3	3	1.0	ACS	**22.0**
7	IV-I	-	-	-	10.5	6	3	2		**21.5**
8	IV-II	-	-	-	-	6	-	7		**13**
TOTAL(Actual)		**12**	**21**	**22.5**	**66**	**15**	**12**	**11.5**	**0**	**160**

S.No.	Course Work-Subject areas	Credits (as per AICTE)	Credits (as per NEC -MECH)
1	Humanities and Social Sciences (HS)	12	12
2	Basic Sciences (BS)	25	21
3	Engineering Sciences (ES)	24	22.5
4	Professional Core (PC)	48	66
5	Professional Elective (PE)	18	15
6	Open Elective (OE)	18	12
7	Project/Practical Training/Internship/Skills Lab (PR)	15	11.5
	Total Credits	**160**	**160**

LIST OF OPEN ELECTIVES OFFERED BY ALL DEPARTMENTS

Open Elective-I

S.No.	Open Elective-I Subject Title	Department Offering the Subject	Sub Code	No.of periods per week		No.of Credits
				L	T	C
1	MEMS	EEE	19BEE4OE11	3	-	3
2	Energy Audit, Conservation & Management	EEE	19BEE4OE12	3	-	3
3	RPT &3D Printing (Other than ME)	ME	19BME4OE11	3	-	3
4	Operations Research	ME	19BME4OE12	3	-	3
5	Smart Materials	ME	19BME4OE13	3	-	3
6	Product Engineering	ME	19BME4OE14	3	-	3
7	DBMS (Other Than CSE)	CSE	19BCS4OE11	3	-	3
8	Web Development Using Mean Stack Tech	CSE	19BCS4OE12	3	-	3
9	Principles of Signals, Systems & Communications(Other than ECE)	ECE	19BEC4OE11	3	-	3
10	Medical Electronics	ECE	19BEC4OE12	3	-	3
11	GIS	CE	19BCE4OE11	3	-	3
12	Public Health Engineering	CE	19BCE4OE12	3	-	3

Open Elective-II

S.No.	Open Elective-II Subject Title	Department Offering the Subject	Sub Code	No.of periods per week		No.of Credits
				L	T	C
1	Non-Conventional Energy Resources	EEE	19BEE5OE11	3	-	3
2	Electrical Machine Design	EEE	19BEE5OE12	3	-	3
3	Work study	ME	19BME5OE11	3	-	3
4	Lean Manufacturing	ME	19BME5OE12	3	-	3
5	Condition Monitoring	ME	19BME5OE13	3	-	3
6	Mechatronics	ME	19BME5OE14	3	-	3
7	AI	CSE	19BCS5OE11	3	-	3
8	OOPS through JAVA	CSE	19BCS5OE12	3	-	3
9	Fundamentals of Image Processing (Other than ECE)	ECE	19BEC5OE11	3	-	3
10	Consumer Electronics	ECE	19BEC5OE12	3	-	3
11	Disaster Management	CE	19BCE5OE11	3	-	3
12	Urban Transportation & Planning	CE	19BCE5OE12	3	-	3

Open Elective-III

S.No.	Open Elective-III Subject Title	Department Offering the Subject	Sub Code	No.of periods per week		No.of Credits
				L	T	C
1	Soft Computing	EEE	19BEE6OE11	3	-	3
2	Industrial Electronics	EEE	19BEE6OE12	3	-	3
3	Smart Materials	ME	19BME6OE11	3	-	3
4	Nano Technology	ME	19BME6OE12	3	-	3
5	Total Quality Management	ME	19BME6OE13	3	-	3
6	Basic Manufacturing Processes	ME	19BME6OE14	3	-	3

7	Cloud Computing	CSE	19BCS6OE11	3	-	3
8	Block Chain Technologies	CSE	19BCS6OE12	3	-	3
9	Introduction to Embedded Systems (Other than ECE)	ECE	19BEC6OE11	3	-	3
10	Global Positioning System(GPS)	ECE	19BEC6OE12	3	-	3
11	Environmental Impact Assessment	CE	19BCE6OE11	3	-	3
12	Smart Cities Development	CE	19BCE6OE12	3	-	3

Open Elective-IV

S.No.	Open Elective-IV Subject Title	Department Offering the Subject	Sub Code	No.of periods per week		No.of Credits
				L	T	C
1	Control System	EEE	19BEE7OE11	3	-	3
2	Embedded Control of Electric Drives	EEE	19BEE7OE12	3	-	3
3	Pneumatics & Hydraulic Automation	ME	19BME7OE11	3	-	3
4	Heat Ventilation & Air conditioning	ME	19BME7OE12	3	-	3
5	Supply Chain Management	ME	19BME7OE13	3	-	3
6	Industrial Robotics	ME	19BME7OE14	3	-	3
7	Cyber Security	CSE	19BCS7OE11	3	-	3
8	Ethical Hacking	CSE	19BCS7OE12	3	-	3
9	Introduction to Micro Processors & Micro Controllers(Other than ECE)	ECE	19BEC7OE11	3	-	3
10	Automotive Electronics	ECE	19BEC7OE12	3	-	3
11	Computer Aided Project Management	CE	19BCE7OE11	3	-	3
12	Solid waste hazardous management	CE	19BCE7OE12	3	-	3

R19 COURSE STRUCTURE
I B.TECH- I SEMESTER

S.No	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Communicative English -I	19BCC1TH01	HS	40	60	100	2	-	-	2
2	Engineering Physics	19BCC1TH02	BS	40	60	100	2	1	-	3
3	Linear Algebra & Calculus	19BCC1TH03	BS	40	60	100	3	-	-	3
4	Engineering Drawing	19BCC1TH04	ES	40	60	100	1	-	4	3
5	C Programming	19BCC1TH10	ES	40	60	100	3	-	-	3
6	English Communication Skills Lab - I	19BCC1LB01	HS	20	30	50	-	-	3	1.5
7	Engineering Physics Lab	19BCC1LB02	BS	20	30	50	-	-	3	1.5
8	C Programming Lab	19BCC1LB07	ES	20	30	50	-	-	3	1.5
9	Engineering Workshop Practice	19BCC1LB04	ES	20	30	50	-	-	3	1.5
10	Environmental Studies (MC)	19BCC1MC01	BS	-	-	-	3	-	-	0
Total										**20.0**

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	0	0	40	60	100	2
Code: 19BCC1TH01	**COMMUNICATIVE ENGLISH - I (Common to All Branches)**						

COURSE OBJECTIVES:

- To equip the students with appropriate oral and written communication skills.
- To inculcate the skills of listening, reading and critical thinking.
- To enhance the students' proficiency in reading skills enabling them meet the academic needs of their course.
- To enable the engineering students develop their basic communication skills in English for academic and social purposes.

COURSE OUTCOMES:

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

CO 1: **Infer** explicit and implicit meaning of a text, recognize key passages; raise questions and summarize it.

CO 2: **Compose** paragraphs, essays as creative writing**.**

CO 3: **Build** grammatically correct sentences using a variety of sentence structures.

CO 4: **Enhance** word power and usage of lexicons.

CO 5: **Compile** emails, letters, reports, resume and information transfer.

UNIT– I

1. **Akio Morita**
   a) **Speaking**: Introducing self and others.
   b) **Reading**: Skimming for main idea, scanning for specific piece of information.
   c) **Writing**: Note – making flowed by paragraph writing, effective opening sentences, introducing the topic, key words, main idea, summarize the main idea.
   d) **Grammar and Vocabulary**: Content words and function words, verbs, nouns, adjectives and adverbs. Basic sentence structure and simple question form, framing jargon, technical vocabulary (15 words)

UNIT–II

2. **Dhirubhai Ambani**
   a) **Speaking**: Discussions on specific topic
   b) **Reading**: Identifying the sequence of ideas and recognizing verbal techniques to link the ideas in a paragraph.
   c) **Writing**: Paragraph writing, using key words/phrases and organizing points in a coherent manner.
   d) **Grammar and Vocabulary**: Linkers, articles and prepositions.

UNIT–III

3. **Louis Braille**
   a) **Speaking**: Discussions on specific topic
   b) **Reading**: Sequencing of ideas and recognizing verbal techniques to link the ideas in a paragraph.
   c) **Writing**: Paragraph writing, using key words/phrases and organizing points in a coherent manner.
   d) **Grammar and Vocabulary**: Cohesive devices, articles and prepositions

UNIT-IV

4. **Mallika Srinivasan**
   a) **Speaking:** Role plays, asking for and giving information/directions/instructions
   b) **Reading**: Understand and interpret graphic elements used in texts.
   c) **Writing**: Information transfer.
   d) **Grammar and Vocabulary**: Adjectives, adverbs and antonyms.

UNIT-V

5. **Muhammad Yunus**
   a) **Speaking**: Oral presentations
   b) **Reading:** Reading for comprehension.
   c) **Writing**: Essay writing
   d) **Grammar and Vocabulary**: Articles, prepositions, tenses, subject verb agreement and technical jargon (15 words)

TEXT BOOKS:

1**. "**Modern Trail Blazers", Orient Black Swan Pvt.Ltd.Publisher, 1ST edition. 2013

2. English All Round -I (Communication skills for Under Graduate Learners)– Orient Black Swan Pvt.Ltd.Publisher, 1st edition,2019

REFERENCE BOOKS:

1. Raymond Murphy, *Murphy's English Grammar,* Cambridge University Press 2004
2. Meenakshi Raman, Sangeeta Sharma, *Technical Communication: English Skills for Engineers*, Oxford University Press, 2009
3. Michael Swan, *Practical English Usage*, Oxford University Press, 1996

Web References:

1. https://app.grammarly.com/
2. https://www.grammarly.com/blog
3. https://www.englishclub.com/
4. https: www.nonstopenglish.com/
5. https://www.fluentu.com/blog/english/
6. https://www.fluentu.com/blog/english/
7. http://freerice.com soon migrating to https://beta.freerice.com/

I B.TECH I/II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
Code:19BCC1TH02	**ENGINEERING PHYSICS(Common to All branches)**						

COURSE OBJECTIVES:

- To impart knowledge in basic concepts of wave optics, fiber optics, properties of solid crystal materials and magnetic materials, acoustics, superconductors.
- To familiarize the applications of materials relevant to engineering field.

COURSE OUTCOMES:

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

CO 1: **Find** the experimental evidence of wave nature of light and interference in thin films, Diffraction grating and Polarisation in various fields.

CO 2: **Analyse** various types of lasers & optical fibers.

CO 3: **Explain** the crystal structures and XRD techniques.

CO 4: **Develop** the strategies to apply the concepts of magnetiism in engineering field.

CO 5: **Examine** the various applications of semiconductors in engineering field.

UNIT– I

Interference & Diffraction: Introduction -Interference in thin films by reflection – Newton's rings, introduction to diffraction – difference between Fresnel's and Fraunhofer diffraction - Fraunhofer diffraction at single slit (qualitative) - Diffraction grating.

Polarization: Introduction – Types of Polarization – Double refraction – Nicol's prism-Quarter wave plate and Half Wave plate

UNIT–II

Lasers: Introduction – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Population inversion – Ruby laser – Helium Neon laser-Applications.

Fiber Optics: Introduction- Principle of optical fiber - Acceptance angle – cone - Numerical Aperture-Applications.

UNIT–III

Crystallography : Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC.

X-Ray Diffraction: Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg's law.

UNIT-IV

Electromagnetic Fields: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell's Electromagnetic Equations.

Magnetic materials: Magnetic Susceptibility- Magnetic permeability –Classification of Magnetic materials – Dia, Para, Ferro – Soft and Hard magnetic materials - Applications

UNIT-V

Quantum Mechanics: Introduction –de-Broglie's concept of Matter waves – Physical significance of wave function - Schrodinger Time Independent wave equations – Particle in a one dimensional potential box.

Semiconductor Physics: Origin of energy band formation in solids- classification of materials into conductors, semiconductors and insulators, Intrinsic and Extrinsic semiconductor- Hall Effect.

TEXT BOOKS:

1. A.J. Dekker, "Solid state Physics", ISBN 10: 0333918339 / ISBN 13: 9780333918333, Mc Millan India Ltd, First edition, 2000.
2. M.N. Avadhanulu & P.G. Kshirasagar, "A text book of Engineering Physics", ISBN 81-219-0817-5, S. Chand publications, First Edition, 2011.
3. P. K. Palanisamy, "Engineering Physics", ISBN: 9788183714464, Scitech Publishers, 4th Edition, 2014
4. M.R. Srinivasan, "Engineering Physics", ISBN978-81-224-3636-5, New Age international publishers, 2nd Edition,2014

REFERENCE BOOKS:

1. Charles Kittle, "Introduction to solid state physics" ISBN: 9788126578436, Willey India Pvt.Ltd, 5TH edition, 2012.

2. M.Arumugam, "Applied Physics", ISBN: 81-89638-01-7, Anuradha Agencies, 4th edition, 2013.

3. D.K.Bhattacharya, "Engineering Physics", ISBN: 0198065426, 9780198065425, Oxford University press, 2nd edition, 2010.

4. Sanjay D Jain and Girish G Sahasrabudhe "Engineering Physics", University Press ISBN: 8173716781,1st edition, 2010.

5. B.K.Pandey & S. Chaturvedi "Engineering Physics" ISBN: 8131517616, Cengage Learning, 1st edition, 2012.

Web References:

1. http://link.springer.com/physics
2. http://www.thphys.physics.ox.ac.uk
3. http://www.sciencedirect.com/science
4. http://www.e-booksdirectory.com

E-Books:

1. http://www.peaceone.net/basic/Feynman
2. http://physicsdatabase.com/free-physics-books
3. http://www.damtp.cam.ac.uk/user/tong/statphys/sp.pdf
4. http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html

I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
Code:19BCC1TH03	**LINEAR ALGEBRA & CALCULUS (Common to All Branches)**						

COURSE OBJECTIVES:

- Understanding basic concepts of linear algebra (systems of linear equations, matrix calculus).
- To become proficiency in solving computational problems of linear algebra.
- To acquire knowledge on mean value theorems in calculus.
- Familiarization about the techniques in calculus and multivariate analysis.

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

CO 1: **Solve** the system of linear equations.
CO 2: **Analyze** the applications of matrices in various fields and obtain Eigen values and Eigenvectors.
CO 3: **Relate** the results of mean value theorems in calculus to Engineering problems.
CO 4: **Apply** the functions of several variables to evaluate the rates of change with respect to time and space variables in engineering.
CO 5: **Compute** the area and volume by interlinking them to appropriate double and triple integrals.

UNIT-I: LINEAR SYSTEMS OF EQUATIONS: (10 hours)

Rank of a matrix - Echelon form, Normal form, Solution of linear systems, Direct Methods, Gauss elimination, Gauss Jordon and Gauss Seidal Methods. Solutions of linear simultaneous equations: LU decomposition.

Application: Finding the current in a electrical circuit

UNIT – II: EIGENVALUES AND EIGENVECTORS (12 hours)

Eigenvalues, Eigenvectors, Properties, Cayley - Hamilton Theorem, Quadratic forms, Reduction of quadratic form to canonical form, Rank, Positive definite, negative definite, semi definite, index, signature.

Application: Finding powers and inverse of a square matrix using Cayley Hamilton's Theorem.

UNIT – III: MEAN VALUE THEOREMS (6 hours)

Review on limits and continuity, Mean Value theorems (without proofs): Rolle's theorem, Lagrange's theorem, Cauchy's theorem, Taylor's (Generalized mean value) theorem, increasing and decreasing functions, Maxima and minima of function of single variable.

UNIT- IV: PARTIAL DIFFERENTION: (8 hours)

Function of two or more variables, Partial derivatives, Total derivatives, change of variables, Jacobian - functional dependence, Taylor's theorem for Two variables. Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT-V: APPLICATION OF INTEGRATION AND MULTIPLE INTEGRALS: (12 hours)

Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates. Multiple Integrals- double and triple integrals, Change of Variables, Change of order of Integration.

TEXT BOOK :

1. Dr. B.S. Grewal, "*Higher Engineering Mathematics*", 43rd Edition, Khanna Publishers, 2012.

REFERENCES:

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, "*Engineering Mathematics*", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
3. Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
4. Peter V. O'Neil, *"Advanced Engineering Mathematics"*, 7th Edition, Cengage Learning, 2011.
5. Bhavanari Satyanarayana, Pradeep Kumar T.V. & Srinivasulu D, "Linear Algebra and Vector Calculus", Studera Press, New Delhi, 2017.

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	1	-	4	40	60	100	3
Code: 19BCC1TH04	**ENGINEERING DRAWING (COMMON TO CIVIL & MECH)**						

COURCE OBJECTIVES:

- The students to use drawing instruments and to draw polygons, engineering Curves & engineering scales.
- The students use to make orthographic projections, projections of points, simple lines & projections of the lines inclined to both the lines.
- The students use to draw the projections of the planes inclined to both the plane.
- The students use to draw the projections of solids & development of surfaces.
- The students use to draw conversion of isometric views to orthographic views vice versa and to learn basic drawing commands in auto cad.

COURSE OUTCOMES:

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

CO 1: **Construct** the geometrical shapes of regular polygons, Engineering Curves, and scales.
CO 2: **Develop** the orthographic projections, projections of points, and lines inclined to both the planes.
CO 3: **Construct** the projection of planes inclined to both the planes.
CO 4: **Develop** the projection of regular solids and surfaces.
CO 5: **Interpret** the conversion of isometric views to orthographic views vice versa.

UNIT– I

THE BASIC CONCEPTS IN ENGINEERING DRAWING: Introduction to engineering drawing instruments, lettering and dimensioning practice. Geometrical constructions- Constructing regular polygons by general methods.

CURVES USED IN ENGINEERING PRACTICE: Introduction to conic sections, construction of ellipse, parabola, hyperbola by eccentricity method. Construction of ellipse by - Arcs of circles Method, Concentric Circles Method and Oblong Method, & parallelogram methods.

ENGINEERING SCALES: Introduction scales on drawings Representation fraction: Construction of plain, diagonal and vernier scale.

UNIT–II

ORTHOGRAPHIC PROJECTIONS: Introduction to type of projections, first angle and third angle projections.

PROJECTION OF POINTS: Principles of orthographic projection – Convention – First angle projections, projections of points.

PROJECTIONS OF STRAIGHT LINES:
Projections of straight lines parallel to both the planes, parallel to one plane and inclined to the other plane. Lines inclined to both the planes - Projections of straight lines inclined to both the planes- determination of true lengths, angle of inclination and traces.

UNIT–III
PROJECTIONS OF PLANES: regular planes perpendicular / parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-IV
PROJECTIONS OF SOLIDS: introduction to projections of solids, types of solids: prisms, pyramids, cones and cylinders –simple positions and the axis inclined to one of the plane.

DEVELOPMENT OF SURFACES: Development of surfaces of right regular solids- Prisms, Cylinder, Pyramids, Cone and their sectional parts
.

UNIT-V
ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS: Introduction of isometric views, isometric projections & orthographic projections. Conversion of isometric views to orthographic views and orthographic views to isometric views.

INTRODUCTION TO AUTO CAD: Practice on Draw, Edit & Modify commands using auto CAD.

TEXT BOOKS:
1. Engineering Drawing by N.D. Butt, Chariot Publications.
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Drawing & Graphics by K.Venu gopal, New age international Publishers.

REFERENCE BOOKS:
1. Engineering Graphics for Degree by K.C. John, PHI Publishers.
2. Engineering Drawing by Basant Agarwal & CM. Agarwal, Tata McGraw Hill Publishers.

Web References:
1. URL: https://www.youtube.com/watch?v=ohhdNRtDpCY,

E-Books:
1. https://www3.nd.edu/~cpoellab/teaching/cse40814/Lecture1-Handouts.pdf

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
CODE: 19BCC1TH10	**C PROGRAMMING**						

COURSE OBJECTIVE:

- To know the basic problem solving process using Flow Charts and algorithms.
- To understand the basic concepts of control structures in C.
- To learn concepts of arrays, functions, pointers and Dynamic memory allocation in C.
- To use the concepts of structures, unions, files and command line arguments in C.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO 1: **Develop** algorithms and flow charts for simple problems.
CO 2: **Utilize** suitable control structures for developing code in C.
CO 3: **Make use of** functions and arrays in developing modular programs.
CO 4: **Make use of** structures and pointers to write well-structured programs.
CO 5: **Make use of** file Operations in C programming for a given application.

UNIT I

Introduction to Algorithms and Programming Languages: Algorithm – Key features of Algorithms – Some more Algorithms – Flow Charts – Pseudo code – Programming Languages – Generation of Programming Languages – Structured Programming Language **Introduction to C:** Introduction – Structure of C Program – Writing the first C Program -Compiling and Executing C Programs - Using Comments – Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C - Operators in C -Programming Examples – Type Conversion and Type Casting.

UNIT II

Decision Control and Looping Statements: Introduction to Decision Control Statements – Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – Goto Statement.

Functions: Introduction – using functions – Function declaration/ prototype – Function Definition – function call – return statement – Passing parameters – Scope of variables –Storage Classes – Recursive functions – Recursion vs Iteration.

UNIT III

Arrays: Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array – Calculating the length of the Array – Operations on Array — Two Dimensional Arrays –Operations on Two Dimensional Arrays.

Strings: Introduction – Reading Strings – Writing Strings – String Manipulation functions -Array of Strings.

UNIT IV

Pointers: Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers – Passing Arguments to Functions using Pointer, Dynamic Memory Allocation.

Structure, Union, and Enumerated Data Types: Introduction – Nested Structures –Arrays of Structures – Structures and Functions – Self-referential Structures – Union –Enumerated Data Types.

UNIT V

Files: Introduction to Files – Using Files in C – Reading Data from Files – Writing Data To Files – Detecting the End-of-file – Error Handling during File Operations – Accepting Command Line Arguments – Functions for Selecting a Record Randomly - Remove () –Renaming a File – Creating a Temporary File

TEXT BOOKS:

1. Reema Thareja**, "**Programming in C**",** First **edition,** OXFORD University Press 2018.

REFERENCE BOOKS:

1. REEMA THAREJA, "Introduction to C programming" OXFORD UNIVERSITY PRESS

2. Rachhpal Singh, "Programming in C", kalyani publishers

3. E Balagurusamy, "computing fundamentals & c programming", isbn 978-0-07- 066909-3, Tata McGraw-Hill, Second Reprint, 2008,

4. Ashok N Kamthane, "Programming with ANSI and Turbo C", Pearson Edition Publications, 2002.

5. Dennis Richie and Brian Kernighan, "The C programming Language", 2nd edition.

WEB REFERENCES:

1. http://cprogramminglanguage.net/
2. http://lectures-c.blogspot.com/
3. http://www.coronadoenterprises.com/tutorials/c/c_intro.htm
4. http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code: 19BCC1LB01	**ENGLISH COMMUNICATION SKILLS LAB-I (Common to All Branches)**						

COURSE OBJECTIVES:

- To build confidence in the students to communicate effectively in English.
- To strengthen the oral communication skills to enable them to interact with the people in various social situations.
- To enable the learners improve pronunciation through emphasis on word accent, intonation and rhythm

COURSE OUTCOMES:

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

CO 1: **Develop** various conversations skills /discourses using formal and informal expressions.
CO 2: **Apply** phonological knowledge to speak English with good pronunciation, overcoming mother tongue influence.
CO 3: **Identify** and comprehend several accents of English Language by listening to audio clips.
CO 4: **Utilize** basic communication skills in JAMS and Role plays.

UNIT– I

a. Greeting, Introducing and Taking leave
b. Pure Vowels
c. Listening - TEDx Talks (https://www.ted.com/talks/ashweetha_shetty_how-education-helped-me-rewrite-my-life?language-en#t-623369)
d. Self-Introduction

UNIT–II

a. Giving information and Asking for information
b. Diphthongs
c. Listening -TEDx Talks(https://www.youtube.com/watch?v=Dk20-E0yx_s)
d. Role Play

UNIT–III

a. Inviting, Accepting and Declining Invitations
b. Consonants
c. Listening - TEDx Talks (https://www.youtube.com/watch?v=IgAnj6r1O48)
d. JAM

UNIT-IV

a. Commands, Instructions and Requests
b. Accent and Rhythm
c. Listening -TEDx Talks(https://youtu.be/SKvMxZ284AA)
d. Tables Turned

UNIT-V

a. Suggestions and Opinions
b. Intonation
c. Listening -TEDx Talks(https://youtu.be/ov6pEGXRYZo)
d. Impromptu

TEXT BOOKS:

"Strengthen Your Communication Skills", Maruthi Publications, 2013.

REFERENCE BOOKS:

1. Meenakshi Raman, Sangeeta Sharma, *Technical Communication: Principles and Practice*, Oxford University Press, 2015
2. J.D.O Conner, *Better English Pronunciation*, Cambridge University Press 1980.
3. T.Balasubramanian, "*A Text Book of English Phonetics for Indian Students"*, Macmillan,1981
4. Penny ur *Grammar Practice Activities*, Cambridge University Press, 2010.
5. Mark Hancock, *Pronunciation in Use*, Oxford University Press 2007.

I B.TECH I/II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	20	30	50	1.5
Code:19BCC1LB02	**ENGINEERING PHYSICS LAB(Common to All branches)**						

COURSE OBJECTIVES:

To impart physical measurement skills and make the students understand coherence between theoretical and practical knowledge.

COURSE OUTCOMES:

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

CO 1: **Explain** the principle of physics and interpret them in engineering field and compares the results with theoretical calculations.
CO 2: **Utilize** modern engineering physics techniques and tools in real time applications in engineering studies.
CO 3: **Identify** the characteristics and the behavior of materials in a practical manner and gain knowledge and its usage.
CO 4: **Apply** the analytical techniques and graphical analysis to the experimental data.

LIST OF EXPERIMENTS:

1. Rigidity modulus of material by wire-dynamic method (torsional pendulum)
2. Determination of wavelength of a source-Diffraction Grating-Normal incidence
3. Newton's rings –Radius of Curvature of Plano Convex Lens.
4. Determination of thickness of thin wire- Air wedge method
5. Determination of wavelength of Laser Source-single slit diffraction.
6. Determine the Numerical aperture of an optical fiber.
7. Melde's experiment – Transverse and Longitudinal modes.
8. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
9. Verification of laws of stretched string by using Sonometer.
10. Calculate the energy loss in a given ferromagnetic material by plotting B-H Curve.
11. Energy Band gap of a Semiconductor p - n junction.
12. Characteristics of Thermistor – temperature coefficient

TEXT BOOKS:

1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links).
2.Physics Practical Manual, Lorven Publications
3. S. Balasubramanian , M.N. Srinivasan " A Text book of Practical Physics"- S Chand Publishers, 2017.

Web References:

1. https://www.youtube.com/watch?v=NDsSPtL9dyQ
2. https://www.youtube.com/watch?v=9agoJRCnu4w
3. https://www.youtube.com/watch?v=bv-lLJreyCU
4. http://vlab.amrita.edu/index.php

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code: 19BCC1LB07	**C PROGRAMMING LAB**						

COURSE OBJECTIVE:

The purpose of this course is to introduce to students to the field of language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

COURSE OUTCOMES:

After completion of this C Programming Lab, students should be able to:

CO 1: **Analyze** logical structure of computer programming and different constructs to develop programs in C Language.

CO 2: **Compare** and contrast various data types and operator precedence.

CO 3: **Analyze** the use of conditional and looping statements to solve problems associated with conditions and repetitions.

CO4: **Analyze** simple data structures, use of pointers and dynamic memory allocation techniques.

CO 4: **Make use of** functions and file I/O operations in developing C Programs.

Exercise l

Construct Flowcharts for the following through Raptor:

i) Develop a calculator to convert time, distance, area, volume and temperature from one unit to another.

ii) Calculate simple and compound interest for various parameters specified by the user.

iii) Calculate the average of n numbers.

Exercise 2

a) Write a C Program to calculate the area of triangle using the formula Area $=(s*(s-a)*(s-b)*(s-c))^{1/2}$ where s= (a+b+c)/2.

b) Write a C Program to find the largest of three numbers using ternary operator.

c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 3

a) Write a C program to find the roots of a quadratic equation.

b) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 4

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

b) Draw a flow chart using Raptor and write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 5

a) Draw a flow chart using Raptor and write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.

c) Write a C Program to check whether the given number is Armstrong number or not.

Exercise 6

a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

Exercise 7

a) Draw a flow chart using Raptor and write a C Program to find both the largest and smallest number of an array of integers
b) Write a C Program to find transpose of a matrix.

Exercise 8

Draw a flow chart using Raptor and write C programs that use both recursive and non-recursive Functions for the following

i) To find the factorial of a given integer.
ii)To find the GCD (greatest common divisor) of two given integers.

Exercise 9

a) Draw a flow chart using Raptor and write a C Program for the following To find Fibonacci sequence
b) Write C programs illustrating call by value and call by reference concepts.

Exercise 10

Write C Programs for the following string operations without using the built in functions - to concatenate two strings

a) To append a string to another string
b) To compare two strings

Exercise 11

Write C Programs for the following string operations without using the built in functions

a) To find whether a given string is palindrome or not

Exercise 12

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

i. To insert a sub-string in to given main string from a given position.
ii.To delete n Characters from a given position in a given string.
iii. To replace a character of string either from beginning or ending or at a specified location

Exercise 13

a) Write a C Program to Implement Taylor series method
b) Write a C Program to Implement Euler's method
c) Write a C Program to Implement Runge Kutta method

Exercise 14

a) Draw a flow chart using Raptor and write a C program to implement a linear search.
b) Draw a flow chart using Raptor and write a C program to implement binary search
c) Write a C program to implement sorting of an array of elements.

Exercise 15

a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two arrays using pointers
c) Write a C program to swap two numbers using pointers

Exercise 16
Examples which explores the use of structures, union and other user defined variables

Exercise 17
a) Write a C program which copies one file to another.
b) Write a C program to count the number of characters and number of lines in a file.
c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

Exercise 18

Virtual Lab: http://cse02-iiith.vlabs.ac.in/ /
Any three programs must be submitted with result from the above link

*** At the end of the semester the student has to submit a Mini-Project on Computer Programming. The list of Mini-Projects is available in the department.**

TEXT BOOKS:
1. Reema Thareja, " Programming in C", OXFORD .
2. The C programming Language by Dennis Richie and Brian Kernighan 2nd ed..

REFERENCE BOOKS:
1. Dr.E.Balaguruswamy, "Programming in ANSI C", Tata McGraw-Hill Education.
2. Hanly, "Problem Solving and Program Design in C", Koffman, 7th ed, PEARSON.
3. Forouzan, Gilberg, Prasad ,"C Programming, A Problem Solving Approach", CENGAGE.
4. Programming in C, Second Edition by Ashok N.Kamthane, Pearson.

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code:19BCC1LB04	**ENGINEERING WORKSHOP PRACTICE (COMMON TO CIVIL,MECH & EEE)**						

COURSE OBJECTIVES:

- To impart knowledge to students to develop their technical skill sets for creating entities from raw material.
- To give hands on training and practice to students for use of various tools, devices, machines.
- To develop ability of students to understand, plan and implement various processes and operations to be performed on the raw material to create object of desired shape and size.

COURSE OUTCOMES:

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

CO 1: **Make Use of** the various carpentry tools, machines, devices used in engineering practice for preparing different carpentry joints.

CO 2: **Make Use of** the various fitting tools, machines, devices used in engineering practice for preparing different Fits.

CO 3: **Develop** funnel and square box thorough knowledge of various Tin Smithy tools.

CO 4: **Demonstrate** the various house wiring connections for different house wiring connections.

- **CARPENTARY:**
  1. Preparation of T-Joint
  2. Preparation of dovetail Joint

- **FITTING:**
  1. Preparation of v-fit
  2. Preparation of square-fit

- **TIN SMITHY:**
  1. Preparation of funnel
  2. Preparation of square box

- **HOUSE WIRING:**
  1. Series bulbs connection
  2. Parallel bulbs connection
  3. Stair case connection
  4. Florescent lamp connection

IB.TECH I/II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	0	0	-	-	10	MC(0)
Code :19BCC1MC01	**ENVIRONMENTAL STUDIES (Common to all Branches)**						

COURSE OBJECTIVES:

- To make the students aware about the environment and it's inter–disciplinary, to familiarize the concept of ecosystem and their importance, basic understanding of the ecosystem and its diversity.
- Overall understanding of the natural resources.
- To bring the awareness among students about the importance of biodiversity and the need for its conservation.
- To make the students understand the adverse effects of environmental pollution, its causes and measures to control it.
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities. Awareness on the social issues, environmental legislation and global treaties understanding the environmental policies and regulations.

COURSE OUTCOMES:

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

CO 1: **Explain** the concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.

CO 2: **Analyze** the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.

CO 3: **Explain** the biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.

CO 4: **Distinguish** various attributes of the pollution, their impacts and measures to reduce or control the pollution along with waste management practices.

CO 5: **Define** Environmental policy, legislation, environmental assessment and the stages involved in EIA Environmental audit.

UNIT – I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness. Institutions and people in Environment.

Ecosystems:

Definitions and concepts – Characteristics of ecosystem – Structural and functional features – Producers, consumers and decomposers and food webs – Types of ecosystems – Forests, grassland, desert, crop land, pond, lake, river and marine ecosystems – Energy flow in the ecosystem – Ecological pyramids – Ecological successions.

UNIT – II

Natural Resources: Water resources–Use and over utilization of surface and natural resourced ground water–Floods, drought, conflicts over water, dams–benefits and problems on tribal population & Environment.

Forest resources: Use and over–exploitation, deforestation.

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

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer–pesticide problems, water logging, salinity–concept of sustainable agricultural methods.

Energy Resources: Renewable (wind energy, tidal energy) and non renewable energy resources (Fossil fuels, coal).

UNIT – III

Biodiversity: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity

Conservation of biodiversity: Threats to biodiversity: habitat loss, man wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: In-Situ conservation and Ex- situ conservation.

UNIT – IV

Environmental Pollution and Control Technologies: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, and nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Good Agricultural Practices – Drip irrigation, soil erosion and desertification

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V

Environmental Policy, Legislation and Environmental Management: Environmental ethics: Issues and possible solutions. Environmental Protection Act, Legal aspects -Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation.

Impact Assessment and its significance - various stages of EIA, preparation of EMP and EIS, Environmental audit, Ecotourism.

Visit to some local Polluted Site: Study of an industrially Polluted area.

TEXT BOOKS:

1. AnubhaKaushik& C. P. Kaushik, Environmental Studies, New Age International (P) Ltd., New Delhi. Fourth edition, 2014.
2. P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani,Environmental Studies, Pearson Education, Chennai.ISBN 978-93-325-2052-3,Second edition-2014.

REFERENCE BOOKS:

1. Deekshita Dave & P. Udaya Bhaskar, Text Book of Environmental Studies Cengage Learning.
2. Shaashi Chawla, a Textbook of Environmental Studies, TMH, New Delhi.
3. Benny Joseph Environmental Studies, Tata McGraw Hill Co, New Delhi.
4. Dr.K.V.S.G. Murali Krishna, Environmental Studies VGS Publishers, Vijayawada, First Edition 2016.
5. Bharucha, E. Text book of Environmental Studies, First edition, Universities Press (India) Pvt., Ltd., Hyderabad, 2005.

Web References:

1. URL:https://www.youtube.com/watch?v=7G3eXI_DPn8
2. URL: https://www.eolss.net/sample-chapters/C09/E6-70-05-01.pdf
3. URL: https://www.youtube.com/watch?v=QuRL6NbyvEQ
4. URL: https://google/ Introduction to Environmental Studies 5JM1G2
5.URL:http://www.teacherspayteachers.com/Product/Food-Chains-Trophic-Levels-and-Ecological- Pyramids-PowerPoint Click the above
6. URL:http://iadc-dredging.com/en/371/environment/ecosystem-services/ this webinar will focus on the concept of ecosystem services
7. URL: http://mocomi.com/ presents: What is Air Pollution? Air pollution is the introduction of foreign products into the atmosphere.
8. URL: https://en.wikipedia.org/wiki/green_impact_assessment

E-books:

1. .https://faculty.psau.edu.sa/.../doc-5-pdf-d78456fce3bebc84d9320fa2f9cf9e2a-original
2. https://www.researchgate.net/.../273775623_Introduction_to_Environmental_Sciences

I B.TECH- II SEMESTER

S.No.	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Communicative English -II	19BCC2TH01	HS	40	60	100	2	-	-	2
2	Differential Equations & Vector Calculus	19BCC2TH02	BS	40	60	100	2	1	-	3
3	Engineering Mechanics	19BCC2TH11	ES	40	60	100	2	1	-	3
4	Engineering Chemistry	19BCC2TH03	BS	40	60	100	3	-	-	3
5	Elements of Electrical & Electronics Engineering	19BCC2TH14	ES	40	60	100	2	1	-	3
6	Mechanical Workshop Practice	19BME2LB01	ES	20	30	50	-	-	3	1.5
7	Elements of Electrical & Electronics Engineering Lab	19BCC2LB02	ES	20	30	50	-	-	3	1.5
8	Engineering Chemistry Lab	19BCC2LB03	BS	20	30	50	-	-	3	1.5
9	IT Workshop	19BCC2LB07	ES	20	30	50	-	-	3	1.5
10	Constitution of INDIA(MC)	19BCC2MC01	MC	-	-	-	3	-	-	0
Total										**20**

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	0	0	40	60	100	2
Code: 19BCC2TH01	**COMMUNICATIVE ENGLISH - II (Common to All Branches)**						

COURSE OBJECTIVES:

- To enable the engineering students develop their basic communication skills in English for academic and social purposes.
- To equip the students with appropriate oral and written communication skills.
- To enhance the skills of listening, reading and critical thinking.
-

COURSE OUTCOMES:

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

CO 1: **Infer** explicit and implicit meaning of a text, recognize key passages; raise questions and summarize it.

CO 2: **Compose** paragraphs, essays as creative writing.

CO 3: **Build** grammatically correct sentences using a variety of sentence structures.

CO 4: **Enhance** word power and usage of lexicons.

CO 5: **Compile** emails, letters, reports, resume and information transfer.

UNIT– I

a. **Reading**: Rahul Bajaj
b. **Communication Skills -**Role and significance of communication, Features of Human Communication-
c. **Writing:** Emails and Letters
d. **Vocabulary**: Homonyms, Homophone and Homographs.

UNIT–II

a. **Reading:** Ratan Tata
b. **Communication Skills -**Process of Communication & types of Communication, barriers to communication
c. **Writing:** General Essay
d. **Vocabulary:** Words often confused, Suffixes & Prefixes

UNIT–III

a. **Reading:** Sabeer Bhatia
b. **Communication Skills -**Importance of Listening for effective communication, Interpersonal communication-
c. **Writing:** Note making
d. **Vocabulary:** Synonyms and Antonyms (100)

UNIT-IV

a) **Reading:** Steve Jobs
b) **Communication Skills -**Persuasion techniques
c) **Writing:** Resume
d) **Vocabulary:** One word substitutes (100)

UNIT-V

a. **Reading:** Sudha Murthy
b. **Communication Skills -**Telephone and Cell phone etiquette-
c. **Writing:** Report writing; types, format, style, sample reports
d. **Vocabulary:** Frequently used Idioms (100)

TEXT BOOKS:

1**. "**Modern Trail Blazers" , Orient Black Swan Pvt.Ltd.Publisher, 1ST edition. 2013
2. E Suresh Kumar," *Engineering English",* Orient Black Swan Pvt. Ltd. Publishers.

REFERENCE BOOKS:

1. Raman, Meenakshi and Sangeetha Sharma, "*Technical Communication: Principles and Practice",* Oxford University Press, New Delhi. 2015.
2. Rutherford, Andrea. J *Basic Communication Skills for Technology*. Pearson, New Delhi. 2001
3. Raymong Murphy, "*Murphy's English Grammar",* Cambridge University Press 2004.
Sanjay Kumar, Pushpa Latha, "*Language and Communication Skills for Engineerers",* Oxford University Press, 2018.

I B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
Code: 19BCC2TH02	**DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to Civil, EEE, ME and ECE)**						

COURSE OBJECTIVES:

- To formulate and solve first order ordinary differential equations.
- To solve second order differential equations of various kinds.
- To find the solution of first order linear and non-linear partial differential equations.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:

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

CO 1: **Apply** first order ordinary differential equations to real life situations.
CO 2: **Identify** and apply suitable methods in solving the higher order differential equations.
CO 3: **Solve** the partial differentiation equations.
CO 4: **Interpret** the physical meaning of different operators as gradient, curl and divergence.
CO 5: **Estimate** the work done against a field, circulation and flux using vector calculus.

UNIT I: DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE: (10 hours)

Linear-Bernoulli's-Exact equations and equations reducible to exact form.
Applications: Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories, Electrical circuits.

UNIT-II: LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER: (10 hours)

Finding the complementary functions, Inverse operator, Rules for finding the particular integrals, Method of variation of parameters. Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients.
Application: L-C-R Circuit problems.

UNIT – III: FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS: (10 hours)

Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange's) equations.

UNIT- IV: VECTOR DIFFERENTIATION: (8 hours)

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT- V: VECTOR INTEGRATION: (10 hours)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

TEXT BOOK :

1. Dr. B.S. Grewal, "*Higher Engineering Mathematics*", 43rd Edition, Khanna Publishers, 2012.
2. Bhavanari Satyanarayana, Pradeep Kumar T.V. & Srinivasulu D, "Linear Algebra and Vector Calculus", Studera Press, New Delhi, 2017.

REFERENCES:

1. Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
2. Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
3. Peter V. O'Neil, *"Advanced Engineering Mathematics"*, 7th Edition, Cengage Learning, 2011.
4. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, "*Engineering Mathematics*", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
Code: 19BCC2TH11	**ENGINEERING MECHANICS (COMMON TO CIVIL & MECH)**						

COURSE OBJECTIVES:

- Learn and understanding the basic principles of mechanics of rigid bodies, various types of force systems and to analyze problems in a simple and logical manner.
- Study and calculate the concepts of wedge friction, and to analyze simple trusses using method of joints and method of sections.
- Study and determine centroids and center of gravity of various standard geometrical shapes as well as composite areas and bodies.
- Learn the concept of moment of inertia and the mathematical calculations involved in finding moments of inertia of two dimensional areas.
- The students are to be exposed to concepts of work, energy and particle motion.

COURSE OUTCOMES:

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

CO 1: **Apply** the principles of mechanics to determine the resultant of several concurrent forces acting on a particle.

CO 2: **Analyze** the trusses using method of joints and method of sections; apply the basic concepts of dry friction and wedges.

CO 3: **Illustrate** the centroid and center of gravity bodies and composite sections.

CO 4: **Determine** the Area Moment of Inertia and Mass Moment of Inertia of areas bodies and composite sections.

CO 5: **Apply** the work-energy principle to particles and connected systems for engineering applications.

UNIT– I

INTRODUCTION TO ENGINEERING MECHANICS: Basic Concepts**,** Characteristics of a Force, Force system classification, Resultant of Force Systems, parallelogram law of forces, Triangle of forces.

SYSTEMS OF FORCES: Resolution of forces, Coplanar Concurrent forces, Moment of Force and its Application – Couples, Varignon's theorem.

EQUILIBRIUM OF SYSTEMS OF FORCES: Equations of Equilibrium of Coplanar concurrent, Lami's Theorem, support reactions, free body diagrams.

UNIT–II

ANALYSIS OF PLANE TRUSSES: Definition, Assumptions made in the analysis of plane trusses-methods of joints and method of sections.

FRICTION: Introduction, Classification of friction, Laws of Friction, Coefficient of Friction, Angle of Friction, Angle of Repose, Motion of a body on an Inclined Plane, Ladder friction, Wedge friction.

UNIT–III

CENTROID: Centroids of simple figures (from basic principles)-Centroids of composite figures.

CENTRE OF GRAVITY: Centre of Gravity of simple body (from basic principles), Centre of gravity of composite bodies, pappu's theorem.

UNIT-IV

AREA MOMENTS OF INERTIA: Definition, Radius of gyration, Parallel axis theorem, perpendicular axis theorem, Moments of Inertia of composite figures, polar moment of Inertia.

MASS MOMENT OF INERTIA: Moment of Inertia of Rigid body-Moment of Inertia from basic principles-Slender bar, Rectangular Plate, Circular Plate, Moment of Inertia of 3D Bodies-Cone, Solid Cylinder.

UNIT-V

KINETICS: Analysis as a particle, Newton's laws of motion, D'Alembert's principle –simple applications- analysis as a rigid body in translation-fixed axis rotation-Simple applications.

WORK-ENERGY METHOD: Equations for Translation, work-Energy applications to particle motion, connected system-Impulse momentum method-simple applications.

TEXT BOOKS:

1. Engineering Mechanics by S.Timoshenko & D.H.Young., 4th Edn - ,Mc Graw Hill publications.
2. Engineering Mechanics by S.S. Bhavikatti-New age publications
3. Engineering Mechanics Statics and Dynamics A.K.TAYAL Umesh publications.

REFERENCE BOOKS:

1. Engineering Mechanics by Fedinand . L. Singer , Harper – Collins.
2. Mechanics of Materials (In Si Units) by Beer and Johnson, Tata McGraw-Hil.
3. Strength of Materials (Mechanics of Materials) by James M.Gere and Barry J.Goodno, PWS-KENT Publishing Company, 1990
4. Strength of Materials (Mechanics of Solids) by R.K. Rajput , S.Chand Publications.

Web References:

1. https://nptel.ac.in/courses/112103109/14
2. https://nptel.ac.in/courses/112103109/11
3. https://nptel.ac.in/courses/122104014/4

E-Books:

1. https://easyengineering.net/engineeringmechanicsbooks/

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
Code: 19BCC2TH03	**ENGINEERING CHEMISTRY (COMMON TO ALL BRANCHES)**						

COURSE OBJECTIVES:

- To analyze water for its various parameters and its significance in industrial and domestic allocations.
- To acquire the knowledge on types of polymers, fuels and their applications.
- To provide information on exciting advanced materials available in engineering.
- To apply the electrochemical principles, understand the fundamentals of corrosion and development of different techniques in corrosion control.
- To learn the importance of engineering materials used in daily life and industry.

COURSE OUTCOMES:

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

CO 1: **Analyze** the suitable method of water treatment depending on the quality treatment.
CO 2: **Compare** different types of polymers, fuels and their importance-Analyzing
CO 3: **Utilize** the advanced materials as engineering materials and apply them in domestic and industrial life-Applying
CO 4: **Distinguish** electrical energy sources and importance of corrosion science-Analyzing
CO 5: **Identify** different types of engineering materials and applications in engineering.

UNIT-I: WATER CHEMISTRY

Characteristics of water: Sources, Impurities–Hardness & its units–Industrial water characteristics–Softening of water by external treatment methods (Lime soda process, Zeolite and Ion exchange process)–Numerical problems on lime soda process–Desalination of brackish water (Reverse osmosis and Electrodialysis).

Water analysis techniques: Alkalinity–hardness (Complexo-metric)–Break point chlorination–Free chlorine–DO–BOD and COD.

UNIT-II: POLYMERS AND FUEL CHEMISTRY

Polymers: Introduction to polymers–Chain growth (free radical, ionic)–Step growth polymerization–Coordination polymerization–Copolymerization with specific examples–Thermoplastics and thermosets–Plastic moulding methods (Compression & Injection moulding)–Rubbers–Natural rubber–Processing–Vulcanization.

Fuels-Types of fuels–Calorific value–Numerical problems based on calorific value–Analysis of coal–Liquid fuels–Refining of petroleum–Cracking of heavy oil–Knocking and anti knocking agents–Octane and cetane values.

UNIT-III: CHEMISTRY OF ADVANCED MATERIALS

Nano materials: Introduction–Sol-gel method & Chemical reduction method of preparation – Characterization by BET method and TEM methods–Carbon nano tubes and fullerenes: Types–Preparation–Properties and Applications.

Liquid crystals: Introduction–Types–Applications.

Composite materials: Introduction–Definition–Types–Applications–Cermets.

UNIT-IV: ELECTROCHEMISTRY AND CORROSION

Electrochemistry: Galvanic cells–Single electrode potential–Reference electrodes–Electrochemical series–Batteries (primary, secondary and fuel cells)–Applications of secondary batteries in E-vehicles.

Corrosion: Causes and effects of corrosion–Theories of corrosion (chemical and electrochemical corrosion)–Factors effecting corrosion–Corrosion control methods–Cathode protection–Sacrificial anodic, Impressed current methods–Surface coatings–Methods of application on metals (Hot dipping, Galvanizing, Tinning, Cladding, Electroplating, Electroless plating)–Organic surface coatings–Paints–Constituents and their functions–Pigment Volume Concentration.

UNIT-V: CHEMISTRY OF ENGINEERING MATERIALS

Lubricants: Introduction–Mechanism of lubrication–Classification of lubricants–Properties and testing of lubricating oils.

Cement & Refractories: Manufacture–Setting and hardening of cement–Failures of cement–Slag cement–Refractory: Introduction–Classification and properties of refractories.

TEXT BOOKS:

1. Shikha Agarwal, "**Engineering Chemistry**", ISBN 1107476410, 2nd Edition, Cambridge University Press, New Delhi, (2019).
2. O.G. Palana, "**Engineering Chemistry**", ISBN 0070146101, Tata McGraw Hill Education Private Limited, New Delhi, (2009).
3. B. Rama Devi, Ch. Venkata Ramana Reddy, Prashantharath, "**Text Book of Engineering Chemistry**", ISBN 9789353500511, Cenage Learning India Pvt. Ltd, (2016).

REFERENCE BOOKS:

1. P.C. Jain and M. Jain "**Engineering Chemistry**", ISBN 8187433175, 15/e, Dhanpat Rai & Sons, Delhi, (2015).
2. B.S Murthy and P. Shankar, "**A Text Book of NanoScience and NanoTechnology"**, University Press (2013).
3. K. Sesha Maheshwaramma and Mridula Chugh, "**Engineering Chemistry"**, Pearson India Edn services, (2016).
4. S.S. Dara, "**A Textbook of Engineering Chemistry"**, ISBN 8121932645, S.Chand Publisher, (2010)

Web References:

1. URL: https://www.youtube.com/watch?v=CWOJW4357Bg
2. URL: https://www.youtube.com/watch?v=H1Y1oxQ5eUA&t=627s
3. URL: https://www.youtube.com/watch?v=1xWBPZnEJk8
4. URL: https://www.youtube.com/watch?v=p9yPXdT0k48&t=225s
5. URL: https://www.youtube.com/watch?v=xb_xndPe4n0&t=390s

E-Books:

1. "**Engineering Chemistry**" (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
Code: 19BCC2TH14	**ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING (Common To Mech and Civil)**						

Course Objectives

- To familiarize with the basic DC network.
- To explain the concepts of electrical machines and their characteristics.
- To identify the importance of transformers and induction motor.
- To impart knowledge about the characteristics of semi conductor devices.
- To expose basic concepts and applications of Transistor

Course Outcomes

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

CO 1: **Analyze** the behavior of an electrical circuit.
CO 2: **Measure** the performance quantities such as losses, efficiency of DC machines
CO 3: **Create** the construct of transformer and Induction motor
CO 4: **Classify** the importance and applications of p-n junction diode.
CO 5: **Evaluate** the configurations and applications of Transistor.

Unit I: Basic laws and Circuits

Active and passive elements-voltage-current-power-power factor-energy-Ohms law-Kirchhoff's Laws-series and parallel circuits-source transformations-delta-wye conversion.

Unit II: DC Machines

Principle Operation-Constructional features-induced EMF-Types of DC generators-Working of DC motor-Torque expression-3point starter-Speed controls-Losses and Efficiency by direct loading.

Unit III: Transformers

Constructional details-working principle-EMF equation-voltage regulation-losses and efficiency-open/short circuit tests.
Induction Motors:3-Phase Induction motor Construction-working principle-Types-slip-Performance characteristics-1-phase Induction motor working principle-starting methods-applications

Unit IV: Semiconductor Devices

Introduction-Bonds-extrinsic-intrinsic-p-n Junction diode-current and voltage characteristics-rectifier circuits-half wave-full wave-bridge rectifier-Zener diode as Voltage Regulator.

Unit V: **Transistor Configurations**

Construction-working-Transistor as amplifier-Transistor as switch -Analysis of CE, CB and CC Characteristic's-Comparison of CE, CB and CC configurations.

Text Books:

1. D.P.Kothari, I.J.Nagrath, Basic Electrical and Electronics Engineering, 1stedition, McGraw Hill Education (India) Private Limited,2017.
2. B.L. Theraja, Fundamentals of Electrical Engineering and Electronics, 1stedition, S. Chand Publishing, New Delhi, 2006.
3. Adel S. Sedra and Kenneth C. Smith, Microelectronic Circuits 6th edition, Oxford University Press, 2014.
4. V.K. Mehta, "Principle of Electrical and Electronics Engg." S.Chand publishing, New Delhi,2006.

References:

1. S.K.Bhattacharya, Basic Electrical and Electronics Engineering, Pearson Education,2011.
2. Dharma Raj Cheruku, B T Krishna, Electronic Devices and Circuits, 2/e, Pearson Education, 2008.
3. R.K.Rajput, Basic Electrical and Electronics Engineering, University Science Press, New Delhi,2012.

Web References:

1. URL: https://www.youtube.com/watch?v=ohhdNRtDpCY

E-Books:

1. https://www3.nd.edu/~cpoellab/teaching/eee40814/Lecture1-Handouts.pdf

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code: 19BME2LB01	**MECHANICAL WORKSHOP PRACTICE**						

COURSE OBJECTIVES:

- To impart knowledge to students to develop their technical skill sets for creating entities from raw material.
- To give hands on training and practice to students for use of various tools, devices, machines.
- To develop ability of students to understand, plan and implement various processes and operations to be performed on the raw material to create object of desired shape and size.

COURSE OUTCOMES:

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

CO 1: **Make use of** the various black smithy tools, machines, devices used in engineering practice for preparing different Black smithy shapes. .

CO 2: **Make the use** various welding tools, machines, devices used in engineering practice for preparing the different welding joints.

CO 3: **Demonstrate** the various machines and engines used in engineering practice.

CO 4: **Develop** different types of wooden patterns thorough knowledge of various foundry tools.

- **BLACK SMITHY:**
  - Preparation of square bar from round rod
  - Preparation of L-shape
- **WELDING:**
  - Preparation of Butt Joint using electrical arc welding
  - Preparation of T-Joint using electrical arc welding
- **MACHINE SHOP:**
  - Preparation of hole using bench drilling machine
  - Dismantling and assembling of Maruti car engine
  - Making internal thread cutting
  - Making external thread cutting
- **FOUNDRY:**
  - Preparation of split piece wooden pattern on wood lathe
  - Preparation of single piece wooden pattern on wood lathe

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	20	30	50	1.5
Code: 19BCC2LB02	**ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY (Common to Mech and Civil)**						

COURSE OBJECTIVES:

To expose the students to the operation of DC motor, Transformer and rectifiers give them Experimental skill.

COURSE OUTCOMES:

At the end of the course, the student will able to

- **CO 1:** **Determine** the efficiency and regulation of 1-phase transformer
- **CO 2:** **Compute** the performance characteristics of transformers and DC machines through Suitable tests.
- **CO 3:** **Calculate** the ripple factor of half-wave&full-wave rectifiers.
- **CO 4:** **Gain** practical experience related to electronics circuits; stimulate more interest and Motivation for further studies of electrical circuits.

Any 5 of the following experiments to be conducted from each PART:

PART-A: Electrical Experiments:

1. Verification of Kirchhoff's law.
2. Swinburne's test and Predetermination of efficiencies as Generator and Motor
3. Brake test on DC shunt motor. Determination of performance curves
4. Speed control of D.C shunt motor by a) Armature voltage control b) Field flux control method.
5. OC & SC tests on single phase transformer (predetermination of efficiency and regulation).
6. Load test on three-phase induction motor.

PART-B: Electronics Experiments:

7. PN junction diode characteristics a) Forward bias b) Reverse bias
8. Transistor CE characteristics (input and output).
9. Half wave rectifier characteristics with and without filter
10. Full wave rectifier characteristics with and without filter
11. Characteristics of CE Amplifier.
12. Characteristics of CC Amplifier.

I B.TECH II SEMESTERS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code: 19BCC2LB03	**ENGINEERING CHEMISTRY LAB (COMMON TO ALL BRANCHES)**						

COURSE OBJECTIVES:

- To provide the students with a solid foundation in chemistry laboratory required to solve the engineering problems.
- To expose the students in practical aspects of the theoretical concepts.
- To train the students on how to handle the instruments.

COURSE OUTCOMES:

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

CO 1: **Develop** and perform analytical chemistry techniques to address the water related problems (hardness, alkalinity, Chlorine, DO).
CO 2: **Explain** the functioning of different analytical instruments.
CO 3: **Compare** viscosity and surface tension of different oils.
CO 4: **Measure** molecular/system properties such as strength of solutions, conductance of solutions and acid number of lubricating oils, etc.

List of Experiments

Introduction to chemistry laboratory–Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis etc.

1. Estimation of NaOH using standard HCl solution
2. Determination of hardness of water sample by EDTA method
3. Determination of alkalinity of water sample
4. Determination of Dissolved Oxygen content of water sample by Winkler's method
5. Determination of Dissolved Chlorine by Mohr's method
6. Estimation of Fe^{+2} by using $KMnO_4$
7. Preparation of phenol formaldehyde resin/Urea formaldehyde
8. Conductometric titration between strong acid and strong base
9. Determination of viscosity of a liquid by Ostwald's viscometer
10. Determination of surface tension of a liquid by Stalagnometer
11. Determination of moisture content present in given coal sample
12. Determination of acid value of an oil

TEXT BOOKS:

1. N.K Bhasin and Sudha Rani "**Laboratory Manual on Engineering Chemistry**" 3/e, Dhanpat Rai Publishing Company (2007).
2. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B "**Vogel's Quantitative Chemical Analysis**" 6/e, Pearson publishers (2000).
3. Sudharani, "**Lab manual on Engineering Chemistry**" Dhanpat Rai Publications, Co., New Delhi. (2009).

I B.TECH II SEMESTERS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code:19BCC2LB07	**IT WORKSHOP**						

COURSE OBJECTIVES:
Enabling the student to understand basic hardware and software tools through practical exposure.

COURSE OUTCOME:

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

- **CO 1:** **Demonstrate** the need of PC hardware components, applications and softwares.
- **CO 2:** **Explain** the knowledge of networks, internet and World Wide Web, Search engines, Netiquette.
- **CO 3:** **Experiment with** the installation and use of different software like Windows XP, Linux.
- **CO 4:** **Identify** and fix the defective PC and software related issues.
- **CO 5:** **Make use of** various options in Microsoft word, Excel and Power point.

PC Hardware:
Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Trouble shooting Hardware and Software some tips and tricks.

Internet & World Wide Web:
Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene (protecting the personal computer from getting infected with the viruses), worms and other cyber-attacks.
Productivity tools: Crafting professional word documents; excel spread sheets, power point presentations and personal websites using the Microsoft suite of office tools.

PC Hardware
Task 1: Identification of the peripherals of a computer. To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.
Task 2: (Optional): A Practice on disassembling the components of a PC and assembling them to back to working condition.
Task 3: Examples of Operating Systems- DOS, MS Windows, Installation of MS windows on a PC
Task 4: Introduction to Memory and Storage Devices, I/O Port, Device Drivers, Assemblers, Compilers, Interpreters, Linkers, Loaders.
Task 5: Hardware Troubleshooting (Demonstration): Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).
Software Troubleshooting (Demonstration): Identification of problem and fixing the PC for any software issues.
Internet & Networking Infrastructure
Task 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices-

Gateway, Routers, Hub, Bridge, NIC, Bluetooth technology, Wireless Technology, Modem, DSL, and Dialup Connection.

Orientation & Connectivity Boot Camp and Web Browsing: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

Task 7: Search Engines & Netiquette:

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc).Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

Task 8: Cyber Hygiene (Demonstration) : Awareness of various threats on the internet. Importance of Security patch updates and Anti-Virus solution Ethical Hacking, Firewalls, Multi-factors authentication techniques including Smart card Biometrics and also practiced

WORD

Task 9: MS Word Orientation: Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

Task 10 : Creating Project : Abstract Features to be covered:-Formatting Styles, Inserting Table, Bullets and Numbering, Changing Text Direction, Cell alignment, footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

EXCEL

Task 11: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

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

LOOKUP/VLOOKUP

Task 12: Performance Analysis: Features to be covered:-Split cells, freeze panes, group and outline, Sorting, Boolean and Logical operators, Conditional Formatting.

POWER POINT

Task 13: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes:- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in PowerPoint.

Task 14: Focusing on the power and potential of Microsoft power point Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes:- Master Layouts (slide, template and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background , textures, Design Templates, Hidden slides, OLE in PPT.

TEXT BOOKS:

Faculty to consolidate the workshop manuals using the following references.

1. Anita Goel , Computer Fundamentals, Pearson
2. Scott. Mueller QUE , Scott Mueller's Upgrading and Repairing PCs, 18/e, Pearson, 2008

REFERENCE BOOKS:

1. Dr.N.B.Venkateswarlu, Essential Computer and IT Fundamentals for Engineering and Science Students.
2. G Praveen Babu, M V Narayana, "Information Technology Workshop", BS Publications, 3e
3. Vikas Gupta, "Comdex Information Technology", Dreamtech.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	-	-	-	-
Code: 19BCC2MC01	**CONSTITUTION OF INDIA**						

COURSE OUTCOMES:

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

- **CO 1:** **Examine** salient features of Indian Constitution and live accordingly in society & interpret the meaning of Fundamental Rights of State Policy
- **CO 2:** **Discover** various aspects of Union Government legislation and live up to the expectations of the rules.
- **CO 3:** **Examine** State Government legislation and improve your living standards by following the rules strictly
- **CO 4:** **Examine** powers and functions of local bodies such as Municipalities and Panchayats and, take advantage of available resources for better living
- **CO 5:** **Analyze** the powers and functions of Election Commission and The Union Public Service Commission and decide upon it for safe and secured life.

UNIT-I: INTRODUCTION TO INDIAN CONSTITUTION & FUNDAMENTAL RIGHTS

Meaning of the term Indian Constitution –Preamble- Constituent Assembly- Salient Features of Indian Constitution. Fundamental Rights -Fundamental Duties -The Directive Principles of State Policy.

UNIT-II: UNION GOVERNMENT

Union Government -Union Legislature (Parliament) -Lok Sabha and Rajya Sabha (with Powers and Functions) -Union Executive -President of India (with Powers and Functions) -Prime Minister of India (with Powers and Functions) -Union Judiciary (Supreme Court) -Jurisdiction of the Supreme Court

UNIT-III: STATE GOVERNMENT

State Government -State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) -Powers and Functions of the State Legislature -State Executive-Governor of the State (with Powers and Functions) -The Chief Minister of the State (with Powers and Functions) -State Judiciary (High Courts)

UNIT-IV: LOCAL SELF GOVERNANCE

Powers and functions of Municipalities, Panchyats, ZP's and Co – Operative Societies

UNIT-V: SOVEREIGN BODIES

Election Commission of India (with Powers and Functions) -The Union Public Service Commission (with Powers and Functions)

BOOKS:

1. Introduction to constitution of India, Durga Das Basu, Lexis Nexis Publications
2. Constitution of India by PRFESSIONAL BOOK PUBLISHERS
3. The Constitution of India by Arun K Tiru vengadam, Blooms bury publishers.
4. The constitution of India by PM Bakshi, Universal law publishing co
5. The Constitution of India by S.R. Bhansali, Universal law publishing co

II B.TECH- I SEMESTER

S.No.	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Fluid Mechanics & Hydraulic Machinery	19BME3TH02	PC	40	60	100	2	1	-	3
2	Materials Science and Metallurgy	19BME3TH04	PC	40	60	100	3	-	-	3
3	Thermodynamics	19BME3TH05	PC	40	60	100	2	1	-	3
4	Mechanics of Solids	19BME3TH06	PC	40	60	100	2	1	-	3
5	Numerical Methods & Transformations	19BCC3TH01	BS	40	60	100	2	1	-	3
6	Machine Drawing & Basic Design Engg. Soft. Lab.	19BME3TH03	ES	40	60	100	1	-	4	3
7	Fluid Mechanics & Hydraulic Machinery Lab	19BME3LB01	PC	20	30	50	-	-	3	1.5
8	Mechanics of Solids & Metallurgy Lab	19BME3LB02	PC	20	30	50	-	-	3	1.5
9	Quantitative Aptitude & Reasoning	19BCC3MC01	MC	-	-	-	3	-	-	0
10	Community Service	19BCC3MC02	MC	-	-	-	-	-	-	0
	Total									**21**

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
Code: 19BME3TH02	**FLUID MECHANICS AND HYDRAULIC MACHINERY**						

COURSE OBJECTIVES:

- To understand the concept of fluid statics and properties of fluids.
- To understand the fluid kinematics and dynamics.
- Get the knowledge of boundary layer theory to solve the problems.
- To understand velocity diagrams on different vanes.
- Learn the working of different kinds of turbines and pumps.

COURSE OUTCOMES:

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

CO 1: **Explain** about Fluid Properties and hydrostatic forces acting on different surfaces

CO 2: **Apply** conversation laws to fluid flow problems in engineering applications

CO 3: **Compute** theory of Boundary layer flows, Identifies dimensionless parameters

CO 4: **Illustrate** the force required to move the vane using by Jet

CO 5: **Demonstrate** the turbines and its functions & Operating conditions of Centrifugal and Reciprocating pumps.

UNIT - I

PROPERTIES OF FLUIDS AND FLUID STATICS: Fluid properties: Mass density, specific weight, specific volume, specific gravity, viscosity, vapour pressure, compressibility, surface tension and capillarity.

FLUID STATICS: fluid pressure at a point, variation of pressure within a static fluid, hydrostatic law - Pressure head, Pascal's law, Measurement of pressure, U-Tube manometer, Differential U-Tube manometer.

UNIT - II:

FLUID KINEMATICS: Lagrangian and Eulerian description of fluid flow: velocity and acceleration of fluid particles, different types of fluid flow, description of flow pattern: Stream line, streak line, path line. Principle of conservation of mass: Continuity equation, applications of continuity equation.

FLUID DYNAMICS: Euler's equation of motion along a stream line - Bernoulli's equation, Practical applications of Bernoulli's equation in flow measurement devices like venturimeter, orifice meter and Pitot tube.

UNIT – III:

BOUNDARY LAYER THEORY: Boundary layer development on a flat plate and its characteristics - Boundary layer thickness, displacement thickness, momentum thickness, energy thickness.

DIMENSIONAL AND MODEL ANALYSIS: Dimensional analysis: dimensions, dimensional homogeneity, methods of dimensional analysis-Buckingham Pi theorem, Raleigh's method Model analysis. Similitude, derivations of important dimensionless numbers.

UNIT – IV:

BASICS OF TURBO MACHINERY: Hydrodynamic force or jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes

HYDRAULIC TURBINES: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies.

UNIT - V:

HYDRAULIC PUMPS: Classification, working, work done - manometric head losses and efficiencies, specific speed- pumps in series and parallel-performance characteristic curves, NSPH; Reciprocating pump Working.

TEXT BOOKS:

1. Fluid Mechanics and Hydraulics Machines by R.K.Bansal, Laxmi publications
2. Fluid Mechanics and Hydraulic Machines by R.K.Rajput, S. Chand Publications

REFERENCE BOOKS:

1. Fluid Mechanics by White.F.M, Tata McGraw-Hill, 5th Edition, New Delhi, 2003.
2. Hydraulics and Fluid Mechanics by P.N.Modi and S.M.Sethi, Standard Book House, New Delhi.

WEB REFERENCES:

1. https://nptel.ac.in/courses/105101082/ Fluid Mechanics by Prof S K Som, Department of Mechanical Engineering

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
Code: 19BME3TH04	**MATERIAL SCIENCE & METALLURGY**						

COURSE OBJECTIVES:

- To learn the principles of materials science and engineering though lab investigation
- To learn to organize the lab results into a logic, concise and accurate report
- To review physics and chemistry in the context of materials science & engineering
- To give an introduction to metals, ceramics, composites powder metallurgy

COURSE OUTCOMES:

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

CO 1: **Illustrate** the knowledge related to the structure and properties of materials, crystal Systems and phase diagrams of alloys.

CO 2: **Examine** properties of ferrous materials and their engineering applications

CO 3: **Explain** the basic concepts of Heat treatment processes and their applications

CO 4: **Examine** nonferrous materials properties and their engineering applications.

CO 5: **Choose** the various types of ceramics, composite materials and basic steps involved in the Powder Metallurgy process.

UNIT– I

STRUCTURE OF METALS AND CONSTITUTION OF ALLOYS: Ionic, Covalent and Metallic bonds; Amorphous and Crystalline solids. Crystal structure - BCC, FCC, HCP. Crystallization of metals– Nuclei formation and Crystal growth, grain and grain boundaries, Grain size; Necessity of alloying, substitutional solid solutions and Hume Rothery rules of solid solubility, interstitial solid solutions.

EQUILIBRIUM DIAGRAMS: Introduction to Phase and Phase diagrams with its Importance and types-Unary, Binary and Ternary phase diagrams; Binary phase diagrams of Fe-Fe3C and Cu-Ni. Micro constituents in steels- Austenite, Ferrite, Cementite, Pearlite, Bainite, Martenite; eutectic, peritectic, eutectoid and peritectoid reactions. Cooling curve of pure iron, Lever Rule, Gibbs Phase Rule.

UNIT –II

FERROUS METALS AND ALLOYS:

STEELS: Introduction, Classification and Influence of constituents on steel; Structure, properties and applications of plain carbon steels; Alloy steels-Purpose and effect of alloying elements; Properties of Stainless steels and tool steels.

CAST IRON: Introduction, comparison with steels and Classification-Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, S.G. cast iron.

UNIT – III

HEAT TREATMENT OF ALLOYS: Purpose of heat treatment; Process and applications of Annealing, normalizing, Hardening and tempering; Effect of cooling on austenite transformation, TTT diagrams, Hardenability and factors affect hardening; Surface Hardening of Steels- Carburizing, Nitriding, Cyaniding.

UNIT – IV

NON-FERROUS METALS AND ALLOYS: Introduction, Structure and properties of copper Aluminium, Titanium and their alloys.

UNIT – V

CERAMICS: Introduction; Glasses, Ceramets, Abrasive materials.

COMPOSITE MATERIALS: Introduction, types-particle reinforced, fiber reinforced and structural composites.

POWDER METALLURGY: Introduction, preparation, industrial applications, advantages and limitations.

TEXT BOOKS:

1. Introduction to Physical Metallurgy by Sidney H. Avener, TataMcGraw Hill
2. Material Science and Metallurgy by V.D.Kodgire, Everest Publishing House

REFERENCES:

1. Materials Science and engineering by Callister and Baalasubrahmanyam, Wiley India
2. Material science and Engineering by V. Rahghavan, P.H.I Publications
3. Material Science and Metallurgy by A V K Suryanarayana, B S Publications
4. Material Science and Metallurgy by U. C. Jindal by Pearson Publications

WEB REFERENCES:

1. http://nptel.ac.in/courses/Webcourse-contents/IIScBANG/Material%20Science/pdf/Lecture Notes/ MLN_02.pdf
2. http://nptel.ac.in/courses/113105023/Lecture7.pdf
3. http://nptel.ac.in/courses/Webcourse-contents/IIScBANG/Material%20Science/pdf/PPTs/ MTS_07_m.pdf
4. http://nptel.ac.in/courses/IITMADRAS/Design_Steel_Structures_I/1_introduction/3_properties _of_steel.pdf
5. http://nptel.ac.in/courses/112108150/pdf/Lecture_Notes/MLN_10.pdf

E-Books:

1. https://www.ebooks.com/en-us/subjects/technology-metallurgy-ebooks/1211/
2. http://www.digitalbookindex.org/_search/search010mmetallurgya.asp
3. https://www.pdfdrive.com/metallurgy-books.html
4. https://www.elsevier.com/books/fundamentals-of-metallurgy/seetharaman/978-1-85573-927-7
5. https://ebooks.benthamscience.com/book/9781681085708/

II B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
Code: 19BME3TH05	THERMODYNAMICS						

COURSE OBJECTIVES:

1. To acquire the knowledge of first law of thermodynamics and its analysis.
2. To learn the second law of thermodynamics and significance of entropy principles.
3. To learn the concepts of reactant, non-reactant gas mixtures and pure substance.
4. To understand the significance of various thermal cycles.

COURSE OUTCOMES:

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

- **CO 1:** **Illustrate** the concepts of heat, work, and forms of energy
- **CO 2:** **Classify** various thermal systems using thermodynamic laws and principles.
- **CO 3:** **Apply** the laws of thermodynamics for various thermodynamic systems.
- **CO 4:** **Evaluate** the performance parameters of pure substances and gas mixtures.
- **CO 5:** **Analyze** different thermodynamic cycles and estimate work done and performance

UNIT - I

BASIC CONCEPTS AND DEFINITIONS: Thermodynamic fundamentals, Thermodynamic equilibrium and Quasi-static Process, thermodynamic path, cycle, Work and Heat, work done in various non-flow processes.

ZEROTH LAW OF THERMODYNAMICS: Temperature Scales, Temperature measurement, Constant Volume Gas Thermometer, Advantages of gas thermometers over liquid thermometers

UNIT-II

FIRST LAW: First law of thermodynamics for a system undergoing a cycle and for a change in state. First Law Analysis of Closed System, Thermodynamic processes, Different forms of stored energy, Energy-Forms of Energy, PMM-I.

FIRST LAW FOR FLOW SYSTEMS: Steady flow energy equation and applications, limitations of first law of thermodynamics

UNIT - II

SECOND LAW OF THERMODYNAMICS: Introduction, Thermal Energy Reservoirs, Heat Engines, Refrigerators, Heat Pumps, Kelvin-Planck & Clausius Statements of Second law of Thermodynamics, , Equivalence of Kelvin-Plank and Clausius Statements, PMM II, Differences between reversible and Irreversible Process, Carnot Cycle, Carnot Theorem.

ENTROPY: Introduction, temperature-entropy Plot, Principle of increase of entropy, Entropy Change for Ideal gases, Applications of Entropy.

UNIT - III:

PURE SUBSTANCES: Pure substance, vapour-liquid-solid phase equilibrium in a pure substance, Independent properties of a pure substance, Equations of state for vapour phase of a simple compressible substance, Tables of thermodynamic properties, thermodynamic surfaces.

MIXTURES OF PERFECT GASES– Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive.

UNIT - V:

POWER CYCLES: Carnot, Otto, Diesel, Dual cycles– Description and representation on P-V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles, Brayton and Rankine cycles.

REFRIGERATION CYCLES: Reversed Carnot cycle - Performance Evaluation, VCR system, Bell-Coleman cycle.

TEXT BOOKS:

1. Thermodynamics Engineering Approach by Yunus A. Cengel M. and Michael A. Boles, Seventh edition, McGraw Hill Education (India) Private Limited, 2011.
2. Engineering Thermodynamics by P.K.Nag, Fifth edition, Tata McGraw Hill Education Private Limited, 2012.

REFERENCES:

1. Fundamentals of Classical Thermodynamics by G.J.Van Wylen& Sonntag, 4th Edition, 1994 Wiley publication 2005.
3. Thermal Engineering by R.K. Rajput, 8th Edition, Lakshmi Publications
4. Engineering Thermodynamics by P.Chattopadhyay, Oxford Higher Edn Publications
5. Thermodynamics by J.P.Holman, McGrawHill.

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
Code: 19BME3TH06	**MECHANICS OF SOLIDS**						

COURSE OBJECTIVES:

- To Understand stresses and deformation in a member due to an axial loading. Also to estimate the thermal stresses, strains and strain energy in members subjected to axial loading.
- Understand the concept of shear force and bending moment with respect to beams and to draw the shear force and bending moment diagrams.
- Understand bending and shear stresses in beams of various cross sections under different loading conditions.
- Understand and analyze beam deflections using various methods like double integration approach, Macaulay's method.
- Study the pressure vessels, their classification and to estimate various stresses such as radial, circumferential, longitudinal and shrinkage induced in them, concepts of torsion.

COURSE OUTCOMES:

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

CO 1: **Illustrate** the concepts of stress and strain and thermal stress in members, strain energy due gradually, suddenly applied loads.

CO 2: **Analyze** shear force diagrams and bending moment diagrams to the different loads for the different support arrangements.

CO 3: **Determine** shear stresses induced in the beams which are made with different cross sections like rectangular, circular, I, T sections.

CO 4: **Solve** the equations of slope and deflection for different support arrangements by double integration method, Macaulay's method.

CO 5: **Determine** stresses induced in cylinders subjected to internal, external pressures. Know how a cylinder fails.

UNIT– I

SIMPLE STRESSES & STRAINS: Concept of stress and strain- Types of stresses & strains-tensile ,compressive, shear –Hooke's law – stress – strain diagram for mild steel – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Bars of varying section – composite bars. Elastic moduli and the relationship between them. Temperature stresses.

STRAIN ENERGY & IMPACT LOADING: Strain energy - Resilience – Stress due to various types of axial loads- Gradually applied suddenly applied and impact loadings.

UNIT–II

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams-cantilever beam, simply supported beam, overhanging beam– Concept of shear force and bending moment–S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, Uniform Distributed Load (U.D.L), uniformly varying loads and combination of these loads–Point of contra flexure–Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT–III

FLEXURAL STRESSES: Theories of simple bending– Neutral axis, Moment of resistance-derivation of bending equation: M/I = f/y = E/R, Assumptions in the theory of bending. Section modulus, Bending stresses of rectangular, circular, I and T section.

SHEAR STRESSES: Shear stress distribution across various beams sections- rectangular, circular, I and T sections.

UNIT-IV

DEFLECTION OF BEAMS: Member bending into a circular arc –slope, deflection and radius of curvature. Determination of slope and deflection for cantilever and simply supported beams subjected to point loads and U.D.L by Double integration method- Macaulay's method.

UNIT-V

THIN CYLINDERS: Thin cylinders - longitudinal and circumferential stresses Derivation of formulae and calculations of hoop stress, longitudinal stress in a cylinder subjected to internal pressures

THICK CYLINDERS: Derivation of formulae for radial and hoop stresses- lame's equation– cylinders subjected to inside & outside pressures – compound cylinders.

TORSION OF SHAFTS: Theory of pure torsion- Torsional moment of resistance-derivation of Torsion equation: $T/J = \tau/r = G\theta/L$ - assumptions in the theory of pure torsion, polar modulus, power transmitted by a circular shafts.

TEXT BOOKS:

1. Mechanics of Materials by Dr . B.C. Punmia, Er. Ashok Kumar Jain, Dr. Arun\ Kumar,
2. Strength of materials by S. Ramamrutham , Dhanpat Rai Publications.
3. Strength of materials by R. K. Bansal, Lakshmi publications

REFERENCE BOOKS:

1. Introduction to solid mechanics by Irving H. Shames, James M. Pitarresi, Pearson Publications.
2. Mechanics of Materials (In Si Units) by Beer and Johnson, Tata McGraw-Hil.
3. Strength of Materials (Mechanics of Materials) by James M.Gere and Barry J.Goodno, PWS-KENT Publishing Company, 1990
4. Strength of Materials (Mechanics of Solids) by R.K. Rajput , S.Chand Publications.

WEB REFERENCES:

1. URL: https://nptel.ac.in/courses/112107146/23
2. https://nptel.ac.in/courses/105105108/19
3. https://nptel.ac.in/courses/112105125/pdf/module-9%20lesson-2.pdf
5. https://nptel.ac.in/courses/112105164/36

E-BOOKS:

1. https://easyengineering.net/a-textbook-of-strength-of-materials/

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
Code: 19BCC3TH01	**NUMERICAL METHODS AND TRANSFORMATIONS** (CIVIL, EEE, ME)						

COURSE OBJECTIVES:

- To elucidate the different numerical methods to solve nonlinear algebraic equations.
- To propagate the use of different numerical techniques for carrying out numerical integration.
- Explore the use of Laplace transform method to solve with initial value problems of ODE.
- To acquire fundamental Knowledge of Fourier series and Fourier Transform and able to give Fourier expansions of a given function.

COURSE OUTCOMES:

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

CO 1: **Evaluate** approximating roots of polynomials and transcendental equations by different algorithms.

CO 2: **Apply** Newton's forward backward and Lagrange's interpolation for equal and unequal intervals.

CO 3: **Apply** different algorithms for approximating solutions of ordinary differential equation to its analytical computations.

CO 4: **Select** the technique of Laplace transform and apply it to solve differential equations.

CO 5: **Relate** Fourier series, integral, transforms and they are provided with practice in their application and interpretation in a range of situations.

UNIT –I: SOLUTIONS TO ALGEBRAIC EQUATIONS AND INTERPOLATION: **(10 hours)**

Solution of polynomial and transcendental equations: bisection method, Regula-Falsi method and Newton-Raphson method. Finite differences, relation between operators, interpolation using Newton's, Gauss's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

UNIT –II: NUMERICAL SOLUTIONS OF ODE AND INTEGRATION: (8 hours)

Numerical Differentiation, Ordinary differential equations-Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations. Numerical integration- trapezoidal rule and Simpson's 1/3rd and $3/8^{th}$ rules.

UNIT-III: LAPLACE TRANSFORMATIONS: (12 hours)

Laplace transform and its properties, Transform of derivatives and integrals, Multiplication by t^n, division by t, Unit step function and unit impulse function. Transform of periodic functions, Evolutions of integrals by Laplace Transforms. Finding inverse transforms by the method of partial fractions, other methods of finding inverse Laplace Transforms, Convolution theorem(without proof), Solutions of Initial and Boundary Value Problems.

UNIT – IV: FOURIER SERIES: (10 hours)

Introduction, Euler's formulae, Periodic functions, Dirichlet's conditions, conditions for a Fourier expansion, functions of any period, functions having points of discontinuity, odd and even functions - half range series.

UNIT – V: FOURIER TRANSFORMS: (8 hours)

Fourier integral theorem (without proof), Fourier cosine and sine integrals, Fourier transform, Fourier sine and cosine transforms, properties of Fourier Transforms, convolution theorem (without proof).

TEXT BOOK:

1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publisher.

REFERENCES:

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, "Engineering Mathematics", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGrawhill.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9thEditiwiley-India.
4. Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage Learning, 2011.

II B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	1	-	4	40	60	100	3
Code: 19BME3TH03	MACHINE DRAWING & BASIC DESIGN ENGINEERING SOFTWARE LAB						

COURSE OBJECTIVES:

This course will give the insight into the design, creation of assembly and get the detailed drawing of machine components. To enhance the student's knowledge and skills in engineering drawing and to introduce drafting packages and commands for computer aided drawing and modelling

COURSE OUTCOMES:

At the end of the course, students will be able to identify and classify

- **CO 1:** **Explain** about sectional views, limits, fits and tolerances
- **CO 2:** **Construct** screw fasteners, Keys, Cotters and Pin joints joints, and assembly machine parts.
- **CO 3:** **Create** a model machine parts by using software packages such as. CATIA

A.MACHINE DRAWING:

1. Introduction: Full and half sectional views, limits, fits and tolerances.
2. Screwed fasteners: Screw thread nomenclature - types & classification of screw threads, Square & Hexagonal headed bolted joints.
3. Keys, Cotters and Pin joints: Saddle & Sunk Keys, Cotter Joint with sleeve, Knuckle Joint.
4. Assembly Drawings: Screw Jack, Tail Stock, Eccentric, Pipe vice, Plummer block.

B.COMPUTER AIDED DRAFTING (CAD): using CATIA

1. Introduction to CATIA: Sketcher, part design & drafting.
2. Sketcher: profile tools, operation tools, constraint tools, sketch tools.
3. Part Design: sketcher, sketch based features, dress up features.

Any Three Figures:

- **A)** BASE PLATE
- **B)** DOVETAIL STOP
- **C)** GUIDE PLATE
- **D)** SLOTTED LINK
- **E)** GLAND BLANK

Text Books:

1. Machine Drawing by K.L.Narayana, P.Kannaiah & K.Venkata Reddy, New Age International, and 3rd Edition.
2. CATIA V5-6R2015 for Engineers and Designers, 13ed Kindle Edition, Prof.sham.tickoo.

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Reference Books:

1. Machine Drawing by K.R.Gopala Krishnan, Subhas Publications, 20th Edition, 2007.
2. CATIA V5-6R2018 for Engineers and Designers, Prof.sham.tickoo, BPB Publications (2019)
3. CATIA V5 Tutorials Mechanism Design & Animation Release 20

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code: 19BME3LB01	**FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**						

COURSE OBJECTIVE:

To impart practical exposure on the performance evaluation methods of various flow measuring equipment and hydraulic turbines and pumps.

COURSE OUTCOMES:

After completion of the course students are able to:

- **CO 1:** **Experiment with** the flow discharge measuring devices used in pipes, channels and tanks.
- **CO 2:** **Solve** the flow equations to estimate performance of the pump
- **CO 3:** **Evaluate** the friction factor of a pipe flow
- **CO 4:** **Apply** conservation principles to hydraulic machines

LIST OF EXPERIMENTS:

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

VIRTUAL LAB:

1. Verification of Bernoulli's theorem
2. Reynolds experiment for determination of different regimes of flow.

II B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code:19BME3LB02	**MECHANICS OF SOLIDS & METALLURGY LAB**						

COURSE OBJECTIVES:

In this laboratory students will have the opportunity to apply loads to various materials under different equilibrium conditions. The student will perform tests on materials in tension, compression, torsion, and impact.

To impart practical exposure on the microstructures of various materials and their hardness evaluation. Also to impart practical knowledge on the evaluation of material properties through various destructive testing procedures

COURSE OUTCOMES:

After completion of the course students are able to:

CO 1: **Experiment with** different materials for the evaluation of material properties through various destructive testing procedures.

CO 2: **Examine** the microstructures of different materials and also identify the hardness values.

NOTE: Any 6 experiments from each section A and B.

(A) MECHNICS OF SOLIDS LAB:

1. Direct tension test-brittle and ductile materials
2. Fatigue Test
3. 3-point bend test
4. Unsymmetrical bend test
5. Specimen preparation and characterization
6. Torsion test
7. Vickers hardness Test
8. Test on springs
9. Compression test on cube
10. Impact test
11. Punch shear test
12. Brinell's and Rockwell's hardness test
13. Simply Supported beam

Virtual Lab:

1. To obtain strain measurement for Aluminium specimen by conducting creep test

(B) METALLURGY LAB:

I. Preparation and study of the Micro Structure of Ferrous materials-

a) Cast Iron

1. Grey cast iron
2. Nodular cast iron
3. White cast iron

b) Steel

4. Mild steel
5. Low carbon steel
6. High carbon Steel

II. Preparation and study of the Micro Structure of Non-Ferrous materials-

7. Brass
8. Aluminium
9. Copper
10. Hardenability of steels by Jominy End Quench Test.
11. Die penetration Test.

Virtual Lab:

1. Investigate Mechanical properties of Nano material by conducting Nano indentation test.

II B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	-	-	-	0
Code: 19BCC3MC01	**QUANTITATIVE APTITUDE AND REASONING**						

COURSE OBJECTIVES:

- To train students in analyzing real life scenarios considering all factors
- To educate the students on principles of mathematical problems and problem solving methods
- To train students for campus placements
- To make students adept in applying appropriate logic and shortcuts to solve the problems in the least possible time.

COURSE OUTCOMES:

After thorough learning of Quantitative Aptitude and Reasoning, a student:

CO 1: **Prepare** well for clearing Quantitative Aptitude and Reasoning tests for campus Placements

CO 2: **Critically** evaluate various real life situations by resorting to Analysis of key issues and factors.

CO 3: **Demonstrate** various principles involved in solving mathematical problems and There by reducing the time taken for performing job functions.

SYLLABUS FOR QUANTITATIVE APTITUD :

Unit I: Simple equations, Ratio, Proportion, Variation

1. **Simple equations**
   a. Definition of Linear Equations
   b. Formation of simple equations
   c. Problems on Ages, Fractions and Digits
   d. Indeterminate system of equations
   e. Special cases in indeterminate system of equations
2. **Ratio and proportion**
   a) Definition of Ratio
   b) Properties of Ratios
   c) Comparison of Ratios
   d) Problems on Ratios
   e) Compound Ratio
   f) Problems on Proportion, Mean proportional and Continued Proportion
3. **Variation**
   a) Direct variation
   b) Inverse variation
   c) Joint variation
   d) Problems on Variations

Unit II: Percentages, Partnership.

1. Percentages

a) Introduction
b) Converting a percentage into decimals
c) Converting a Decimal into a percentage
d) Percentage equivalent of fractions
e) Problems on percentages

2. Partnership

a) Introduction
b) Relation between capitals, Period of investments and Shares

Unit III: Profit And Loss

a) Problems on Profit and Loss percentage
b) Relation between Cost Price and Selling price
c) Discount and Marked Price
d) Two different articles sold at same Cost Price
e) Two different articles sold at same Selling Price
f) Gain% / Loss% on Selling Price

SYLLABUS FOR REASONING

UNIT IV: Deductions & Connectives

1. Deductions

a) Finding the conclusions using Venn diagram method
b) Finding the conclusions using syllogism method

2. Connectives

a) Definition of a simple statement
b) Definition of compound statement
c) Finding the Implications for compound statements
d) Finding the Negations for compound statements

UNIT V: Analytical Reasoning puzzles

a) Problems on Linear arrangement
b) Problems on Circular arrangement
c) Problems on Double line-up
d) Problems on Selections
e) Problems on Comparisons

UNIT VI: Clocks, Calendars & Blood relations

1. **Clocks**
   a) Finding the angle when the time is given
   b) Finding the time when the angle is known
   c) Relation between Angle, Minutes and Hours
   d) Exceptional cases in clocks

2. **Calendars**
   a) Definition of a Leap Year
   b) Finding the number of Odd days
   c) Framing the year code for centuries
   d) Finding the day of any random calendar date

3. **Blood relations**
   a) Defining the various relations among the members of a family
   b) Solving Blood Relation puzzles
   c) Solving the problems on Blood Relations using symbols and notations

TEXT BOOKS:

1. GL Barrons, Mc Graw Hills, Thorpe's verbal reasoning, LSAT Materials
2. R S Agarwal, S.Chand , 'A modern approach to Logical reasoning'
3. R S Agarwal, S Chand, 'Quantitative Aptitude'
4. Quantitative Aptitude - G. L BARRONS
5. Quantitative Aptitude - Abhijit Guha Mc Graw Hills

REFERENCES:

1. www.careerbless.com/**aptitude**/qa/home.php
2. www.affairscloud.com/**quantitative-aptitude**-questions
3. www.careerafter.com/rs-aggarwal-**quantitative-aptitude**-pdf/
4. www.amazon.in/**Quantitative-Aptitude**-Competitive-Examinations.../8121924987
5. www.indiabix.com
6. www.practice**aptitude**tests.com/numerical-**reasoning**-tests

II Year II Semester

S.No.	Subject	Sub Code	Cat. Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	Kinematics of Machinery	19BME4TH01	PC	40	60	100	2	1	-	3
2	Manufacturing Technology	19BME4TH02	PC	40	60	100	3	-	-	3
3	Metrology & Instrumentation	19BME4TH03	PC	40	60	100	3	-	-	3
4	Applied Thermo Dynamics	19BME4TH04	PC	40	60	100	2	1	-	3
5	**Open Elective-1**		OE	40	60	100	3	-	-	3
6	Applied Thermo Dynamics Lab	19BME4LB01	PC	20	30	50	-	-	3	1.5
7	Metrology & Instrumentation Lab	19BME4LB02	PC	20	30	50	-	-	3	1.5
8	Manufacturing Technology Lab	19BME4LB03	PC	20	30	50	-	-	3	1.5
9	English Communication Skills Lab - II	19BCC4LB01	HS	20	30	50	-	-	3	1.5
	Total									**21**

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
Code: 19BME4TH01	**KINEMATICS OF MACHINERY**						

COURSE OBJECTIVES:

- To make student understand the purpose of kinematics, Kinematic joint and mechanism and to study the relative motion of parts in a machine without taking into consideration the forces involved.
- To make student understand various mechanisms for straight line motion and their applications including steering mechanism.
- To make student understand the velocity and acceleration concepts and the methodology using graphical methods and principles and application of four bar chain.
- To make student understand the theories involved in cams.
- To make student understand gears, gear trains.

COURSE OUTCOMES:

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

CO 1: **Illustrate** the various types of kinematic links, kinematic joints & mechanisms.
CO 2: **Interpret** the various types of lower pair mechanisms.
CO 3: **Construct** the velocity and acceleration diagram of different mechanisms.
CO 4: **Construct** the different CAM profiles.
CO 5: **Demonstrate** the Gears and Gear Trains.

UNIT– I

MECHANISMS: Elements or Links – Classification of Links – Types of kinematic pairs –Types of constrained motion. Gubralrs criteria, Grashoff's law, Degrees of freedom, Kutzbach criterian for planar mechanisms

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

UNIT–II

LOWER PAIR MECHANISM: Exact and approximate copiers and generated types - Peaucellier, Hart and Scott Russul - Grasshopper - Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph. Conditions for correct steering - Davis Steering gear, Ackermans steering gear - velocity ratio; Hooke's Joint: Single and double - Universal coupling- application-problems.

UNIT–III

KINEMATICS: Velocity and acceleration – Motion of a link in machine –Determination of Velocity and acceleration diagrams – Graphical method –Application of relative velocity method four bar chain. Velocity and acceleration analysis of a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration. Plane motion of body.

INSTANTANEOUS CENTER OF ROTATION: centroids and axodes– relative motion between two bodies – Three centres in line theorem –Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT-IV

CAMS: Definitions of cam and followers – their uses – Types of followers and cams– Terminology – Types of follower motion: Uniform velocity, Simple harmonic motion and uniform acceleration and retardation. Maximum velocity and maximum acceleration during outward and return strokes in the above three cases. Analysis of motion of Roller follower

UNIT-V

GEAR: Higher pairs, friction wheels and toothed gears–types – law of gearing, condition for constant velocity ratio for transmission of motion, velocity of sliding –phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact.

GEAR TRAINS: Introduction to gear Trains, Train value, Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio –Epicyclic gear trains.

TEXT BOOKS:

1. S.S.Ratan, Theory of Machines, Mc. Graw Hill Publ.
2. Thomas Bevan,Theory of Machines ,CBS Publishers & Distributors

REFERENCE BOOKS:

1. Sadhu Singh ,Theory of Machines , Pearsons Education
2. Khurmi,Theory of machines ,S.Chand publications
3. Ashok G. Ambedkar ,Mechanism and machine theory , PHI Publications.

WEB REFERENCES:

1. https://nptel.ac.in/courses/112104121/
2. https://www.slideshare.net/senthilkumar1311/kinematics-of-machinery

E-BOOKS:

3. https://www.amazon.in/Kinematics-Machinery-Ramachandran-S-ebook/dp/B01N6P33YT#reader_B01N6P33YT

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
Code: 19BME4TH02	MANUFACTURING TECHNOLOGY						

COURSE OBJECTIVES:

- To emphasize the importance manufacturing sciences in the day-to-day life, and to study the basic manufacturing processes
- To understand the conventional manufacturing processes like casting, metal forming, and welding process.

COURSE OUTCOMES:

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

CO 1: **Explain** various manufacturing processes and fundamentals of casting process
CO 2: **Outline** different types of welding process for fabrication of metals
CO 3: **Demonstrate** advanced welding processes by make use of sketches
CO 4: **Compare** the characteristics of cold and hot working processes of Forming, forging and Rolling
CO 5: **Explain** principles of Extrusion and Drawing processes by make use of sketches

UNIT-I

INTRODUCTION TO MANUFACTURING PROCESSES: Difference between Production and Manufacturing.

FOUNDRY: Introduction to casting process, steps involved in making a casting, Advantages of casting and its applications, Types of patterns, Materials used for patterns, Pattern allowances, Gating elements and moulding procedure, Moulding materials, Cores, Types of Sand moulding-CO2 Moulding and Shell Moulding.

SPECIAL CASTING METHODS: Permanent Mould Casting, Die Casting, Centrifugal Casting, Investment Casting, Continuous Casting, Fettling of Castings, Casting Defects: causes and remedies.

UNIT-II

WELDING: Classification of welding processes, Types of welds and types of joints.

GAS WELDING: Equipment, Oxy-Acetylene flame, types, Gas welding procedure, Gas cutting.

ARC WELDING: Principle of Arc welding, Equipment, Electrodes, Electrode coatings, AC and DC Welding, Arc Blow, Arc Length Characteristics, Related Simple Problems. Welding defects – Causes and Remedies.

UNIT-III

RESISTANCE WELDING: Principle, Butt welding, spot welding and seam welding. Simple problems on resistance welding.

OTHER WELDING PROCESSES: Thermit welding, Inert gas welding - TIG and MIG welding, Submerged arc welding, plasma arc welding, soldering and brazing.

UNIT-IV

FORMING: Introduction, Elastic & Plastic deformation; Recovery, Recrystallization & grain growth; Hot working & Cold working.

FORGING: Introduction, Hot forging & Cold forging, Open & Closed die forging, Forging defects & remedies.

ROLLING: Introduction, Hot & Cold rolling process, Angle of bite, Rolling stand arrangements.

UNIT-V

EXTRUSION & DRAWING: Extrusion fundamentals, Classification of Extrusion- Forward Extrusion, Backward Extrusion, Impact extrusion, Hydrostatic extrusion. Types of drawing: Wire drawing, Tube drawing.

TEXT BOOKS:

1. Manufacturing Technology Vol-I by P.N. Rao, Tata McGraw Hill Publications.
2. Production Technology by P. C. Sharma, S. Chand Publications.

REFERENCES:

1. Welding Technology by Little byTata McGraw Hill Publications.
2. Manufacturing Engineering and Technology by Kalpak Jain, Pearson Education/PHI.

Web References:

1. https://nptel.ac.in/courses/112107144/1
2. https://nptel.ac.in/courses/112107144/2
3. https://nptel.ac.in/courses/112107144/10
4. https://nptel.ac.in/courses/112107144/13
5. https://nptel.ac.in/courses/112107144/14

E-Books:

1. https://easyengineering.net/manufacturingbooks/
2. https://easyengineering.net/manufacturingbooks/
3. https://books.google.com/books/about/Manufacturing_Technology.html?id=fSHZAgAAQBAJ
4. https://www.researchgate.net/publication/259800841_Manufacturing_Technology_Vol_1_Foundry_Forming_and_Welding

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
Code: 19BME4TH03	**METROLOGY & INSTRUMENTATION**						

COURSE OBJECTIVES:

- Inspection of engineering parts with various precision instruments.
- Design of part, tolerances and fits.
- Principles of measuring instruments and gauges and their uses.
- Imparting the principles of measurement which includes the working mechanism of various displacement transducers, measurement of temperature and pressure gauges.

COURSE OUTCOMES:

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

CO 1: **Explain** the design tolerances and fits for selected product quality.
CO 2: **Illustrate** the standards of length, angle measurement.
CO 3: **Demonstrate** the concepts of limit gauges and optical measurements.
CO 4: **Explain** of various transducers to measure displacement
CO 5: **Analyze** various Temperature and pressure transducers for engineering applications

UNIT– I

SYSTEMS OF LIMITS AND FITS: Introduction, nominal size, tolerance, limits, deviations, fits - Unilateral and bilateral tolerance system, hole and shaft basis systems- interchangeability and selective assembly. International standard system of tolerances, selection of limits and tolerances for correct functioning.

UNIT–II

LINEAR MEASUREMENT: Length standards, end standards, slip gauges- calibration of the slip gauges, dial indicators, micrometres.

MEASUREMENT OF ANGLES AND TAPERS: Different methods – bevel protractor, angle slip gauges- spirit levels- sine bar, rollers and spheres used to measure angles and tapers.

UNIT–III

LIMIT GAUGES: Taylor's principles-design of GO and NO GO gauges; plug, ring, snap, gap, taper, profile and position gauges**.**

OPTICAL MEASURING INSTRUMENTS: Tools maker's microscope and uses, autocollimators, optical projector, optical flats and their uses.

UNIT-IV

BASIC PRINCIPLES OF INSTRUMENTATION: Units and standards – Static measurements – Scale and pointer type instruments – Definition of range, sensitivity, hysteresis, accuracy, precision, reliability, repeatability, linearity, drift, Static and dynamic response, reproducibility, calibration procedure, errors in measuring instruments, source of errors.

MEASUREMENT OF DISPLACEMENT: Theory and construction of various transducers to measure displacement - LVDT, piezo electric, inductive, capacitance, resistance.

UNIT-V

MEASUREMENT OF TEMPERATURE: Classification, ranges, various principles of measurement, expansion, electrical resistance, thermistor, thermocouple.

MEASUREMENT OF PRESSURE: Units - classification – different principles used. Manometers, piston, bourdon pressure gauges, bellows - diaphragm gauges. Low pressure measurement, McLeod pressure gauge.

TEXT BOOKS:

Engineering Metrology, Mahajan, Dhanpat Rai Publishers.

1. Measurement Systems Applications & design by D.S Kumar, Khanna Publishers.

REFERENCE BOOKS:

1. Engineering Metrology, R.K.Jain, Khanna Publishers.
2. Engineering Metrology by I.C.Gupta, DhanpatRai Publishers.
3. Mechanical and Industrial Measurements, R.K. Jain, Khanna Publishers.

WEB REFERENCES:

1. https://www.youtube.com/watch?v=HpIEeBtJupY&list=PLbMVogVj5nJSZiwuh_tp50dKry8mCxzKA&index=1

E-BOOKS:

1. http://www.gvpce.ac.in/syllabi/Engineering%20Metrology.pdf

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
Code: **19BME4TH04**	**APPLIED THERMODYNAMICS-I**						

COURSE OBJECTIVES:

- To understand the engine terminology and working principles of I.C Engines.
- To learn analytical techniques to the engineering problems and performance analysis of internal combustion engines.
- To learn the design and operating characteristics of modern internal combustion engines.

COURSE OUTCOMES:

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

CO 1: **Illustrate** the reasons and effects of various losses that occur in the actual engine operation.
CO 2: **Analyze** the combustion phenomenon and knocking in SI and CI Engines
CO 3: **Explain** the performance and emission parameters of SI and CI engines
CO 4: **Analyze** the working of different types of compressors

UNIT - I:

ANALYSIS OF IC ENGINE CYCLES: Air standard cycle, fuel air cycle and actual cycle. Comparison of air-standard and fuel air cycle, fuel air cycle and actual cycle. Different types of losses.

WORKING OF I.C ENGINES: Classification - Working principles, Valve and Port Timing Diagrams, - Engine systems -Carburettor, Fuel Injection System, Ignition, Cooling and Lubrication, principle of Wankle engine, principles of supercharging and turbocharging.

UNIT - II:

COMBUSTION IN S.I. ENGINES: Normal Combustion and abnormal combustion - Importance of flame speed and effect of engine variables - Type of Abnormal combustion, pre-ignition and knocking - Fuel requirements and fuel rating, anti knock additives -combustion chamber- requirements, types.

COMBUSTION IN C.I. ENGINES: Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT - III:

MEASUREMENT, TESTING AND PERFORMANCE: Parameters of performance -measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power - Performance test – Heat balance Sheet.

UNIT - IV:

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

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

UNIT-V:

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

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

TEXT BOOKS:

1. Internal Combustion Engines by V.Ganesan, Tata McGraw Hills Publications
2. A treatise on heat power engineering by Vasandani & D.S.Kumar, Metropolitan Book Co. Ltd.

REFERENCES:

1. Internal Combustion Engine by M.L.Mathur and R.P.Sharma, DhanpatRai Publications
2. Thermal Engineering by R.S.Khurmi and J.K.Guptha, S.Chand Publicationss

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code: **19BME4LB01**	**APPLIED THERMODYNAMICS-I LAB**						

COURSE OBJECTIVES:

1. To learn the construction and working principle of I.C.Engines practically.
2. To understand the working principle and performance of air compressor practically.
3. To learn the heat balance test of an I.C. Engine.

COURSE OUTCOME:

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

CO1: **Estimate** various fuel characteristics through experimental testing.
CO2: **Analyze** the performance characteristics of Internal Combustion Engines
CO3: **Evaluate** the performance parameters of refrigeration system
CO4: **Construct** the performance curves of air compressors

LIST OF EXPERIMENTS:

1. Determination of flash point, fire point.
2. Determination of calorific value of fuel using Bomb Calorimeter.
3. Determination of viscosity of fluid.
4. I.C. Engine Valve Timing Diagram
5. I.C. Engine Port Timing Diagram
6. Determination of performance characteristics of 2-Stroke Petrol Engine.
7. I.C. Engine Performance Test on Single Cylinder 4 Stroke Diesel Engine
8. Evaluation of Engine Friction by Conducting Morse Test on 4 - Stroke Petrol Engine.
9. Evaluation of Engine Friction by Conducting Motoring/Retardation Test on Single Cylinder 4 Stroke Diesel Engine
10. Heat Balance Test on Single Cylinder 4 Stroke Diesel Engine
11. Performance Test on Variable Compression Ratio
12. Volumetric Efficiency of a Reciprocating Air Compressor
13. Performance of Air-conditioning system (Virtual Lab)
14. IC engines components design simulation (Virtual Lab)

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code: **19BME4LB02**	**METROLOGY & INSTRUMENTATION LAB**						

COURSE OBJECTIVES:

The Metrology and instrumentation Laboratory course is designed for measuring and gauging instruments for inspection of precision linear, geometric forms, angular and surface finish measurements. The student can learn the measurements with and calibration of instruments. Instrumentation lab introduces the students with the theory and methods for conducting experimental work in the laboratory and calibration of various instruments for measuring pressure, temperature, displacement, speed, etc.

COURSE OUTCOMES:

CO1: **Examine** different instruments that are available for linear, angular and roughness measurements and select and use the appropriate measuring instrument according to a specific requirement.

CO2: **Analyze** proper measuring instrument and know the requirement of calibration, errors in measurement etc.

METROLOGY LAB:

1. Measurement of lengths, heights, diameters by Vernier calipers, micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear tooth Vernier caliper for tooth thickness inspection and flange micro meter for checking the chordal thickness of spur gear.
2. Machine tool alignment test on the lathe, drilling & milling machines.
3. Angle and taper measurements with bevel protractor, Sine bars, rollers and balls.
4. Use of spirit level in finding the straightness of a bed and flatness of a surface.
5. Thread inspection with two wires/ three wire method & tool maker's microscope.
6. Surface roughness measurement with roughness measuring instrument.

INSTRUMENTATION LAB:

1. Calibration of pressure gauge.
2. Calibration of thermocouple for temperature measurement.
3. Calibration of Resistance Temperature Detector for temperature measurement.
4. Study and calibration of LVDT transducer for displacement measurement.
5. Calibration of strain gauge.
6. Calibration of thermistor for temperature measurement.
7. Calibration of capacitive transducer.
8. Study and calibration of photo and magnetic speed pickups.
9. Calibration of resistance temperature detector.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code: **19BME4LB03**	**MANUFACTURING TECHNOLOGY LAB**						

COURSE OBJECTIVES:

- To apply the class room knowledge to do the experiments in the lab
- To identify and solve the problems while doing the experiments of casting, metal forming & casting and welding processes.

COURSE OUTCOMES:

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

CO 1: **Examine** the green sand mold for single-piece and multi-piece patterns
CO 2: **Construct** joints using electric arc, spot, and gas welding techniques.
CO 3: **Experiment with** injection and blow molding using plastic parts.
CO 4: **Construct** a pipe bend and a washer using hydraulic press.
CO 5: **Experiment with** Stir Casting Mac
CO 6:
CO 7: hine using Fabricate alloy or composite.

LIST OF EXPERIMENTS:

I. MOLDING PRACTICE:

1. Preparation of a green sand mould using single piece pattern.
2. Preparation of a green sand mould using multi piece pattern.
3. Sand testing: green strength, dry strength, grain fineness number, permeability etc.

II. WELDING PRACTICE:

1. Preparation of a T joint using electric arc welding.
2. Preparation of a Butt Joint using gas welding.
3. Preparation of a lap joint using spot welding.

III. PLASTIC MOLDING:

Injection Molding:

1. Preparation of a key chain by using two plate mold.

Blow Molding:

1. Preparation of a bottle by using blow molding technique.

IV. MECHANICAL PRESSES:

1. Preparation of a rodbends using hydraulic press.
2. Preparation of a washer using hydraulic press.

V. DEMONSTRATION OF STIR CASTING MACHINE:

1. Preparation of Aluminum casting with stir casting machine

VI. VIRTUAL LAB:

Metal Forming Virtual Simulation Lab (http://msvs-dei.vlabs.ac.in/)

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code: 19BCC4LB01	**ENGLISH COMMUNICATION SKILLS LAB-II (Common to All Branches)**						

COURSE OBJECTIVES:

- To train the students to use language effectively in various professional interactions like Group Discussions, Public Speaking, Presentations and Interviews.
- To make the students understand the importance of body language.
- To provide exposure to students to soft skills like Goal Setting, Assertiveness, Time Management, Positive Attitude and Stress Management
- To expose the students to variety of a self-instructional, learner friendly, electronic media and stimulate intellectual faculties/resources

COURSE OUTCOMES:

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

CO 1: **Utilize** Non-verbal cues and interpret nonverbal symbols.
CO 2: **Develop** presentation Skills and make formal presentations using strategies.
CO 3: **Analyze** problem solving skills effectively to participate in Group Discussions.
CO 4: **Build** interview skills for employability.

UNIT– I
Body Language

UNIT–II
Presentation Skills

UNIT–III
Group Discussions

UNIT-IV
Interviews and Telephonic Interviews

UNIT-V
Debates

TEXT BOOKS:

"Strengthen Your Communication Skills", Maruthi Publications, 2013.

REFERENCE BOOKS:

1. "*Personality Development and Soft Skills"*, Oxford University Press, New Delhi.
2. M Ashraf Rizvi, "*Effective Technical Communication skills"*, McGraw-Hill, 2005.
3. Barun K Mitra, "*Personality Development and Soft Skills",* Oxford University Press, 2011.
4. Konar N, "*Communication Skills for Professionals",* PHI Learning Private Limited, 2011.

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(AUTONOMOUS)