ACADEMIC REGULATIONS,

COURSE STRUCTURE AND

DETAILED SYLLABUS

for

B.Tech Four Year Degree Course (A-20 I & II year)

in

MECHANICAL ENGINEERING

(ME)

(Applicable for the batches admitted from 2020-2021)

SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY
(An Autonomous Institution approved by UGC and affiliated to JNTUH) (Accredited by NAAC with 'A' Grade and Accredited by NBA of AICTE) Yamnampet, Ghatkesar, Malkajigiri Medchal District -501301.

January, 2021

DEPARTMENT OF MECHANICAL ENGINEERING

VISION OF THE DEPARTMENT

To emerge as a renowned center in Mechanical Engineering by following the best practices in teaching, learning and research

MISSION OF THE DEPARTMENT

1. Provide good academic environment for pursuing high quality undergraduate, Post graduate and Doctoral programmes in mechanical engineering that will prepare our graduates for outstanding professional careers

2. Provide service to practicing engineers, industry, government, educational and technical societies through effective engagement with these groups and by providing professional knowledge.

3. Ensure that our students are well trained in interpersonal skills, team work, professional ethics, practical industrial training and participate in professional society activities.

4. Conduct and proliferate high quality research work to students for lifetime of learning.

PROGRAMME EDUCATION OBJECTIVES

I. **Preparation & Learning Environment:** To prepare and provide student with an academic environment for students to excel in postgraduate programs or to succeed in industry / technical profession and the life-long learning needed for a successful professional career.

II. **Core Competence:** To provide students with a solid foundation in mathematical, scientific and engineering fundamentals required to solve engineering problems and also to pursue higher studies.

III. **Breadth:** To train students with good scientific and engineering breadth so as to comprehend, analyze, design, and create novel products and solutions for the real life problems.

IV. **Professionalism:** To inculcate in students professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach, and an ability to relate engineering issues to broader social context.

PROGRAM OUTCOMES (POs)

After completion of the program of study of B. Tech in Mechanical Engineering, every student has to know the following

The program outcomes (POs) are listed below:

a) Graduate will demonstrate knowledge in fundamentals of mathematics, science and engineering

b) Graduate will demonstrate an ability to identify, formulate and solve problems in key areas of Design, Production and Thermal of Mechanical Engineering discipline

c) Graduate will demonstrate an ability to design and conduct experiments, analyze and interpret data related to various areas of Mechanical Engineering

d) Graduate will demonstrate ability in conducting investigations to solve problems using research based knowledge and methods to provide logical conclusions

e) Graduate will demonstrate skills to use modern engineering and IT tools, software's and equipment to analyze the problems in Mechanical Engineering

f) Graduate will show the understanding of impact of engineering solutions on the society to assess health, safety, legal, and social issues in Mechanical Engineering

g) Graduate will demonstrate the impact of professional engineering solutions in environmental context and to be able to respond effectively to the needs of sustainable development

h) Graduate will demonstrate the knowledge of Professional and ethical responsibilities

i) Graduate will demonstrate an ability to work effectively as an individual and as a team member/leader in multidisciplinary areas

j) Graduate will be able to critique writing samples (abstract, executive summary, project report), and oral presentations.

k) Graduate will demonstrate knowledge of management principles and apply these to manage projects in multidisciplinary environments.

l) Graduate will recognize the need of self education and ability to engage in life - long learning

PEOs	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
I	☐	☐			☐							☐
II		☐	☐	☐	☐						☐	
III			☐	☐	☐			☐		☐	☐	
IV						☐	☐	☐	☐		☐	☐

ACADEMIC REGULATIONS
FOR B.TECH. REGULAR STUDENTS
WITH EFFECT FROM
THE ACADEMIC YEAR 2020-21
(A-20)

1.0 Under-Graduate Degree Programme in Engineering & Technology (E&T)

1.1 SNIST offers a 4-year (8 semesters) **Bachelor of Technology** (B. Tech.) degree programme, under Choice Based Credit System (CBCS) with effect from the academic year 2020-21 in the following branches of Engineering.

Sl. No.	Branch
1.	Civil Engineering
2.	Electrical and Electronics Engineering
3.	Mechanical Engineering
4.	Electronics and Communication Engineering
5.	Computer Science and Engineering
6.	Information Technology
7.	Electronics and Computer Engineering

1.2. Credits (Semester system for B. Tech courses)

The existing credit system of giving one credit for a lecture hour/ tutorial hour per week and giving 0.5 credit for every hour of practical and drawing shall be continued in these regulations also.

2.0 Eligibility for admission

2.1 Admission to the Under Graduate courses shall be made either on the basis of the rank of the candidate in entrance test conducted by the Telangana State Government (EAMCET) or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government from time to time. However, admissions under Management / NRI Category shall be made on the relevant orders issued by the Govt. of Telangana from time to time.

2.2 The medium of instruction for the entire Under Graduate programme of study in E&T will be **English** only.

3.0 B. Tech. Programme structure

3.1 A student after securing admission shall pursue the Under Graduate programme in B. Tech. in a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B. Tech course. However, the student can take two more years for appearing the examinations to clear the backlog subjects.

In the First year it is structured to provide **45 credits** and the credits in II , III and IV years should not exceed **119 credits** as per AICTE model curriculum for the B. Tech. programme. Each student shall secure **164 credits** (with CGPA ≥5) required for the completion of the Under Graduate programme and Award of B. Tech degree.

Each student shall secure **164 total credits** (with CGPA ≥ 5) for the completion of the Under Graduate programme for the award of the B.Tech. degree. However, any revision made in this regard and approved by the Academic Council of the college and by Parent University shall be implemented from the date of the revision.

3.2 **UGC/AICTE** specified definitions/ descriptions are adopted appropriately for various terms and abbreviations stated below.

3.2.1 Semester scheme

Each Under Graduate programme is of 4 academic years (8 semesters) with the academic year being divided into two semesters of 22 weeks (90 instructional days) each, each semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'.

Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated curriculum / course structure as suggested by AICTE are followed.

3.2.2 Credit courses

- A student in a semester has to earn credits which shall be assigned to each subject/ course in an L: T: P: C (lecture periods: tutorial periods: practical periods: credits) structure based on the following general pattern.
- One credit for one hour/ week offered in the entire semester for theory lecture (L) / Tutorial (T) courses.
- One credit for two hours/ week offered in the entire semester for laboratory/ practical (P) courses.
- The orientation course recommended by AICTE in the model curriculum is offered for 3 weeks and Cyber Security in III year as mandatory course.
- Environmental Engineering is offered mandatory course for B. Tech Mechanical Engineering and ECE students in II year.
- However, these courses will be reflected in the Memo of Marks, the grading will be awarded below, with some total of 100 marks with CIE for 30 marks and SEE for 70 marks.

% of Marks Secured in a Subject/Course	Letter Grade
Greater than or equal to 90%	O (Outstanding)
80 and less than 90%	A+ (Excellent)
70 and less than 80%	A (Very Good)
60 and less than 70%	B+ (Good)
50 and less than 60%	B (Average)
40 and less than 50%	C (Pass)
Below 40%	F (FAIL)
Absent	Ab

- For mandatory courses i.e ., **Orientation Course** for B. Tech I year students to be taught for one week in I semester with Two Units and remaining Four Units in B. Tech. I year II semester and **Cyber Security** is offered as mandatory course for all the students of Civil, ME,EEE and will not have credits, but evaluation will be done as per the above table. A student cannot obtain degree unless he / she completes all the mandatory courses.

3.2.3 Subject Course Classification

All subjects / courses offered for the Under Graduate programme in E&T (B. Tech. Degree programmes) are broadly classified as follows. The Institution has followed all the guidelines issued by AICTE/UGC.

The groups of the subjects shall be as given in the table hereunder along with the credits suggested by AICTE. efforts are made by individual departments to make up the total credits equal to 164.

Sl. No.	Category	Suggested Breakup of Credits (Total 160)	CSE	ECE	CED	EEE	ME	IT	ECM
1	Humanities and social sciences including Management courses	12*	14	14	11	13	13	14	13
2	Basic Science including Mathematics courses	25*	22	23	29	30	24	22	26
3	Engineering Science courses including workshop, drawing, basic electrical /electronics mechanical course as well as various computer courses offered for Non – IT branches	24*	29	28	31	25	28	29	28
4	Professional core courses	48*	59	59	51	61	62	59	59
5	Professional Elective courses (five courses)relevant to chosen specialization / branch	18*	15	15	15	15	15	15	15
6	Open Electives(3 courses) offered by any other departments / MBA department **	18*	6	6	6	6	6	6	6
7	Project work, seminar and internship in industry or elsewhere	15*	19	19	21	14	16	19	17
8	Mandatory courses (Environmental Sciences, Induction training, Indian constitution, Essence of Indian Traditional Knowledge)	(Non-credit)	(Non-credit)	(Non-credit)	(Non-credit)	(Non-credit)	(Non-credit)	(Non-credit)	(Non-credit)
	Total	160*	164	164	164	164	164	164	**164**

The Joint Board of Studies and Academic Council of the institution has approved the total number of credits to be 164. The various groups of subjects mentioned above shall have credits suggested above with minor variations.

4.0   Course registration

4.1   A 'faculty advisor or counselor' shall be assigned to a group of 20 students, who will advise student about the under graduate programme, its course structure and curriculum, choice/option for Professional and open Electives based on their employment potential / further studies.

4.2   The student will progress semester after semester as the Institute is following cohort system to satisfying the conditions of promotion to the next semester.

4.3   **In the present system there shall be five subjects in each professional elective stream and three subjects in open elective stream.** A student can opt for a stream of professional/ open electives which should be submitted to the faculty Advisor/ Counselor and copy of it to the Examination Section through the Head of the department. A copy of it will be retained with the Head of the department/ faculty Advisor/ Counselor and the student.

4.4.   **The student can take one extra subject in each semester and can complete the program in 3 ½ years but original degree will be issued along with his / her batch mates after 4 years.**

4.5.   **If a student acquires 20 credits extra than the required credits as per the regulations he will be awarded honors.**

4.6   The purpose of offering Elective Streams in both Professional and Open Electives is to facilitate the students to have a minor specialization based on their interest, so that they will have multi disciplinary exposure. Hence, a student is to take a stream of Electives in either in Professional / Open Elective. He shall not be permitted to opt for other elective subjects in other streams in subsequent semesters.

4.7   Dropping of Electives may be permitted, only after obtaining prior approval from the faculty advisor / counselor, '**within a period of 15 days** from the beginning of the current semester.

5.0   Subjects / courses to be offered

5.1   A typical section (or class) nominal strength for each semester shall be 60.

5.2   A subject / course may be offered to the students, **only if** a minimum of **30 students** opt for it. The maximum strength of a section is limited to 80.

6.0   Attendance requirements:

6.1   A student shall be eligible to appear for the semester end examinations, if student acquires a minimum of 75% of attendance in aggregate of all the subjects / courses (excluding attendance in mandatory courses, Internship during II year, NCC / NSO and NSS) for that semester.

6.2   Shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.

6.3   A stipulated fee shall be payable towards condoning of shortage of attendance as decided by finance committee of SNIST from time to time.

6.4   Shortage of attendance below 65% in aggregate shall in **NO CASE** be condoned.

6.5 **Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester.**

They get detained and their admission for that semester shall stand cancelled.

They will not be promoted to the next semester. They may seek re-admission for all those subjects registered in that semester in which student was detained, by seeking re-admission into that semester as and when offered; in case if there are any professional electives and / or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category. He will be governed by the new regulations in which he takes re-admission.

6.6   A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same semester.

7.0 **Academic requirements**
The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no.6.

7.1   **A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject / course, if student secures not less than 35% marks (24 out of 70 marks) in the semester end examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing 'C' grade or above in that subject / course.**

7.2   A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to group projects, seminar, comprehensive test, viva-voce and major project. If a student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them.

The student would be treated as failed, if student

(i)   does not complete all the mandatory courses offered during the course
(ii)   does not submit a report on internship, group project, major project, or does not make a presentation of the same before the evaluation committee as per schedule, or
(iii)   does not present the seminar as required in the I year and II year or
(iv)   secures less than 40% marks in comprehensive test and seminar/ comprehensive test and viva-voce / group project/major project evaluations.

Student may reappear once for each of the above evaluations, when they are scheduled again; if student fails in such 'one re-appearance' evaluation also, student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.3 **Promotion Rules based upon credits**

S. No.	Promotion	Conditions to be fulfilled
1	First year First Semester to Second Semester	Regular course of study of first year first semester and should have satisfied the minimum requirement of attendance to appear I year I semester.
2	First year to second year first semester	i. Regular course of study of first year First and second semesters. ii. Must have secured at least 50% of credits (22) upto first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.

3.	II Year I Semester to II Semester	Regular course of study of second year first semester.
4	Second year to third year first semester	i. Regular course of study of First and second semesters of second year. ii. Must have secured at least 60% of credits (54) upto second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	i. Regular course of study of third year second semester. ii. Must have secured 60% of credits (79) up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

7.4 A student (i) shall attend for all courses / subjects covering 164 credits as specified and listed in the course structure, (ii) fulfils all the attendance and academic requirements for 164 credits, (iii) earn all 164 credits by securing SGPA $\geq$ 5.0 (in each semester), and CGPA (at the end of each successive semester) $\geq$ 5.0, (iv) **passes all the mandatory courses,** to successfully complete the under graduate programme. The performance of the student in these 164 credits shall be taken into account for the calculation of 'the final CGPA (at the end of under graduate programme), and shall be indicated in the grade card of IV year II semester.

7.5 If a student registers for some more '**extra subjects**' (in the parent department or other departments / branches of engineering) other than those listed subjects as specified in the course structure of his Department, the performances in those ' **extra subjects**' will not be taken into account while calculating the SGPA and CGPA. For such '**extra subjects**' registered, Percentage (%) of marks and letter grade alone will be indicated in the grade card as a performance measure, subject to completion of the attendance and academic requirements as stated in the regulations 6 and 7.1 to 7.4 above.

7.6 A student eligible to appear in the semester end examination for any subject / course, but absent from it or failed (thereby failing to secure **'C'** grade or above) has to reappear for that subject/ course in the supplementary examination as and when conducted. In such cases, CIE assessed earlier for that subject / course will be carried over, and added to the marks obtained in the supplementary examination for evaluating performance in that subject.

7.7 A student **detained in a semester due to shortage of attendance, may be re-admitted when the same semester is offered in the subsequent academic years for the fulfillment of academic requirements**.

The academic regulations under which student has been readmitted shall be applicable. However, no grade allotments or SGPA / CGPA calculations will be done for the entire semester in which student has been detained.

7.8 A student detained **due to lack of credits, will be promoted to the next academic year only after acquiring the required credits as per academic regulations.**

The academic regulations shall be applicable to a student whatever they are in force at the time of re-admission.

8.0   Evaluation - Distribution and weightage of marks

8.1   The performance of a student in each semester shall be evaluated subject-wise for a maximum of 100 marks for a theory and 100 marks for every practical subject with 30 marks Continuous Internal Evaluations (CIE) and 70 marks for Semester End Examinations (SEE)

Summer Break: Internship-I and Internship-II will be organized during summer vacation of II-II and III-II and evaluation of the same will be carried out during lab examinations of III-I and IV-I.

In addition, there will be Group Project-I in III year I semester, Group Project-II in III year II semester, and Group Project-III in IV year I semester, Major project in IV year II semester will be evaluated for 100 marks.

The pattern of continuous internal evaluation for Internship Project and Group Project is given below:

Sl. No	Description	Marks
1	Abstract, Design, implementation and Presentation in front of Project Review Committee consisting of HoD, Senior faculty and Internal guides (Average)	15 marks
2	Report	05 marks
3	Evaluation by Internal Guide	10 marks
	Total sessional marks	**30 marks**

Semester end examination   -   70 marks

Pattern of external evaluation for Internship Project and Group Project.

Sl. No	Description	Marks
1	Final report	10 marks
2	Presentation	10 marks
3	Demonstration/defence of project	50 marks
	Total sessional marks	**70 marks**

Pattern of continuous internal evaluation for Major Project in IV year II semester is as follows:

Sl. No	Description	Marks
1	Progress of Project work and the corresponding interim report as evaluated by Project Review Committee at the end of 6 weeks	5 marks
2	Seminar at the end of 6 weeks	5 marks
3	Progress of Project work as evaluated by Project Review Committee at the end of 11 weeks	5 marks
4	Seminar at the end of 11 weeks	5 marks
5	Evaluation by Project Review Committee at the end of 15 weeks and Final Project Report	5 marks
6	Final presentation and defense of project	5 marks
	Total	**30 marks**

Pattern of External Evaluation for Major project - 70 Marks

Sl. No	Description	Marks
1	Final Project Report	10 marks
2	Presentation	20 marks
3	Demonstration / Defense of Project before committee	40 marks
4	**TOTAL**	**70 marks**

8.2   For all the other theory and lab subjects the distribution of marks shall be 30 for Continuous Internal Evaluation (CIE) and 70 for the Semester End-Examination (SEE).

8.3   Theory Subjects

8.3.1   Pattern for Continuous Internal Evaluation (CIE) 30 marks

The following procedure is to be adopted for awarding internal marks of 30 for all the B. Tech. students from the **Academic Year 2020-2021**

The distribution of marks for continuous internal evaluation (30 marks) is shown below. Average of two Mid Tests will be taken for final award of marks.

a)	**Part – A** of Mid Test will have 10 questions	5 marks
b)	**Part – B** of Mid Test will have 4 questions (1 from each unit and 4th question from any one unit or combination) and student has to answer 3 questions	15 marks
c)	**Part – C** Mid Test Question Paper Will have 3 questions – One from each unit taken from assignment questions. Student has to answer 1 question out of 3 questions	3 marks
d)	**Assignment– I** three questions from each unit (1,2,3 unit) – total of 9 questions to be submitted before first mid test. **Similarly assignment – II**: will have three questions from each unit (4, 5, 6 units) total of 9 questions will be submitted before Mid Test II and average of two assignments will be considered.	2 marks
e)	Attendance *	3 marks
f)	Class notes	2 marks
	Total	**30 marks**

*   Three marks are awarded for each theory subject for the students who put in attendance in a graded manner as given below:

S. No.	Attendance Range	Marks Awarded
1.	65 % and above but less than 75%	1
2.	75% and above and less than 85%	2
3.	85% and above	3

Marks for attendance shall be added to each subject based on average of attendance of all subjects put together.

If any candidate is absent in any subject or mid-term examination, this student wishes to improve performance, a **third mid-test** will be conducted for that student by the Institution in the entire syllabus, on the same day of Semester End Examination (SEE) for $2^1/_2$ hours. That result will be

treated as III mid test and average of better two of (mid test I,II,III) will be considered. III mid test will have Part-A (compulsory) and Part-B with essay type questions and three out of four questions are to be answered.

b) <u>**Pattern for External Examinations - (70 marks)**</u>

• There shall be external examination in every theory course and consists of two parts (Part-A & Part-B). The total time duration for this semester end examination will be 3 hours.

• **Part-A** shall have 20 marks, which is compulsory. It will have 10 short questions set with 2 marks each. There shall be atleast one question to each of the six units and two questions from units 1,2,3 and two questions from unit 4,5,6 and number of questions from any unit shall not exceed two.

• **Part-B** of the question paper shall have essay type questions for 50 marks and shall have 8 questions out of which any 5 are to be answered. At least one question must appear from each Unit. Seventh question must have 2 to 3 bits taken from 1st, 2nd, and 3rd units and 8th question also with 2 to 3 bits taken from 4th, 5th and 6th units, such that not more than 2 questions shall be from any one unit. All the questions carry equal marks.

8.4 **Pattern of Evaluation for Lab subjects** - **(100 marks)**

8.4.1 For practical subjects there shall be a continuous evaluation during the semester for 30 sessional marks and 70 marks for semester end examination. Out of the 30 marks for Continuous Internal Evaluation, the distribution of marks is as follows

S. No	Item	Marks
1.	Day to Day work	05 marks
2.	Final Record and viva	09 marks
3.	Average of two tests including viva	05 marks
4.	Lab Based Project Report viva and demo	08 marks
5.	Attendance	03 marks
	Total	**30 marks**

8.4.2 The semester end examination for 70 marks for the lab subjects shall be conducted by an external examiner and an internal examiner appointed by the Chief Superintendent of Examinations of the college. The marks are distributed as follows:

S. No	Item	Marks
1.	Procedure to experiment and Tabulation	10 marks
2.	Conduct of experiment, observation, Calculation	30 marks
3.	Results including graphs, discussions and conclusion	20 marks
4.	Viva voce and Record	10 marks
	Total	70 marks

8.4.3 **In case computer based examinations**

S. No	Item	Marks
1.	Flow chart and algorithms	10 marks
2.	Program writing and execution	30 marks
3.	Result and conclusions	20 marks
4.	Viva voce and Record	10 marks
	Total	70 marks

8.5 **For the subject having design and / or drawing, (such as Engineering Drawing and Machine Drawing), the distribution shall be 30 marks for internal evaluation (10 marks for day-to-day work including drawing,3 marks for home assignment work, 12 marks for average of two internal tests and 2 marks for class notes 3 marks for attendance) and 70 marks for end semester end examination.**

There shall be two internal tests in a Semester and the average of the two shall be considered for the award of marks for internal tests.

Third test facility can be availed as mentioned above (8.3.1 (i) (a) and (b)

8.6. Technical Seminar

There shall be a technical seminar evaluated for 100 marks from I year I semester to II year II Semester. The evaluation is purely internal and will be conducted as follows:

Sl.No	Description	Marks
1	Literature survey, topic and content	10
2	Presentation including PPT	10
3	Seminar Notes	05
4	Interaction with audience after presentation	05
5	Final Report 3 copies	10
6	Class room participation	05
7	Punctuality in giving seminar as per Scheduled time and date	10
8	Mid Semester Viva (on the seminar topics completed up to the end of 9th week	15
9	End Semester Viva	30
	Total	**100 Marks**

Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.

8.7 Comprehensive Test and Viva-voce:

Comprehensive test and Viva Voce	The subjects studied in the Semester concerned related to branches concerned and for placements
B.Tech I year I semester	I semester
B.Tech I year II semester	I and II semester
B.Tech II year I semester	I, II and III semester
B.Tech II year II semester	I, II, III and IV semester
B.Tech III year I semester	I, II, IIII, IV and V semester
B.Tech III year II semester	I, II, IIII, IV, V and VI semester
B.Tech IV year I semester	I, II, IIII, IV, V, VI and VII semester

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

Allocation of marks :

*Comprehensive Test	: 70 marks
**Viva Voce	: 30 marks
Total	**: 100 marks**

*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 30 marks.

Total marks for Comprehensive Test will be 70.

The total sessional marks in this subject of Comprehensive Test and Viva Voce will be : 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

8.8   The laboratory records and internal test papers shall be preserved in the respective departments as per the college norms and shall be produced to the Committee of the college or any external agency like AICTE, NAAC, JNTUH, NBA etc., as and when the same are called for.

8.9.   There shall be a Internship 1 and Internship 2, in an Industry of their specialization. Students will register for this immediately after II year II semester end examination and III year II semester examinations and pursue it during summer vacation. Internship 1 and Internship 2 shall be submitted as a project report and presented before the committee in III year I semester and IV year I semester along with lab examination. This project report will be evaluated for 30 internal marks and 70 external marks. The committee consists of an external examiner, Head of the Department, Supervisor of the Internship project and Senior Faculty Member of the Department.

8.10   The laboratory marks and the internal marks awarded by the college are subject to scrutiny and scaled down by the Departmental committees wherever necessary. In such cases, the internal and laboratory marks awarded by the department will be referred to a committee. The committee will arrive at a scaling factor and the marks will be scaled accordingly.   The recommendation of the committee is final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the college rules and produced before the visiting committees as and when they are asked for.

8.11.   For mandatory courses like orientation course, cyber security, a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in sum total of continuous internal evaluation and external examination for passing the subject / course. These marks will be graded as per table given in 3.2.2.

9.0   Grading procedure

9.1   Marks will be awarded to indicate the performance of student in each theory subject, laboratory / practicals, seminar, Group Project 1,2,3, in the Major project and Comprehensive Test and Viva.

Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade shall be given.

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

% of Marks Secured in a Subject / Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points (GP)
Greater than or equal to 90%	O (Outstanding)	10
80% and less than 90%	A+ (Excellent)	9
70% and less than 80%	A (Very Good)	8
60% and less than 70%	B+ (Good)	7
50% and less than 60%	B (Average)	6
40% and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

9.3   A student obtaining '**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.

9.4   A student who has not appeared for examination in any subject, '**Ab'** grade will be allocated in that subject, and student shall be considered '**failed'**. Student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered.

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

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

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

9.7   The student passes the subject / course only when **GP is not less than 5 (i.e. 'C' grade or above)**

9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (CP) secured from all subjects / courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to two decimal places. SGPA is thus computed as

$$\text{SGPA} = \{ \sum_{i=1}^{N} C_i\, G_i \} / \{ \sum_{i=1}^{N} C_i \} \; \dots. \text{ For each semester}$$

(i.e., upto and inclusive of S semesters, S 2),

where '**N**' is the **total** number of subjects (as specifically required and listed under the course structure of the parent department) the student has '**registered**' i.e., from the 1st semester onwards upto and inclusive of the 8th semester, 'j' is the subject indicator index (takes into account the subjects from 1 to 8 semesters), C_J is the number of credits allotted to the Jth subjects and G_j represents the grade points (GP) corresponding to the letter grade awarded for that Jth subject.

After registration and completion of the first year first semester, SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA

Course / Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	C	5	3 x 5 = 15
	21			152

SGPA = 152/21 = 7.24

Illustration of calculation of CGPA:

Course / Subject	Credits	Letter Grade	Grade Points	Credit points Points
I				
Course 1	4	A	8	4 x 8 = 32
Course 2	4	A	9	4 x 9 = 36
Course 3	4	B	6	4 x 6 = 24
Course 4	3	O	10	3 x 10 = 30
Course 5	3	B	7	3 x 7 = 21
Course 6	3	A	8	3 x 8 = 24
I				
Course 7	4	B	7	4 x 7 = 28
Course 8	4	O	10	4 x 10 = 40
Course 9	4	A	8	4 x 8 = 32
Course 10	3	B	6	3 x 6 = 18

Course 11	3	C	5	3 x 5 = 15
Course 12	3	A	9	3 x 9 = 27
Total Credits	= 42			Total Credit Points =327

$$CGPA = 327/42 = 7.79$$

9.9 For merit ranking or comparison purposes or any other listing, **only** the '**rounded off'** values of the CGPAs will be used.

9.10 For calculations listed in regulations 9.6 to 9.9, performance in failed subjects/ courses (securing **F** grade) will also be taken into account, and the credits of such subjects/courses will also be included in the multiplications and summations.

After passing the failed subject(s) newly secured letter grades will be taken into account for calculation of SGPA and CGPA.

However, mandatory courses will not be taken into consideration.

10.0 Passing standards

10.1 A student shall be declared successful or 'passed' in a semester, if student secures a GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when student gets SGPA 5.00 at the end of that particular semester); and a student shall be declared successful or 'passed' in the entire under graduate programme, only when gets a CGPA 5.00 for the award of the degree as required.

10.2 After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, and grade earned etc.), credits earned, SGPA, and CGPA.

11.0 Declaration of results

11.1 Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.

11.2 For final percentage of formula may be used.

12.0 Award of degree marks equivalent to the computed final CGPA, the following
% of Marks = (final CGPA – 0.5) x 10

12.1 A student who registers for all the specified subjects/ courses as listed in the course structure and secures the total number of credits (with CGPA ≥5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have '**qualified'** for the award of the B.Tech. degree in the chosen branch of Engineering as selected at the time of admission.

12.2 A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

12.3 Students with final CGPA (at the end of the under graduate programme) 8.00 and above, and fulfilling the following conditions -

(i) Should have passed all the subjects/courses in '**first appearance'** within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.

(ii)   Should have secured a CGPA ≥ 8.00, at the end of each of semesters, starting from first year first semester onwards.

(iii)   Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason, shall be placed in **'FIRST CLASS WITH DISTINCTION'**, otherwise **FIRST CLASS** only.

12.4   Students with final CGPA (at the end of the under graduate programme) ≥ 6.5 but < 8.00, shall be placed in '**FIRST CLASS'**.

12.5   Students with final CGPA (at the end of the under graduate programme) ≥ 5.5 but < 6.5, shall be placed in '**SECOND CLASS'**.

12.6   All other students who qualify for the award of the degree (as per item 12.1), with final CGPA (at the end of the under graduate programme) ≥ 5 but < 5.5, shall be placed in '**pass class**'.

12.7   A student with final CGPA (at the end of the under graduate programme) < 5.00 will not be eligible for the award of the degree.

12.8   Students fulfilling the conditions listed under item 12.3 alone will be eligible for award of '**university rank**' and '**gold medal**'.

13.0 Withholding of results

13.1 If the student has not paid the fees to the university / college at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

14.0 Transitory regulations

14.1   A student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the degree programme, may be considered eligible for readmission to the same subjects / courses (or equivalent subjects/ courses, as the case may be), and same professional electives / open electives (or from set/category of electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the date of commencement of student's first year first semester).

A student admitted in one academic regulation and he is getting readmission in some other academic regulations , the college has to offer substitute / additional subjects based on the comparison of two academic regulations. The details of substitute / additional subjects offered with the recommendations of board of studies of the concerned branch has to be given from time to time. The student will be governed by the academic regulations at the time of re-admission.

15.0 Student transfers

15.1   There shall be no branch transfers after the completion of admission process.

15.2   The students seeking transfer to Sreenidhi Institute of Science and Technology (SNIST) from various other Universities / institutions have to pass the failed subjects which are equivalent to the subjects of SNIST, and also pass the subjects of SNIST which the students have not studied at the earlier institution.

Further, though the students have passed some of the subjects at the earlier semesters of SNIST, the students have to study substitute subjects in SNIST and get sessional marks by attending 3rd mid test and paying requisite fee as per the rules.

15.3   The transferred students from other Universities/ institutions to SNIST who are on rolls to be provided one chance to write the CIE (internal marks) in the failed subjects and /or subjects not studied as per the clearance letter issued by the Institution.

15.4   The autonomous affiliated colleges have to provide one chance to write the internal examinations in the failed subjects and /or subjects not studied, to the students transferred from other universities / institutions to SNIST who are on rolls, as per the clearance (equivalence) letter issued by the University.

16.0   **Scope**

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

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

16.3   The Institution 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 Institution.

Academic Regulations for B.Tech.
(LATERAL ENTRY SCHEME)
w.e.f the AY 2021-22

1. **Eligibility for award of B. Tech. Degree (LES)**
   The Lateral Entry Scheme (LES) students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years failing which he will forfeit the seat.

2. The student shall register and secure for all the credits with CGPA $\geq$ 5 from II year to IV year B.Tech. programme (LES) as per the regulations for the award of B.Tech. degree. **Out of the total credits secured, the student can avail exemption up to 6 credits**, that is, one open elective subject and one professional elective subject or two professional elective subjects for B.Tech programme to improve the performance of the Grade point average.

3. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech. However, the student can take **two more** years for appearing the examinations.

4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

5. **Promotion rules based on credits**

S.	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 27 credits out of 45 credits i.e., 60% of credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 52 credits out of 87 credits i.e., 60% of credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

6. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

MALPRACTICE RULES
DISCIPLINARY ACTION FOR MIS-CONDUCT OF STUDENTS DURING EXAMINATIONS

	Nature of Malpractice/ Mis-conduct of the conduct	Punishment
	If the student:	
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 student is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student 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 students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the student is to be cancelled and sent to the university.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and UG major project) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all university examinations. The continuation
		of the course by the student 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 student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the student 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 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.	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 student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the student 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 student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.
9.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student 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 student has already appeared including practical examinations and UG major project 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 student has appeared including practical examinations and UG major project of that semester/year examinations.

12. If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the university for further action to punishment award suitable.

Malpractices identified by squad or special invigilators

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

2. Punishment for institutions: (if the squad reports that the college is encouraging malpractices)

    a. A show cause notice shall be issued to the college.
    b. Impose a suitable fine on the college.
    c. Shifting the examination centre from the college to another college for a specific period of not less than one year.

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Sl.No	AICTE Category	Dept Course	Course code	Name of the Course	L	T	P/D	C	Max. Marks	
				A20-Course Structure for B. Tech(Mech)-I Year – I semester (1st Semester)						
									CIE	SEE
1	BS	S&H	8HC06	Applied Physics	3	1	0	4	30	70
2	BS	S&H	8HC09	Matrix Methods and Calculus (MMC)	2	1	0	3	30	70
3	ES	ME	8BC02	Engineering Graphics	1	0	4	3	30	70
4	ES	IT	8FC01	Problem Solving using C	3	0	0	3	30	70
5	PC	ME	8B103	Engineering Mechanics	2	0	0	2	30	70
6	HS&MS	S&H	8HC02	Written Communication Skills	1	0	0	1	30	70
7	BS	S&H	8HC65	Applied Physics Lab	0	0	2	1	30	70
8	HS&MS	S&H	8HC62	Written Communication Lab	0	0	2	1	30	70
9	ES	IT	8FC61	Problem Solving using C Lab	0	0	2	1	30	70
10	Proj,Sem, interns, viva	ME	8B191	Comprehensive test and Viva-voce-I (2 Mids-Test (20M) and vivA (10M)and End Semester Test (50M) andViva(20M) = 70)	1	0	0	1	30	70
11	Proj,Sem, interns, viva	ME	8B185	Technical Seminar I	0	0	2	1	100	
12	MC	S&H	8HC18	Orientation Course	1	0	0	0	Marks and Grade will be given at the end of I year II semester	
				Total	14	2	12	21	400	700

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Sl.No	AICTE Category	Dept Course	Course code	Name of the Course	L	T	P/D	C	Max. Marks	
— A20-Course Structure for B. Tech.(Mech.)-I Year – II semester (2nd Semester)										
									CIE	SEE
1	BS	S&H	8HC04	Engineering Chemistry	3	1	0	4	30	70
2	BS	S&H	8HC12	Differential Equations & Integral Calculus (DEIC)	2	1	0	3	30	70
3	BS	S&H	8HC08	Basic Mathematics, Analysis and Reasoning (BMAR)	2	1	0	3	30	70
4	ES	CSE	8EC01	Data Structure and C++	3	0	0	3	30	70
5	HS&MS	S&H	8HC01	Oral Communication Skills	1	0	0	1	30	70
6	ES	ME	8BC01	Workshop/ Manufacturing processes (Theory)	1	0	0	1	30	70
7	PC	ME	8B205	Mechanics of solids	2	0	0	2	30	70
8	ES	ME	8BC61	Workshop/ Manufacturing processes Lab	0	0	2	1	30	70
9	HS&MS	S&H	8HC61	Oral Communication Lab	0	0	2	1	30	70
10	BS	S&H	8HC64	Engineering Chemistry Lab	0	0	2	1	30	70
11	ES	CSE	8EC61	Data Structure (C and C++) Lab	0	0	2	1	30	70
12	PC	ME	8B262	Advanced Engineering Graphics & CAD	0	0	2	1	30	70
13	Proj,Sem, interns, viva	ME	8B292	Comprehensive test and Viva-voce-II (2 Mids-Test (20M) and vivA (10M)and End Semester Test (50M) andViva(20M) = 70)	1	0	0	1	30	70
14	Proj,Sem, interns, viva	ME	8B286	Technical Seminar II	0	0	2	1	100	
15	MC	S&H	8HC18	Orientation Course	2	0	0	0	30	70
									Grade Evaluation	
				Total	**17**	**3**	**12**	**24**	**520**	**980**

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Sl.No	AICTE Categery	Dept Course	Course code	Name of the Course	L	T	P/D	C	Max. Marks	
				A20- Course Structure for B. Tech.(Mech)-II Year – I semester (3rd Semester)						
									CIE	SEE
1	BS	S&H	8HC15	Complex Analysis, Probability And Statistics	2	1	0	3	30	70
2	ES	IT	8FC21	Python programming and Algorithms	2	1	0	3	30	70
3	HS&MS	S&H	8HC05	Environmental Science and Ecology	2	0	0	2	30	70
4	HS&MS	MBA	8ZC01	Economics, Accountancy and Management Science	2	0	0	2	30	70
5	PC	ME	8B306	Thermodynamics	2	1	0	3	30	70
6	PC	ME	8B307	Materials Science and Metallurgy	2	0	0	2	30	70
7	PC	ME	8B308	Machine Drawing and Computer aided Drawing Practice	1	0	2	2	30	70
8	PC	ME	8B363	Metallurgy Lab & Mechanics of Solids Lab	0	0	2	1	30	70
9	PC	ME	8B364	Fuels and Lubricants Lab	0	0	2	1	30	70
10	Proj,Sem, interns, viva	ME	8B393	Comprehensive test and Viva-voce-III (2 Mids-Test (20M) and vivA (10M)and End Semester Test (50M) andViva(20M) = 70)	1	0	0	1	30	70
11	Proj,Sem, interns, viva	ME	8B387	Technical Seminar III	0	0	2	1	100	
				Total	14	3	8	21	400	700

Sl.No	AICTE Category	Dept Course	Course code	Name of the Course	L	T	P/D	C	Max. Marks	
A20- Course Structure for B. Tech.(Mech) -II Year – II Semester(4th Semester)										
									CIE	SEE
1	ES	EEE	8AC48	Elements of Electrical & Electronics Engineering	3	0	0	3	30	70
2	ES	CSE	8EC41	Java Programming	2	1	0	3	30	70
3	HS&MS	S&H	8HC17	Universal Human Values	2	1	0	3	30	70
4	PC	ME	8B409	Manufacturing Processes	3	0	0	3	30	70
5	PC	ME	8B410	Kinematics of Machinery	2	1	0	3	30	70
6	PC	ME	8B411	Fluid Mechanics and Hydraulic Machinery	2	0	0	2	30	70
7	HS&MS	S&H	8HC03	Soft Skills	1	0	0	1	30	70
8	HS&MS	S&H	8HC63	Soft Skills Lab	0	0	2	1	30	70
9	ES	EEE	8AC95	Electrical & Electronics Engineering lab	0	0	2	1	30	70
10	PC	ME	8B465	Manufacturing Processes Lab	0	0	2	1	30	70
11	PC	ME	8B466	Fluid Mechanics and Hydraulic Machinery Lab	0	0	2	1	30	70
12	Proj,Sem, interns, viva	ME	8B494	Comprehensive test and Viva-voce-IV (2 Mids-Test (20M) and vivA (10M)and End Semester Test (50M) andViva(20M) = 70)	1	0	0	1	30	70
13	Proj,Sem, interns, viva	ME	8B488	Technical Seminar IV	0	0	2	1	100	
14	Proj,Sem, interns, viva	ME		Summer Industry Internship-I **(Internal Evaluation only in III Year - I Sem (2 Internal Reviews (30 M) and External Evaluation (70M))**	---	---	---	---	---	---
				Total	16	3	10	24	460	840

Sl.No	AICTE Category	Dept Course	Course code	Name of the Course	L	T	P/D	C	Max. Marks	
				A20-Course Structure for B. Tech.(Mech.)-III Year – I Semester (5th Semester)						
									CIE	SEE
1	MC	ME	8FC24	Cyber Security	2	0	0	0	30	70
										GRADE
2	PC	ME	8B512	Applied Thermodynamics	2	1	0	3	30	70
3	PC	ME	8B513	Dynamics of Machinery	2	1	0	3	30	70
4	PC	ME	8B514	Design of Machine Members	2	1	0	3	30	70
5	PC	ME	8B515	Metal Cutting and Machine Tools	3	0	0	3	30	70
6	PE	ME		**Professional Elective-I**	3	0	0	3	30	70
7	**OE**			**Open Elective-I**	2	0	0	2	30	70
8	PC	ME	8B568	Applied Thermodynamics Lab	0	0	2	1	30	70
9	PC	ME	8B569	Machine Tools Lab	0	0	2	1	30	70
10	PC	ME	8B570	KOM & DOM Lab	0	0	2	1	30	70
11	Proj,Sem, interns, viva	ME	8B571	Group Project-1	0	0	2	1	30	70
12	ES	ME	8B595	Comprehensive test and Viva-voce-V (2 Mids-Test (20M) and vivA (10M)and End Semester Test (50M) andViva(20M) = 70)	0	1	0	1	100	---
13	Proj,Sem, interns, viva	ME	8B567	Summer Industry Internship-I (Internal Evaluation only)	0	0	0	1	30	70
				Total	16	4	8	23	460	840

Sl.No	AICTE Categery	Dept Course	Course code	Name of the Course	L	T	P/D	C	Max. Marks	
				A20-Course Structure for B. Tech.(Mech.)-III Year – II Semester (6th Semester)						
									CIE	SEE
1	ES	CSE	8EC45	Artificial Intelligence	2	0	0	2	30	70
2	PC	ME	8B620	Heat Transfer	2	1	0	3	30	70
3	PC	ME	8B621	CAD/CAM and FEM	3	0	0	3	30	70
4	PC	ME	8B622	Operations Research	3	0	0	3	30	70
5	PE	ME		**Professional Elective-II**	3	0	0	3	30	70
6	PC	ME	8B672	CAD Lab	0	0	2	1	30	70
7	PC	ME	8B673	Heat Transfer Lab	0	0	2	1	30	70
8	PC	ME	8B674	Production Drawing Practice Lab	0	0	2	1	30	70
9	Proj,Sem, interns, viva	ME	8B775	Group Project-2	0	0	2	1	30	70
10	ES	ME	8B696	Comprehensive test and Viva-voce-VI (2 Mids-Test (20M) and vivA (10M)and End Semester Test (50M) andViva(20M) = 70)	0	1	0	1	30	70
11	Proj,Sem, interns, viva	ME		Summer Industry Internship-II (Internal Evaluation only in IV Year - I Sem (2 Internal Reviews (30 M) and External Evaluation (70M))	---	---	---	---	---	---
				Total	13	2	8	19	300	700

Sl.No	AICTE Category	Dept Course	Course code	Name of the Course	L	T	P/D	C	Max. Marks	
				A20-Course Structure for B. Tech.(Mech.) -IV Year – I Semester (7th Semester)						
									CIE	SEE
1	PC	ME	8B727	Robotics	3	0	0	3	30	70
2	PC	ME	8B728	Additive Manufacturing Processes	2	1	0	3	30	70
3	PC	ME	8B729	Metrology and Instrumentation	3	0	0	3	30	70
4	PE	ME		**Professional Elective-III**	3	0	0	3	30	70
5	PE	ME		**Professional Elective-IV**	3	0	0	3	30	70
6	**OE**			**Open Elective-II**	2	0	0	2	30	70
7	PC	ME	8B777	M&I Lab	0	0	2	1	30	70
8	PC	ME	8B778	CAM/CAE Lab	0	0	2	1	30	70
9	Proj,Sem, interns, viva	ME	8B779	Group Project-3	0	0	2	1	30	70
10	ES	ME	8B797	Comprehensive test and Viva-voce-VII (2 Mids-Test (20M) and vivA (10M)and End Semester Test (50M) andViva(20M) = 70)	0	1	0	1	30	70
11	Proj,Sem, interns, viva	ME	8B776	Summer Industry Internship-II (Internal Evaluation only)	---	---	---	1	30	70
				Total	16	2	6	22	330	700

30

Sl.No	AICTE Category	Dept Course	Course code	Name of the Course	L	T	P/D	C	Max. Marks	
				A20-Course Structure for B. Tech.(Mech.)-IV Year – II Semester (8ᵗʰ Semester)						
									CIE	SEE
1	PE	ME		**Professional Elective –V**	3	0	0	3	30	70
2	**OE**			**Open Elective-III**	2	0	0	2	30	70
3	Proj,Sem, interns, viva		8B880	Major Project	---	---	10	5	30	70
				Total :	5	0	10	10	90	210

Professional Elective Streams	Course Code	PE– I (3-1)	Course Code	PE – II (3-2)	Course Code	PE – III (4-1)	Course Code	PE – IV (4-1)	Course Code	PE – V (4-2)
						Professional Electives (PE)				
Design	8B516	Design and Analysis of Experiments	8B623	Hydraulics and Pneumatic Systems	8B730	Tool Design	8B734	Fracture Mechanics	8B838	Design Optimization
Thermal	8B517	Power Plant Engineering	8B624	Refrigeration and Air Conditioning	8B731	Computational Fluid Dynamics	8B735	Renewable Energy Systems Energy Management Systems	8B839	Jet propulsion and Rocket Engineering
Manufacturing	8B518	Production Planning and Control	8B625	Quality and Reliability Engineering	8B732	Advanced Manufacturing Processes	8B736	Design for Manufacturing & Assembly	8B840	Mechatronics
Automobile Engineering	8B519	Automotive Petrol & Diesel Engines	8B626	Automotive Power Units and Transmission	8B733	Automotive Electrical Systems & Electronics	8B737	Vehicle Body Engineering	8B841	Alternate Fuels and Energy Systems

Open Elective Streams	Course Code	Open Elective (OE)				
		OE– I	Course Code	OE – II	Course Code	OE – III
		(3-1)		(4-1)		(4-2)
Entrepreneurship Stream	8ZC02	Basics of Entrepreneurship	8ZC04	Advanced Entrepreneurship	8ZC03	Product and Services
Social Sciences Stream	8ZC05	Basics of Indian Economy	8ZC06	Basics of Polity and Ecology	8ZC27	Indian History, Culture and Geography
Innovation and Design Thinking Stream	8ZC08	Design literacy and Design Thinking	8ZC09	Co-Creation and Product Design	8ZC10	Entrepreneurship & Business Design
Finance Stream	8ZC11	Banking Operations, Insurance and Risk Management	8ZC12	Entrepreneurship Project Management and Structured Finance	8ZC13	Financial Institutions, Markets and Services
ECE		Fundamental of Digital Circuits and Microprocessors	8DC43	Introduction to VLSI Design	8DC44	Internet of things(IOT)
CSE	8EC44	Database systems Concepts	8FC23	Data Analytics	8EC47	Computer Networks
EEE	8AC46	Control System Engineering	8AC36	Special Machines	8AC44	Fundamentals of Measurements and Instrumentation

Syllabus for B. Tech. I Year I semester
Mechanical Engineering
APPLIED PHYSICS

Code :8HC06

L	T	P/D	C
3	1	0	4

Course Objectives

- To understand basic fundamentals of crystallography, crystal structures andtheir properties.
- To understand the various defects of a crystal and strain hardening.
- To know the various types of vibrations, radius of gyration, moment of inertia and Ultrasonics and their importance.
- To make the students to widen the conceptual understanding of the fundamental principles of interference and diffraction.
- To understand the basic concepts of normal light, Laser and its applicationsand to know about the fundamentals of radioactivity and its applications.
- To discuss about the nano-technology, preparation techniques and characterization (XRD, SEM & TEM), CNTs.

Course Outcomes

After completing the course, studentsare able to

- Get the knowledge to classify the crystal structures, their parameters and draw the various crystal planes using Miller indices.
- Understand and analyze the various crystal defects-its types, strain hardening.
- Understand about the vibrations, radius of gyration, moment of inertia and ultrasonic.
- Analyze the wave nature of light, superposition principle, differentiation between interference, diffraction and their applications
- Explain aboutthe types of emissions, laser principle, working of different types of lasers and their applications.To understand the nuclear fission and fusion,radioactivity emission of alpha, beta and gamma rays.
- To understand the nano & bulk concepts, surface to volume ratio,quantum confinement,CNTs and preparation methods. Analysis techniques like XRD, SEM, TEM.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X											
CO2	X	X	X									

CO3	**X**	**X**	**X**									
CO4	**X**			**X**								
CO5	**X**											
CO6	**X**											

Unit:1
Crystallography

Unit Cell,Space Lattice, Lattice Parameters, Crystal Systems, Bravais Lattices,Atomic Radius, Co-ordination Number and Packing Factor Different metals which classified as SC, BCC, FCC, HCP structures and their relative properties, deformation and corresponding strength and ductility.Crystal directions and Planes,Miller Indices and Inter Planar Spacing of Orthogonal Crystal Systems.

Unit:2
CrystalDefects

Point Defects:Vacancies, Interstitials and Substitutional. Frenkel and Schottky Defects and Calculations of theirconcentrations.Qualitative treatment of line defects and the phenomenon of Strain hardening.

Unit:3
Vibrations and Ultrasonics
Vibrations:

Qualitative treatment of free, damped, forced vibrations and resonance. Radius of gyration, moment of inertia and calculation of moment of inertia of circular disc, solid sphere, solid cylinder, thin rod and rectangular lamina.Applications: Physical Pendulum, Torsional Pendulum, Compound Pendulum.

Ultrasonics:

Production of ultrasonics by Magnetostriction method and piezoelectric method, Applications of Ultrasonics.

Unit:4
Wave optics

Interference: Introduction, Superposition of waves and Young's double slit experiment.Interference in thin films due to reflection of light and Newton's rings. Applications: Calculation of refractive Index of a liquid andthickness of glass plate.

Diffraction: Introduction, Plane diffraction grating andresolving power of a grating.Calculation of wavelength of a spectral line by using diffraction grating.

Unit:5
Lasers and Nuclear Energy
Lasers:

Characteristics of LASER, Spontaneous and Stimulated Emission of Radiation,Einstein's Coefficients and their significance. Meta-stable State, Pumping, Population Inversion. Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers.

Nuclear Energy: Mass Defect, binding energy, Nuclear fission, Nuclear fusion.Radioactivity: $\Box$, β, γ rays decay, Geiger-Muller counter.Introduction of nuclear power plant.

Unit:6

Nanotechnology

Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement Effect, Bottom-up Fabrication: Sol-gel, Precipitation and Chemical Vapor Deposition(CVD).Top-down Fabrication: Thermal evaporation, Ball Milling, Characterization of Nano materials (XRD&TEM), Carbon Nano Tubes(CNTs), Applications of Nano Materials.

Text Books:

1. Engineering Physics by M.N. Avadhanulu, P.G.Kshirsagar and TVS Arun Murthy. S. Chand publications.

Reference Books:

1. Charles Kittel, Introduction to Solid State Physics.
2. Dekker, Solid State Physics
3. Halliday and Resnick, Physics
4. Engineering Mechanics by S.S. Bhavikatti& J.G. Rajasekharappa.
5. Theory of Vibrations with Applications – WT Thomson
6. S.O. Pillai, Solid State Physics
7. A. Ghatak – Optics

Syllabus for B. Tech. I Year I semester
Mechanical Engineering
MATRIX METHODSAND CALCULUS

Code :8HC09

L	T	P/D	C
2	1	0	3

Pre Requisites: Mathematics Knowledge at Pre-University Level

Course Objectives: To make the students to understand and expected to learn
1. *About the linear system and some analytical methods for solution.*
2. *Concept of Eigen values and Eigen vectors their properties and applications.*
3. *Concept of convergence of a series and expansion of a function in sine and cosine terms.*
4. *Mean value theorems and their applications to the given functions, series expansions of a function.*
5. *Special functions such as Beta & Gamma functions and their properties, evaluation of improper integrals.*
6. *Basic concepts of multivariable differential calculus.*

Course Outcomes: After the course completion the students will be able to
1. *Check the consistency or inconsistency of a linear system and ability to solve real time problems.*
2. *Calculate the Eigen values and Eigen vectors of a matrix and their application for orthogonal transformation.*
3. *Define the convergence, divergence or oscillating nature of a series and express the function as Fourier series.*
4. *Verify the mean value theorems and also express the given function in series form using Taylor's theorem.*
5. *Solve the problems using special functions; evaluating the improper integrals..*
6. *Compute the extreme values of a function defined with and without constraints.*

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X	X										
CO2			X									
CO3				X						X		
CO4						X						
CO5									X			
CO6											X	

UNIT- I: Matrices-1
Symmetric, skew-symmetric and orthogonal matrices. Inverse of a matrix by Gauss Jordan method, rank of a matrix; System of linear equations- Rank method/Gauss Elimination method.

UNIT- II: Matrices-2
Hermitian, Skew-Hermitian and Unitary matrices. Eigen values and Eigenvectors and their properties without proofs; Cayley-HamiltonTheorem(without proof) and its applications in finding higher powers & inverse of a matrix, Diagonalization of a matrix.

UNIT-III: Fourier Series
Convergence of Sequence& Series (Definitions), Fourier series, Half range Sine and Cosine series, Parseval's Theorem (without proof).

UNIT- IV: Calculus-1
Rolle's Theorem and Mean value theorems (Statements and Geometrical Interpretations without proof); Taylor's and Maclaurin's theorems with remainders(without proof) and its applications in evaluating definite integrals.

UNIT- V: Calculus - 2
Beta and Gamma functions and their properties; Evaluation of improper integrals. Applications of definite integrals to evaluate surface areas and volumes of revolutions.

UNIT-IV: Multivariable Calculus (Differentiation)

Limit, continuity and partial derivative, Jacobian; Maxima and minima; Lagrange method of multipliers;
Vector Differentiation: Gradient, directional derivatives; Concepts of divergence and curl with physical significance.

Text Books:
1. R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.

Reference Books:
  i. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,
  ii. Reprint, 2008.
 III. B.S. Grewal, Elementary Engineering Mathematics, Khanna Publishers
  iv. C Sankaraiah, A Text book of Engineering Mathematics – I, VGS Book Links
   v. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
  vi. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
 vii. P. Sivaramakrishna Das and C.Vijayakumari, Mathematics-I (calculus, Differential Equations and Linear Algebra), Pearson Publications

Syllabus for B. Tech. I Year I semester
Mechanical Engineering
ENGINEERING GRAPHICS

Code : 8BC02

L	**T**	**P/D**	**C**
1	0	4	3

Course objectives:

1: To teach students the basic principles of Engineering graphics and instruments used
2: To introduce the concept of projections in drawing and its applications for simple drawing entities
3: To impart the knowledge of various types of solids and their projections in different position wrt principle planes
4: To teach the concept of sections of solids and their applications
5: To develop a clear understanding of the basic principles involved in three dimensional Engineering drawings.
6: To train the students for the extraction of multiple views from a solid model using AutoCAD

Course outcomes

After completing this course, the student will able to:

1) Get familiar to use the instruments to solve the engineering problem and draw various type of curves used in engineering
2) Understand and Implement Orthographic projections and draw projections of simple drawing entities such as points Lines, and Planes
3) Draw projections of different types of regular solids in various positions wrt principal planes of projection
4) Draw Sections of various Solids including Cylinders, cones, prisms and pyramids and draw the developments of these solids and their sections.
5) Construct Isometric Scale, Isometric Projections and Views and convert 3D views to 2D orthographic views
6) Understand from basic sketching through 2D and 3-D solid modeling using computer aided design (CAD) software

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**X**											**X**
CO2	**X**											**X**
CO3	**X**											**X**
CO4	**X**											**X**
CO5	**X**											**X**
CO6	**X**											X

UNIT – I

Introduction to Engineering Drawing: Drawing Instruments and their uses, types of lines, Lettering, Dimensioning-Terms & notations, placing of dimensions, general rules of dimensioning.

Curves used in Engineering Practice and their Constructions:

Conic Sections including Rectangular Hyperbola - General method, Cycloid and Involutes of circles

Scales: Reducing, Enlarging and Full Scales, types of scales, Construction of plain scales and diagonal scales only-simple problems

UNIT – II

Orthographic Projection: Principles of Projection – Methods of projection, First angle and third angle projections, Projections of Points, Projections of straight lines –line inclined to one plane and line inclined to both reference planes

UNIT –III

Projections of regular Planes: types of planes, plane inclined to one reference plane, Oblique planes

Projections of regular Solids: types of solids, Projections of: Prisms, Cylinders, Pyramids, Cones – simple position and axis inclined to one plane only

UNIT –IV

Sections and sectional views of Solids: Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

Development of Surfaces: Methods of development, Development of lateral Surfaces of Right Regular Solids – Prisms, Cylinders, Pyramids, Cones and their sections.

UNIT – V

Isometric Projection: Meaning, Isometric axes, lines and planes, Isometric Scale – Isometric drawing or View – Isometric drawing of planes and simple solids such as prisms, pyramids, cylinder, cone

UNIT –VI

Conversion of isometric views to orthographic views of simple objects.

(Demonstration only) Overview of Computer Graphics : Demonstrating features of the CAD software - The Menu System, Toolbars, , Dialog boxes and windows, Drawing entities - lines, circles, arcs etc and editing commands, Dimensioning of objects, 2 D drawings-simple exercises , 3D wire-frame and shaded solids- Commands, Boolean operations.

TextBook:

Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House (In First-angle Projection Method)

Reference Books:

1) Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

2) Agrawal B. &Agrawal C. M. (2012), Engineering Graphics, TMH Publication

3) AUTOCAD Software Theory and User Manuals

Syllabus for B. Tech. I Year I semester
Mechanical Engineering
PROBLEM SOLVING USING C

Code : 8FC01

L	T	P/D	C
3	0	0	3

Course Objectives

- To acquire problem solving skills
- To be able to develop flowcharts
- To understand structured programming concepts
- To be able to write programs in C Language

Course Outcomes:

After completion of this course student will learn

1. To formulate simple algorithms for arithmetic, logical problems and to translate the algorithms to programs(in C language)
2. To test and execute the programs and correct syntax and logical errors, to implement conditional branching, iteration and recursion
3. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
4. To use arrays, pointers and structures to formulate algorithms and programs.
5. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
6. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					**X**				**X**			
CO2					**X**				**X**			
CO3					**X**				**X**			
CO4					**X**				**X**			
CO5					**X**				**X**			
CO6					**X**				X			

UNIT I
Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples.
From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

UNIT II
History of C language, Characteristics of C language, Structure of C Language, C Tokens
Arithmetic expressions, Operator Precedence &**Associativity**
Conditional Branching and Loops
Writing and evaluation of conditionals and consequent branching and **Jumping Constructs Pretest and Post test**, Iteration and loops (3 lectures)

UNIT III
Function: Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference, **Storage Classes**
Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.
Macros – Definition, comparison with functions.

UNIT IV
Arrays: Arrays (1-D, 2-D), Character arrays **Ragged Arrays and Dynamic Arrays**
Basic Algorithms Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required) Quick sort or Merge sort.

UNIT V
Pointers Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notation of linked list (no implementation) **Dynamic Memory allocation Functions**.
Strings:String Handling Functions.

UNIT IV
Structure: Structures, Defining structures and Array of Structures,
Nested Structures enum, typedef
File handling (only if time is available, otherwise should be done as part of the lab)
File Handling Functions, File Modes, File Operations

Suggested Text Books

   (i)   Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

   (ii)   E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill Suggested

Reference Books

   (i)   Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,

           Prentice Hall of India

Syllabus for B. Tech. I Year I semester
Mechanical Engineering

ENGINEERING MECHANICS

Code :8B103

	L	T	P/D	C
	2	0	0	2

Course Objectives:

Understand the Concepts o1f Resultant and Equilibrium of System of Forces, Properties of surfaces and volumes and Dynamics of Particle and Rigid Bodies.

Course Outcomes: After completing the subject, students will be able:

- to analyse the system of forces, free body diagrams to solve problems dealing with forces in a plane or in spatial force systems.
- to analyse plane frame and solving using different methods like method of joints and method of sections
- to understand friction concept and applications like wedge friction.
- to understand the properties of surfaces and volumes and roll played by centroid and centre of gravity in different applications.
- to understand second moment of area and its application strength of materials in evaluating strength.
- to understand mass moment of inertia and its role in the analysis of rigid body rotation and kinematics and kinetics of particle & rigid body.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X											
CO2	X											
CO3	X											
CO4	X											
CO5	X											
CO6	X											

UNIT-I
Introductory Concepts: Fundamental Concepts & Axioms, System of Forces.
Resultant of Force System: Parallelogram law, Resolution of forces, Resultant of Coplanar ConcurrentForces, Component Forces in Space, Moment of Force, Principle of Moments, Moment of Couple, Resultant of Coplanar Non-concurrent Forces, Resultant of Spatial Concurrent and Non-concurrent Forces.
Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar systems, Spatial System, Spatial systems for Concurrent and Non-concurrent forces, Lami's Theorem, Equilibrium of Coplanar systems, Equilibrium of Spatial systems.

UNIT-II
Analysis of Structures: Construction of Trusses, Assumptions, Methods of Analysis – Method of Joints and Method of Sections.
Virtual Work: Concept of Virtual work method, Principle and application of Virtual work to simple systems.

UNIT-III
Friction: Theory of friction, Laws of Friction, Types of Friction, Limiting Friction, Sliding, Rolling and Pivot friction, Static and Dynamic friction, Motion of Bodies, Wedge friction, Screw Jack and Differential Screw Jack.
Centroid & Centre of Gravity: Centroid of areas and lines, Centroids determined by Integration, Centroids of composite areas and lines, Theorem of Pappus, Centre of gravity of flat plate, Centre of gravity of simple bodies from basic principles, centre of gravity of composite bodies.

UNIT-IV
Area Moment of Inertia: Definition, Polar moment of inertia, Radius of gyration, Transfer Formula for Moment of Inertia, Moment of Inertia by integration, Moment of Inertia for Composite Areas, Product of Inertia, Transfer Formula for Product of Inertia.
Mass Moment of Inertia: Radius of Gyration, Mass moment of Inertia by integration, Transfer Formula for Mass Moment of Inertia, Mass Moment of Inertia of composite bodies.

UNIT-V
Kinematics of Particle: Rectilinear and Curvilinear translation, Rectangular components of curvilinear translation, Normal & Tangential components of acceleration.
Kinematics of Rigid Bodies: Types of rigid bodies motions, Angular motion–Fixed Axis Rotation, Centroidal Rotation and Non–centroidal Rotation.
Kinetics: Analysis as Particle and Rigid Body in translation Fixed Axis Rotation.

UNIT - VI
Work - Energy Method: Work – Energy Equation for translation, Work -Energy applied to particle motion, work-Energy applied to connected systems, Work -Energy applied is fixed axis rotation.
Impulse – Momentum Method: Linear Impulse Momentum, Conservation of linear momentum, Elastic Impact and types of Impacts, Coefficient of Restitution.

TEXT BOOKS:
1. K. Vijay Kumar Reddy and J. Suresh Kumar, Singer's Engineering Mechanics, BS Publications, Hyderabad, 2011
2. Engineering Mechanics by S.S.Bhavikatti J.G.Rajasekharappa.

REFERENCE BOOKS:
1. Engineering Mechanics by Timoshenko & Young
2. Irving H.Shames , Engineering Mechanics.
3. Kurmi R.S. Engineering Mechanics S.Chand & Co.
4. Engineering Mechanics by Meriam and Kraize
5. Engineering Mechanics by K.L.Kumar / Tata McGraw Hill.

Syllabus for B. Tech. I Year I semester
Mechanical Engineering

WRITTEN COMMUNICATION SKILLS

Code :8HC02

	L	**T**	**P/D**	**C**
	1	0	0	1

Course Objectives:

To enable students to:
- upgrade their knowledge of basic writing skills, writing cohesive paragraphs and effective letters.
- differentiate between confusing words, learn correct spellings and have a sound grip over the use of phrasal verbs.
- master the techniques of reading passages and comprehend them.
- understand the nuances of technical communication and apply it in their academic and professional career.
- acquaint themselves with the concept of soft skills, having the right attitude towards their education, career and life in general.
  learn the importance of building a strong resume.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								**X**	**X**	**X**		**X**
CO2								**X**	**X**	**X**		**X**
CO3								**X**	**X**	**X**		**X**
CO4								**X**	**X**	**X**		**X**
CO5								**X**	**X**	**X**		**X**
CO6								**X**	**X**	**X**		**X**

UNIT I

1. Elements of effective writing skills

1.1 Use of appropriate words and phrases
1.2 Sentence structures
1.3 Vocabulary: Synonyms – Antonyms
Homophones, Homonyms, Homographs, words often confused, One - word substitutes,
Idioms and Phrases
1.4 Avoid discriminatory writing

UNIT II

2.Professional writing skills

2.1 Paragraph writing
2.2 Letter writing (language to be used in a formal letter)
2.3 Leave letter, letter of apology, complaint letters, enquiry letters with replies
2.4 e-correspondence

UNIT III

3. Reading Comprehension

3.1 Prediction techniques, Skimming and Scanning
3.2 Literal Comprehension
3.3 Evaluative Comprehension
3.4 Inferential Comprehension

UNIT IV

4. Report Writing
4.1 Significance, types, steps, formatsof a report
4.2 Detailed analysis of manuscript of a report
4.3 Language and structure to be used in a formal report
4.4 model reports – assignments

UNIT V

5. Resume Writing& Cover Letter
5.1 Types, purpose and design of Résumé
5.2Differences among Bio-data, Curriculum Vitaé and Résumé
5.3 Methods to build a winning Résumé
5.4 Writing an effective Cover Letter

UNIT VI

6. Technical Communication and Soft Skills

6.1 Technical vocabulary
6.2 Review of technical articles
6.3 Technical research paper writing
6.4 Attitude Vs Behavior in professional circles

Text book :compiled by the faculty of English (for internal circulation only).
Reference books: * English for Professionals by S.S.Prabhakar Rao   * English for Technical Communication by K.R.Lakshminarayana

- English for Business Communication by Dr.T.Farhathullah
- Professional Communication by Alok Jain, Pravin S.R.Bhatia and A.M.Sheikh
- Business Communication, Principles to Practice- Monipally.
- Advanced Technical Communication: Kavita Tyagi and Padma Mistri

Syllabus for B. Tech. I Year I semester

Mechanical Engineering
APPLIED PHYSICS LAB

Code:

L	**T**	**P/D**	**C**
0	0	2	1

<u>**Course Objectives**</u>

- To explain about magnetic induction, Biot-Savart principle – Magnetism.
- To study the LED characteristics and forward resistance – Semiconductor devices.
- Explaining about the electrical resonance by using the LCR circuit – Electrical /resonance.
- To know the time constant of RC circuit - Electrical.
- Explain about the acceleration due to gravity and radius of gyration and periodic vibrations-Compound Pendulum – Vibrations.
- To understand the rigidity modulus-Torsional pendulum – Vibrations.
- Discuss the dispersive power of prism-minimum deviation method – Light.
- Explain the formation of Newton's rings-interference – Light.
- Discussion of diffraction pattern using the grating – LASER.
- To understand about the ionizing radiation by using the Geiger–Muller counter – Nuclear energy.
- To understand the transverse laws of vibrations-Sonometer – Resonance.
- To explain the electrically vibrating the tuning fork by using Melde's experiments – Electromagnetism.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**X**		**X**						**X**			
CO2	**X**		**X**						**X**			
CO3	**X**		**X**						**X**			
CO4	**X**		**X**						**X**			
CO5	**X**		**X**						**X**			
CO6	**X**		X						X			

<u>**List of Experiments**</u>
1. Determination of magnetic induction flux density along the axis of a current carrying circular coil using Stewart and Gee's experiment.
2. Studying the characteristics and calculating the forward resistance of a LED.
3. Study of series and parallel resonance of an LCR circuit.
4. Determination of time constant of an RC-circuit
5. Determination of acceleration due to gravity and radius of gyration using compound pendulum.
6. Determination of rigidity modulus of a given wire material using the Torsional pendulum.
7. Calculation of dispersive power of a given material of prism by using

spectrometer in minimum deviation method.

8. Determination of wavelength of a monochromatic light source by using Newton's rings experiment.

9. Determination of wavelength of a given laser source of light by using diffraction grating in normal incidence method.

10. Studying the characteristics of Geiger–Muller counter and verifying the inverse square law.

11. Verification the transverse laws of stretched strings by using the Sonometer.

12. Determination of frequency of an electrically vibrating tuning fork using the Melde's experiment.

NOTE: Any **TEN** of the above experiments are to be conducted.

Course Outcomes

After completing the experiment, students are able to

- Understand and search to apply the fundamentals of magnetic induction, Ampere's law, Oersted's law and the Biot-Savart law.
- Analyze the difference between normal diode, LED, forward bias, reverse bias, I-V characteristics, direct and indirect band gap semiconductors.
- Analyze the LCR circuit combination, parallel, series electrical resonance, inductance, reactance, capacitance and electrical and electronic fundamentals.
- Characterize the RC network, time constant, capacitor functioning and its application.
- Analyze the concept and application parts of radius of gyration and periodic vibrations.
- Summarize the fundamentals of modulus-types, stress, strain, elasticity, plasticity and Hook's law.
- Know about the light properties-dispersion, prism, spectrometer and minimum deviation arrangement.
- Understand the concepts of interference, conditions, formation of Newton's rings-reason.
- Recognize the difference between the interference and diffraction, grating, laser characteristics.
- Understand the concept of radiation, ionizing radiation, radiological protection and inverse square law.
- Demonstrate the resonance phenomenon and verify the transverse laws of stretched strings by using Sonometer.
- Describe the types of waves like longitudinal, transverse, stationary and progressive waves. Electromagnetic induction and its applications.

Syllabus for B. Tech. I Year I semester
Mechanical Engineering
WRITTEN COMMUNICATION LAB

Code: 8HC62

	L	T	P/D	C
	0	0	2	1

Course Objectives:
To enable students to:

- upgrade their knowledge of basic writing skills, writing cohesive paragraphs and effective letters.
- differentiate between confusing words, learn correct spellings and have a sound grip over the use of phrasal verbs.
- master the techniques of reading passages and comprehend them.
- understand the nuances of technical communication and apply it in their academic and professional career.
- acquaint themselves with the concept of soft skills, having the right attitude towards their education, career and life in general.
      learn the importance of building a strong resume.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									**X**	**X**		
CO2									**X**	**X**		
CO3									**X**	**X**		
CO4									**X**	**X**		
CO5									**X**	**X**		
CO6									X	X		

UNIT I
1. Elements of effective writing skills
Exercises on
- Words often Confused
- Synonyms – Antonyms
- Identifying Homophones, Homonyms, Homographs
- words often confused
- One - word substitutes
Idioms and Phrases

UNIT II

2.Professional writing skills

Practice exercises on
- Paragraph Writing using hints/guided Paragraphs
- Writing different types of letters
- Learning e-correspondence

UNIT III

3. Reading Comprehension

Practice sessions on
- Using passages for skimming and scanning

Reading Comprehension using different techniques

UNIT IV

4. Report Writing
- Practice Writing reports and reviewing technical Articles

formal expressions, technical vocabulary, active voice and passive voice, introduction, body and conclusion of a report

UNIT V

5. Resume Writing& Cover Letter
Practice exercises on
- Resume Building

Drafting cover letters

UNIT VI

6. Technical Communication and Soft Skills

Practice exercises on
- Technical vocabulary
- Writing articles and research papers
- Activities based on Soft skills

Developing attitude and behavior

Text book :compiled by the faculty of English (for internal circulation only).
Reference books: * English for Professionals by S.S.Prabhakar Rao   * English for Technical Communication by K.R.Lakshminarayana
- English for Business Communication by Dr.T.Farhathullah
- Professional Communication by Alok Jain, Pravin S.R.Bhatia and A.M.Sheikh
- Business Communication, Principles to Practice- Monipally.
- Advanced Technical Communication: Kavita Tyagi and Padma Mistri

Syllabus for B. Tech. I Year I semester
Mechanical Engineering
Problem Solving using C Lab

Code: 8FC61

L	T	P/D	C
0	0	2	1

Course Objectives:
To be able to understand the fundamentals of programming in C Language
To be able to write, compile and debug programs in C
To be able to formulate problems and implement in C.
To be able to effectively choose programming components
To solve computing problems in real-world.

Course Outcomes:
After completion of this course student will learn
1. To formulate the algorithms for simple problems
2. To translate given algorithms to a working and correct program
3. To be able to correct syntax errors as reported by the compilers
4. To be able to identify and correct logical errors encountered at run time
5. To be able to write iterative as well as recursive programs
6. To be able to represent data in arrays, strings and structures and manipulate them through a program
7. To be able to declare pointers of different types and use them in defining self referential structures.
8. To be able to create, read and write to and from simple text files.

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					**X**				**X**			
CO2					**X**				**X**			
CO3					**X**				**X**			
CO4					**X**				**X**			
CO5					**X**				**X**			
CO6					X				X			

1. **Unit I (Cycle 1)**
   1. Write an algorithm for converting a given Celsius temperature to its equivalent Fahrenheit temperature and draw a flowchart.
   2. Write an algorithm to find the largest of three given numbers and draw a flowchart.
   3. Write an algorithm and draw a flowchart for finding the roots and nature of roots of a quadratic equation, given its coefficients.
   4. Write an algorithm and flowchart for finding the first n Fibonacci numbers, give n.

2. Unit II (Cycle 2)
1. Write an algorithm, flowchart, and C program for:
2. Finding the area and circumference of a circle of given radius.
3. Finding the volume of a sphere of given radius.
4. Finding the lateral surface area of a right circular cone of given base radius and height.
5. Finding selling price of an item, given its cost price and profit percent.
6. Finding the interest on a given principal for a given period of time at a given rate of per year.
7. Write a C program to display all the sizes of data types in C.
8. Write a C program to display a given decimal integer into an equivalent octal number and hexadecimal number using %o and %x in printf function.

3. Unit II (Cycle 3)
1. Write a C program to find the roots and nature of the roots of a quadratic equation, given its coefficients.
2. Write a C program for finding the largest of three given numbers.
3. A salesman gets a commission of 5% on the sales he makes if his sales is below Rs.5000/- and a commission of 8% on the sales that exceeds Rs.5000/- together with Rs.250/-. Write an algorithm or a flowchart and develop C program for computing the commission of the salesman, given his sales.
4. Write a C Program to demonstrate Marcos.

4. Unit III (Cycle 4)
1. Write three C programs to print a multiplication table for a given number using while, do-while, and for loops.
2. Write a C program to compute the sum of:
3. $1+x+x^2+x^3+\ldots\ldots\ldots+x^n$, given x and n.
4. $1! + 2! + 3! + \ldots + n!$, given n.
5. $1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10! + \ldots$ to n terms where the nth term becomes less than 0.0001.

5. Unit III (Cycle 5)
1. Write a C program in the menu driven style to perform the operations +, -, *, /, % between two given integers.
2. Write a C program to find the largest and the least of some numbers given by the user.
3. Write a C program to find the sum of the digits of a positive integer.

6. Unit III (Cycle 6)
1. Write C functions for the following:
a) A function that takes an integer n as argument and returns 1 if it is a prime number and 0 otherwise.
b) A function that takes a real number x and a positive integer n as arguments and returns x^n.
c) A function that takes a positive integer n as an argument and returns the nth Fibonacci number.

2. Using recursion write C functions for the following:

      a) Factorial of a non-negative integer n.
      b) Number of combinations of n things taken r at a time.
      c) Greatest Common Divisor of two integers.
      d) Least Common Multiple of two integers.

7. Unit III (Cycle 7)
      a) Write a menu driven style program to compute the above functions (cycle 6) on the choice of the function given by the user.
      b) Define macros for the following and use them to find sum of the squares of the minimum and maximum of two given numbers.
          a) Larger of two numbers.
          b) Smaller of two numbers.
          c) Sum of the squares of two numbers.
      c) Write a program to generate Pascal's triangle.
      d) Write a program to count the number of letters, words, and lines in a given text.

8. Unit IV (Cycle 8)
    1. Write a program to store the numbers given by the user in an array, and then to find the

      mean, deviations of the given values from the mean, and variance.
    2. Write a C program to initially store user given numbers in an array, display them and then to insert a given number at a given location and to delete a number at a given location.
    3. Write a program to store user given numbers in an array and find the locations of minimum and maximum values in the array and swap them and display the resulting array.

9. Unit IV (Cycle 9)
    1. Write a C program to implement the operations of matrices – addition, subtraction, multiplication.
    2. Write a program to find whether a given matrix is symmetric, lower triangular, upper triangular, diagonal, scalar, or unit matrix.

10. Unit V (Cycle 10)
    1. Write a function to swap two numbers.
    2. Write a function to compute area and circumference of a circle, having area and circumference as pointer arguments and radius as an ordinary argument.

11. Unit VI (Cycle 11)
    1. Define a structure for complex number. Write functions on complex numbers (addition, subtraction, absolute value, multiplication, division, complex conjugate) and implement them in a menu driven style.
    2. Define a structure point. Write a program to find the distance between two points.
    3. Define a structure student having members roll no., name, class, section, marks. Create an array of 10 students give the data and find the average marks, section-wise.

12. Unit VI (Cycle 12)

1. Write a program to:
   a) Create a file by the name given by the user or by command line argument and add the text given by the user to that file.
   b) Open the file created above and display the contents of the file.
   c) Copy a file into some other file, file names given by the user or by command line arguments.
   d) Append a user mentioned file to another file.
   e) Reverse the first n characters of a file.

Syllabus for B. Tech. I Year I semester

Mechanical Engineering
COMPREHENSIVE TEST AND VIVA-VOCE-I

Code : 8B191

L	T	P/D	C
1	0	0	1

Course Objective :

Evaluate, comprehend and assess of the concepts and the knowledge gained in the core courses of the first and the second year.

Course Outcome :
1. Comprehend the concepts in the core and elective courses.
2. Exhibit technical knowlegde to face interviews.
3. Exhibit life long Learning skills for higher education and to persue Professional practice.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1		X	X				X	X			X	X
CO2		X	X				X	X			X	X
CO3		X	X				X	X			X	X
CO4		X	X				X	X			X	X
CO5		X	X				X	X			X	X
CO6		X	X				X	X			X	X

Comprehensive Test and Viva Voce	**The subjects studied in the Semester concerned related to branches concerned and for placements**
B.Tech I year I semester	I semester
B.Tech I year II semester	I and II semester
B.Tech II year I semester	I, II and III semester
B.Tech II year II semester	I, II, III and IV semester
B.Tech III year I semester	I, II, IIII, IV and V semester
B.Tech III year II semester	I, II, IIII, IV, V and VI semester
B.Tech IV year I semester	I, II, IIII, IV, V, VI and VII semester

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

Allocation of marks :

*Comprehensive Test   :   70 marks

**Viva Voce   : 30 marks

Total   : 100 marks

*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 20 marks.

End Semester Examination for Comprehensive Test will be taken for 50 marks.

Total marks for Comprehensive Test will be 70.

**Average of best two of Mid Tests of Mid – I, Mid – II and Mid - III for Viva Voce will be taken for 10 marks.

End Semester Examination for Comprehensive Viva Voce shall be evaluated for 20 marks.

The total for Viva Voce will be 30.

Thus the total sessional marks in this subject of Comprehensive Test and Viva Voce will be : 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

Syllabus for B. Tech. I Year I semester
Mechanical Engineering
TECHNICAL SEMINAR I

Code : 8B185

L	T	P/D	C
0	0	2	1

Course Objective :

Develop ability to be a public speaker. Learn the importance of delivering seminars for demonstrating oratory and develop interview facing skills.

Course Outcomes: After completing this course, the student will be able to

1. Identify current general, political and technology related topics.
2. Arrange and present seminar in a effective manner
3. Collect, survey and organize content in presentable manner
4. Demonstrate oratory skills with the aid of Power Point Presentations
5. Exhibit interview facing skills and team leading qualities

Technical Seminar evaluation

There shall be a technical seminar evaluated for 100 marks each from I year I Semester to II year II Semester. The evaluation is purely internal and will be as follows:

Sl.No	Description	Marks
1	Literature survey, topic and content	10
2	Presentation including PPT	10
3	Seminar Notes	05
4	Interaction with audience after presentation	05
5	Final Report 3 copies	10
6	Class room participation	05
7	Punctuality in giving seminar as per Scheduled time and date	10
8	Mid Semester Viva (on the seminar topics completed up to the end of 9th week	15
9	End Semester Viva	30
	Total	**100 Marks**

6. Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.

Syllabus for B. Tech. I Year I semester
Mechanical Engineering
<u>**Orientation Course**</u>

Code : 8HC18

	L	**T**	**P/D**	**C**
	1	**0**	**0**	**0**

Unit - I

Universal Human Values

Introduction -Self – Exploration, Basic human aspirations, Need for a holistic perspective, Role of Education, Understanding Happiness, Understanding the human being – Self and Body.

Unit - II

Universal Human Values

Relationships-Understanding Relationship –Trust and Respect. Harmony in the Society, Natural Environment, Participation in nature Harmony in nature/existence.

Unit - III

Improving Learning Capabilities-Basic Skills of Learning

Principles of Learning, Study Skills & E-Learning,Listening Skills,Effective Reading and Reviewing,Reading Comprehension, Textbook Reading Strategies, Test taking strategies, Introduction to Soft Skills and Employability Skills, Interpersonal skills.

Unit - IV

Improving Learning Capabilities-Personality Development and Life Skills

Goal Setting, Motivation, Time Management, Positive Attitude, Decision Making, Building Self-confidence, Attributes of a Good Personality, Memory Management, Characteristics of a successful student, Responsibilities of Students in shaping themselves, Morals, Ethics & Values, Difference between Studying in a Professional College and High School / Junior College

Unit - V

Literature , Proficiency Modules(PM) in English, Health, Yoga & Diet, Co-Curricular & Extracurricular activities

Literature -History of human civilization, Indian civilization, Indus valley civilization and culture, history of religions, the basic tenets of Christianity, Islam, Hinduism, Buddhism, Jainism, Sikkim and Judaism, Indian culture and values.

Proficiency Modules in English -Strategies to improve proficiency in English skills(L/S/R/W), Exercises based on Remedial grammar, Exercises on Remedial Vocabulary

Health - Dimensions of Health, Basic activities of daily living, Instrumental activities of daily living, Types of Health, Factors affecting health

Yoga- Introduction to Yoga, Kinds of Yoga, Pranayama and Dhyana (Meditation)

Diet- Balanced Diet, Components of Diet, Health Eating Pyramid.

Co-curricular andExtra Curricular activities

Unit - VI

**Lectures by Eminent Persons, Research, Innovation & Patents and
Local Visit**

Lectures by Eminent Persons on Science, Technology & Environment,

Innovations R&D and Entrepreneurship-Sreenidhi HUB, Basics of Innovation, Entrepreneurship and Intellectual Property Rights (IPR)

Local Visit to Village and City including Hi-tech City.

Feedback on last but one day of Orientation Course

Text Books:

1. RR Gaur, R Sangal, GP Bangaria, 2009, A Foundation Course in Value Education (English).

Reference Books:

1. Yoga, Food and Health (by Swami Gurupremananda Saraswati)

Syllabus for B. Tech. I Year II semester
Mechanical Engineering
ENGINEERING CHEMISTRY

Code: 8HC04

L	T	P/D	C
3	1	0	4

Course Objectives:

1. To understand microscopic chemistry in terms of atomic and molecular orbitals
2. To learn the preparation and applications of commercial and conducting polymers and lubricant materials
3. To learn the industrial problems caused by water and municipal water treatment
4. To acquire knowledge about different types of batteries and their working mechanism
5. To develop the concepts and types of corrosion and the factors influence corrosion
6. To understand the control methods and protective coatings for metals and other surfaces

Course Outcomes

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

1. Understand and analyse microscopic chemistry in terms of atomic orbitals, molecular orbitals and intermolecular forces.
2. Identify and differentiate polymers, thermoplastic, thermosetting plastics and various lubricants.
3. Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.
4. Understand and interpret the important fundamental concepts of electrochemistry and solve the problems related to batteries.
5. Differentiate the types of corrosion and methods used to prevent the corrosion, surface coating techniques

Learn and implement synthesis of drug molecules and learn fundamentals of analytical techniques like electronic, vibrational and rotational spectroscopy.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X					X	X					
CO2	X	X	X	X								
CO3	X					X	X					
CO4	X					X						
CO5	X					X						
CO6	X	X	X									

UNIT - I

Atomic and molecular structure (6L)

Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics (F_2, Cl_2CO, NO). Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT - II

Plastics and Lubricants(8L)

Plastics: Polymerization-Addition and Condensation polymerization, Plastics – Thermosetting and Thermoplastics, preparation, properties and **engineering applications of plastics:** PVC, Teflon, Bakelite. Fibers: Nylon 6,6 and Dacron.

Rubbers – natural and artificial rubber, vulcanization of natural rubber, Buna-S, Buna-N and their **engineering applications.**Fabricated Reinforcing Polymers**- engineering applications**

Lubricants: Definition, classification and function of lubricants, Types of lubrication and mechanisms – Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants – Viscosity, flash and fire point, cloud and pour point and acid value.**Engineering applications.**

UNIT - III

Water Technology (8L)

(a) **Introduction: -** Hardness of water – types of hardness (temporary and permanent), calculation of hardness- Numerical problems. Estimation of hardness of water by EDTA Method.
(b) **Water for Industrial purpose:** Food, sugar, textile, paper and pharma industries, water for steam making characteristics of boiler feed water, boiler troubles- scale and sludge & Carry over (priming &foaming), boiler corrosion, caustic embrittlement.
(c) **Water Treatment:** Internal conditioning- phosphate, carbonate & calgon conditioning. External Treatment: Ion-exchange process. Desalination-reverse osmosis. Municipal water treatment-sedimentation, coagulation, filtration, disinfection-chlorination, ozonization. **Engineering applications: Methodology and working of mineral water plant for drinking purpose.**

UNIT - IV

Electrochemistry (8L)

Conductance – conductors (metallic and electrolytic), types of conductance – specific, equivalent and molar conductance – effect of dilution on conductance.

Free energy and emf, cell potentials, electrode potential (oxidation and reduction). Types of electrodes - redox electrode (quinhydrode electrode), metal – metal insoluble salt electrode and Ion selective electrode. Cell notation and cell reaction –Nernst equation and applications. **Engineering Applications.**

 Batteries : Types of batteries

(a)   Primary batteries – Lechalanche cell (dry cell), Lithium cell
(b)   Secondary batteries(Accumulators) – Lead acid battery, Lithium-ion battery
(c)   Fuel cells- H_2 – O_2 fuel cell and MeOH-O_2 fuel cell-advantages and applications.
Engineering applications – future water powered car, Hydrogen production and storage.

UNIT - V

Corrosion and Surface treatment(8L)

Corrosion – basic concepts –types of corrosion, chemical, electrochemical corrosion
(absorption of O_2 and evolution of H_2)-factors affecting the rate of corrosion.
Cathodic protection – sacrificial anodic protection and impressed current cathodic protection method.

Surface treatment

Mechanical surface treatment and coatings, casehardening and surface coating, thermal spraying, vapour deposition, Ion implantation, Diffusion coating.

Methods of metallic coatings-hot dipping (tinning and galvanizing), metal cladding (Al cladding), electroplating (copper plating) and electroless plating (nickel plating), electroforming, ceramic, organic and diamond coating

UNIT-VI

Organic reactions and drug molecules(5L)

Introduction: reactions involving substitution (S_N1, S_N2) addition to double bond(C=C), elimination (E^1 and E^2), oxidation (using $KMnO_4$, CrO_3), reduction (Hydrogenation by Ni/H_2, Pd/C)

Drugs: Definition, classification structure and applications of commonly used drug molecules- paracetamol, aspirin, ibuprofen and diphenhydramine (Benadryl)

Principles of spectroscopy and selection rules: Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules-**Applications**.

TEXT BOOKS:
1. Engineering Chemistry: PK Jain & MK Jain, Dhanapathrai Publications (2018)
2. Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020)

REFERENCE BOOKS:
1. Textbook of Engineering Chemistry: Jaya Shree Anireddy, Wiley Publications (2019)
2. Engineering Chemistry: by & B.Rama Devi, Prsanta Rath & Ch. Venkata Ramana Reddy, Cengage Publications (2018)
3. Engineering Chemistry: Shashi Chawla, Dhanapathrai Publications (2019)
4. Textbook of Engineering Chemistry: SS Dara, SS Umare S. Chand Publications (2004)

Syllabus for B. Tech. I Year II semester
Mechanical Engineering
DIFFERENTIAL EQUATIONS & INTEGRAL CALCULUS

Code:8HC12

L	T	P/D	C
2	1	0	3

Course Objectives: To make the students to understand and expected to learn
1. *Various analytical methods to solve first order and first degree ordinary differential equations.*
2. *Methods to solve higher order ordinary differential equations.*
3. *Formation of partial differential equation and to solve linear and non-linear differential equations.*
4. *Solve higer order partial differential equations with method of separation of variables particularly wave and heat equations.*
5. *Solve the problems of multiple integration and apply these concepts for finding the parameters like surface area, volume, center of mass and centre of gravity.*
6 *Solve line, surface and volume integral problems*

Course Outcomes: After the course completion the students will be able to
(i) *Find the solutions of first order first degree and not of first degree differential equations and their applications such as Newton's law of cooling, Natural growth and decay.*
(ii) *Identify and solve higher order ordinary differential equations with constant coefficients using some standard methods and also their applications in vibration of motion.*
(iii) *Solve first order partial differential equations.*
(iv) *Solve the problems of Heat and wave equations.*
(v) *Solve the problems of multipleintegration and apply these concepts for finding the parameters like surface area, volume, center of mass and centre of gravity.*
(vi) *Solve the problems on surface area, volume etc. using Greens, Gauss-divergence and Stokes theorem.*

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X	X										
CO2			X									
CO3				X						X		
CO4						X						
CO5									X			
CO6											X	

UNIT - I: First order ordinary differential equations: (10 L)

Exact, equations reduced to exact; linear and Bernoulli's equations; Orthogonal Trajectories, Newton's Law of Cooling, Law of natural Growth/Decay.

UNIT - III: Ordinary differential equations of higher order: (10 L)

Higher order linear differential equations with constant coefficients-Standard types of finding P.I, method of variation of parameters, Cauchy-Euler equation. Solution to the problems of vibration of motion.

UNIT– III: First Order Partial Differential Equations:(10L)

Formation of Partial Differential Equations by Elimination of Arbitrary Constants and Arbitrary Functions. Solutions to First order Linear and Non-linear Equations-Standard Forms, Equations Reducible to Standard Forms.

(PTO)

UNIT-VI: Higher Order Partial Differential Equations: (10L)

Classification of partial differential equations. Method of Separation of Variables. Initial and Boundary conditions, Solutions of One dimensional wave, Heat equations and Laplacian equation in Cartesian form.

UNIT - V: Multiple Integrals   (10L)

Double integrals, change of order of integration, change of variables (Cartesian to polar), Triple integrals (Cartesian), Applications in finding areas and volumes.

UNIT - IV: Vector Integration (10 L)

Line integrals, Surface integrals, volume integrals, Green, Gauss divergence and Stokes theorems (without proofs).

Text Books:
1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

Reference Books:
- (i) B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
- (ii) Engineering Mathematics, Srimanta Pal, Oxford University press.
- (iii) G. B. Thomas and R. L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- (iv) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

Syllabus for B. Tech. I Year II semester
Mechanical Engineering
BASIC MATHEMATICS, ANALYSIS AND REASONING

L	T	P/D	C
2	1	0	3

Code: 8HC08

Pre Requisites: Nil

Course objectives: *By learning Quantitative Aptitude and Logical Reasoning, a student can answergeneral problems in his everyday life within a short time with the help of quicker methods. Also it improves thecertain skills of a student such as numerical and logical ability, mental capacityand also in sharpening minds. This course is very much useful for competitive examinations.*

Course Outcomes: *After completion of this course students will be able to solve, the questions given on testing divisibility, HCF and LCM,averages, percentage and profit and loss, ratio and proportion simple and compound interest, time and work, time and distance and etc. Also able to solve the questions given on series completion and analogy, odd one out and coding and decoding,blood relations, directions and Arithmetical reasoning, Venn diagrams,cubes and dice, clocks and calendar.*

Mapping of Course Outcomes with Program Outcomes:

	P01	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**X**	**X**										
CO2			**X**									
CO3				**X**						**X**		
CO4						**X**						
CO5									**X**			
CO6											X	

Syllabus

Unit I: Number System: Test for Divisibility, Test of prime number, Division and Remainders – HCF and LCM of Numbers – Fractions and Decimals-Vedic Mathematics-Average-Problems on Ages- Problems on Numbers- Ratio and Proportion.

Unit II: Percentage – Profit, Loss and Discount – Partnership and Share-Simple Interest - Compound Interest. Time and Work- Pipes and Cisterns-Time and Distance- Problems on Trains- Boats and Streams, Allegation or Mixtures.

Unit III: Mensuration: Area of Plane Figures, Volume and Surface Area of Solid Figures.
Data Interpretation: Tabulation, Bar Graphs, Pie Charts, Line Graphs-Logarithms-Permutation and Combination-Probability-Linear Equations-Quadratic Equations-Surds and Indices-Coordinate geometry.

Unit–IV: Series Completion: Number Series, Alphabet Series, Alpha – Numeric Series.
Analogy: Completing the Analogous Pair, Simple Analogy, Choosing the Analogous pair, Double Analogy, Word Analogy, and Number Analogy.
Classification: Word Classification, Number Classification and Letter Classification.
Coding & Decoding: Letter Coding, Number Coding, Matrix Coding, Substitution, Deciphering Message Word Codes, Jumbled Coding. Crypt arithmetic-Inequalities-Input Output Tracing

Unit–V: Blood Relations– Direction sense test- Number, Ranking & Time Sequence Test – Mathematical Operations-Arithmetical Reasoning. Puzzle Test: Classification Type Questions, Seating Arrangements, Comparison Type Questions, Sequential Order of Things, Selection Based on Given Conditions, Family Based Puzzles, Jumbled Problems.

Unit –VI: Logical Venn Diagrams –Cubes and Dice – Analytical Reasoning-Assertions and Reason–Logical Deductions-Syllogism -Statement and Arguments-Statement and Conclusions-Clocks & Calendar-Data Sufficiency.

Text Books:

1. Quantitative Aptitude by R.S.Agarwal
2. Verbal and Non Verbal Reasoning by R.S.Agarwal.

Syllabus for B. Tech. I Year II semester
Mechanical Engineering
DATA STRUCTURE AND C++

Code:8EC01

L	T	P/D	C
3	**0**	**0**	**3**

Course Objective:

1. Understand the concepts of Abstract data Type, linear data structures such as stacks, queues and lists and their applications.
2. Comprehend different nonlinear data structures such as trees and graphs and analyze their time complexities.
3. Understand object-oriented programming and advanced C++ concepts and be able to write programs with C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, Templates etc.

Course Outcomes:

1. Explain Abstract data type, stack and Queues with their applications
2. Write programs on Singly linked lists, doubly linked lists, Circular list and explain their operations.
3. Explain concepts of Trees, AVL Trees and Graphs with examples and applications.
4. Describe and solve problems of searching and sorting and evaluate the time complexity of each algorithm.
5. Explain concepts of OOPs and implement programs using objects, classes, constructors and destructors.
6. Explain and apply concepts of oops, write programs implementing functions, operator overloading and inheritance.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					X				X			
CO2					X				X			
CO3					X				X			
CO4					X				X			
CO5					X				X			
CO6					X				X			

UNIT I:
Introduction to data structures: Abstract data type (ADT), Stacks, Queues and Circular queues and their implementation with arrays.
Applications of Stack: infix to post fix conversion, postfix expression evaluation.
Applications of Queues.

UNIT II:
Singly linked lists, Advantages of Linked lists over Arrays, Doubly linked lists, Circular list and their operations, representing stacks and queues with Linked lists.

UNIT III:
Trees- Binary trees, terminology, representation, traversals. AVL trees, AVL tree operations: Insertion, deletion and searching. Graphs- terminology, representation, graph traversals (DFS and BFS).

UNIT IV:
Searching –Searching: Linear and binary search methods.
Sorting: Quick sort, Merge sort.

Performance analysis of Searching and Sorting Algorithms. Heaps: Introduction, Min Heap, Max Heap, Operations on Heaps, Heap Sort. Hashing: Hash Table, Hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing.

UNIT V:
Introduction to C++ programming-object oriented programming concepts, Structured Vs OOP. Classes and objects-class definition, Objects, class scope and accessing members, Constructors-default constructor, parameterized constructor, copy constructor. Destructor.

UNIT VI:
Static class members, this pointer, friend functions, Dynamic memory management with operators new and delete. Overloading-function overloading, Operator overloading, restrictions on operator overloading, overloading unary and binary operators, templates, inheritance: single, multiple and multi level inheritance.

TEXT BOOKS:
Data Structures and C++ by Reema Thareja
Data Structure through C by Yashavant Kanetkar.
The complete reference C++ By HerbSchildt.

REFERENCES:
1. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft. Data Structures and Algorithms. Addison Wesley, 1983.
2. Data Structures using c Aaron M.Tenenbaum , Yedidyah Langsam,Moshe J Augenstein.
3. Introduction to Data Structures in C By Kamtane
4. Data Structures, A pseudocode Approach with C by Richard F. Gilberg and Behrouz A. Forouzan.

Syllabus for B. Tech. I Year II semester
Mechanical Engineering
ORAL COMMUNICATION SKILLS

Code: 8HC01

	L	T	P/D	C
	1	**0**	**0**	**1**

Course Objectives:
To enable students to:
- enhance oral communication skills
- develop the skill of speaking effectively
- get introduced basics of soft skills and enhance their confidence levels and etiquette
- learn to make formal presentations both online and offline.
- Improve their reading skills by applying different strategies of reading
    understand the nuances and learn the art of group discussion

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										X		
CO2										X		
CO3										X		
CO4										X		
CO5										X		
CO6										X		

Unit: 1
1. Introduction to Oral Communication Skills
1.1. Importance and need for general and technical Communication
1.2 Barriers to effective communication
1.3 Self introduction, introducing and greeting others
 Techniques to enrich vocabulary power

UNIT: 2
2. Effective Speaking Skills
2.1 Use of cohesive devices
2.2 Achieving confidence, clarity and fluency in speaking
2.3 Body language: eye contact, facial expression, gestures, posture and body movements
2.4 Speech etiquette

UNIT: 3
3. Activities on listening and speaking
3.1 Soft Skills
3.2 Listening to structured talks
3.3 Strategies to improve speaking skills
3.4 JAM sessions

UNIT:4
4. Presentation Skills:
4.1 Nature and importance of presentation skills
4.2 Planning, preparing and organizing a presentation
4.3 Making an effective online presentation
4.4 Storytelling: Nuances of delivery

UNIT:5
5. Reading Comprehension
55.1 Reading comprehension Techniques
5.2 Study Skills
5.3 Note making
5.4 Reading passages from a book for   practice

UNIT: 6
6. Group Discussion:
6.1 Importance of Group Discussion
6.2 Characteristics of successful group discussions
6.3 Techniques for individual contribution in a group discussion
6.4 Group discussions for practice

Text Book: Compiled by the faculty of Sreenidhi (for internal circulation only)
Suggested Readings: * SPOKEN ENGLISH A Self-Learning Guide to Conversation
              Practice by V Sasikumar P. V. Dhamija
- English for Professionals by S.S.Prabhakar Rao
- English for Business Communication by Dr.T.Farhathullah
- Professional Communication by Alok Jain, Pravin S.R.Bhatia and
A.M.Sheikh
- Objective English : Pearson's Publications
- Word Power Made Easy: Norman Lewis
- Business Communication Strategies : Monipally.

Syllabus for B. Tech. I Year II semester
Mechanical Engineering
WORKSHOP/MANUFACTURING PROCESSES (Theory)

Code : 8BC01

	L	**T**	**P/D**	**C**
	1	0	0	1

Course Objectives:

 Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

COURSE OUTCOMES:

- To understand various basic tools to perform simple joints using metal and wood.

- To understand the principle of various electrical and electronic appliances and their applications.

- To understand the manufacturing process of welding, casting and tin smithy and their applications.

- To understand the operation of basic as well as advanced machines used for fabrication of Metals, Plastics and Glass.

Mapping of Course Outcomes with Program Outcomes:

	P01	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	X	X										X
CO2	X	X										X
CO3	X	X										X
CO4	X	X										X
CO5	X	X										X
CO6	X	X										X

Unit-I

- Fitting & Power Tools : Fitting Tools- Marking and Measuring tools, Cutting tool, Finishing tools-etc- basic Fitting operations, Safe working practices

- Introduction to power tools- Power Hacksaw, Drill, Grinder ,etc.

Unit-II

- Electrical & Electronics Appliances: Introduction, wires and wires sizes, wiring boards, common house wiring methods, symbols and house hold electrical appliances.

Unit-III

- Carpentry: Introduction-Timber, Wood joints- Lap, dovetail, Tools- Marking tools, Cutting tool, Finishing tools-etc- basic carpentry operations, Wood turning lathe

Unit-IV

- Plastic molding & Glass Cutting: Types of Plastics, Processing of Plastics: Injection moulding and Blow moulding. Introduction to Glass materials and physical properties -Cutting tools.

Unit-V

- Casting: Importance, Advantages and limitations, Pattern, Sand Casting – Casting terms, Procedure, Applications, Die Casting– Principle and Applications,

- Metal joining - Various methods of Joining, Welding - Types of Welding - Weld joints, Arc welding – Principle, Coated electrode, arc welding equipment, Applications, Resistance Spot welding, Soldering and Brazing

- Sheet Metal Operations - Punching, Blanking

Unit-VI

Machining: meaning, Advantages and Drawbacks, Basic concepts of machine tool, chips and cutting tool, Principle of Lathe, Drilling, and Grinding, CNC machine tools - Advantages, parts of a CNC system, Additive manufacturing – Need, principles of SLS, FDM methods

Text Books:

1) Hajra Choudhury S.K., HajraChoudhury A.K. and Nirjhar Roy S.K.,

2)) Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

Reference Books:

Rao P.N., "Manufacturing Technology", Vol. I and Vol. II,   Tata McGrawHill House, 2017.

Syllabus for B. Tech. I Year II semester
Mechanical Engineering
MECHANICS OF SOLIDS

Code: 8B205

L	T	P/D	C
2	0	0	2

Course Objective:

The objective is to learn the fundamental concepts of stresses, strains, and deformation of solids with applications to beams and columns. Fundamentals of applying equilibrium, compatibility, and force-deformation relationships to structural elements in order to evaluate the strength of materials.

Course Outcomes:

After studying this course, the students will be able:

1. To Understand simple stresses and strains of uniform bars, cross- section varying bars, compound bars and statically in-determinate bars
2. To Understand principle stresses, strains and torsion of circular shafts
3. To Understand Shear Force Diagrams (SFD) and Bending Moment Diagrams(BMD) for various types of beams
4. To Understand bending stresses and shear stresses of different types of beams
5. To understand how to determine deflections of various beams and buckling load of slender columns.
6. To Understand how to find out various stresses that are developed in thin and thick cylinders

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X	X										
CO2	X	X										
CO3	X	X										
CO4	X	X										
CO5	X	X										
CO6	X	X										

UNIT – I (Simple Stresses & Strains)
Simple Stresses & Strains: Mechanical Properties: Elasticity, plasticity, Hooke's law, stress-strain diagram for Mild steel, Young's modulus, yielding and yield strength, ductility, toughness and elastic recovery, Tensile and compression tests; **Hardness:** Rockwell, Brinell and Vickers and their relation to strength. Types of stresses- uniaxial, biaxial & triaxial and strains–Working stress, Factor of safety, Lateral strain, Poisson's ratio, volumetric strain, Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses, Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT – II (Mohr's circle and Torsion)
Principal stresses: Normal stress, Shear stress. Principal stresses, Mohr's stress circle and its application. **Torsion of shafts**: Stresses and deformation in circular and hollow shafts, stepped shafts.

UNIT – III (SF & BM Diagrams)
Shear Force and Bending Moment Diagrams: Definition of beam, Types of beams, Concept of SF and BM, SF and BM diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL, UVL and combination of these loads, Point of Contra flexure – Relation between SF, BM and rate of loading at a section of a beam.

UNIT – IV (Flexural Stresses)
Bending Stresses: Theory of simple bending, Assumptions, Derivation of bending equation: $M/I = f/y = E/R$, Neutral axis, Determination bending stresses, section modulus of rectangular, circular (Solid and Hollow) and I sections.
Shear Stresses:Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular and I sections.

UNIT – V (Deflections)
Deflection of Beams: Bending of Beam into a circular arc – slope, deflection and radius of curvature –Differential equation for the elastic line of a beam – Double integration and Macaulay's method.

UNIT – VI (Thin & Thick cylinders)
Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter and volume of thin cylinders – Riveted boiler shells – Thin spherical shells.
Thick cylinders: Lame's equation – cylinders subjected to inside & outside pressures – compound cylinders

TEXT BOOKS:
1. Strength of materials by S.Ramamrutham
2. Strength of Materials by SS Rattan

REFERENCE BOOKS:
1. Mechanics of Materials By Hibbeler Pearson Publications
2. Strength of Materials -By Jindal, Umesh Publications.
3. Strength of Materials by S.Timshenko & Young
4. Strength of Materials by Andrew Pytel and Ferdinond L. Singer Longman.
5. Solid Mechanics, by Popov

Syllabus for B. Tech. I Year II semester
Mechanical Engineering
WORKSHOP/MANUFACTURING PROCESSES LAB

Code : 8BC61

L	**T**	**P/D**	**C**
0	0	2	1

COURSE OBJECTIVES:

1) To know the different popular manufacturing process
2) To gain a good basic working knowledge required for the production of various engineering products
3) To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field
4) To identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances

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

CO-1: Use various types of conventional manufacturing Processes

CO-2: Manufacture components from wood, MS flat, GI Sheet etc. – hands on experience

CO-3: manufacturing of components by machining like shafts, holes & threaded holes, surface finishing of components etc.

CO-4: Produce small devices / products /appliances by assembling different components

Mapping of Course Outcomes with Program Outcomes:

	P01	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	X	X										X
CO2	X	X										X
CO3	X	X										X
CO4	X	X										X
CO5	X	X										X
CO6	X	X										X

LIST OF EXPERIMENTS

S.No	Trades	Experiment name
1	Fitting Shop	**1**. Preparation of T-Shape Work piece **2.** Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding.
2	Carpentry	3. Cross Half Lap joint 4. Half Lap Dovetail joint
3	Electrical & Electronics	5. One lamp one switch 6. Stair case wiring
4	Welding (Arc & Gas) & Soldering	7. Practice of Lap and Butt joint by Arc welding Demonstration: Gas welding, Resistance welding & Soldering
5	Casting	8. Preparation of mould cavity using solid pattern 9. Preparation of mould cavity using split pattern Demonstration: pouring of molten metal
6	Tin Smithy	10. Preparation of Rectangular Tray 11. Preparation of Square box
7	Machine Shop	Turning, Drilling and grinding operations on Lathe, Drilling and grinding machines
8	Plastic molding & Glass Cutting	12 a) Injection Moulding b) Glass Cutting with hand tools
9	Domestic Appliances	Study of internal components & circuit of appliances such as Fans, Mixers, Air blower, Iron box, Rice cooker, Emergency light etc.,
10	Lab project	Making various components and / or assembling the components which can be useful in domestic / engineering applications

Syllabus for B. Tech. I Year II semester
Mechanical Engineering
ORAL COMMUNICATION LAB

Code: 8HC61

L	**T**	**P/D**	**C**
0	0	2	1

Course Objectives:
To enable students to:
- enhance oral communication skills
- develop the skill of speaking effectively
- get introduced basics of soft skills and enhance their confidence levels and etiquette
- learn to make formal presentations both online and offline.
- Improve their reading skills by applying different strategies of reading
        understand the nuances and learn the art of group discussion

Mapping of Course Outcomes with Program Outcomes:

	P01	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1										X		
CO2										X		
CO3										X		
CO4										X		
CO5										X		
CO6										X		

Unit: 1

1. Introduction to Oral Communication Skills
Practice sessions on
• Self-introduction, introducing others and greetings
Sharing experiences, anecdotes and story telling

UNIT: 2
2. Effective Speaking Skills
Practice sessions on
• Confidence boosting
• Asking for and Giving Directions
Discussions and Role Plays on different types of Etiquette

UNIT: 3
3. Activities on listening and speaking
Practice exercises on
• Situational Dialogues
JAM/Extempore/ Impromptu

UNIT:4
4. Presentation Skills
Practice sessions on
Formal Presentations

UNIT:5
5. Reading Comprehension
Practice sessions on

- Reading comprehension

Reading from simple and difficult passages from articles and books

UNIT: 6
6. Group Discussion:
Practice sessions on

- Group Discussion

Text Book: Compiled by the faculty of Sreenidhi (for internal circulation only)
Suggested Readings: * SPOKEN ENGLISH A Self-Learning Guide to Conversation
Practice by V Sasikumar P. V. Dhamija

- English for Professionals by S.S.Prabhakar Rao
- English for Business Communication by Dr.T.Farhathullah
- Professional Communication by Alok Jain, Pravin S.R.Bhatia and

A.M.Sheikh

- Objective English : Pearson's Publications
- Word Power Made Easy: Norman Lewis
- Business Communication Strategies : Monipally.

Syllabus for B. Tech. I Year II semester
Mechanical Engineering
CHEMISTRY LABORATORY

Code :8HC64

L	**T**	**P/D**	**C**
0	0	2	1

Course Objectives:

The student will be able to learn:

1. To reparation of Inorganic compounds
2. To determine surface tension of a liquid
3. To determineviscosity of lubricant
4. To determine acid value of an oil
5. To estimate hardness of water
6. To analyze the amount of chloride content
7. To determine cell constant and conductance of solutions
8. To determine redox potential and emf of solutions
9. To determine the rate constant of acid
10. To synthesize a polymer (Thiakol rubber / Urea-Farmaldehyde resin)
11. To synthesize a drug- Aspirin
12. To estimate of Mn^{+7} by Colorimetry method

Course Outcomes

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

1. Preparation of Inorganic compounds
2. Determination surface tension of a liquid
3. Determinationviscosity of lubricant
4. Determination acid value of an oil
5. Estimation hardness of water
6. Analysis the amount of chloride content
7. Determination of cell constant and conductance of solutions
8. Determinationof redox potential and emf of solutions
9. Determination of the rate constant of acid
10. Synthesis of a polymer (Thiakol rubber / Urea-Farmaldehyde resin)
11. Synthesis of a drug- Aspirin
12. Estimation of Mn^{+7} by Colorimetry method

Mapping of Course Outcomes with Program Outcomes:

	P01	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**X**		**X**						**X**			
CO2	**X**		**X**						**X**			
CO3	**X**		**X**						**X**			
CO4	**X**		**X**						**X**			
CO5	**X**		**X**						**X**			
CO6	**X**		**X**						**X**			

List of Experiments

1. Preparation of coordination complex NiDMG Complex
2. Determination of surface tension
3. Determination of viscosity
4. Saponification/acid value of an oil
5. Ion exchange column for removal of hardness of water / Estimation of Hardness of water by EDTA Method
6. Determination of chloride content of water
7. Determination of cell constant and conductance of solutions(HCl Vs NaOH / Mixture of acid Vs Strong base)
8. Potentiometry - determination of redox potential and emf ($FeSO_4$ Vs $KMNO_4$ / HCl Vs NaOH)
9. Determination of the rate constant of acid catalyzed hydrolysis of methylacetete
10. Synthesis of a polymer- Thiakol rubber / Urea-Farmaldehyde resin
11. Synthesis of a drug- Aspirin
12. Estimation of Mn^{+7} by Colorimetry method

Syllabus for B. Tech. I Year II semester

Mechanical Engineering
DATA STRUCTURE (C AND C++) LAB

Code :

	L	T	P/D	C
	0	0	2	1

Course objective:
Understand the data structures: simple and complex and use them to write the programs for implementing searching, sorting, expression evaluations. Understand the applications that use the particular data structure and its significance in the development of operating systems and the softwares . Understand the object-oriented programming concepts of C++.

Course Outcomes:
1   Write programs to implement Stacks, Queues and circular queues.
2   Write programs using tree traversals. Inorder, preorder and post order.
3   Write Programs on searching, sorting and hashing operations.
4   Write programs on Binary trees
5   Write programs in C++ to implement classes and operator overloading.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					X				X			
CO2					X				X			
CO3					X				X			
CO4					X				X			
CO5					X				X			
CO6					X				X			

UNIT –I:
1.   Write a C program that implement stack and its operations using arrays
2.   Write a C program that implement Queue and its operations using arrays.
3.   Write a C program that implement Circular Queue and its operations using arrays.
4.   Write a C program that uses Stack operations to perform the following
      i) Converting infix expression into postfix expression
      ii) Evaluating the postfix expression

UNIT –II:
5.   Write a C program that uses functions to perform the following operations on singly linked list:
      i) Creation ii) Insertion   iii) Deletion   iv) Traversal
6.   Write a C program using functions to perform the following operations on circular singly linked list:
      i) Creation ii) Insertion   iii) Deletion   iv) Traversal

7. Write a C program that uses functions to perform the following operations on doubly linked list:
    i) Creation ii) Insertion   iii) Deletion   iv) Traversal in both ways
8. Write a C program to implement operations on the following Data Structures Using Singly linked list:
    i) Stack ii) Queue

UNIT- III
9. Write a C program that uses functions to perform the following:
    i) Creating a Binary Tree of integers
    ii) Traversing the above binary tree in preorder, in order and post order.

UNIT- IV
10. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
    i) Linear search   ii) Binary search
11. Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
    i) Bubble sort   ii) Insertion sort   iii) Selection Sort

12. Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
    i) Quick sort   ii) Merge sort iii) Heap Sort
13. Write a C Program to implement Separate Chaining using Hashing. Include Insertion, Deletion and Display of the Elements .

UNIT –V

14. Write a C++ program to read and display the details of student class with data members as name, rollno and 3 subjects' marks.
15. Write a C++ program to implement all types of constructors.

UNIT VI

16. Write a C++ program to implement operator overloading for addition of two complex numbers.

Syllabus for B. Tech. I Year II semester
Mechanical Engineering
ENGINEERING GRAPHICS WITH- CAD

Code :8B262

	L	T	P/D	C
	0	0	2	1

COURSE OBJECTIVES:

1. To develop a clear understanding of the basic principles involved in three dimensional Engineering drawings.
2. To train the students for the extraction of multiple views from a solid model using AutoCAD.

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

1) Construct Isometric Scale, Isometric Projections and Views and convert 3D views to 2D orthographic views.
2) Understand from basic sketching through 2D and 3-D solid modeling using computer aided design (CAD) software

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X											X
CO2	X											X
CO3	X											X
CO4	X											X
CO5	X											X
CO6	X											X

UNIT – I

Intersection of Solids: Engineering applications, Line Intersection, Methods of determining line of intersection between surfaces: Line method, Cutting-plane method, Intersection of two Prisms, Cylinders(under similar category), intersection of Cylinder and Prism (Under dis-similar category)

UNIT – II

Perspective Projections: Introduction, Principle of perspective projection, definition of Perspective elements, methods of drawing perspective view: visual ray method, vanishing point method, Perspective View of Points, Lines, Plane Figures and Simple Solids

UNIT –III

Introduction to AutoCAD Software: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The

Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

Customization & CAD Drawing: Setting of drawing page and the printer, including scale settings, Setting of units and drawing limits; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles

UNIT –IV

AutoCAD Software: Annotations, Layering &Other Functions: Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, Layers to create drawings; Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print commands Introduction to Computer Graphics: Modeling – Wireframe, Surface and Solid Modelling; Spatial Transformations - Move, Rotate, Zoom; Co-ordinate Systems; Model Viewing

UNIT – V

Two dimensional and Three dimensional drawing using AUTOCAD: drawing of engineering curves, projections of lines, planes, solids, development of solids and using AUTOCAD draw commands and edit commands

UNIT –VI

Solid Modeling: Introduction to solid modeling; Creation of simple solid models; Part editing and two-dimensional documentation of models. Demonstration of a simple team design project: Creation of engineering models of practical applications relevant to the domain and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids using Solid

Text Book:

Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

Reference Books:

1) Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

2) Agrawal B. &Agrawal C. M. (2012), Engineering Graphics, TMH Publication

3) AUTOCAD Software Theory and User Manuals

Syllabus for B. Tech. I Year II semester

Mechanical Engineering
COMPREHENSIVE TEST AND VIVA-VOCE- II

Code : 8B292

	L	T	P/D	C
	1	0	0	1

Course Objective :

Evaluate, comprehend and assess of the concepts and the knowledge gained in the core courses of the first and the second year.

Course Outcome :
1. Comprehend the concepts in the core and elective courses.
2. Exhibit technical knowlegde to face interviews.
3. Exhibit lifelong Learning skills for higher education and to pursue Professional practice.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1		H	M				H	M			L	L
CO2		H	M				H	M			L	L
CO3		H	M				H	M			L	L
CO4		H	M				H	M			L	L
CO5		H	M				H	M			L	L
CO6		H	M				H	M			L	L

Comprehensive Test and Viva Voce	The subjects studied in the Semester concerned related to branches concerned and for placements
B.Tech I year I semester	I semester
B.Tech I year II semester	I and II semester
B.Tech II year I semester	I, II and III semester
B.Tech II year II semester	I, II, III and IV semester
B.Tech III year I semester	I, II, IIII, IV and V semester
B.Tech III year II semester	I, II, IIII, IV, V and VI semester
B.Tech IV year I semester	I, II, IIII, IV, V, VI and VII semester

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

Allocation of marks :

*Comprehensive Test   : 70 marks

**Viva Voce   : 30 marks

Total   : 100 marks

*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 20 marks.

End Semester Examination for Comprehensive Test will be taken for 50 marks.

Total marks for Comprehensive Test will be 70.

**Average of best two of Mid Tests of Mid – I, Mid – II and Mid - III for Viva Voce will be taken for 10 marks.

End Semester Examination for Comprehensive Viva Voce shall be evaluated for 20 marks.

The total for Viva Voce will be 30.

Thus the total sessional marks in this subject of Comprehensive Test and Viva Voce will be : 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

Syllabus for B. Tech. I Year II semester

Mechanical Engineering
TECHNICAL SEMINAR II

Code : 8B286

	L	T	P/D	C
	0	0	2	1

Course Objective :
Develop ability to be a public speaker. Learn the importance of delivering seminars for demonstrating oratory and develop interview facing skills.

Course Outcomes: After completing this course, the student will be able to

1. Identify current general, political and technology related topics.
2. Arrange and present seminar in a effective manner
3. Collect, survey and organize content in presentable manner
4. Demonstrate oratory skills with the aid of Power Point Presentations
5. Exhibit interview facing skills and team leading qualities

Technical Seminar evaluation

There shall be a technical seminar evaluated for 100 marks each from I year I Semester to II year II Semester. The evaluation is purely internal and will be as follows:

Sl.No	Description	Marks
1	Literature survey, topic and content	10
2	Presentation including PPT	10
3	Seminar Notes	05
4	Interaction with audience after presentation	05
5	Final Report 3 copies	10
6	Class room participation	05
7	Punctuality in giving seminar as per Scheduled time and date	10
8	Mid Semester Viva (on the seminar topics completed up to the end of 9th week	15
9	End Semester Viva	30
	Total	**100 Marks**

1. Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.

Syllabus for B. Tech. II Year I semester- Mechanical Engineering
COMPLEX ANALYSIS, PROBABILITY AND STATISTICS

Code :8HC15

L	T	P/D	C
2	1	0	3

Pre Requisites: Engineering Mathematics-II

Course Objectives: To make the students to understand and expected to learn
1. *Form partial differential equations and find the solution to first order linear and nonlinear partial differential equations.*
2. *Applications of PDE.*
3. *Concepts of the probability, types of random variables and probability distributions.*
4. *Sampling distributions and their properties, concepts on estimation.*
5. *Concepts on testing the hypothesis concerning to large samples.*
6. *Different kinds of tests related to small samples and tests concerned to small size samples and goodness of fit and independence of attributes using chi-square distribution.*

Course Outcomes:
Students will able to learn
  i. *Basic concepts of Complex Analysis and conformal mapping and their properties.*
  ii. *Series expansion of a function using Taylor's and Laurent's series. Evaluation of definite integrals and improper integrals.*
  iii. *Concepts of probability and will able to solve problems on discrete and continuous probability distributions.*
  iv. *Learn basic concepts of sampling distribution and able solve problems on estimation.*
  v. *Concepts of Control Charts*
  vi. *Testing the hypothesis concerning to large size and small size samples also goodness of fit and independence of attributes using chi-square distribution.*

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X	X										
CO2			X									
CO3				X						X		
CO4						X						
CO5									X			
CO6											X	

Syllabus

UNIT - I: Complex Variable – Differentiation: (8 L)
Differentiation, analytic functions, Cauchy-Riemann equations, harmonic functions, finding harmonic conjugate. Finding Analytic Functions.

UNIT - II: Complex Variable – Integration: (12 L)
Cauchy - Integral theorem (without proof), Cauchy Integral formula (without proof), singularities, zeros of analytic functions, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.

UNIT-III: Random Variables and Probability Distributions: (12L)
Conditional probability, Multiplication theorem, Baye's theorem (without Proof). Random variables – Discrete and Continuous, Probability Mass and Density Functions, Expectation and Variance. Probability Distributions: Binomial, Poisson and Normal Distributions.

UNIT-IV: Sampling Distributions and Estimation: (8L)
Populations and Samples, Sampling distribution of the Mean (σ - known and Unknown), Sums and Differences, Central limit theorem.Estimation: Point Estimation and Interval Estimation concerning Means for Large Samples.

UNIT-V: Quality Control: (8L)
Control Charts –Control lines, determination of control limits, Types of control charts-Control charts for variables (mean chart, Range chart) – charts for attributes (fraction defective, no. of defectives and defects for unit)

UNIT-VI:Tests of Hypothesis for Small Samples: (10 L)
Tests of Hypothesis, Type–I and Type-II Errors, Hypothesis testing concerning one mean and two means and Test of Hypothesis concerning one Proportion and difference of proportions.Student t-test, Hypothesis testing concerning one mean and two means, F-test and χ^2 test-Goodness of fit, Independence of Attributes.

TEXT BOOKS:
1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publications, New Delhi.
2. Probability and Statistics for Engineers: Miller and John E. Freund, PHI Publishers, 9th Edition

REFERENCE BOOKS:
1. Advanced Engineering Mathematics, S.R.K. Iyengar and R.K.Jain, Narosa Publication.
2. Probability and Statistics, T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham, M.V.S.S.N. Prasad, S. Chand Publications.
3. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, pearson Educations.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. SCHAUM'S outlines: Probability and Statistics, Murray R. Spiegel, John Schiller, R. Alu Srinivasan, Mc Graw Hill publishers.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
PYTHON PROGRAMMING AND ALGORITHMS

Code : 8FC21

L	**T**	**P/D**	**C**
2	1	0	3

Mapping of Course Outcomes with Program Outcomes:

	P01	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	X	X										
CO2			X									
CO3				X						X		
CO4						X						
CO5									X			
CO6											X	

UNIT I: **Introduction to Python**:
History, Features, Modes of Execution, Setting up path, working with Python Basic Syntax,
Variable and Data Types, Operators. Conditional Statements (If, If- else, Nested if-else)
Looping (for, While Nested loops) Control Statements (Break, Continue, Pass).
- **Functions:** Defining a function, calling a function, Types of functions, Function
  Arguments

UNIT II:String Manipulation:
  Accessing Strings, Basic Operations, String slices
- **Lists:** Accessing list, Operations, Tuple: Accessing tuples, Operations,
- **Dictionaries:** Accessing values in dictionaries,
- **Modules:** Importing module, Math module, Random module, Packages
- **Exception Handling**:Exception, Exception Handling, Except clause, Try? Finally
  clause User Defined Exceptions

-
UNIT III:
- **Python- OOPs concept:** Class and object, Attributes, Inheritance, Overloading
  Overriding, Data hiding.
- **Regular expressions:** Match function, Search function, Matching VS Searching,
  Modifiers Patterns.

UNIT IV:
Case Study with NumPy/PlotPy/SciPy/GUI Programming, Introduction, Tkinter
programming, Tkinter widgets

UNIT V:
  Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity,

Asymptotic Notation- Big oh notation, Omega notation, Theta notations
- **Divide and conquer:** General method, applications-Binary search, Quick sort, Merge sort
- **Applications:** Implementing Algorithms ,performance analysis and sorting techniques using Python

UNIT VI:
- **Greedy method**: General method, applications- 0/1 knapsack problem, Minimum cost spanning trees.
- **Dynamic Programming**: General method, applications-Optimal binary search trees, Travelling sales person problem, Reliability design.
- **Applications:** Implementing some Greedy method and Dynamic programming techniques using Python

 Text books:
1.	Think Python: How to Think Like a Computer Scientist Allen B. Downey, O'Relly publications.
2.	Learning with Python by Jeffrey Elkner, Chris Meyers Allen Downey, Dreamtech Press.
3.	Fundamentals of Computer Algorithms, Ellis Horowitz,Satraj Sahni and Rajasekharam, Galgotia publications pvt. Ltd.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
ENVIRONMENTAL SCIENCE AND ECOLOGY

Code :8HC05

		L	T	P/D	C
		2	0	0	2

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

Course Outcomes:

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												x
CO2												x
CO3												x
CO4												x
CO5												x
CO6												x

UNIT-I Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity.

UNIT-II Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source.

UNIT-III Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT-IV Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants.Acid rain-Threshold limit values of chemicals present in environment, Global warming, Ozone layer depletion, Water pollution: Sources and types of pollution. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health

hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Sewage water Treatment, Kyoto protocol, and Montréal Protocol.

UNIT-V Sustainable development and Green Technology: Concept of sustainable development, threats to sustainability population and its explosion, Crazy consumerism, over-exploitation of resources, strategies for achieving sustainable development environmental education, conservation of resources, urban sprawl sustainable cities and sustainable communities, human health , role of IT in Environment, Environmental Ethics, Environmental Economic – Concept of Green Building, Clean Development Mechanism (CDM).

UNIT-VI Environmental Policy, Legislation & Environment Impact Assessment: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Course Outcomes

After completion of the course, the student will be able to:
1. Understand about ecosystem and energy flow among the organisms.
2. Know the resources available, use of them and overexploitation of the resources in the nature.
3. Learn the value, use and value of biodiversity.
4. Understand the causes and effect of pollution and implement measures in control of pollution.
5. Understand the sustainable development and implement green technology for sustainable development..
6. Learn and implement policy to protect the environment.

TEXT BOOKS:
1. Perspectives in *Environmental Studies*: *Kaushik* A. and *Kaushik*, C.P. New Age International (P) Ltd. (2008)
2. Environmental Studies by Erach Bharucha, 2005 University Press.

REFERENCE BOOKS:
1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
THERMODYNAMICS

Code :8B306

L	T	P/D	C
3	0	0	3

Course Objective:

- To learn about work and heat interactions, and balance of energy between system and its surroundings
- To learn about application of I law to various energy conversion devices

- To evaluate the changes in properties of substances in various processes

- To understand the difference between high grade and low grade energies and II law limitations on energy conversion

- To Learn the application of steam tables and Mollier charts for pure substances(steam)
- To understand the processes and efficiencies of basic power cycles

Course Outcomes: After completing this course

- The students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions
- Students can evaluate changes in thermodynamic properties of substances
- The students will be able to evaluate the performance of energy conversion devices
- The students will be able to differentiate between high grade and low grade energies.
- The students will be able to use property table and Mollier charts to evaluate properties of steam at different states.
- The students will be able to analyze and evaluate the performance of basic thermodynamics cycles

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x		x	x								
CO2	x		x	x								
CO3	x		x	x								
CO4	x		x	x								
CO5	x		x	x								
CO6	x		x	x								

Unit I: INTRODUCTION AND ZEROTH LAW

Contents: Fundamentals - System & Control volume; Property, State & Process; Exact & Inexact differentials; Work-Thermodynamic definition of work; examples; Displacement work; Path dependence of displacement work and illustrations for simple processes; electrical, magnetic, gravitational, spring and shaft work.

Temperature, Definition of thermal equilibrium and Zeroth law; Temperature scales; thermometric properties of various thermometers

Applications: These concepts will be useful in analyzing thermodynamics systems and construction of thermometers

Unit II: GAS LAWS & FIRST LAW FOR NON FLOW PROCESS

Definition of heat, specific heat, examples of heat/work interaction in systems- control mass-First Law for Cyclic & Non-cyclic processes; Concept of total energy E ; Demonstration that E is a property; Various modes of energy, Internal energy.

Fundamentals- Working Fluid & behaviour: Perfect gas laws – Ideal gas-Equation of state, specific and universal gas constants-specific heat relations.

Application of First law for ideal gas undergoing during different processes; calculation of displacement Work; heat transfer; internal energy

 Applications: These concepts will be applied in analysis of closed systems- piston cylinder cases.

Unit III: FIRST LAW FOR FLOW PROCESS & SECOND LAW

First Law for Flow Processes - Derivation of general energy equation for a control volume; definition of Enthalpy; Steady state steady flow processes including throttling; Examples of steady flow devices; Application of I law applications for steady flow devices.

Second law - Definitions of direct and reverse heat engines; Definitions of thermal efficiency and COP; Kelvin-Planck and Clausius statements; Definition of reversible process; Internal and external irreversibility; Carnot cycle; Absolute temperature scale.

Applications: Theses concepts will be employed in different applications like turbines, compressors, nozzles etc.

Unit IV: ENTROPY, AVAILABILTY, IRRIVERSIBILY

Clausius inequality; Definition of entropy S ; Demonstration that entropy S is a property; Evaluation of entropy for solids, liquids, ideal gases undergoing various processes; Principle of increase of entropy.(4)

Calculation of change in entropy during mixing process; Ideal Gas Mixtures- governing laws: evaluation of equivalent properties.

Irreversibility and Availability, Availability function for systems and Control volumes undergoing different processes, Lost work. Second law analysis for a control volume

 Applications: (i) The above concepts are employed in calculating the efficiency and losses of different processes.

Unit V: PROPERTIES OF PURE SUBSTANCES

Pure substances-definition, Properties of two phase systems - Const. temperature and Const. pressure heating of water; Definitions of saturated states; P-v-T surface; Use of steam tables; Saturation tables; Superheated tables; Identification of states & determination of properties, Mollier's chart.

Determination of entropy from steam tables; Definition of Isentropic efficiency for compressors, turbines and nozzles

Applications: The above concepts are employed in the steam power plants.

Unit VI: BASIC THERMODYNAMIC CYCLES

Thermodynamic cycles - Basic Rankine cycle; Basic Brayton cycle; Basic vapor compression cycle and comparison with Carnot cycle.

Applications: The basics of these cycles will be useful for the actual design of external combustion engines

Text Books:

1. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals of Thermodynamics, John Wiley and Sons.

2. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India

3. Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.

4. Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
MATERIALS SCIENCE AND METALLURGY

Code :8B307

	L	T	P/D	C
	2	0	0	2

Objectives:
1. Understanding of the correlation between the internal structure of materials, their mechanicalproperties and various methods to quantify their mechanical integrity and failure criteria.
2. To provide a detailed interpretation of equilibrium phase diagrams.
3. Learning about metallurgy of alloy systems, different phases, microstructures and heat treatment methods to tailor the properties of Fe-C alloys.

Course Outcomes:
1. Student will be able to identify crystal structures for various materials and understand the defects in such structures.
2. Understand how to tailor material properties of ferrous and non-ferrous alloys
3 How to quantify mechanical integrity and failure in materials
   Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X	X	X									
CO2	X	X	X									
CO3	X	X	X									
CO4	X	X	X									
CO5	X	X	X									
CO6	X	X	X									

Unit – I
Mechanical Behavior and NDT:
Crystal Structure: Unit cells, Metallic crystal structures, examples of metals with BCC, FCC and HCP crystal structures, ceramics crystal structure. **Imperfection in solids:** Point, line, interfacial and volume defects; slip systems, dislocation strengthening mechanisms, Frank Read Source of dislocation; Dislocation pile-up; Strain hardening, Intermediate annealing; Concept of single and polycrystals;Effect on grain size on ductility of metal, critically resolved shear stress. **NDT:** Introduction to non-destructive testing: (i) Visual examination, (ii) X-ray radiography and (iii) Dye penetrant test.

Unit – II
Failure, Fatigue, Creep
Failure: Ductile and brittle failures, Ductile to brittle transition, Fracture mechanics: Introduction to Stress intensity factor approach and Griffith criterion. **Fatigue failure: fatigue-stress patterns,** Low cycle fatigue, High cycle fatigue, Stress-life approach, SN curve, endurance and fatigue limits, effects of mean stress on fatigue life, Modified Goodman diagram; To solve few problems on Fatigue, Thermally induced fatigue, Fracture with

fatigue,Temperature induced failures, Creep: Definition, creep curve and mechanism of creep; Case studies in failures.

Unit – III.
Alloys, Phase diagrams, NF Alloys:
Alloys: Alloys, substitutional solid solution, Hume Rothery's rules for solid solution and interstitial solid solutions- **Phase diagrams:** Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions. **Binary phase diagrams:** Ni-Cu, Cu-Zn, Cu-Sn, Al-Cu, and Al-Si. "**Nonferrous Alloys:**Properties and applications of copper, brass, bronze, Al alloys, NIMONIC-105 alloy, and Titanium alloys.

Unit - IV
Fe-Fe$_3$C Phase diagram, Steels, Cast irons:
Fe-Fe$_3$C Phase diagram: Iron Iron-carbide phase diagram and description of microstructural aspects of phases (Ferrite, Austenite, Cementite, Pearlite, ledeburite, hypo and hyper eutectoid steels; hypo and hyper eutectic cast irons). **Steels:** low carbon, medium carbon, high carbon, stainless, Hadfield,high speed steels, their compositions, microstructures and applications. **Cast irons:** Types of cast irons; compositions, microstructures and applications of (Grey, white, Spheroidal graphite, Malleable) cast irons.

Unit – V
Heat treatment of steels, heat treatment of non-ferrous alloys:
Heat treatment of Steels: Annealing, normalizing and spheroidising, hardening, tempering, isothermaltransformation diagrams for Fe-C alloys and microstructure development. Continuous cooling curvesand interpretation of final microstructures and properties-austempering, martempering, case hardening, carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, vacuum and plasma hardening, **Heat treatment of non-ferrous alloys:**Aluminum alloys, Titanium alloys and Nickel basesuperalloy NIMONIC-105.

Unit – VI
Special steels, Advanced materials:
Special steels: Alloying of steel, Effect of alloying elements in steels, properties and applications of stainless steel and tool steels, maraging steels, **Properties and applicationsofAdvanced Materials:** Composites: Metal matrix composites (MMC), CMC, PMC and C-C composites, applications of composites. Principles and applications of SMART Materials (Shape memory alloys and Piezeo electric ceramics). Nanomaterials, properties and applications.

Text Book:
W. D. Callister, Jr and David G. Rethwisch, "Materials Science and Engineering-An Introduction", 9thEdition, WileyIndia.

References:
1.   Physical Metallurgy principles by Reed-Hill
2.   Mechanical Metallurgy / G.E. Dieter
3.   V. Raghavan, "Material Science and Engineering', Prentice Hall of India Private Limited, 1999.

4.   Engineering Materials-2 an Introduction to Microstructure, Processing and Design – Micheal F Ashby &David R H Jones
5.   Introduction to Physical Metallurgy / Sidney H. Avener.- Design Data book
6.   Material Science and Metallurgy/Kodgire.
7.   Essential of Materials science and engineering/ Donald R.Askeland/Thomson
8.   Kenneth G. Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of India Private Limited, 4th Indian Reprint, 2002.
9.   Material Science - Vanclak
10.   U. C. Jindal, "Engineering Materials and Metallurgy", Pearson, 2011.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
MACHINE DRAWING AND COMPUTER AIDED DRAWING PRACTICE

Code :8B308

	L	T	P/D	C
	1	0	2	2

Course Objective:

To familiarize with the standard conventions for different materials and machine parts in working drawings. To make part drawings including sectional views for various machine elements. To prepare assembly drawings given the details of part drawings.

Course Outcomes:

After studying this course, the students will be able to:

- Understand the principles and requirements of the machine drawings.
- Understand the various symbols used in machine drawing.
- Understand the principles and requirements of various Assembly drawings.
- Drawing of different machine components
- Imagine and drawing the assembly by seeing the components given.
- Ability to understand the existing geometric modeling and develop a geometric modeling for a new component in design process

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x											
CO2	x											
CO3	x											
CO4	x											
CO5	x											
CO6	x											

UNIT-I : Machine Drawing Conventions

a)   Sectional views: section planes and drawing of sections, Types of sectional views – Full sectional view, half sectional view, auxiliary sectional views, Parts not usually sectioned

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

UNIT-II : Drawing of simple machine parts

Selection of Views, additional views for the following machine parts with easy drawing proportions.

a)   Popular forms of Screw threads like V, Metric, BSW, Buttress, Square, ACME, Worm nuts like square and hexagonal headed, Bolts like square and hexagonal headed, eye bolt, foundation bolts, stud bolts, set screws, washers

b)   Keys, cotters & joints and knuckle joint.

UNIT-III : Drawing of machine elements

Selection of Views, additional views for the following machine elements and parts with easy drawing proportions

Shaft coupling: Flange, Split-Muff, Flexible couplings, Claw, Oldham's and Universal Coupling

Riveted joints for plates.

UNIT-IV : Assembly Drawings of Engine parts

Stuffing box, Cross head, Eccentric, Connecting rod - Drawings of assembled views for the part drawings using conventions and easy drawing proportions

Assembly Drawings of Valves and Detailed drawings

Steam stop valve, spring loaded safety valve, feed check valve and air cock - Drawings of assembled views for the part drawings using conventions and easy drawing proportions

UNIT-V : Assembly Drawings of Machine parts

Screws jack, Tailstock, Machine Vice, Plummer block, foot step bearing - Drawings of assembled views for the part drawings using conventions and easy drawing proportions

UNIT-VI :Computer Aided 2D Drafting:

1.   Introduction to Auto CAD, Setting up drawing environment, Command and System variables, Coordinate system.
2.   Creating graphic primitives like Point, Line, Planes, Circle, Arc, Annotation etc.
3.   Creating and editing 2D object, Layers and object Properties. Creating dimensions, Blocks and External reference.
4.   Creating a layout to plot, documents, file formats.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

TEXT BOOKS:
1. Machine Drawing – Dhawan, S.Chand Publications
2. Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers
3. Shan Tickoo, "Auto CAD 2011: A Problem Solving Approach", Autodesk Press USA.

REFERENCES:
1. Machine Drawing – P.S.Gill.
2. 4. Machine Drawing – ND Bhat

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
METALLURGY LAB & MECHANICS OF SOLIDS LAB

Code :8B363

	L	T	P/D	C
	0	0	2	1

METALLURGY LAB

Course objective:

To learn the sample preparation technique, etch and observe optical microstructures of ferrous and nonferrous metals/alloys.

Course Outcomes:

After studying this course, the students will be able to:

- acquire the knowledge of preparation of samples for metallurgical study.
- acquire the knowledge of preparation of sample for metallurgical study of a plain carbon steel, cast iron, alloy steel, heat treated steel and their interpretation.
- acquire the knowledge of preparation of sample for metallurgical study of nonferrous metal/alloy and interpretation

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x		x	x								x
CO2	x		x	x								x
CO3	x		x	x								x
CO4	x		x	x								x
CO5	x		x	x								x
CO6	x		x	x								x

List of Experiments:

1. Specimen preparation for metallographic examination and Study of Metallurgical Microscope
2. Study of microstructure of plain carbon steel
3. Study of microstructures of heat treated plain carbon steel.
4. Study of microstructures of Alloy steel
5. Study of microstructures of cast iron
6. Study of microstructure of some Non ferrous Metal or alloy (Al-Si alloy)
7. Demonstration of Jominy end quench test.

(MECHANICS OF SOLIDS LAB

Course Objective:

The objective is to learn the fundamental concepts of stresses, strains, and deformation of solids with applications structural elements.

Course Outcomes:

After studying this course, the students will be able to:

- know how to measure the hardness and impact strength of given materials
- measure the modulus of rigidity of given spring, and shaft.
- find the deflection of beams theoretically and paracticaly.

List of Experiments:

1. Direct Tension Test
2. Bending Test on simply supported and cantilever beams
3. Torsion Test
4. Brinell and Rockwell hardness tests (of samples obtained from Jominy End quench Test & samples of various treated and untreated steels obtained from Metallurgy Lab)
5. Test on Springs
6. Compression Test on Cube
7. Impact Test

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
FUELS AND LUBRICANTS LAB

Code :8B364

	L	T	P/D	C
	0	0	2	1

Course Objectives: To understand the properties of fuels and lubricants.

Course Outcomes:

- To determine the flash and fire point using Abels Apparatus
- To determine the flash and fire point using Pensky Martens Apparatus
- To determine the Viscosity using Saybolt Viscometer
- To determine the Calorific value using Bomb Calorimeter

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x	x						x			x
CO2		x	x						x			x
CO3		x	x						x			x
CO4		x	x						x			x
CO5		x	x						x			x
CO6		x	x						x			x

List of Experiments:

1. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Abels Apparatus
2. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Pensky Martens apparatus
3. Carbon residue test: Liquid fuels.
4. Determination of Viscosity of Liquid lubricants and Fuels using: Saybolt Viscometer
5. Determination of Viscosity of Liquid lubricants and Fuels using: Redwood Viscometer
6. Determination of Viscosity of Liquid lubricants and Fuels using: Engler Viscometer.
7. Determination of Calorific value: of Gaseous fuels using: Junkers Gas Calorimeter.
8. Determination of Calorific value: Solid/Liquid/ fuels using: Bomb Calorimeter.
9. Drop point and Penetration Apparatus for Grease.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
COMPREHENSIVE TEST AND VIVA-VOCE-III

Code : 8B393

	L	T	P/D	C
	1	0	0	1

Course Objective :

Evaluate, comprehend and assess of the concepts and the knowledge gained in the core courses of the first and the second year.

Course Outcome :
1. Comprehend the concepts in the core and elective courses.
2. Exhibit technical knowlegde to face interviews.
3. Exhibit life long Learning skills for higher education and to persue Professional practice.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1		H	M				H	M			L	L
CO2		H	M				H	M			L	L
CO3		H	M				H	M			L	L
CO4		H	M				H	M			L	L
CO5		H	M				H	M			L	L
CO6		H	M				H	M			L	L

Comprehensive Test and Viva Voce	The subjects studied in the Semester concerned related to branches concerned and for placements
B.Tech I year I semester	I semester
B.Tech I year II semester	I and II semester
B.Tech II year I semester	I, II and III semester
B.Tech II year II semester	I, II, III and IV semester
B.Tech III year I semester	I, II, IIII, IV and V semester
B.Tech III year II semester	I, II, IIII, IV, V and VI semester
B.Tech IV year I semester	I, II, IIII, IV, V, VI and VII semester

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

Allocation of marks :

*Comprehensive Test   : 70 marks

**Viva Voce   : 30 marks

Total   : 100 marks

*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 20 marks.

End Semester Examination for Comprehensive Test will be taken for 50 marks.

Total marks for Comprehensive Test will be 70.

**Average of best two of Mid Tests of Mid – I, Mid – II and Mid - III for Viva Voce will be taken for 10 marks.

End Semester Examination for Comprehensive Viva Voce shall be evaluated for 20 marks.

The total for Viva Voce will be 30.

Thus the total sessional marks in this subject of Comprehensive Test and Viva Voce will be : 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
TECHNICAL SEMINAR III

Code : 8B387

L	T	P/D	C
0	0	2	1

Course objective:
To learn the importance of delivering seminars on technologies for demonstrating oratory and interview facing skills.

Course Outcomes:
1 Deliver lecture on emerging technologies.
2 Explain domain knowledge to resolve real time technical issues
3 Demonstrate ability to lead and explain concepts and innovative ideas.
4 Demonstrate team leading qualities.
5 Demonstrate public speaking skills.
6 Exchange new information that would not have been available otherwise.

Technical Seminar evaluation

There shall be a technical seminar evaluated for 100 marks each from I year I Semester to II year II Semester. The evaluation is purely internal and will be as follows:

Sl.No	Description	Marks
1	Literature survey, topic and content	10
2	Presentation including PPT	10
3	Seminar Notes	05
4	Interaction with audience after presentation	05
5	Final Report 3 copies	10
6	Class room participation	05
7	Punctuality in giving seminar as per Scheduled time and date	10
8	Mid Semester Viva (on the seminar topics completed up to the end of 9th week	15
9	End Semester Viva	30
	Total	**100 Marks**

1. Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
ELEMENTS OF ELECTRICAL & ELECTRONICS ENGINEERING

Code:8AC48

L	**T**	**P/D**	**C**
2	**0**	**0**	**2**

Course Outcomes:

CO's: after studying this course, the student will be able to
1. Understand the fundamentals of electrical engineering and DC machines.
2. Understand the principles of AC circuits.
3. Understand the principle and operation of three phase induction motor and measuring instruments.
4. Understand the principle and operation of diode.
5. Understand the principle and operation of transistor.
6. Understand the principles of digital electronics.

Mapping of Course Outcomes with Program Outcomes:

	P01	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	x	x										
CO2	x	x										
CO3	x	x										
CO4	x	x										
CO5	x	x										
CO6	x	x										

Unit – I: Fundamentals of Electrical Engineering and DC Machines:

Ohm's Law, Kirchhoff's Laws, types of sources, passive elements. Series parallel circuits, mesh and nodal analysis. Superposition, Reciprocity theorem.
DC Machines: Principle of operation of D.C generators, types, E.M.F equation. Principle of operation of D.C motors, Types motors, Torque equation, Losses and efficiency, simple problems on D.C Generators and motors.

Unit – II: Fundamentals of AC circuits:
AC voltage wave form and basic definitions: Peak Value, R.M.S. value, Average values, Form factor and Peak factor, 'j' operator, Analysis of single phase AC circuits series and parallel (Simple circuits). Three phase circuits – Star - delta connection, Relation between line and phase voltages / currents in a 3-phase Star-Delta balanced system.

Unit – III: Induction Motors and Instruments:
Concept of Faraday's laws, 3- phase induction motor working principle, operation and construction details.

Instruments: Introduction, classification of instruments, operating principles, essential features of measuring instruments, permanent magnet moving coil (PMMC) instruments, moving iron (MI) instruments.

UNIT IV-DIODE: Overview of Semiconductors, PN junction diode and Zener diode –Diode circuits: rectifiers (bridge type only), filters, clippers and clampers.

UNIT V- TRANSISTOR: BJT construction, operation, characteristics (CB, CE and CC configurations) and uses – JFET and MOSFET construction, operation, characteristics (CS configuration) and uses.

UNIT VI-DIGITAL ELECTRONICS : Number systems – binary codes –binary arithmetic - Boolean algebra, laws & theorems - simplification of Boolean expression using K maps - logic gates - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.

Text Books:

Basic Electrical Engineering –T.K. Nagesarkar and M.S. Sukhja, Oxford University Press.2nd edition.
Basic electrical Engineering – M.S. Naidu and S. Kamakshiah – TataMcGraw-Hill, 2005 edition.
Basic Electrical & Electronics Engineering –T.K. Nagesarkar and M.S. Sukhja, Oxford University Press.2nd edition.
Principles of Electronics - V.K.Mehta, S.Chand Publications, 2nd edition.

References:

Theory and problems of Basic electrical Engineering- D.P.Kotahari & I.J.Nagrath PHI.
Electronic Devices and Circuits, Millman & Halkias, TMH publications.

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
JAVA PROGRAMMING

Code: 8EC41

L	T	P/D	C
2	1	0	3

Course Objective:
Understand the concepts of Object oriented programming principles of Java. Write the programs and execute using OOP principles such as garbage collection, overloading methods, constructors, recursion, string handling, StringTokenizer, inheritance and its types, packages, multithreading and threads.

Course Outcomes :
1. Understand the concept of OOP with the need of constructing objects, and classes. Write programs using classes, objects, members of a class and the relationships among them needed for a specific problem.
2. Identify the purpose and usage of principles of inheritance and polymorphism. Implement concepts of polymorphism, encapsulation and methodoverloading
3. Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifiers, automatic documentation through comments)
4. Students understand and implement error exception handling andmulti-threading.
5. Students learn to create GUI for the specificapplications.
6. Write programs for event-handling using various user interface components on applets.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					X				X			
CO2					X				X			
CO3					X				X			
CO4					X				X			
CO5					X				X			
CO6					X				X			

UNIT-I

History of Java, Java buzzwords, datatypes, variables, simple java program,scope and life time of variables,operators, expressions, control statements, type conversion and costing, arrays,, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, overloading methods and constructors, string handling, StringTokenizer.

UNIT-II

Inheritance –Definition, single inheritance, benefits of inheritance, Member access rules, super class, polymorphism- method overriding, Dynamic method dispatch, using final with inheritance, abstract class, Base classobject.

UNIT-III

Interfaces: definition, variables and methods in interfaces, differences between classes and interfaces, usage of implements and extends keyword, uses of interfaces.
Packages: Definition, types of packages, Creating and importing a user defined package.
Applications using interface

UNIT-IV
Exception handling -exception definition, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating user defined exceptions.

Multi-Threading: Thread definition, types of multitasking, uses of multitasking, thread life cycle, creating threads using Thread class and Runnable interface, synchronizing threads, daemon thread.
Applications of multithreading.

UNIT-V
Advantages of GUI over CUI ,The AWT class hierarchy, Component, Frame, user interface components- labels, button, scrollbars, text components, check box, check box groups, choices, lists panels – scroll pane, menu bar, graphics, layout, managers – boarder, grid, flow and card layouts.
Applications: developing calculator, developing feedback form, developing biodata.

UNIT-VI
Event handling: Delegation event model, closing a Frame, mouse and keyboard events, Adapter classes.
Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters toapplets.
Applications: Developing of simple advertisements.

TEXT BOOKS
1. Java; the complete reference, 6th editon, Herbert schildt,TMH.
2. Introduction to Java programming 6th edition, Y. Daniel Liang, pearsoneducation.

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
UNIVERSAL HUMAN VALUES

Code: 8HC17

	L	T	P/D	C
	2	1	0	3

Human Values Courses: This course also discusses their role in their family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course named as "H-102 Universal Human Values 2: Understanding Harmony" is designed which may be covered in their III or IV semester. During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.

OBJECTIVE: The objective of the course is four fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence

3. Strengthening of self-reflection.

4. Development of commitment and courage to act.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												

COURSE TOPICS: The course has 28 lectures and 14 practice sessions in 5 modules:

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1   Purpose and motivation for the course, recapitulation from Universal Human Values-I

2.   Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration

3.   Continuous Happiness and Prosperity- A look at basic Human Aspirations

4.   Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority

5.   Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

6.   Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

7.   Understanding human being as a co-existence of the sentient 'I' and the material 'Body'

8.   Understanding the needs of Self ('I') and 'Body' - happiness and physical facility

9.   Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

10.   Understanding the characteristics and activities of 'I' and harmony in 'I'

11.   Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

12.   Programs to ensureSanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

Module 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship

14. Understanding the meaning of Trust; Difference between intention and competence

15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
21. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding
22. Natural acceptance of human values
23. Definitiveness of Ethical Human Conduct
24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

Module 6:Harmony on Professional Ethics
25. Competence in professional ethics:
a. Ability to utilize the professional competence for augmenting universal human order
b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order:
a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b. At the level of society: as mutually enriching institutions and organizations
28. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. to discuss the conduct as an engineer or scientist etc.

3. READINGS:

3.1 Text Book
1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010 3.

2   Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. 3.The Story of Stuff (Book).

4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

5. Small is Beautiful - E. F Schumacher.

6. Slow is Beautiful - Cecile Andrews

7. Economy of Permanence - J C Kumarappa

8. Bharat Mein Angreji Raj - PanditSunderlal

9. Rediscovering India - by Dharampal

10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi

11. India Wins Freedom - Maulana Abdul Kalam Azad

12. Vivekananda - Romain Rolland (English)

13. Gandhi - Romain Rolland (English)

Syllabus for B. Tech. II Year II semester

Mechanical Engineering
MANUFACTURING PROCESSES

Code: 8B409

L	**T**	**P/D**	**C**
3	0	0	3

Course Objectives:

1) To understand the basic casting process and calculate the pattern allowances and design the riser system needed for defect free casting and understand various types of castings and their applications
2) To understand the importance of metal forming processes and study the Rolling process
3) To gain knowledge in the working principle of Extrusion and Forging operations and learn the various ways of performing theses operations.
4) To be acquainted with the fundamentals of sheet metal operations and distinguish between various types of operations and learn about plastic processing techniques.
5) To understand the various welding processes and learn about the various types of welding operations and their applications.
6) To gain understanding of powder based manufacturing technique and manufacturing methods of plastic based products

Course Outcomes:

1) Select moulding material, pattern and calculate pattern allowances used in casting and design the gating system and Design a suitable riser for the casting and decide specific casting type for a defect free product
2) Distinguish between different forming processes and Analyze the forces and power consumed in rolling operation
3) Decide the specific forging/ extrusion process for making a part and identify the specific defects if any in the process
4) Suggest the sheet metal process for making a part and decide the processing technology for a particular type of plastic.
5) Propose the type of welding joint and specific welding process for an application and estimate the effect of process variables on arc welding
6) Choose appropriate technique for making discrete parts and opt the specific plastic processing method based on type of plastic.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x	x										
CO2	x	x										
CO3	x	x										
CO4	x	x										

CO5	x	x											
CO6	x	x											

UNIT – I

Metal Casting : Advantages and applications of casting processes, Casting terms, Patterns - Pattern allowances and Numerical Problems in pattern calculation, Types of patterns, Pattern Materials, Moulding materials, Elements of Gating system, Gating ratio, Solidification of pure metal and alloys, Cooling curves, Risers - Function, Riser design – Chvorinov's rule, Caine's method- Numerical Problems, Cores-uses, Special casting processes- Centrifugal casting, Die casting, and Investment casting, Casting defects

UNIT – II

Metal Forming: Advantages of forming operations,Nature of plastic deformation, hot working and cold working processes-Advantages, Disadvantages, Types of stresses applied in metal working, Bulk metal forming processes: **Rolling:** Principle, Rolled Products, mechanics of Rolling, Types of Rolling mills, Forces in rolling and power requirements - Numerical Problems

UNIT – III

Forging: basicforging operations,Forging types: Smith, Drop, Press & Machine Forging, Forging defects, Swaging

Extrusion: Extrusion principle Hot extrusion and cold extrusion - Forward extrusion and backward extrusion, Impact extrusion, Hydrostatic extrusion

UNIT – IV

Sheet-Metal Operations: Classification, Springback in metals, shearing action, Press operations: Blanking, Piercing and other operations,Clearance and Shear in press operations, Forces and power requirement in press operations- Numerical Problems, Bending: Nomenclature, Bend allowance, bend length calculation, Types of bending dies, Numerical Problems. Spinning, Stretch forming, Embossing and Coining.

UNIT- V

Welding : Classification of welding processes, Welding terms, Gas welding: Fuel gases, Oxy-Acetylene welding, Flame types, Electric Arc welding: Electrodes, AC & DC, V-I Characteristics-Numerical Problems, Resistance Spot welding, Thermit-welding, Inert Gas welding: Shielding gases, TIG & MIG welding, Submerged arc welding, Friction welding, & Friction stir welding, Explosive welding, Welding defects – causes and remedies. Principles and Applications of Soldering, Brazing and Adhesive bonding

UNIT – VI

Powder Metallurgy- Principle, steps in PM processing, production of metallic powder, mixing and blending, compacting, sintering, Advantages & limitations of PM

Plastics processing: WorkingPrinciple and Applications of: Injection moulding, Blow moulding, Compression moulding, and Transfer moulding

TEXT BOOKS:

1. Manufacturing Technology (Foundry, Forming and Welding)Vol 1 / P.N. Rao/TMH

2. A Text book of Production Technology (Manufacturing Processes) /Dr. P C Sharma /S.Chand Publishers

REFERENCES:

1. Manufacturing Engineering and Technology/Kalpakjian S/ Pearson Education

2. Welding Engineering and Technology / RS Parmar / Khanna Publishers

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
KINEMATICS OF MACHINERY

Code:8B410

	L	T	P/D	C
	2	1	0	3

COURSE OBJECTIVES: The main objective of this course is intended to cover the field of engineering theory, analysis, design and practice that is generally described as mechanisms and kinematics of machines.

COURSE OUTCOMES: After completing the subject, students will be able to:

- understand the basic concepts of mechanism, types of mechanisms and inversions difference between machine mechanism and structure.
- understand velocity and acceleration diagram in order to evaluate the inertia forces in mechanism and machines.
- understand concept of steering gear mechanism, types and Hooke's joint with respect to an automobile.
- In order to understand and design complex motions possible out of comes and followers.
- understand the concept pf toothed gears and selection different types of gear trains in order obtain required velocity ratios.
- understand transmission power by various means like belts, rope and chains and their advantages and limitations.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x		x	x								x
CO2	x		x	x								x
CO3	x		x	x								x
CO4	x		x	x								x
CO5	x		x	x								x
CO6	x		x	x								x

UNIT – I
Mechanisms : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained. Number, type and dimensional synthesis- definitions only.
Machines : Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism – inversion of mechanism – inversions of quadric cycle, chain – single and double slider crank chains.

UNIT - II
Kinematics: Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain.

Analysis of Mechanisms: Analysis of slider crank chain for displacement, velocity and acceleration of slider – Acceleration diagram for 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 – III
Steering Mechanisms: Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio.
Hooke's Joint: Single and double Hooke's joint – Universial coupling – application – problems.
Straight Line Motion Mechanisms : Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

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. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.
Analysis of motion of followers : Roller follower – circular cam with straight, concave and convex flanks.

UNIT – V
Toothed Gears: Higher pairs, friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. 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 – Introduction to Helical, Bevel and worm gearing.
Gear Trains: Introduction – Train value – Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box-Differential gear for an automobile.

UNIT – VI
Belt Rope and Chain Drives : Introduction, Belt and rope drives, selection of belt drive-types of belt drives,V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

TEXT BOOKS:
1. Theory of Machines and Mechanisms-S.S.Rattan, Tata McGraw Hill Publishers
2. Theory of Machines R.S Khurmi & J.K Gupta

REFERENCE BOOKS:
1. Theory of Machines by Thomas Bevan/ CBS
2. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
3. The theory of Machines /Shiegley/ Oxford.

Syllabus for B. Tech. II Year II semester
Fluid Mechanics and Hydraulic Machinery

Code: 8B411

L	T	P/D	C
2	0	0	2

Course Objectives:

To understand the basic principles of fluid mechanics and types of flows. To understand boundary layer concepts and flow through pipes. Evaluate the performance of hydraulic turbines and characteristic curves of pumps.

Course Outcomes:

After studying this course, the students will be able to:

1. understand the fluid properties and measurement of pressure with monometers.
2. Understand the classification of fluid, Bernoulli's equation, momentum equation and their applications
3. understand Reynolds's experiment, major losses, minor losses
4. understand velocity triangle, work done calculations, elements of Hydroelectric power plant, pump storage plant.
5. Understand the classifications of turbines working principles of turbines, draft tube theory, performance of turbine.
6. Understand various types of pumps working principle of reciprocating pump, centrifugal pump, performance characteristics of centrifugal pump.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x	x						x			x
CO2		x	x						x			x
CO3		x	x						x			x
CO4		x	x						x			x
CO5		x	x						x			x
CO6		x	x						x			x

UNIT I
Fluid statics : Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers. *Applications: Foundation of basic concepts and pressure measurement devices.*

UNIT II
Fluid kinematics : Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow and three dimensional flow.

Fluid dynamics : Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

Applications: The fluid dynamics concepts are employed in analyzing fluid flow problems and design of hydraulic devices.

UNIT III

Exact flow solutions in channels and ducts, Couette and Poisuielle flow, laminar flow through circular conduits and circular annuli- concept of boundary layer – measures of boundary layer thickness – Darcy Weisbach equation, friction factor,
Applications: Analysis of fluid flow through pipes and design of hydraulic pipe.

UNIT IV
Need for dimensional analysis–methods of dimension analysis–Similitude–types of similitude Dimensionless parameters–application of dimensionless parameters–Model analysis.

UNIT V
Euler's equation – theory of Rotodynamic machines – various efficiencies – velocity components at entry and exit of the rotor, velocity triangles – Centrifugal pumps, working principle, work done by the impeller, performance curves – Cavitation in pumps- Reciprocating pump–working principle.
Applications: Lifting of water in steam power plant, irrigation, and other power plants.

UNIT VI
Classification of water turbines, heads and efficiencies, velocity triangles- Axial, radial and mixed flow turbines Pelton wheel, Francis turbine and Kaplan turbines, working principles – draft tube- Specific speed, unit quantities, performance curves for turbines – governing of turbines.
Applications: Turbines used in hydro-powerplants under different head conditions.

TEXT BOOKS :
1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

REFERENCES :
1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
4..Hydraulic Machines Including Fluidics PB by Jagdish Lal Metropolitan Book Co. Pvt. Ltd. , 1994.

Syllabus for B. Tech. II Year II semester

Mechanical Engineering

SOFT SKILLS

Code:8HC03

L	**T**	**P/D**	**C**
1	**0**	**0**	**1**

Course objectives:

To enable students to:

- make self-assessment.
- know the importance of certain soft skills like time management and goal setting.
- sharpen their verbal ability to handle the competitive exams.
- enhance their team skills and design thinking capabilities for effective problem solving and decision making.
- know their emotional quotient which guides their thinking, behavior and helps them manage stress efficiently.
- equip themselves with the prerequisites, and relevant techniques to effectively attend corporate interviews.

Mapping of Course Outcomes with Program Outcomes:

	P01	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												

UNIT:1

1. Know Yourself

    1.1 ortance of knowing yourself
    1.2 SWOT / SWOC Analysis
SWOT / SWOC Grid

UNIT:2

2. Organising Oneself

2.1 Developing positive outlook towards life
2.2 Time management
2.3 Goal Setting

UNIT:3

3. Verbal Aptitude

3.1 Reading Comprehension:

Strategies to comprehend difficult passages from a book; SQ3R (survey, question, read, recite, and review)

3.2 Word Analogies

3.3 Spotting Errors

3.4 Sentence Completion / Sentence

UNIT: 4

4. Skills to Excel

.1 Team work and Team Dynamics - Collaboration and Leadership

4.2 Decision Making, Design Thinking

4.3 Critical thinking and Creative

Problem Solving.

UNIT: 5

5.Self-Management Skills

5.1   Emotional Intelligence

5.2 Stress Management

UNIT: 6

6.   Interview Skills

6.1   Interview Skills: Meaning and Purpose of an Interview

6.2   Types of interviews; Interview Preparation techniques

6.3   Dress code at an interview

6.4   FAQs in HR Interview

Text Book: SOFT SKILLS – Dr. K. Alex, S. Chand publications
Suggested Readings: * SOFT SKILLS – Meenakshi Raman ; * Word Power made Easy – Norman Lewis ; * Objective English - Pearson's Publications ; * Skill Sutras- Jayashree Mohanraj * The Power of Soft Skills – Robert A. Johnson ; * Soft Skills for Everyone – Jeff Butterfield

Syllabus for B. Tech. II Year II semester

Mechanical Engineering

SOFT SKILLS LAB

Code:8HC63

	L	T	P/D	C
	0	0	2	1

Course objectives:
To enable students to:
* Make self-assessment.
* Know the importance of certain soft skills like time management, goal setting and etiquette so that they can make their mark in their career and life in general.
* sharpen their verbal ability to handle the competitive exams.
* enhance their team skills and design thinking capabilities for effective problem solving and decision making.
* know their emotional information which guides their thinking, behavior and helps them manage stress efficiently.
* equip themselves with the prerequisites, and the relevant techniques to effectively tackle the corporate interview process in vogue.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												

UNIT:1

1. Know Yourself
Practice exercises on
* Self-Analysis
* Questionnaire,
SWOT Practice

UNIT:2

2. Organising Oneself

Practice activities on
* Managing time
Goal Setting

UNIT:3

3.   Verbal Aptitude

Practice exercises on
*   Reading from difficult passages from books
*   Word analogies
*   Spotting Errors
Sentence Completion / Sentence Equivalence

UNIT: 4

4.   Skills to Excel

.Practice activities on
*   Team building activities
    Practice Activities, Case Studies and Group Discussions on decision making and problem solving, creativity and innovation.

UNIT: 5

5.   Self-Management Skills

Practice activities on
Case Studies and Group Discussions on managing stress and enhancing emotional intelligence.

UNIT: 6

6.   Interview Skills

Mock Interviews

Text Book: SOFT SKILLS – Dr. K. Alex, S. Chand publications
Suggested Readings: * SOFT SKILLS – Meenakshi Raman ; * Word Power made Easy – Norman Lewis ; * Objective English - Pearson's Publications ; * Skill Sutras- Jayashree Mohanraj * The Power of Soft Skills – Robert A. Johnson ; * Soft Skills for Everyone – Jeff Butterfield

Syllabus for B. Tech. II Year II semester

Mechanical Engineering
ELEMENTS OF ELECTRICAL & ELECTRONICS ENGINEERING LAB

Code: 8AC95

	L	T	P/D	C
	0	0	2	1

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												

Electrical Experiments

1. Brake test on 3-phase induction motor (performancecharacteristics).
2. Speed control of DC shunt motorby
   a) ArmatureVoltageControl .
   b) Fieldfluxcontrolmethod.
3. Brake test on DC shuntmotor.
4. Swinburne's test on DC shuntmachine.
5. OCC characteristics of DC shunt generator.
6. Verification of superposition and ReciprocityTheorems.

Electronics Experiments

1. V-I Characteristics of PN –junctiondiode.
2. V-I Characteristics of Zener –junctiondiode.
3. Half wave and full waverectifier.
4. V-I Characteristics of Bipolar junctionTransistor.
5. V-I Characteristics of MOSFET.
6. Verification of logicgates

Syllabus for B. Tech. II Year II semester

Mechanical Engineering

MANUFACTURING PROCESSES LAB

Code: 8B465

L	T	P/D	C
0	0	2	1

Course Objective:

Understand the entire procedure for preparing a component through the sand casting route
Perform sand testing to produce defect free product
Understand the procedure for doing arc, gas, and resistance welding processes.
 Understand the procedure for press working operations
Understand the plastic processing techniques.

COURSE OUTCOMES:

After studying this course, the students will be able to:

- Make a pattern preparation of sand mould and cast the part
- Perform welding operation under different conditions and test the quality of the weld
- Make use of plasma technique for accurately cutting metals and also perform brazing operation
- Identify the various press working operations and various parts of hydraulic press and perform operations
- Choose the appropriate plastic moulding method to manufacture a plastic product

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x	x								x	
CO2		x	x								x	
CO3		x	x								x	
CO4		x	x								x	
CO5		x	x								x	
CO6		x	x								x	

I. Metal Casting Lab:

1. Pattern Design and making – 1 Exercise

2 .Core Making-1 Exercise

3. Sand properties testing - -for strengths, and permeability – 2 Exercises

4. Melting and Pouring - 1 Exercise

II Welding Lab:

1. Arc welding (AC & DC)- To study the effect of polarity on weld strength and heat effected zone in Arc welding.2 Exercises

2. Spot Welding - 1 Exercise

3. TIG & MG Welding - 2 Exercises

4. Plasma Cutting and Brazing - 2 Exercises

III Mechanical Press Working:

1.Study of simple, compound and progressive press tool.
2.Blanking & Piercing operation- 1 Exercise
3. Bending and other operations-1 Exercise

IV Processing Of Plastics:

1. Injection Moulding

2. Blow Moulding

V Demonstration of Electrical Discharge Machine   & Submerged Arc Welding

Syllabus for B. Tech. II Year II semester - Mechanical Engineering
FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Code:8B466

L	**T**	**P/D**	**C**
0	**0**	**2**	**1**

Course Objectives:

To understand the basic principles of fluid mechanics and types of flows. To understand boundary layer concepts and flow through pipes. Evaluate the performance of hydraulic turbines and characteristic curves of pumps.

Course Outcomes:

After studying this course, the students will be able to:

1. compute the performance of pelton wheel under working conditions
2. compute the performance of francis turbine under working conditions
3. compute performance of reciprocating pump under working conditions
4. compute the Performance of centrifugal pump under working conditions
5. compute the Performance of multistage pump under working conditions
6. compute the coefficient of discharge of venturimeter of orifice meter under working conditions

Mapping of Course Outcomes with Program Outcomes:

	P01	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		**x**	**x**						**x**			**x**
CO2		**x**	**x**						**x**			**x**
CO3		**x**	**x**						**x**			**x**
CO4		**x**	**x**						**x**			**x**
CO5		**x**	**x**						**x**			**x**
CO6		**x**	**x**						**x**			**x**

List of Experiments:

    Verification of Bernoulli's Theorem

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Calibration of Rotameter
4. Calibration of Flow Nozzle
5. Determination of friction factor for a given pipe line
6. Determination of minor losses in a pipeline.
7. Determination of Co-efficient of discharge for mouth piece (cd)
8. Performance Test on Single Stage Centrifugal Pump
9. Performance Test on Multi Stage Centrifugal Pump.
10. Performance Test on Reciprocating Pump.
11. Impact of jets on Vanes
12. Performance Test on Pelton Wheel.
13. Performance Test on Francis Turbine.
14. Performance Test on Kaplan Turbine

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
COMPREHENSIVE TEST AND VIVA-VOCE-IV

Code : 8B494

L	**T**	**P/D**	**C**
1	**0**	**0**	**1**

Course Objective :

Evaluate, comprehend and assess of the concepts and the knowledge gained in the core courses of the first and the second year.

Course Outcome :
1. Comprehend the concepts in the core and elective courses.
2. Exhibit technical knowlegde to face interviews.
3. Exhibit life long Learning skills for higher education and to persue Professional practice.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1		**H**	**M**				**H**	**M**			**L**	**L**
CO2		**H**	**M**				**H**	**M**			**L**	**L**
CO3		**H**	**M**				**H**	**M**			**L**	**L**
CO4		**H**	**M**				**H**	**M**			**L**	**L**
CO5		**H**	**M**				**H**	**M**			**L**	**L**
CO6		**H**	**M**				**H**	**M**			**L**	**L**

Comprehensive Test and Viva Voce	**The subjects studied in the Semester concerned related to branches concerned and for placements**
B.Tech I year I semester	I semester
B.Tech I year II semester	I and II semester
B.Tech II year I semester	I, II and III semester
B.Tech II year II semester	I, II, III and IV semester
B.Tech III year I semester	I, II, IIII, IV and V semester
B.Tech III year II semester	I, II, IIII, IV, V and VI semester
B.Tech IV year I semester	I, II, IIII, IV, V, VI and VII semester

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

Allocation of marks :

*Comprehensive Test	: 70 marks
**Viva Voce	: 30 marks
Total	: 100 marks

*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 20 marks.

End Semester Examination for Comprehensive Test will be taken for 50 marks.

Total marks for Comprehensive Test will be 70.

**Average of best two of Mid Tests of Mid – I, Mid – II and Mid - III for Viva Voce will be taken for 10 marks.

End Semester Examination for Comprehensive Viva Voce shall be evaluated for 20 marks.

The total for Viva Voce will be 30.

Thus the total sessional marks in this subject of Comprehensive Test and Viva Voce will be : 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
TECHNICAL SEMINAR --IV

Code : 8B488

	L	T	P/D	C
	0	0	2	1

Course objective

Develop an ability to understand and present the latest technological developments in computer science. Identify one of them, understand its impact on the event/method/society as a whole and present the seminar on the same which enhances oratory and interview facing skills.

Course Outcome :

1 Deliver lecture on emerging technologies.
2 Explain domain knowledge to resolve real time technical issues
3 Demonstrate ability to lead and explain concepts and innovative ideas.
4 Demonstrate team leading qualities.
5 Demonstrate public speaking and lifelong learning skills for higher studies and to pursue professional practice.
6 Exchange new information that would not have been available otherwise.
7 Develop debating and interview skills.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1						X	X	X	X		X	
CO2						X	X	X	X		X	
CO3						X	X	X	X		X	
CO4						X	X	X	X		X	
CO5						X	X	X	X		X	
CO6						X	X	X	X		X	

Technical Seminar evaluation

There shall be a technical seminar evaluated for 100 marks each from I year I Semester to II year II Semester. The evaluation is purely internal and will be as follows:

Sl.No	Description	Marks
1	Literature survey, topic and content	10
2	Presentation including PPT	10
3	Seminar Notes	05
4	Interaction with audience after presentation	05

5	Final Report 3 copies	10
6	Class room participation	05
7	Punctuality in giving seminar as per Scheduled time and date	10
8	Mid Semester Viva (on the seminar topics completed up to the end of 9th week	15
9	End Semester Viva	30
	Total	**100 Marks**

1. Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.