**ACADEMIC REGULATIONS**

**COURSE STRUCTURE**

**AND**

**detailed syllabus**

for

**B.Tech Four Year Degree Course**

**(A-18 I and II year)**

in

**MECHANICAL engineering**

**(ME)**

(Applicable for the batches admitted from 2018-2019)



**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 -501 301.

**January, 2019**

**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) OF B.TECH MECHANICAL ENGG**

**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

**ACADEMIC REGULATIONS**

**FOR B.TECH. REGULAR STUDENTS**

**WITH EFFECT FROM**

**THE ACADEMIC YEAR 2018-19**

**(A-18)**

**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 2018-19 in the following branches of Engineering.

|  |  |
| --- | --- |
| **Sl. No.** | **Branch** |
|  | Civil Engineering |
|  | Electrical and Electronics Engineering |
|  | Mechanical Engineering |
|  | Electronics and Communication Engineering |
|  | Computer Science and Engineering |
|  | Information Technology |
|  | Electronics and Computer Engineering |

**1.2. Credits (Semester system for I year)**

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 merit rank obtained by graduate programs shall be made either on the basis of the rank of the candidate in entrance test conducted by the Telangana State Government (EAMCET) or the University 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 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 39 credits and the credits in II , III and IV years should not exceed 127 credits as per AICTE model curriculum for the B.Tech. programme.

Each student shall secure 166 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 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 program recommended by AICTE in the model curriculum consisting of courses like Mandatory Induction program for 3 weeks like Physical Activity such as Yoga , Pranayama other games and sports in which the students are interested, Creative Arts , Universal Human Values, Literary, Proficiency Modules ( English and Computer Literacy ) , Lectures by Eminent People, Visits to local Areas and Familiarization to Dept/ Branch & Innovations does not carry any credits.
* However there will be an end examination and will also reflect in the Memo of Marks. The grading will be as follows

|  |  |
| --- | --- |
| **% 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 |

* Other mandatory courses i.e ., Environmental Science, Indian Constitution , Essence of Indian Traditional Knowledge also will not have credits but evaluation will be done as per the above table.

**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 almost all the guidelines issued by AICTE/UGC.

The groups of the subjects shall be as given in the table given hereunder along with the credits suggested by AICTE

|  |  |  |
| --- | --- | --- |
| **Sl.**  **No.** | **Category** | **Suggested Breakup of Credits**  **(Total 160)** |
| 1 | Humanities and social sciences including Management courses | 12\* |
| 2 | Basic Science courses | 25\* |
| 3 | Engineering Science courses including workshop, drawing, basics of electrical / mechanical / computer etc | 24\* |
| 4 | Professional core courses | 48\* |
| 5 | Professional Elective courses relevant to chosen specialization / branch | 18\* |
| 6 | Open Electives from other technical and / or emerging subjects | 18\* |
| 7 | Project work, seminar and internship in industry or elsewhere | 15\* |
| 8 | Mandatory courses (Environmental Sciences, Induction training, Indian constitution, Essence of Indian Traditional Knowledge) | (Non-credit) |
|  | Total | 160\* |

The Academic council of the institution has approved the total number of credits to be 165. 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/ Councilor 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 / councilor and the student.

4.4. **The student can take extra credits 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 (subject to retaining a minimum of 16 credits), ‘**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 upto 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.

**6.4** Shortage of attendance below 65% in aggregate shall **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 registration for that semester shall stand cancelled.**

**They will not be promoted to the next semester.** They may seek re-registration 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.

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 (26 out of 75 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 UG mini-project and seminar, if 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 submit a report on UG mini-project, or does not make a presentation of the same before the evaluation committee as per schedule, or

(ii) does not present the seminar as required in the IV year I Semester, or

(iii) secures less than 40% marks in UG mini-project/ seminar evaluations.

Student may reappear once for each of the above evaluations, when they are scheduled again; if student fails in such ‘one reappearance’ 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 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 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 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 shall register for all subjects as specified and listed in the course structure, fulfills all the attendance and academic requirements for all credits, ‘earn all credits’ by securing SGPA 5.0 (in each semester) and CGPA (at the end of each successive semester) 5.0 to successfully complete the under graduate programme.

**7.5** After securing total credits as specified for the successful completion of the entire under graduate programme, the student can avail exemption of two subjects i.e upto 6 credits, that is, one open elective and one professional elective subject or two professional elective subjects for optional drop out from total credits earned; resulting total credits specified for under graduate programme performance evaluation, i.e., the performance of the student in these credits shall alone be taken into account for the calculation of ‘the final CGPA of 5.0 (at the end of under graduate programme, which takes the SGPA of the IV year II semester into account)’ , and shall be indicated in the grade card of IV year II semester.

However, the performance of student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not be altered.

**7.6** If a student registers for some more ‘**extra subjects’** (in the parent department or other departments / branches of Engg.) 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 regulations 6 and 7.1 to 7.5 above.

**7.7** 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) may 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.

**7.8** 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.

**7.9** A student detained **due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits.**

The academic regulations under which student has been readmitted shall be applicable to him / her.

**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 a practical subject.

In addition, industry-oriented mini-project, group project, Project – I will also be evaluated for 100 marks, Project – II for 200 marks, Technical Seminar and comprehensive viva for 100 marks each.

The continuous internal evaluation for Project – I in IV year I semester shall consist of :

|  |  |  |
| --- | --- | --- |
| **Sl.No** | **Description** | **Marks** |
| 1 | Literature survey and presenting seminar at the end of 6 weeks | 10 marks |
| 2 | Report | 5 marks |
| 3 | Demonstration/presentation at the end of 14 weeks | 10 marks |
| 4 | Total sessional marks | 25 marks |

Semester end examination - 75 marks

Pattern of external evaluation for Project – I

|  |  |  |
| --- | --- | --- |
| **Sl.No** | **Description** | **Marks** |
| 1 | Final report | 15 marks |
| 2 | Presentation | 10 marks |
| 3 | Demonstration/defence of project | 50 marks |
| 4 | Total sessional marks | 75 marks |

The continuous internal evaluation for Project – II in IV year II semester shall consist of :

|  |  |  |
| --- | --- | --- |
| **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 | 10 marks |
| 6 | Final Project Report | 5 marks |
| 7 | Final presentation and defence of project | 15 marks |
| 8 | Total | 50 marks |

Division of marks for External Evaluation for project II – 150 Marks

|  |  |  |
| --- | --- | --- |
| **Sl.No** | **Description** | **Marks** |
| 1 | Final Project Report | 30 marks |
| 2 | Presentation | 20 marks |
| 3 | Demonstration / Defense of Project | 100 marks |
| 4 | **TOTAL** | **150 marks** |

8.2 For all the other theory and lab subjects the distribution of marks shall be 25 for Continuous Internal Evaluation (CIE) and 75 for the Semester End-Examination (SEE).

* 1. **Theory Subjects**

**8.3.1 Pattern for Continuous Internal Evaluation ( CIE) 25 marks**

**Subjects except Foreign languages (15+2+3+2=25 Marks)**

The following procedure is to be adopted for awarding internal marks of 25 for all the B. Tech., M. Tech., and MBA students from the Academic Year 2018-19

The distribution of marks for continuous internal evaluation ( 25 marks) is shown below. Average of two Mid Tests will be taken for final award of marks.

1. Part – A of Mid Test will have 10 questions – 5 marks
2. Part – B of Mid Test will have 3 questions (1 from each unit) and student

has to answer 2 questions - 10 marks

1. Assignment – I three questions from each unit – total of 9 questions

to be submitted before first mid test - 2 marks

Similarly assignment – II will be given to be Submitted before II Mid Test

and average of two assignments will be considered.

1. 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

1. Attendance - 3 marks
2. Class notes - 2 marks

Three marks are assigned for each theory course for those 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 upto 85% | 2 |
| 3. | More than 85% | 3 |

Marks for attendance shall be added to each subject based on average of attendance of all

subjects put together.

**i) Award of final sessional marks :**  Mid-examination marks, average marks of two assignments, marks for class notes, Attendance, shall be added and the total marks are awarded as final sessional marks towards Continuous Internal Evaluation ( CIE) for 25 marks as detailed below.

|  |  |  |
| --- | --- | --- |
| **S. No** | **Item** | **Marks** |
| 1. | Average of two Mid Tests | 15 |
| 2. | Average of two assignments | 2 |
| 3 | Assignment test in Mid Test paper (Part – C) | 3 |
| 4 | Class Notes | 2 |
| 5 | Attendance | 3 |
|  | **Total** | **25** |

**(ii) Foreign languages**

|  |  |  |
| --- | --- | --- |
| **S. No** | **Item** | **Marks** |
| 1 | 2 written tests (Average of two to be taken) | 12 marks |
| 2 | Oral Comprehension | 04 marks |
| 3 | Assignment & Class notes | 06 marks |
| 4 | Attendance | 03 marks |
|  | **Total marks** | **25 marks** |

**b) Pattern for External Examinations - (75 marks)**

• There shall be external examination in every theory course and its shall 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 25 marks, which is compulsory. It will have 10 short questions out of which 5 questions are set with 3 marks each and another 5 questions are set with 2 marks each. There shall be atleast one question to each of the six units and the 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 25 sessional marks and 75 marks for semester end examination. Out of the 25 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 | 06 marks |
| 3. | Average of two tests including viva | 05 marks |
| 4. | Lab Based Project Report viva and demo | 06 marks |
| 5. | Attendance | 03 marks |
| **Total** | | **25 marks** |

8.4.2 The semester end examination for 75 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 | 15 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 | | 75 marks |

**8.4.3 In case computer based examinations**

|  |  |  |
| --- | --- | --- |
| **S. No** | **Item** | **Marks** |
| 1. | Flow chart and algorithms | 15 marks |
| 2. | Program writing and execution | 30 marks |
| 3. | Result and conclusions | 20 marks |
| 4. | Viva voce and Record | 10 marks |
| Total | | 75 marks |

8.5 **For the subject having design and / or drawing, (such as Engineering Drawing and Machine Drawing), the distribution shall be 25 marks for internal evaluation (10 marks for day-to-day work including drawing, home assignment work, 10 marks for average of two internal tests and 2 marks for class notes 3 marks for attendance) and 75 marks for end semester 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 (100 marks)**

There shall be a technical seminar evaluated for 100 marks from I year to IV year\*. 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 | 15 |
| 3 | Seminar Notes | 10 |
| 4 | Interaction | 05 |
| 5 | Report | 10 |
| 6 | Attendance in the seminar class | 10 |
| 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 | 10 |
| 9 | End Semester Viva | 20 |
|  | Total | 100 Marks |

Student must secure 40% i.e. 40 marks to be successful

\* According to the syllabus approved by the Academic Council as per Board of studies recommendations

**8.7 Comprehensive Viva-voce (II-II, III-II and IV-II\*)**

There shall be comprehensive viva voce as stated above which will be evaluated for 100 marks. Out of 100 marks, 25 marks are internal and 75 marks are external.

|  |  |  |
| --- | --- | --- |
| S.No. | Description | marks |
| 1 | First mid-sessional viva at the end of 5 weeks (Internal) | 12.5 marks |
| 2 | Second mid-sessional viva at the end of 10 weeks (Internal) | 12.5 marks |
| 3 | Final viva during practical examinations (External) | 75 marks |
| 4 | Total | 100 Marks |

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\* According to the syllabus approved by the Academic Council as per Board of Studies recommendations

**8.7.2** The evaluation of comprehensive viva-voce has to be carried out by two teachers independently and average be taken.

The sessional marks awarded by the Department are not final.

They are subject to scrutiny by a committee constituted by the college and scaling is done wherever necessary.

The recommendations of the Committee are final and binding.

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.

**9.0 Grading procedure**

9.1 Marks will be awarded to indicate the performance of student in each theory subject, laboratory / practicals, seminar, UG mini project and UG major project.

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

SGPA = { Ci Gi } / {  Ci } …. 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), CJ is the number of credits allotted to the Jth subjects and Gj 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 Year I Semester** | | | | | | |
| 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 Year II Semester** | | | | | | |
| 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 an 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) ≥ 7 but ≤ 8.00, shall be placed in ‘**FIRST CLASS’**.

**12.5** Students with final CGPA (at the end of the under graduate programme) ≥ 6 but ≤ 7, 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 ≤ 6, 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.

**15.0 Student transfers**

15.1There 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 provide one chance to write the CBI (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 2019-20**

**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 ≥ 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 resulting in 160 credits for B.Tech programme performance evaluation**.**

**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.

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

**5. Promotion rules based on credits**

|  |  |  |
| --- | --- | --- |
| **S. No** | **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 29 credits  out of 48 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 58 credits out of 96 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).

**MALPRACTICES RULES**

**DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS**

|  |  |  |
| --- | --- | --- |
|  | **Nature of Malpractice/Improper 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.

\* \* \* \* \*

**SREENIDHI INSTITUTE OF SCIENCE and TECHNOLOGY (AUTONOMOUS)**

**B.Tech. (Mechanical Engineering)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course structure for B. Tech. I Year I Semester ME** | | | | | | | | |
| **Sl.No** | **Course code** | **Name of the Course** | **L** | **T** | **P** | **C** | **Max. Marks** | |
| 1 | 7HC04 | Applied Physics | 3 | 1 | 0 | 4 | **CIE** | **SEE** |
| 2 | 7B101 | Engineering Mechanics | 3 | 1 | 0 | 4 | 25 | 75 |
| 3 | 7HC06 | Engineering Mathematics – I | 3 | 1 | 0 | 4 | 25 | 75 |
| 4 | 7BC02 | Engineering Graphics & Design | 1 | 0 | 4 | 3 | 25 | 75 |
| 5 | 7HC02 | English (Oral communication skills) | 1 | 0 | 0 | 1 | 25 | 75 |
| 6 | 7HC64 | Applied Physics Lab | 0 | 0 | 3 | 1.5 | 25 | 75 |
| 7 | 7HC62 | English (Oral communication skills) Lab | 0 | 0 | 2 | 1 | 25 | 75 |
| 8 | 7B191 | Technical Seminar I | 0 | 0 | 2 | 1 | 100 |  |
|  |  | Total | 11 | 3 | 11 | 19.5 | 250 | 450 |
|  |  |  |  |  |  |  |  |  |
| **Course structure for B. Tech. I Year II Semester ME** | | | | | | | | |
| **Sl.No** | **Course code** | **Name of the Course** | **L** | **T** | **P** | **C** | **Max. Marks** | |
| 1 | 7HC03 | Chemistry | 3 | 1 | 0 | 4 | **CIE** | **SEE** |
| 2 | 7FC01 | Problem Solving using C | 3 | 0 | 0 | 3 | 25 | 75 |
| 3 | 7HC08 | Engineering Mathematics – II | 3 | 1 | 0 | 4 | 25 | 75 |
| 4 | 7BC01 | Workshop/ Manufacturing practices (Theory) | 1 | 0 | 0 | 1 | 25 | 75 |
| 5 | 7HC01 | English (Reading, Listening and Writing) | 1 | 0 | 0 | 1 | 25 | 75 |
| 6 | 7HC63 | Chemistry Lab | 0 | 0 | 3 | 1.5 | 25 | 75 |
| 7 | 7FC61 | Problem Solving using C Lab | 0 | 0 | 3 | 1.5 | 25 | 75 |
| 8 | 7BC61 | Workshop/ Manufacturing practices lab | 0 | 0 | 3 | 1.5 | 25 | 75 |
| 9 | 7HC61 | English lab (Reading, Listening and Writing) | 0 | 0 | 2 | 1 | 25 | 75 |
| 10 | 7B292 | Technical Seminar II | 0 | 0 | 2 | 1 | 100 |  |
|  |  | Total | 11 | 2 | 13 | 19.5 | 300 | 600 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **II Year – I semester (3**rd Semester) | | | | | | | | |
| S.No. | Subject Code | Subject | L | T | P/D | C | Max. Marks | |
|  |  |  |  |  |  |  | **CIE** | **SEE** |
| 1 | 7HC12 | Engineering Mathematics –III | 2 | 1 | --- | 3 | 25 | 75 |
| 2 | 7B306 | Thermodynamics | 3 | --- | --- | 3 | 25 | 75 |
| 3 | 7B307 | Mechanics of Solids | 3 | --- | --- | 3 | 25 | 75 |
| 4 | 7B308 | Materials Engineering | 3 | --- | --- | 3 | 25 | 75 |
| 5 | 7B309 | Fluid Mechanics and Hydraulic Machinery | 3 | --- | --- | 3 | 25 | 75 |
| 6 | 7B310 | Machine Drawing and Computer aided drawing Practice | 1 | --- | 4 | 3 | 25 | 75 |
| 7 | 7B362 | Metallurgy Lab & Mechanics of Solids Lab | --- | --- | 4 | 2 | 25 | 75 |
| 8 | 7B363 | Fuels and Lubricants Lab | --- | --- | 2 | 1 | 25 | 75 |
| 9 | 7B364 | Fluid Mechanics and Hydraulic Machinery Lab | --- | --- | 2 | 1 | 25 | 75 |
| 10 | 7B393 | Technical seminar-III | --- | --- | 2 | 1 | 100 |  |
|  |  | **Total** | **15** | **1** | **14** | **23** | **325** | **675** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **II Year – II Semester( 4th Semester)** |  |  |  |  |  |  |
| **S.No.** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max. Marks** |  |
|  |  |  |  |  |  |  | **CIE** | **SEE** |
| 1 | 7B411 | Manufacturing Processes | 3 | --- | --- | 3 | 25 | 75 |
| 2 | 7B412 | Applied Thermodynamics-I | 3 | --- | --- | 3 | 25 | 75 |
| 3 | 7B413 | Kinematics of Machinery | 2 | 1 | --- | 3 | 25 | 75 |
| 4 | 7AC48 | Electrical and Electronics Engineering | 2 | --- | --- | 2 | 25 | 75 |
| 5 | OEC | Open Elective-I | 3 | --- | --- | 3 | 25 | 75 |
| 6 | 7ZC01 | Management Science and Financial Accounting | 2 | --- | --- | 2 | 25 | 75 |
| 7 | 7AC95 | Electrical and Electronics Engineering lab | --- | --- | 2 | 1 | 25 | 75 |
| 8 | 7B465 | Manufacturing Processes Lab | --- | --- | 2 | 1 | 25 | 75 |
| 9 | 7B494 | Technical seminar-IV | --- | --- | 2 | 1 | 100 |  |
| 10 | 7B466 | Comprehensive Viva-voce-I | --- | --- | 2 | 1 | 50 | 50 |
| 11 | \*\* | **Summer Industry Internship-I (Evaluation will be in III - I)** | --- | --- | --- | --- | --- | --- |
|  |  | **Total** | **15** | **1** | **8** | **20** | **350** | **650** |

|  |  |
| --- | --- |
|  | **Open Elective-I** |
| 7EC02 | Data Structures |
| **7GC46** | Biology for Engineers |
| 7ZC22 | Basics of Entrepreneurship |
| 7ZC25 | Basics of Indian Economy |
| 7ZC20 | Product and Services |
| 7ZC05 | Banking Operations, insurance and Risk Management |
| 7BC61 | Smart Materials |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **III Year – I Semester (5th Semester)** |  |  |  |  |  |  |
| **S.No.** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max. Marks** |  |
|  |  |  |  |  |  |  | **CIE** | **SEE** |
| 1 | 7B514 | Applied Thermodynamics-II | 2 | 1 | --- | 3 | 25 | 75 |
| 2 | 7B515 | Design of Machine Elements-I | 3 | --- | --- | 3 | 25 | 75 |
| 3 | 7B516 | Metal Cutting and Machine Tools | 3 | --- | --- | 3 | 25 | 75 |
| 4 | 7B517 | Dynamics of Machinery | 2 | 1 | --- | 3 | 25 | 75 |
| 5 |  | Echology, Indian Culture & History | 2 | --- | --- | 2 | 25 | 75 |
| 6 | OEC | Open Elective-II | 3 | --- | --- | 3 | 25 | 75 |
| 7 | 7HC76 | Quantitative Aptitude | -- | -- | 2 | 1 | 25 | 75 |
| 8 | 7B567 | Applied Thermodynamics Lab | --- | --- | 2 | 1 | 25 | 75 |
| 9 | 7B568 | Machine Tools Lab | --- | --- | 2 | 1 | 25 | 75 |
| 10 | 7B569 | Kinematics & Dynamics of Machines Lab | --- | --- | 2 | 1 | 25 | 75 |
| 11 | 7B595 | Technical Seminar-V | --- | --- | 2 | 1 | 100 |  |
| 12 | \*\* 7B570 | **Summer Industry Internship-I** | --- | --- | --- | 1 | 25 | 75 |
|  |  | **Total** | **15** | **2** | **10** | **23** | **375** | **825** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **III Year – II Semester (6th Semester)** |  |  |  |  |  |  |
| **S.No.** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max. Marks** |  |
|  |  |  |  |  |  |  | **CIE** | **SEE** |
| 1 | 7B618 | Heat Transfer | 2 | 1 | --- | 3 | 25 | 75 |
| 2 | 7B619 | Design of Machine Elements-II | 2 | 1 | --- | 3 | 25 | 75 |
| 3 | 7B620 | Metrology and Instrumentation | 3 | --- | --- | 3 | 25 | 75 |
| 4 | 7B621 | CAD/CAM | 3 | --- | --- | 3 | 25 | 75 |
| 5 | OEC | Open Elective-III | 3 | --- | --- | 3 | 25 | 75 |
| 6 | PEC | Professional Elective-I | 3 | --- | --- | 3 | 25 | 75 |
| 7 | 7HC77 | Logical Reasoning | -- | -- | 2 | 1 | 25 | 75 |
| 8 |  | Soft skills | -- | -- | 2 | 1 | 25 | 75 |
| 9 | 7B671 | CAD/CAM Lab | --- | --- | 2 | 1 | 25 | 75 |
| 10 | 7B672 | Heat Transfer Lab | --- | --- | 2 | 1 | 25 | 75 |
| 11 | 7B673 | Metrology & Instrumentation Lab | **---** | **---** | 4 | 2 | 25 | 75 |
| 12 | 7B674 | Group Project | --- | --- | 4 | 2 | 25 | 75 |
| 13 | 7B675 | Comprehensive Viva-voce-II | --- | --- | 2 | 1 | 50 | 50 |
| 14 | \*\*\* | **Summer Industry Internship-I (Evaluation will be in IV - I)** | --- | --- | --- | --- | --- | --- |
|  |  | **Total** | **16** | **2** | **18** | **27** | **350** | **950** |

|  |  |
| --- | --- |
| **Open Elective-III** |  |
| Computational Biology (B.T.Stream) | B.T |
| Data Base Systems | CSE |
| VLSI & Embedded System | ECE |
| **Advance Entrepreneurship** | **Entrepreneurship Stream** |
| **Indian history, Culture and Geography** | **Scoial Sciences Stream** |
| **General Management of Entrepreneurship** | **Technology Entrepreneurship** |
| **Finanacial Institutions, Markets and Services** | **Financial Stream** |
| Fundamentals of Measurements and Instrumentation | EEE |
| Basic German Language | language |

|  |  |
| --- | --- |
| **CODE** | **Professional Elective-I** |
| 7B622 | Design and Analysis of Experiments |
| 7B623 | Hydraulics and Pneumatic Systems |
| 7B624 | Thermal Turbo machinery |
| 7B625 | Automobile Engineering |
| 7B626 | Introduction to Nanotechnology |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **IV Year I Semester(7th Semester)** |  |  |  |  |  |  |
| **Sl. No** | **Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max. Marks** |  |
|  |  |  |  |  |  |  | **CIE** | **SEE** |
| 1 | 7B727 | Finite Element Analysis | 3 | --- | --- | 3 | 25 | 75 |
| 2 |  | Indian polity and Economy | 2 | --- | --- | 2 | 25 | 75 |
| 3 | 7B728 | Additive Manufacturing Technologies | 3 | --- | --- | 3 | 25 | 75 |
| 4 | 7B729 | Automation and Robotics | 3 | --- | --- | 3 | 25 | 75 |
| 5 | 7B730 | Operations Research | 2 | --- |  | 2 | 25 | 75 |
| 6 | PEC | Professional Elective-II | 3 | --- | --- | 3 | 25 | 75 |
| 7 | PEC | Professional Elective-III | 3 | --- | --- | 3 | 25 | 75 |
| 8 | 7B776 | Production Drawing Practice | --- | --- | 2 | 1 | 25 | 75 |
| 9 | 7B777 | Project-I | --- | --- | 4 | 2 | 100 |  |
| 10 | \*\*\* 7B778 | **Summer Industry Internship-II** | --- | --- | --- | 1 | 25 | 75 |
|  |  | **Total** | **19** | **0** | **6** | **23** | **325** | **675** |

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| **CODE** | **Professional Elective-II** |
| 7B731 | Rotor Dynamics |
| 7B732 | Refrigeration and Air Conditioning |
| 7B733 | Advanced Manufacturing Processes |
| 7B734 | Characterization of Nanomaterials |
| 7B735 | Quality and Reliability Engineering |
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|  | | **Professional Elective-III** | | | |
| 7B736 | | Design of Mechanisms | | | |
| 7B737 | | Renewable Energy Systems | | | |
| 7B738 | | Design of Press tools and Tool Design | | | |
| 7B739 | | Nano Bio-Materials | | | |
| 7B740 | | Mechatronics | | | |
|  |  | | **IV Year II Semester(8th Semester)** |  |  | |  |  |  |  |
| **Sl. No** | **Code** | | **Subject** | **L** | **T** | | **P/D** | **C** | **Max. Marks** |  |
|  |  | |  |  |  | |  |  | **CIE** | **SEE** |
| 1 | PEC | | Professional Elective-IV | 3 | --- | | --- | 3 | 25 | 75 |
| 2 | PEC | | Professional Elective –V | 3 | --- | | --- | 3 | 25 | 75 |
| 3 | 7B879 | | Project-II | --- | --- | | 10 | 5 | 50 | 150 |
|  |  | | **Total :** | **6** | **0** | | **10** | **11** | **100** | **300** |

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|  | **Professional Elective-IV** |
| 7B841 | Fracture Mechanics |
| 7B842 | Power Plant Engineering |
| 7B843 | Nano composites |
| 7B844 | Simulation Modeling of Manufacturing Systems |
| 7B845 | Mechanics Manufacturing Methods of Composite Materials |

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|  | **Professional Elective-V** |
| 7B846 | Design Optimization |
| 7B847 | Jet propulsion and Rocket Engineering |
| 7B848 | Computational Fluid Dynamics |
| 7B849 | Carbon based nanostructures and their applications |
| 7B850 | Flexible Manufacturing System & Machine Vision |

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**B.TECH. I YEAR I SEM (Mechanical)**

**L T P C**

**Code: 7HC04 APPLIED PHYSICS 3 1 0 4**

**Course Objectives**

* To understand basic fundamentals of crystallography, crystal structures, their properties
* To understand the various defects of a crystal and X-ray diffraction techniques to analyze a crystal structure.
* To make the students to widen the conceptual understanding of the fundamental principles of interference and diffraction (wave optics)
* To understand the basic concepts of normal light, Laser and its applications and to know about the fundamentals of radioactivity and its applications.
* To know the various types of vibrations like periodic, vibrating strings, ultrasonics, magnetostriction, piezo-electricity, NDT.
* To discuss about the nano-technology, preparation techniques and characterization (XRD, SEM & TEM), CNTs

**Unit:1**

**Crystallography and Crystal structures and their relative properties**

Space Lattice, Unit Cell, Lattice Parameters, Crystal Systems, Bravais Lattices, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC

and HCP Structures. Crystal Planes, directions and Miller Indices, Inter Planar Spacing of Orthogonal Crystal Systems.

**Unit:2**

**Crystal Defects and X-ray diffraction**

Point Defects - Vacancies, Substitutional, Interstitial, Frenkel and Schottky Defects-Calculation of concentrations, Qualitative treatment of line (Edge and Screw Dislocations) Defects, Burger’s Vector.

X-ray Diffraction: Bragg’s Law, Laue method and Powder Method.

**Unit:3**

**Wave optics and applications**

**Interference**: Introduction, Superposition of waves, Young’s double slit experiment, Intensity calculation, fringe width, Interference in thin films due to reflection of light, Newton’s rings. Applications: Calculation of Refractive Index of liquid, Thickness of glass plate.

**Diffraction:** Introduction, Plane diffraction grating (Qualitative), Theory of plane transmission grating, Resolving power of a grating - Application; calculation of wavelength of spectral light by using grating.

**Unit:4**

**Lasers**

Characteristics of LASER, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, pumping, Population Inversion, Lasing Action, Einstein’s Coefficients and Relation between them and significance, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers in medicine and engineering.

**Nuclear Energy:** Radioactivity, Nuclear binding energy, Nuclear fission, Nuclear fusion, , β, γ rays decay, Geiger-Muller counter and practical applications of nuclear physics.

**Unit:5**

**Vibrations and ultrasonics**

Undamped vibrations and its solutions (quantitative), Damped, Forced vibrations (qualitative) and Resonance. Applications: Physical Pendulum, Torsional Pendulum and Compound Pendulum, Vibrating strings. Production and properties of ultrasonics by magnetostriction effect and piezoelectric effect. Applications of ultrasonics, special reference to NDT.

**Unit:6**

**Nanotechnology**

Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication, Sol-gel, Precipitation, 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.B.K. Pandey & S. Chaturvedi Engineering Physics, Cengage Learning

2.D.K. Bhattacharya and Poonam Tandon, OXFORD university press.

**Reference Books:**

1. Charles Kittel, Introduction to Solid State Physics, John Wiley Publisher

2. Dekker, Solid State Physics

3. Halliday and Resnick, Physics

4. Engineering Mechanics, 2nd ed. – MK Harbola

5. Theory of Vibrations with Applications – WT Thomson

6. S.O. Pillai, Solid State Physics

7. P K Palanisamy, Engineering Physics, Sitech Publications

8. A. Ghatak – Optics

9. Physical Metallurgy principles 4th edition-Reza Abbaschian Lara Abbaschian

Robert E. Reed-Hill

**Course Outcomes**

After completing the course, students will be 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 defect type, describe the crystal structure using the various X-ray diffraction techniques.
* Analyze the wave nature and its types, superposition principle, differentiation between interference, diffraction and their applications
* Explain about emission, its types, laser principle, types, working and its applications and also to understand the radioactivity, fusion & fission, alpha, beta and gamma rays decay and its applications.
* Understand about the vibrations, periodic motion and apply the knowledge of ultrasonic, non destruction testing, magnetostriction, piezo-electricity.
* Summarize nano & bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation methods (physical & chemical), analysis the techniques like XRD, SEM, TEM

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**Syllabus for B. Tech. I Year I semester**

**Mechanical Engineering**

**ENGINEERING MECHANICS** (Mechanical Engineering)

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**Code:**: 7B101

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| **S.No** | **Course Objectives** | **S.No** | **Course Outcomes** |
| 1. | Understand the Concepts of resultant and equilibrium of System of Forces. | 1. | Understand and tackle the problems associated to Resultants and Equilibrium of system of forces. |
| 2 | To learn various method of analysis of structure including Principle of Virtual Work. | 2. | Analysis of forces in the structures by using method of joints sections and Principle of virtual work. |
| 3. | Learn the concept of Friction & Understanding the Proportion of surfaces and their Application | 3. | Analysis and solve the real world problems related to friction |
| 4. | Understand the properties of surfaces and volumes. | 4. | To Locate the centroid of various geometric shapes from basic principles. |
| 5. | Develop the capacity to predict the effect of force and motion. | 5. | To determine the area moment of inertia and mass moment of inertia for evaluating the strength and to analysis the rigid body motion. To Analyze and solve the motion parameters under the action of system of forces. |
| 6. | To Learn to solve the Problems on Kinetics by energy methods. | 6. | Able to apply various energy methods for solving kinetic problem. |

**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 BOOK:**

1. K. Vijay Kumar Reddy and J. Suresh Kumar, Singer’s Engineering Mechanics, BS Publications, Hyderabad, 2011

**REFERENCE BOOKS:**

1. Irving H.Shames , Engineering Mechanics.
2. Engineering Mechanics by Tayal.
3. Kurmi R.S. Engineering Mechanics S.Chand & Co.
4. Bansal R.K. A Text book of Engineering Mechanics, Laxmi Publications
5. Engineering Mechanics by S.S.Bhavikatti J.G.Rajasekharappa.
6. Engineering Mechanics by Timoshenko & Young.
7. Engineering Mechanics by Meriam and Kraize
8. Engineering Mechanics by K.L.Kumar / Tata McGraw Hill.

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**I Year B.Tech. I Semester Engineering Mathematics -1**

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**(Common to EEE, ECE, ME, CE)**

**2018-19**

**Code: 7**HC06

**Pre Requisites**: Mathematics Knowledge at Pre-University Level

***Course Objectives:*** To make the students to understand and expected to learn

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

**Syllabus**

***Unit-1: Calculus-1***

Evolutes and involutes; Beta and Gamma functions and their properties; Evaluation of improper integrals, Applications of definite integrals to evaluate surface areas and volumes of revolutions.

***Unit-2: Calculus-2***

Rolle’s Theorem and Mean value theorems (Statements and Geometrical Interpretations if any); Taylor’s and Maclaurin’s theorems with remainders (without proof); Taylor’s and Maclaurin’s series expansion.

***Unit-3: Sequences and series***

Convergence of sequence and series, tests for convergence; Power series. Fourier series, Half range sine and cosine series, Parseval’s theorem (without proof).

***Unit-4: Multivariable Calculus (Differentiation):***

Limit, continuity and partial derivatives, total derivative; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, directional derivatives, Tangent plane; Concepts of divergence and curl with physical significance.

***Unit-5: Matrices-1***

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

***Unit-6: Matrices-2***

Eigenvalues and Eigenvectors; Cayley - Hamilton Theorem, Diagonalization of matrices and Orthogonal transformation.

**Text Books:**

1. R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

**Reference Books:**

(i) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

(ii) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,

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) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

(vii) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

(viii) Engineering mathematics, Ravish R.Singh, Mcgraw Hill Education.

***Course Outcomes:*** After the course completion the students will be able to

1. Solve the problems using special functions; evaluate surface areas and volumes of revolutions.
2. Verify the mean value theorems and also express the given function in series form using Taylor’s theorem.
3. Determine the convergence, divergence or oscillating nature of a series and express the function as trigonometric series.
4. Compute the extreme values of a function defined with and without constraints.
5. Check the consistency or inconsistency of a linear system and ability to solve real time problems.
6. Calculate the Eigen values and Eigen vectors of a matrix and their application for orthogonal transformation.

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**Syllabus for B. Tech. I Year**

**ENGINEERING GRAPHICS & DESIGN**

**B.Tech I year I sem (EEE, ECE & ME) II sem (CSE, ECE, IT & CE)**

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**Code : 7BC02**

**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

**UNIT – I**

**Introduction to Engineering Drawing:** Drawing Instruments and their uses, types of lines, Types and uses of pencils, Lettering, Rules of dimensioning.

**Curves used in Engineering Practice and their Constructions**:

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

**UNIT – II**

**Orthographic Projection:** Principles of Orthographic Projections – Conventions – First angle and third angle projections (however all drawing exercises must be in first angle only) - Projection of Points, Lines - Inclined to both planes, Projections of regular Plane, inclined planes - Auxiliary views.

**UNIT –III**

**Projections of Regular Solids:** Projections of Regular Solids: Prisms, Cylinders, Pyramids, Cones – Axis inclined to both planes, Auxiliary views.

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

**UNIT – V**

**Isometric Projections/views:** Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane, Simple Solids. Conversion of isometric views to orthographic views.

**UNIT –VI**

**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,2D drawings-simple exercises , 3D wire-frame and shaded solids- Commands, Boolean operations.

**Text/Reference Books:**

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

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

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

(iv) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

(v) AUTOCAD Software Theory and User Manuals

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**Syllabus for B. Tech I Year I semester**

**(Mechanical Engineering)**

**ENGLISH (Oral Communication Skills)**

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**Code : 7HC02**

Course Objectives : The course will develop the students’ ability to

* integrate listening and speaking skills
* communicate effectively
* speak effectively on a given topic
* master the art of presentation
* interact with peers in a group discussion
* get exposed to face interviews

**Course Outcomes :** After completing the course students will be able to

* understand, analyze and respond to the audience by listening effectively
* acquire the articulation of different types of sentences by practicing pause patterns and question tags.
* translate and demonstrate self, participate effectively in activities like JAM, extempore
* express and deliver a presentation on the given topic through role plays and situational dialogues
* implement English language to meet the standards of corporate and real world in a group.
* present and communicate effectively by facing mock interviews by experts from industry and academy.

**Unit-I : Listening Skills**

* 1. Integrating Listening, Reading and Speaking

1.2Introduction Integrated Speaking Skills

**Unit-II: Oral Communication Skills -I**

2.1 Types of Sentences – Assertive, Interrogative, Imperative and Exclamatory

2.2 Difference between Pauses, Gaps

2.3 Question Tags

2.4 Introduction and Greetings

2.5 Asking and Giving Directions

**Unit-III: Oral Communication Skills -II**

3.1 Speaking on a particular topic

3.2 Content development using cohesive devices

3.3 Common Errors in Spoken English

**Unit-IV: Presentation skills**

4.1Introduction to Presentation Skills

4.2 Role Plays & Situational Dialogues

**Unit-V : Group Discussion**

5.1 Importance of Group Discussion

5.2 Do’s and Don’ts of Group Discussion

**Unit-VI: Interview Skills**

6.1 Introduction to Interview Skills

* 1. Types of Interviews
  2. Pre-Interview Preparation
  3. Interview Etiquette (Non-Verbal)

**Suggested Readings:**

1. *Step by step learning language and life skills* by Niruparani, Jayasree Mohanraj, Indira, Sailakshmi Pearson Publishers
2. *Communication skills for technical students* by TM Farhathullah, Orient Black swan Publications
3. *English for technical Communication* by K.R. Lakshmi Narayan , Scitech Publications
4. *Practical English Usage.* Michael Swan. OUP. 1995.
5. *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
6. *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyderabad. Oxford University Press

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**B.TECH. I YEAR I SEM (Mechanical)**

**L T P C**

**Code: 7HC64 APPLIED PHYSICS LAB - - 3 1.5**

**Course Objectives**

* To explain about magnetic induction, Biot-Savart principle - Magnetism
* 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
* To understand about the [ionizing radiation](https://en.wikipedia.org/wiki/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.
* 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 study the LED characteristics and forward resistance – Semiconductor devices.
* Explaining about the electrical resonance by using the LCR circuit – Electrical / Semiconductor devices.
* To know the time constant of RC circuit - Electrical / Semiconductor devices.

**List of Experiments**

1. Determination of magnetic induction flux density along the axis of a current carrying circular coil using Stewart and Gee’s experiment.
2. Determination of acceleration due to gravity and radius of gyration using compound pendulum.
3. Determination of rigidity modulus of a given wire material using the Torsional pendulum.
4. Studying the characteristics of Geiger–Muller counter and verifying the inverse square law.
5. Verification the transverse laws of stretched strings by using the Sonometer.
6. Determination of frequency of an electrically vibrating tuning fork using the Melde’s experiment
7. Calculation of dispersive power of a given material of prism by using

Spectrometer in minimum deviation method.

1. Determination of wavelength of a monochromatic light source by using

Newton’s rings experiment.

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

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

**Course Outcomes**

After completing the experiment, students will be 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 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.
* Understand the concept of radiation, ionizing radiation, [radiological protection](https://en.wikipedia.org/wiki/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.
* 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.
* 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.

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**Syllabus for B. Tech I Year I semester**

**(Mechanical Engineering)**

**ENGLISH (Oral Communication Skills) Lab**

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**Code : 7HC62**

Course Objectives : The course will develop the students’ ability to

* integrate listening and speaking skills
* communicate effectively
* speak effectively on a given topic
* master the art of presentation
* interact with peers in a group discussion
* get exposed to face interviews

**Course Outcomes :** After completing the course students will be able to

* understand, analyze and respond to the audience by listening effectively
* acquire the articulation of different types of sentences by practicing pause patterns and question tags.
* translate and demonstrate self, participate effectively in activities like JAM, extempore
* express and deliver a presentation on the given topic through role plays and situational dialogues
* implement English language to meet the standards of corporate and real world in a group.
* present and communicate effectively by facing mock interviews by experts from industry and academy.

**Unit-I :** Practice sessions on

Listen & Speak

Listen, Read, and Speak

**Unit-II:** Practice sessions on

Articulation of types of Sentences

Question Tags

Introduction and greeting

Asking for and Giving

Directions

**Unit-III:** Practice sessions on

JAM/Extempore/

Impromptu

Prepared talk on given topics

**Unit-IV:** Practice sessions on

Formal Presentation

Role Plays & Situational Dialogues

**Unit-V :** Practice sessions on

Group Discussion

**Unit-VI:** Practice sessions on

Mock Interviews

**Suggested Readings:**

1. *Step by step learning language and life skills* by Niruparani, Jayasree Mohanraj, Indira, Sailakshmi Pearson Publishers
2. *Communication skills for technical students* by TM Farhathullah, Orient Black swan Publications
3. *English for technical Communication* by K.R. Lakshmi Narayan , Scitech Publications
4. *Practical English Usage.* Michael Swan. OUP. 1995.
5. *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
6. *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyderabad. Oxford University Press

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**Syllabus for B. Tech I Year I semester**

**(Mechanical Engineering)**

**TECHNICAL SEMINAR-I**

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**Code : 7B191**

**Course Objective :**

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

**Course Outcomes :**

* + - 1. Identify 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.
      5. Exhibit interview facing skills.
      6. Demonstrate team leading qualities.

**Suggested topics for seminar :** The students may choose seminar topics from the following: Crystallography , optics , Lasers ,Nuclear Energy , Nanotechnology Etc,.

**Procedure**:

1. Seminar in-charges shall highlight the significance of Technical Seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar In-charge shall take signatures from students.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot / week.
5. Progress of the seminars needs to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for Technical Seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

**Distribution of Marks**

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| Day to day progress of the work | 15 marks |
| Final report and viva | 15 marks |
| Level of content | 20 marks |
| Presentation | 20 marks |
| Discussion & Involvement | 20 marks |
| Attendance | 10 marks |
| Total | 100 Marks |

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**Syllabus for B. Tech I Year II semester**

**(Mechanical Engineering)**

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**CHEMISTRY**

**Code: 7BC03**

**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 and to understand the control methods and protective coatings for metals
6. To learn the chemical reactions of drugs that are used in the synthesis of drug molecules

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

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**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. 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**

**Engineering materials (8L)**

**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.**

**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)**

1. **Introduction**:- Hardness of water – types of hardness (temporary and permanent), calculation of hardness- Numerical problems. Estimation of hardness of water by EDTA Method.
2. **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.
3. **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

1. Primary batteries – Lechalanche cell (dry cell), Lithium cell
2. Secondary batteries(Accumulators) – Lead acid battery, Lithium-ion battery
3. Fuel cells- H2 – O2 fuel cell and MeOH-O2 fuel cell-advantages and applications.

**Engineering applications – future water powered car, Hydrogen production and storage**.

**UNIT - V**

**Corrosion and its prevention (7L)**

Corrosion – basic concepts –types of corrosion, chemical, electrochemical corrosion (absorption of O2 and evolution of H2). Types of electrochemical corrosion – galvanic corrosion, pitting corrosion- factors affecting the rate of corrosion.

**Cathodic protection** – sacrificial anodic protection and impressed current cathodic protection method. Methods of metallic coatings-hot dipping (**tinning and galvanizing**), metal cladding (**Al cladding**), electroplating (**copper plating**) and electroless plating (**nickel plating**).

**UNIT-VI**

**Organic reactions and drug molecules (5L)**

Introduction : reactions involving substitution(SN1, SN2) addition to double bond(C=C), elimination(E1 and E2), oxidation (using KMnO4, CrO3), reduction (Hydrogenation by Ni/H2, 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: by Jain & Jain ,Dhanapathrai Publications (2015)
2. Engineering Chemistry: by Thirumala Chary & Laxminarayana, Scitech Publications (2016)
3. Engineering Chemistry: by & B.Rama Devi, Prsanta Rath & Ch. Venkata Ramana Reddy, Cengage Publications (2016)

**REFERENCE BOOKS:**

1. Fundamentals of Molecular Spectroscopy by C. N. Banwell
2. Drugs by David Krupadanam- Universities Press
3. University chemistry by B. H. Mahan
4. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

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**H: High M: Medium L: Low**

**Syllabus for B. Tech I Year II semester**

**(Mechanical Engineering)**

**Problem Solving using C**

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**Code: 7FC01**

**Course Objectives:**

1. To impart adequate knowledge on architecture of computer and problem solving techniques.

2. To understand and effective usage of syntax and semantics using ‘c’ languages

3. The impart the concept of modularity

4. Learn and apply the concept of array to solve the real time problems.

5. To understand effective and efficient utilization of memory.

**Course Outcomes:**

**After completion of this course student will learn**

1. To formulate simple algorithms for arithmetic, logical problems and to translate the algorithms in to programs using C language

2. To test and execute the programs and correct the logical errors if any, to implement Conditional branching, iteration

3. To analyze and decompose a problem into functions and synthesize a complete program using divide and conquer approach.

4. Students will be able to learn, understand and apply the concept of arrays in various applications.

5. To impart the knowledge about pointers this is the backbone of effective memory handling techniques.

6. Students will be able to express the advantages of user defined data types and issues related to file organizations, which provide flexibility for application development.

**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.

**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**

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill Suggested

**Reference Books**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

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H: High M: Medium L: Low

Sreenidhi Institute of Science & Technology

**(An Autonomous Institution approved by UGC and ‘A’ Grade Awarded by NAAC**

**Syllabus for B. Tech I Year II semester**

**(Mechanical Engineering)**

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**Engineering Mathematics -II**

**Code: 7HC08**

**Pre Requisites**: Engineering Mathematics-I

***Course Objectives:*** To make the students to understand and expected to learn

1. Multiple integration and its applications also acquire knowledge on curvilinear coordinate system.
2. Various analytical methods to solve first order first degree and also the equations not of first degree ordinary differential equations.
3. Methods to solve higher order ordinary differential equations.
4. Series solution of second order ordinary differential equations with variable coefficients.
5. Basic concepts of Complex Analysis and conformal mapping and their properties.
6. Series expansion of a function using Taylor’s and Laurent’s series. Evaluation of definite integrals and improper integrals.

**Syllabus**

***Unit-1: Multivariable Calculus (Integration):***

Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), Introduction to orthogonal curvilinear coordinates, Simple applications involving cubes; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes (without proofs).

***Unit-2: First order ordinary differential equations:***

Exact, linear and Bernoulli’s equations; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut’s type.

***Unit-3: Ordinary differential equations of higher orders:***

Higher order linear differential equations with constant coefficients, method of variation of parameters, Cauchy-Euler equation;

**(PTO)**

***Unit-4: Series Solutions to Second Order Ordinary Differential Equations:***

Power series solutions: Legendre polynomials, Bessel functions of the first kind and their properties.

***Unit- 5: Complex Variable – Differentiation:***

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

***Unit- 6: Complex Variable – Integration:***

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville’s theorem and Maximum-Modulus theorem (without proof); Taylor’s series, zeros of analytic functions, singularities, Laurent’s series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

**Text Books:**

1. R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

**Reference Books:**

(i) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

(ii) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

(iii) B.S. Grewal, Elementary Engineering Mathematics, Khanna Publishers

(iv) Engineering Mathematics, Srimanta Pal, OXFORD university press.

(v) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

(vi) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

(vii) Engineering Mathematics, P.Sivaramakrishna Das, Pearson Publications.

***Course Outcomes:*** After the course completion the students will be able to

1. 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.
2. 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.
3. Identify and solve higher order ordinary differential equations with constant coefficients using some standard methods and also their applications in LCR circuits.
4. Write the solutions of Legendre and Bessel’s equations s series.
5. Understand the concept of analyticity of a function; solve the problems on conformal mapping.

Express the functions of a complex variable in series form also able to evaluate definite and improper integrals using complex integration.

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**Syllabus for B. Tech I Year II semester**

**(Mechanical Engineering)**

**WORKSHOP/MANUFACTURING PRACTICES (THEORY)**

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**B.Tech I year II sem (EEE, ECE & ME)**

**Code: 7BC01**

**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:**

1. To understand various basic tools to perform simple joints using metal and wood.
2. To understand the principle of various electrical and electronic appliances and their applications.
3. To understand the manufacturing process of welding, casting and tin smithy and their applications.
4. To understand the operation of basic as well as advanced machines used for fabrication of Metals, Plastics and Glass.

**Theory:** In theory classes the following syllabus is to be covered in 10hrsusing PPTS and Videos (Elementary treatment only)

* 1. Fitting & Power Tools
  2. Electrical & Electronics Appliances
  3. Carpentry
  4. Plastic molding & Glass Cutting
  5. Metal Casting
  6. Metal Joining: Arc & gas welding and brazing
  7. Metal forming
  8. Machining
  9. Advanced manufacturing methods: (Micro machining, USM,ECM,EDM )
  10. CNC machining & Additive Manufacturing

**Suggested Text/Reference Books:**

1 Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “Elements of Workshop Technology”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

2.Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGrawHill House, 2017.

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**Syllabus for B. Tech I Year II semester**

**(Mechanical Engineering)**

**ENGLISH - (Reading, Listening and Writing)**

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**Code: 7HC01**

**Course Objectives :** The students will

* acquire knowledge on various types of listening techniques, barriers and benefits of listening
* recognize the speech sounds and learn the intonation patterns
* learn various vocabulary patterns
* develop the ability to structure and punctuate the sentences
* learn different reading techniques
* learn different writing skills

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

* understand and differentiate different types of listening techniques used to interact with real world problems
* differentiate the speech sounds and improve their accent and modulation while speaking
* understand and illustrate different word roots, word derivatives – synonyms, antonyms and word inflections
* discriminate a variety of sentence types, their structure and use punctuations
* get acclimatized to reading strategies and note making.
* develop proficiency in writing and preparing resume

**Unit-I : Listening**

* 1. Importance of Listening;

1.2 Types of listening

1.3 Barriers to Listening

1.4 Benefits of Listening

**Unit-II: Basic Communication Skills**

2.1 Introduction to Speech Sounds

2.2 Vowels, Diphthongs, Consonant Sounds

2.3 Significance of word accent

2.4.Intonation Patterns

**Unit-III: Vocabulary**

3.1 Word Roots - Affixes: Prefixes and Suffixes

3.2 Homophones, Homonyms, Homographs

3.3 Synonyms – Antonyms

3.4 One word substitutes

3.5 Idioms and Phrases

**Unit-IV: Basic Writing Skills**

4.1 Sentence Structure

4.2 Kinds of Sentences

4.3 Punctuation in Writing

**Unit-V : Reading Comprehension**

5.1 Skimming and Scanning

5.2 Prediction Techniques and Inferring

5.3 Note Making

5.4 Reading Comprehension

**Unit-VI: Writing Skills**

6.1 Paragraph Writing

* 1. Paraphrasing
  2. Letter Writing
  3. Resume Writing

**Suggested Readings:**

(i)*English grammar just for you*Rajeevan Karal, Oxford publications

(ii) *Practical English Usage.* Michael Swan. OUP. 1995.

(iii) *Remedial English Grammar.* F.T. Wood. Macmillan.2007

(iv) *On Writing Well.* William Zinsser. Harper Resource Book. 2001

(v) *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

(vi) *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.

(vii) *Learn to Write* by Dr. G. Varalakshmi, Kindle Edition 2016

(viii) *A practical course for developing writing skills in English* by J.K. Gangal, PHI Learning Pvt Ltd.

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**Syllabus for B. Tech I Year II semester**

**(Mechanical Engineering)**

**CHEMISTRY LABORATORY**

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**Code: 7HC63**

**Course Objectives**:

The student will be able to learn:

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 (FeSO­4 Vs KMNO4 / 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. Thin layer chromatography

**Course Outcomes**

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

1. Methods to prepare inorganic complexes.
2. The process to determine surface tension of different liquids using stagnometer
3. The process to determine viscosity of lubricants by using redwood viscometer.
4. How to find acid value of an oil.
5. The principle and determination of Hardness of a water sample.
6. The methods to estimate amount of chlorine in water.
7. To determine unknown concentration of acid by using conductometric method.
8. To determine unknown concentration of acid by using potentiometric method.
9. Estimate rate constants of reactions from concentration of reactants/products as a function of time.
10. Methods to prepare industrially important polymers.
11. The method of preparation for organic compounds.
12. To separate the organic compounds from their mixture by using Thin layer chromatography.

**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 (FeSO­4 Vs KMNO4 / 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. Thin layer chromatography

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**Syllabus for B. Tech I Year II semester**

**(Mechanical Engineering)**

**Problem Solving using C LAB**

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**Code: 7FC61**

**Course Objectives:**

1. Students should enhance their analyzing and problem solving and analytic skills to write programs in C language.
2. Student will be trained to implement the basic concepts of the C-programming language.
3. To understands the lab components and apply them to solve the real time problems.
4. To understand design and implementation issues involved in variable allocation, binding, control flow, types, subroutines, and parameter passing.
5. To write diversified solutions using C language.

**Course Outcomes:**

**After completion of this course student will learn**

1. To formulate the algorithms and flow charts for simple, conditional and iterative problems.
2. To be able to follow the syntax of C and correct the errors as reported by the compilers
3. To convert the given problems to programs using expressions, conditions, loops.
4. To do basic programs with arrays and do searching and sorting techniques with arrays.
5. To implement the concept of modularity by using functions.
6. To implement programs by using pointers and pointer arithmetic.
7. To create and implement user defined data types such as structures and unions.
8. To be able to create, read and write simple files.
9. **Unit I (Cycle 1)**
10. Write an algorithm for converting a given Celsius temperature to its equivalent Fahrenheit temperature and draw a flowchart.
11. Write an algorithm to find the largest of three given numbers and draw a flowchart.
12. Write an algorithm and draw a flowchart for finding the roots and nature of roots of a quadratic equation, given its coefficients.
13. Write an algorithm and flowchart for finding the first n Fibonacci numbers, give n.
14. **Unit II (Cycle 2)**
15. Write an algorithm, flowchart, and C program for:
16. Finding the area and circumference of a circle of given radius.
17. Finding the volume of a sphere of given radius.
18. Finding the lateral surface area of a right circular cone of given base radius and height.
19. Finding selling price of an item, given its cost price and profit percent.
20. Finding the interest on a given principal for a given period of time at a given rate of per year.
21. Write a C program to display all the sizes of data types in C.
22. 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.
23. **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.
24. **Unit III (Cycle 4)**
25. Write three C programs to print a multiplication table for a given number using while, do-while, and for loops.
26. Write a C program to compute the sum of:
27. 1+x+x2+x3+………….+xn, given x and n.
28. 1! + 2! + 3! + . . . + n!, given n.
29. 1 – x2/2! + x4/4! – x6/6! + x8/8! – x10/10! + … to n terms where the nth term becomes less than 0.0001.
30. **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.
31. **Unit III (Cycle 6)**
    1. Write C functions for the following:
       1. A function that takes an integer n as argument and returns 1 if it is a prime number and 0 otherwise.
       2. A function that takes a real number x and a positive integer n as arguments and returns xn.
       3. 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:
       1. Factorial of a non-negative integer n.
       2. Number of combinations of n things taken r at a time.
       3. Greatest Common Divisor of two integers.
       4. Least Common Multiple of two integers.
32. **Unit III (Cycle 7)**
    * 1. Write a menu driven style program to compute the above functions (cycle 6) on the choice of the function given by the user.
      2. Define macros for the following and use them to find sum of the squares of the minimum and maximum of two given numbers.
         1. Larger of two numbers.
         2. Smaller of two numbers.
         3. Sum of the squares of two numbers.
      3. Write a program to generate Pascal’s triangle.
      4. Write a program to count the number of letters, words, and lines in a given text.
33. **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.
34. **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.
35. **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.
36. **Unit VI (Cycle 11)**
37. 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.
38. Define a structure point. Write a program to find the distance between two points.
39. 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.
40. **Unit VI (Cycle 12)**
    1. Write a program to:
       1. 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.
       2. Open the file created above and display the contents of the file.
       3. Copy a file into some other file, file names given by the user or by command line arguments.
       4. Append a user mentioned file to another file.
       5. Reverse the first n characters of a file.

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**Syllabus for B. Tech I Year II semester**

**(Mechanical Engineering)**

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**WORKSHOP/MANUFACTURING PRACTICES (LAB)**

**Code: 7BC61**

Course Objectives:

1. To identify various basic tools to perform simple joints using metal and wood.
2. To recognize various electrical and electronic and their applications.
3. To understand the manufacturing process of welding , casting and tinsmithy and apply the processes in making simple products.
4. To understand and operate basic machines for fabrication of Metals, Plastics and Glass.
5. To understand the functions and parts of commonly used domestic appliances.

**COURSE OUTCOMES:**

1. After completion of the course , the student will be able tofabricate components with their own hands.
2. Assemble different components and produce small devices of their interest.

**Work shop and Manufacturing Practices**: Minimum of 10 experiments out of twelve given here under are to be completed

**LIST OF EXPERIMENTS**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Trades** | **List of Experiments** |
| 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.Practice of Cross Half lap joint  4. Practice of Half lap Dovetail joint |
| 3 | Electrical & Electronics | 5. One lamp one switch Practice  6. Stair case wiring: Practice |
| 4 | Welding shop  ( Arc & Gas) | Demonstration of Gas and Resistance welding  7. Practice of Lap and Butt joint using Arc welding |
| 5 | Casting | 8.Preparation of mould by using split pattern  9. Mould preparation and pouring of molten metal. |
| 6 | Tin Smithy | 10. Preparation of Rectangular Tray & Square box |
| 7 | Machine Shop | 11. Demonstration of turning , Drilling and Reaming operations |
| 8 | Plastic molding & Glass Cutting | 12 a) Demonstration of Injection Moulding  b) Demonstration of Glass Cutting with hand tools |
| 9 | Domestic Appliances | 13.Demonstration of Electric Iron, fan, Mixer, Hair Drier, Washing Machine etc. |
| 10 | Lab project | 14. Making various components and / or assembling the components which can be useful in domestic / engineering applications |

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**Syllabus for B. Tech I Year II semester**

**(Mechanical Engineering)**

**ENGLISH LAB (Reading, Listening and Writing)**

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| **L** | **T** | **P** | **C** |
| 0 | 0 | 2 | 1 |

**Code: 7BC01**

**Course Objectives :** The students will

* acquire knowledge on various types of listening techniques, barriers and benefits of listening
* recognize the speech sounds and learn the intonation patterns
* learn various vocabulary patterns
* develop the ability to structure and punctuate the sentences
* learn different reading techniques
* learn different writing skills

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

* understand and differentiate different types of listening techniques used to interact with real world problems
* differentiate the speech sounds and improve their accent and modulation while speaking
* understand and illustrate different word roots, word derivatives – synonyms, antonyms and word inflections
* discriminate a variety of sentence types, their structure and use punctuations
* get acclimatized to reading strategies and note making.
* develop proficiency in writing and preparing resume

**Unit-I :** Practice sessions on

Listening for Basic Vocabulary

Listening for General Information

Listen for specific information

Listening Comprehension

**Unit-II:** Practice sessions on Pronunciation

Articulation of Vowel and Consonant sounds

Listening for Word accent

Intonation Patterns

**Unit-III:** Exercises on Word Roots

Affixes : Prefixes and Suffixes

Identifying Homophones,

Homonyms, Homographs

Synonyms - Antonyms

One word substitutes

Idioms and Phrases

**Unit-IV:** Exercises on

Punctuation and Spelling

Error Identification in Sentences

Conversion of Sentences

**Unit-V :** Practice sessions on

Using passages for skimming and scanning

Note Making using Texts

Reading Comprehension using different techniques

**Unit-VI:** Exercises on

Paragraph Writing using hints/Guided Paragraphs

Writing Letters

Writing Resume

**Suggested Readings:**

(i)*English grammar just for you*Rajeevan Karal, Oxford publications

(ii) *Practical English Usage.* Michael Swan. OUP. 1995.

(iii) *Remedial English Grammar.* F.T. Wood. Macmillan.2007

(iv) *On Writing Well.* William Zinsser. Harper Resource Book. 2001

(v) *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

(vi) *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.

(vii) *Learn to Write* by Dr. G. Varalakshmi, Kindle Edition 2016

(viii) *A practical course for developing writing skills in English* by J.K. Gangal, PHI Learning Pvt Ltd.

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**Syllabus for B. Tech I Year II semester**

**(Mechanical Engineering)**

**TECHNICAL SEMINAR II**

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| 0 | 0 | 2 | 1 |

**Code: 7B292**

**Course Objective :**

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

**Course Outcomes :**

* + - 1. Identify 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.
      5. Exhibit interview facing skills.
      6. Demonstrate team leading qualities.

**Suggested topics for seminar :** The students may choose seminar topics from the following: Fuels, Metals And Alloys, Automobiles, Manufacturing Processes, Environment Etc,.

**Procedure**:

1. Seminar in-charges shall highlight the significance of Technical Seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar In-charge shall take signatures from students.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot / week.
5. Progress of the seminars needs to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for Technical Seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

**Distribution of Marks**

|  |  |
| --- | --- |
| Day to day progress of the work | 15 marks |
| Final report and viva | 15 marks |
| Level of content | 20 marks |
| Presentation | 20 marks |
| Discussion & Involvement | 20 marks |
| Attendance | 10 marks |
| Total | 100 Marks |

**Syllabus for B. Tech. II Year I semester**

**Engineering Mathematics–III**

**(Partial differential equations, Probability and Statistics)**

**(Common to ME & CE)**

**L T P/D C**

**Code: 7HC12 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.*

* ***Mapping of Course Outcomes with Program Outcomes:***

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| CO1 | H |  | M |  |  |  |  |  |  |  |  |  |
| CO2 | H |  | M |  |  |  |  |  |  |  |  |  |
| CO3 | H |  | M |  |  |  |  |  |  |  |  |  |
| CO4 | H |  | M |  |  |  |  |  |  |  |  |  |
| CO5 | H |  | M |  |  |  |  |  |  |  |  |  |
| CO6 | H |  | M |  |  |  |  |  |  |  |  |  |

***Syllabus***

***UNIT– I: 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.

***Unit-II: 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-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.

**(PTO)**

# *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:*** ***Tests of Hypothesis for Large 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.

***UNIT-VI:* Tests of Hypothesis for Small Samples**: **(10 L)**

Student t-test, Hypothesis testing concerning one mean and two means, F-test and χ2 test-Goodness of fit, Independence of Attributes.

**TEXT BOOKS**:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publications, New Delhi.

2. Ronald E. Walpole,Raymond H. Myer

s,Sharon L. Myers,Keying Ye, Probability & Statistics For Engineers & Scientists, 9th Ed. Pearson Publishers.

3. 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.

***Course Outcomes:***

*Students will able to*

1. *Form partial differential equations and find the solution to first order linear and nonlinear partial differential equations.*
2. *Applications of PDE.*
3. *Learn basic concepts of probability and able to evaluate probability.*
4. *Will able to solve problems on discrete and continuous probability distributions.*
5. *Learn basic concepts of sampling distribution and able solve problems on estimation.*
6. *Learn basic concepts of test of hypothesis and able solve problems.*

**Syllabus for B. Tech. II Year I semester**

**Mechanical Engineering Department**

**THERMODYNAMICS**

**Code: 7B306**

**L T P/D C**

3 ---- --- 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

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| CO1 | H |  | M | L |  |  |  |  |  |  |  | L |
| CO2 | H |  | M | L |  |  |  |  |  |  |  | L |
| CO3 | H |  | M | L |  |  |  |  |  |  |  | L |
| CO4 | H |  | M | L |  |  |  |  |  |  |  | L |
| CO5 | H |  | M | L |  |  |  |  |  |  |  | L |
| CO6 | H |  | M | L |  |  |  |  |  |  |  | L |

**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**

**MECHANICS OF SOLIDS**

**Code: 7B307**

**L T P/D C**

**3** -- --- 3

**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

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| CO1 | **H** |  | **M** | **L** |  |  |  |  |  |  |  | **L** |
| CO2 | **H** |  | **M** | **L** |  |  |  |  |  |  |  | **L** |
| CO3 | **H** |  | **M** | **L** |  |  |  |  |  |  |  | **L** |
| CO4 | **H** |  | **M** | **L** |  |  |  |  |  |  |  | **L** |
| CO5 | **H** |  | **M** | **L** |  |  |  |  |  |  |  | **L** |
| CO6 | **H** |  | **M** | **L** |  |  |  |  |  |  |  | **L** |

**UNIT – I (Simple Stresses & Strains)**

**Simple Stresses & Strains:** Elasticity, plasticity – Types of stresses- uniaxial, biaxial & triaxial and strains–Hooke’s law, stress-strain diagram for Mild steel, Working stress, Factor of safety, Lateral strain, Poisson’s ratio, volumetric strain, Elastic moduli & the relationship between them – 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 Bhavikatti, Lakshmi publications
3. Strength of Materials by SS Rattan
4. Mechanics of Materials By Hibbeler Pearson Publications

**REFERENCES:**

1. Strength of Materials by S.Timshenko and Young
2. Engineering Mechanics os Solids by Egor P.Popov
3. Mechanics of Materials by Gere & Goodno Cengage Publications
4. Mechanics of Materials by Ferdinand P Been, Russel Johnson Jr and John J Dewole TMG
5. Strength of Materials by RK Rajput
6. Strength of Materials by R. Subramanian Oxford University press

**Syllabus for B. Tech. II Year I semester**

**Mechanical Engineering**

**MATERIALS ENGINEERING**

**Code : 7B308**

**L T P/D C**

**3** -- --- 3

**Objectives:**

1. Understanding of the correlation between the internal structure of materials, their mechanical properties and various methods to quantify their mechanical integrity and failure criteria.

2. To provide a detailed interpretation of equilibrium phase diagrams.

3. Learning about different phases 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 crystal structures.

2. Students will be able to understand failure modes and test materials for low cycle and high cycle fatigue.

3. Students will acquire knowledge on solid solutions and various nonferous phase diagrams and their interpretations.

4. Students will be able acquire knowldge on Fe-Fe3C phase diagram, steels, cast irons.

5. Students will acuire knowledge on heat treatment priniples and surface hardening methods.

6. Students will be able to acquire knowledge on special steels and advanced materials.

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| CO1 | **M** | **H** | **L** |  |  |  |  |  |  |  |  |  |
| CO2 | **M** | **H** | **L** |  |  |  |  |  |  |  |  |  |
| CO3 | **M** | **H** | **L** |  |  |  |  |  |  |  |  |  |
| CO4 | **M** | **H** | **L** |  |  |  |  |  |  |  |  |  |
| CO5 | **M** | **H** | **L** |  |  |  |  |  |  |  |  |  |
| CO6 | **M** | **H** | **L** |  |  |  |  |  |  |  |  |  |

**Unit – I**

**Mechanical Behavior and Properties of Metals:**

**Crystal Structure:** Unit cells, Metallic crystal structures, ceramics crystal structure. **Imperfection in solids:** Point, line, interfacial and volume defects; dislocation strengthening mechanisms and slip systems, critically resolved shear stress. **Mechanical Property measurement:** Tensile, compression and torsion tests; Young’s modulus, relations between true and engineering stress-strain curves, generalized Hooke’s law, yielding and yield strength, ductility, resilience, toughness and elastic recovery; **Hardness:** Rockwell, Brinell and Vickers and their relation to strength, **NDT:** Introduction to non-destructive testing (NDT).

**Unit – II**

**Failure:** Static failure theories: Ductile and brittle failure mechanisms, Tresca, Von-mises, Maximum normal stress, Mohr-Coulomb and Modified Mohr-Coulomb; Fracture mechanics: Introduction to Stress intensity factor approach and Griffith criterion. **Fatigue failure:** High cycle fatigue, Stress-life approach, SN curve, endurance and fatigue limits, effects of mean stress using the Modified Goodman diagram; Fracture with fatigue,

**Unit - III**

**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.

**Unit - IV**

**Fe-Fe3C 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:** Annealing, normalizing and spheroidising, hardening, tempering, isothermal

transformation diagrams for Fe-C alloys and microstructure development. Continuous cooling curves

and interpretation of final microstructures and properties- austempering, martempering, case hardening, carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, vacuum and plasma hardening.

**Unit - VI**

**Special steels:** Alloying of steel, properties of stainless steel and tool steels, maraging steels, **Nonferrous Alloys:** copper and copper alloys; brass, bronze and cupro-nickel; Aluminium and Al-Cu – Mg alloys- Nickel based superalloys and Titanium alloys. **Advanced Materials:** Composites: Metal matrix composites (MMCs), C-C composites, Polymer matrix composites; applications of composites. Principles and applications of SMART Materials (Shape memory alloys and Piezeo electric ceramics) and Nanomaterials.

**Text Books:**

1. W. D. Callister, 2006, “Materials Science and Engineering-An Introduction”, 6th Edition, Wiley, India.

2. Kenneth G. Budinski and Michael K. Budinski, “Engineering Materials”, Prentice Hall of India, Private Limited, 4th Indian Reprint, 2002.

3. V. Raghavan, “Material Science and Engineering’, Prentice Hall of India Private Limited, 1999.

4. U. C. Jindal, “Engineering Materials and Metallurgy”, Pearson, 2011.

5. Physical Metallurgy principles by Reed-Hill

6. Introduction to Physical Metallurgy / Sidney H. Avener.- Design Data book

7. Material Science and Metallurgy/Kodgire.

**References:**

1 Material Science - Vanclak

2. Engineering Materials-2, An Introduction to Microstructure, Processing and Design – Micheal F Ashby & David R H Jones

3. Mechanical Metallurgy / G.E. Dieter

4. Essential of Materials science and engineering/ Donald R.Askeland/Thomson

**Syllabus for B. Tech. II Year I semester**

**Mechanical Engineering**

**Fluid Mechanics and Hydraulic Machinery**

**Code: 7B309**

**L T P/D C**

3 -- -- 3

**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.

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| CO1 |  | **H** | **L** |  |  |  |  |  | **M** |  |  | **L** |
| CO2 |  | **H** | **L** |  |  |  |  |  | **M** |  |  | **L** |
| CO3 |  | **H** | **L** |  |  |  |  |  | **M** |  |  | **L** |
| CO4 |  | **H** | **L** |  |  |  |  |  | **M** |  |  | **L** |
| CO5 |  | **H** | **L** |  |  |  |  |  | **M** |  |  | **L** |
| CO6 |  | **H** | **L** |  |  |  |  |  | **M** |  |  | **L** |

**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**

**MACHINE DRAWING AND COMPUTER DRAWING**

**Code: 7B310**

**L T P/D C**

**1** -- 4 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

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| CO3 | H | H |  |  |  |  |  |  |  |  |  |  |
| CO4 | H | H |  |  |  |  |  |  |  |  |  |  |
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| CO6 | H | H |  |  |  |  |  |  |  |  |  |  |

**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 partswith 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.

4. Shan Tickoo, “Customizing Auto CAD 2011”, Delmar Cengage Press USA.

**REFERENCES:**

1. Machine Drawing – P.S.Gill.

2. Machine Drawing – Luzzader

3. Machine Drawing – Rajput

4. Machine Drawing – ND Bhat

**Syllabus for B. Tech. II Year I semester**

**Mechanical Engineering**

**METALLURGY LAB & MECHANICS OF SOLIDS LAB**

**Code : 7B362**

**L T P/D C**

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**(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 and their interpretation.
* acquire the knowledge of preparation of sample for metallurgical study of a plain carbon steel in heat treated condition and interpretation.
* acquire knowledge for preparation of sample for metallurgical study of a cast iron/ alloy steel and their interpretation.
* acquire the knowledge of preparation of sample for metallurgical study of a nonferrous metal and interpretation
* acquire the knowledge of preparation of sample for metallurgical study of nonferrous alloy and interpretation

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| CO2 | **M** | **H** | **L** |  |  |  |  |  |  |  |  |  |
| CO3 | **M** | **H** | **L** |  |  |  |  |  |  |  |  |  |
| CO4 | **M** | **H** | **L** |  |  |  |  |  |  |  |  |  |
| CO5 | **M** | **H** | **L** |  |  |  |  |  |  |  |  |  |
| CO6 | **M** | **H** | **L** |  |  |  |  |  |  |  |  |  |

**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:

* To determine UTS of Various materials
* To determine impact Strength of the Materials
* To detrmine Compressive Strength of the Materials
* 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.

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| CO2 | **H** |  |  |  |  |  |  |  |  |  |  |  |
| CO3 | **H** |  |  |  |  |  |  |  |  |  |  |  |
| C04 | **H** |  |  |  |  |  |  |  |  |  |  |  |
| C05 |  |  | **L** |  |  |  |  |  |  |  |  |  |
| CO6 |  |  | **L** |  |  |  |  |  |  |  |  |  |

***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 : 7B363**

**L T P/D C** - - **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

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| CO1 |  | **H** | **L** |  |  |  |  |  | **M** |  |  | **L** |
| CO2 |  | **H** | **L** |  |  |  |  |  | **M** |  |  | **L** |
| CO3 |  | **H** | **L** |  |  |  |  |  | **M** |  |  | **L** |
| CO4 |  | **H** | **L** |  |  |  |  |  | **M** |  |  | **L** |

**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**

**FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**

**Code: 7B364**

**L T P/D C**

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**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. To demonstarate the bernoulli's theorem experiment

2. After copmpletion of experoiment student will able to calculate the coefficient oif discharge of venturimeter and orifice meter

3. to calibration of rotameter and flow nozzle experimentally.

4. determination of friction factor of pipe line and losses due to pipe fitting.

5. after completion of experiment student will able to understand the performance of reciprocating pump.

6. after completion of experiment student will able to understand the performance of centrifugal pump.

7. after completion of experiment student will able to understand the performance of Pelton wheel.

8. after completion of experiment student will able to understand the performance of Francis Turbine

9. to determine the coefficient of Impact jet on vanes by comparing the actual force with the theritical force for stationery vane of different shapes viz hemi spherical, Flat plate and inclined plate.

10. . after completion of experiment student will able to understand the performance of Multi stage pump.

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| CO2 | **L** | **M** | **H** |  | **L** |  |  |  |  |  |  |  |
| CO3 | **L** | **M** | **H** |  | **L** |  |  |  |  |  |  |  |
| CO4 | **L** | **M** | **H** |  | **L** |  |  |  |  |  |  |  |
| CO5 | **L** | **M** | **H** |  | **L** |  |  |  |  |  |  |  |
| CO6 | **L** | **M** | **H** |  | **L** |  |  |  |  |  |  |  |
| CO7 | **L** | **M** | **H** |  | **L** |  |  |  |  |  |  |  |
| CO8 | **L** | **M** | **H** |  |  |  |  |  |  |  |  |  |
| CO9 | **L** | **M** | **H** |  |  |  |  |  |  |  |  |  |
| CO10 | **L** | **M** | **H** |  | **L** |  |  |  |  |  |  |  |

**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 I semester**

**Mechanical Engineering**

**Technical Seminar -III**

**Code: 7B393**

**L T P/D C**

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**Course objective:**

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

**Course Outcomes:**

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| 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 | Develop debating and interview skills. |

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| CO1 |  |  |  |  |  | **M** | **M** | **M** | **L** | **L** |  |  |
| CO2 |  |  |  |  |  | **M** | **M** | **M** | **L** | **L** |  |  |
| CO3 |  |  |  |  |  | **M** | **M** | **M** | **L** | **L** |  |  |
| CO4 |  |  |  |  |  | **M** | **M** | **M** | **L** | **L** |  |  |
| CO5 |  |  |  |  |  | **M** | **M** | **M** | **L** | **L** |  |  |
| CO6 |  |  |  |  |  | **M** | **M** | **M** | **L** | **L** |  |  |

**Procedure**:

1. Seminar in-charges shall highlight the significance of Technical Seminar in the first two sessions and enlighten the students on the utility of these seminars.

2. The slots, titles shall be decided upfront and seminar In-charge shall take signatures from students.

3. The same sheet shall be affixed in the respective classrooms and seminar register.

4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot / week.

5. Progress of the seminars needs to be reviewed by the concerned HOD once in 15 days.

6. The evaluation for Technical Seminars has to be informed to students and displayed in the classrooms.

7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

**Distribution of Marks**

|  |  |
| --- | --- |
| Day to day progress of the work | 15 marks |
| Final report and viva | 15 marks |
| Level of content | 20 marks |
| Presentation | 20 marks |
| Discussion & Involvement | 20 marks |
| Attendance | 10 marks |
| Total | 100 Marks |

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**MANUFACTURING PROCESSES**

**Code: 7B411**

**L T P/D C**

3 ---- --- 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.

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| CO2 | **H** | **M** |  |  |  |  |  |  |  |  |  |  |
| CO3 | **H** | **M** |  |  |  |  |  |  |  |  |  |  |
| CO4 | **H** | **M** |  |  |  |  |  |  |  |  |  |  |
| CO5 | **H** | **M** |  |  |  |  |  |  |  |  |  |  |
| CO6 | **H** | **M** |  |  |  |  |  |  |  |  |  |  |

**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: E**xtrusion 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- P**rinciple, 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**

**APPLIED THERMODYNAMICS – I**

**Code: 7B412**

**L T P/D C**

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**Course Objective:**

To understand the working principles of 2-stroke and 4-stroke cycles, combustion processes of S.I and C.I Engines, working principles of compressors*.*

**Course Outcomes:**

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

1. Compare the air standard, actual and the fuel-air cycles of Internal Combustion Engines.
2. Classify IC Engines, understand the working principles of 2-stroke and 4-stroke cycles, draw valve and port timing diagrams and explain different engine subsystems.
3. Understand the combustion process in S.I and C.I Engines, the phenomenon of knocking, factors affecting knocking, and different types of combustion chambers for S.I and C.I Engines,
4. Understand the performance parameters, methods of measurement of brake and friction power and Draw the heat balance diagram.
5. Understand the working principles of Roots blower, vaned blower, reciprocating compressor-single stage and multi-stage compression with inter cooling.
6. Understand the working principles of centrifugal and axial compressors and draw the velocity diagram and calculate the Compressor Power input and efficiency.

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| CO6 | **H** | **M** |  |  |  |  |  |  |  |  |  |  |

**UNIT – I**

**Actual Cycles and their Analysis:** Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down - Loss due to Gas exchange process, Volumetric Efficiency, Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines. *Applications: These concepts will be useful in achieving overall knowledge about I.C. engines.*

**UNIT-II**

**I.C. Engines :** Classification - Working principles, Valve and Port Timing Diagrams, Air Standard, Air-fuel and Actual cycles - Engine systems – Fuel Carburetor, Fuel Injection System, Multipoint fuel Injection, Ignition, Cooling and Lubrication. *Applications: These topics will give broader view of working of IC engines.*

**UNIT – III**

**Combustion in S.I. Engines :** Normal Combustion and Abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of ) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types. *Applications: These concepts are useful for achieving deeper knowledge about normal and abnormal combustion in SI and CI engines.*

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

**UNIT – IV**

**Testing and Performance :** Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart. *Applications: These topics will tell in greater detail about the performance evaluation of IC engines.*

**UNIT – V**

**Compressors** – Classification –positive displacement and roto-dynamic machinery – power absorbing machines, fan such as blower and compressor – reciprocating and rotary types.

**Reciprocating:** Principles of operation, work required, Isothermal efficiency, volumetric efficiency and effect of clearance, stage compression, under cooling, saving of work, minimum work condition for stage compression. *Applications: These topics will discuss on the design and applications of reciprocating air compressors.*

**UNIT VI**

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

**Axial Flow Compressors:** Mechanical details and principle of operation – velocity triangles and energy transfer per stage, degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency. *Applications: This unit will bring in differences between reciprocating and rotary compressors. Theses compressors are employed in land based power plants and aircraft engines.*

**TEXT BOOKS:**

1. I.C. Engines / V. GANESAN- TMH

2. Thermal Engineering / Rajput / Lakshmi Publications.

**REFERENCES:**

1. IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.

2. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad

3. I.C. Engines / Heywood /McGraw Hill.

4. IC Engines/ Ramalingam/ Scitech publishers

5. “A Treatise on Turbo Machines”,G.Gopalakrishnan, & D.Prithviraj, Scitech

Publications (India) Pvt. Limited (2002.)

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**KINEMATICS OF MACHINES**

**Code: 7B413**

**L T P/D C**

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***Course Objective:***

*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. [CO 1]*
* *Understand velocity and acceleration diagram in order to evaluate the inertia forces in mechanism and machines.[CO 2]*
* *Understand the concept of steering gear mechanism, types and Hooke’s joint with respect to an automobile.[CO 3]*
* *In order to understand and design complex motions possible out of Cam’s and Followers.[CO 4]*
* *Understand the concept of toothed gears and selection different types of gear trains in order obtain required velocity ratios.[CO 5]*
* *Understand transmission power by various means like belts, rope and chains and their advantages and limitations.[CO 6].*

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| CO3 | **H** |  | **M** | **L** |  |  |  |  |  |  |  | **L** |
| CO4 | **H** |  | **M** | **L** |  |  |  |  |  |  |  | **L** |
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| CO6 | **H** |  | **M** | **L** |  |  |  |  |  |  |  | **L** |

**UNIT –I (Basic concepts and Inversions)**

**Introduction :** 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.

**Mechanism & Machines**: Classification of machines – kinematic chain – inversions of kinematic chain – Inversions of quadric cycle chain – single and double slider crank chains.

**UNIT – II (Velocity and Acceleration Diagrams)**

**Velocity and Acceleration Diagrams:(Relative velocity method)** 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 slider crank chain for displacement, velocity and acceleration of slider – Acceleration diagram for a given mechanism, Klein’s construction, Coriolis acceleration, Determination of Coriolis component of acceleration.

**Velocity Diagrams:(Instantaneous centre method):** Instantaneous center of rotation, centrod and axode – 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 (Mechanisms with lower pairs)**

**Steering Mechanisms:** Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio.

**Hooke’s Joint:** Single and double Hooke’s joint –Polar velocity diagram- Angular acceleration of driven shaft- problems.

**Straight Line Motion Mechanisms:** Exact and approximate, copiers and generated types – Peaucellier, Hart, Scott- Russel, Grasshopper, Watt, TChebicheff , Robert Mechanisms and Pantograph.

**UNIT –IV (Cams and Followers)**

**Cams and Followers:** Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Types of follower motion - Uniform velocity, Simple harmonic motion, Uniform acceleration and Cycloid motions. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

**Cams with specified contours (analysis of motion of followers) :** Tangent cam with roller follower, circular arc (convex) cam with flat faced follower and Roller follower.

**UNIT – V (Belt, Rope and Chain Drives)**

**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.

**UNIT – VI (Toothed Gears & Gear Trains)**

**Toothed Gear:** 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, worm and rack and pinion gears.

**Gear Trains:** Introduction – Train value – Types – Simple, compound and reverted gear train – Epicyclic gear Train. Methods of finding train value or velocity ratio , Differential gear for an automobile.

**TEXT BOOKS:**

1. Theory of Machines and Mechanisms-S.S.Rattan, Tata McGraw Hill Publishers

2. Theory of Machines by Thomas Bevan/ CBS

3. Kinematics and Dynamics of Machinery by Robert L. Norton, Tata McGraw Hill Publishers

4. Theory of Machines by Sadhu Singh/ Pearson

**REFERENCES:**

1. Theory of Machines R.S Khurmi & J.K Gupta

2. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age

3. The theory of Machines /Shiegley/ Oxford.

4. Theory of Mechanisms and Machines by Ghosh and Mallick

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**Electrical and Electronics Engineering**

**Code: 7AC48**

**L T P/D C**

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**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.

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| CO5 | **H** |  | **M** | **L** |  |  |  |  |  |  |  |  |
| CO6 | **H** |  | **M** | **L** |  |  |  |  |  |  |  |  |

**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:**

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

**References:**

1. 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**

**(Open Elective-I)**

**DATA STRUCTURES**

**Code: 7EC01 L T P/D C**

**3 1 - 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 non linear 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:**

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| 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. |

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| CO2 |  |  |  | **M** | **H** |  |  |  | **L** |  |  |  |
| CO3 |  |  |  | **M** | **H** |  |  |  | **L** |  |  |  |
| CO4 |  |  |  | **M** | **H** |  |  |  | **L** |  |  |  |
| CO5 |  |  |  | **M** | **H** |  |  |  | **L** |  |  |  |
| CO6 |  |  |  | **M** | **H** |  |  |  | **L** |  |  |  |

**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 - Linear and binary search methods.

Sorting - Bubble sort, Selection sort, Insertion sort, Quick sort, Merge sort.

Heaps - Introduction, Min Heap, Max Heap,Operations on Heaps, Heap Sort.

Performance analysis of Searching and Sorting Algorithms.

**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:**

1. **Data Structures and C++ by Reema Thareja**
2. **Data Structure through C by Yashavant Kanetkar**.
3. **The complete reference C++ By Herb Schildt.**

**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. II Year II semester**

**Mechanical Engineering**

**(Open Elective-I)**

**Biology for Engineers**

**CODE: 7GC51**

**L T P/D C**

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**Course Objective:**  Provides basic understanding of biological mechanisms of living organisms from the perspective of engineers. The course is expected to encourage engineering students to think about solving biological problems with engineering tools.

**COURSE OUTCOMES**

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| **CO:1** | Ability to apply the knowledge of biology to understand its scope and importance in various fields of engineering. |
| **CO:2** | To understand the structure and functions of different types of cell and understand the significance of cell to cell communication. |
| **CO:3** | To gain knowledge as to how genes play an important role in information transfer |
| **CO:4** | Ability to understand the importance of Biomolecules and thermodynamics of biological systems |
| **CO:5** | Ability to demonstrate a substantive knowledge of human physiology |
| **CO:6** | Ability to evaluate the impact of biology on society and how they relate to other engineering branches |

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| CO6 |  |  |  |  |  | **L** |  |  |  |  |  |  |

**UNIT I:**  **BIOLOGY IN ENGINEERING**

Biology- Definition, Scope and relevance of Biology in Engineering-Biomechanics, Bioelectronics, Bioinformatics. Origin of Life – Big Bang Theory, Evolutionary Theories -Darwinism and Lamarckism. Significance of water as universal solvent. Diversity of Life - Whittaker’s five kingdom classification

**UNIT II: CELL BIOLOGY**

Cell – Unicellular & Multicelluar Organisms, Cell structure- Prokaryotic & Bacterial growth curve; Eukaryotic cell Organelles and their Functions. Concept of cell, tissue, organ and organism, Cell cycle, Cell division – Overview of Mitosis and Meiosis, Overview of Cell Signalling & Communication - Autocrine, Paracrine, Synaptic signaling, Endocrine signaling.

**UNIT III: GENETICS IN INFORMATION TRANSFER**

Genetics- definition, Mendel Laws- Law of dominance, Law of segregation and Law of independent assortment, concept of heredity - Chromosomes & DNA,RNA as hereditary material, Genetic code.

**UNIT IV: BIOMOLECULES**

Biomolecules – Carbohydrates - glucose, starch, glycogen, amino-acids-essential and non-essential, roteins, lipids, Enzymes- classification, kinetics, Inhibition. Metabolism-aerobic (Glycolysis, Krebs cycle) & anaerobic respiration, ATP as energy currency, Photosynthesis-overview, Thermodynamics in biological systems- Exothermic & Endothermic Reactions, Endergonic and Exergonic Reactions, Energy flow in organisms (Autotrophs, Heterotrophs, lithotrophs).

**UNIT V: HUMAN PHYSIOLOGY**

Introduction to Human Physiology, Circulatory System - Heart and its functions, blood as transport systems , Nervous System - Brain and its functions, Excretory system - Kidney and its functions, (ammoniotelic, uricotelic and ureotelic)

**UNIT VI: BIOINSPIRED ENGINEERING APPLICATIONS**

Comparison of Science and Engineering-Eye and camera, Bird flight and aircraft, Principles of Brownian movement, Biosensors and their applications in health care and environmental monitoring, Brain Machine Interface- Human locomotion and robotics, Artificial Neural Networks (ANN), Genetic algorithms. Internet of Things (IoT) in agriculture and Healthcare, Nanorobots in medicine.

**TEXT BOOKS:**

1. Introduction To Biology And Biotechnology by Vaidyanath K. , K. Patrap Reddy, BS publications, Second Edition
2. Basic Biotechnology, Second Edition, by Colin Ratledge and Bjorn Kristiansen, Cambridge University Press.

**REFERENCES**

1. Dr. C.C. Chatterjee*,* Human Physiology (11th Edition) Vol I and II*,* Medical Allied Agency, Kolkata, 1987.
2. H.G. Rehm and G. Reed, Biotechnology Volume I & 2

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**(Open Elective-I)**

**BASICS OF ENTREPRENEURSHIP**

**Code: 6ZC22**

**Course Objective:** The objective of the course is to make students understand the nature of Entrepreneurship, and its importance to business to the engineering students, which will allow them to get the required intuition and interest in starting their own start-up’s

**Course Outcomes:**

1. The students’ will acquire basic knowledge on Skills of Entrepreneurship.
2. The students’ will understand the techniques of selecting the customers through the process of customer segmentation.
3. Business Models and their validity are understood by the students’.
4. The basic cost structure and the pricing policies are understood by the students’.
5. The students’ will acquire knowledge about the project management and its techniques.
6. The students’ get exposure on marketing strategies for the Start up.

***Mapping of Course Outcomes with Program Outcomes:***

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| **COs** | **Programme Outcomes** | | | | | | | | | | | |
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**Unit – I: Introduction to Entrepreneurship: -** Define Entrepreneurship, Entrepreneurship as a Career option, Benefits and Myths of Entrepreneurship, Success Rate of Entrepreneurs related to Experience and Family Backup, Characteristics, Qualities and Skills of Entrepreneurship, Entrepreneurial Propensity, Life as an Entrepreneur, Impact of Entrepreneurship on Economy and Society.

**Unit – II: Opportunity & Customer Analysis: -** Identify your Entrepreneurial Style, Identify Business Opportunities, Methods of finding and understanding Customer Problems, Process of Design Thinking, Identify Potential Problems, Customer Segmentation and Targeting, Customer Adoption Process, craft your Values Proportions, Customer-driven Innovation.

**Unit – III: Business Model & Validation: -** Types of Business Models, Lean approach, the Problem-Solution Test, Solution Interview Method, difference between Start-up Venture and Small Business, Industry Analysis, Identify Minimum Viable Product (MVP), Build-Measure-Lean Feedback loop, Product-market fit test.

**Unit – IV: Economics & Financial Analysis: -** Revenue sources of Companies, Income Analysis, and Costs Analysis - Product Cost and Operations Cost, basics of Unit Costing, Break Even Analysis Profit Analysis, Customer Value Analysis, different Pricing Strategies, advantages and disadvantage of various Sources of Finance, Investors Expectations, Return on Investment , Practice pitching to Investors and Corporate.

**Unit – V: Team Building & Project Management: -** Leadership Styles, Shared Leadership Model, Team Building in Venture, Role of good team in venture, Roles and Respondents, Explore collaboration tools and techniques- Brainstorming, Mind mapping. Importance of Project Management, Time Management, Workflow, Network Analysis Techniques – Critical Path Method, Project Evaluation Review Technique and Gantt chart.

**Unit – VI: Marketing & Business Regulations: -** Positioning, Positioning Strategies, building Digital presence and leveraging Social Media, Measuring effectiveness of Channels, Customer Decision-making Process, Sales Plans and Targets, Unique Sales Proposition (USP), Follow-up and close Sales. Business regulations of starting and operating a Business, Start-up Ecosystem, Government schemes.

**References:**

* Robert D Hisrich, Michael P Peters, Dean A Shepherd, Entrepreneurship, Sixth Edition, New Delhi, 2006.
* Thomas W. Zimmerer, Norman M. Scarborough, Essentials of Entrepreneurship And Small Business Management, Fourth Edition, Pearson, New Delhi, 2006
* Alfred E. Osborne, Entrepreneur’s Toolkit, Harvard Business Essentials, HBS Press, USA, 2005.
* Madhurima Lall, Shikha Sahai, Entrepreneurship, Excel Books, First Edition, New Delhi, 2006.
* S.S. Khanka, Entrepreneurial Development, S. Chand and Company Limited, New Delhi, 2007.
* H. Nandan, Fundamentals of Entrepreneurship, Prentice Hall of India, First Edition, New Delhi, 2007.

• S.R. Bhowmik, M. Bhowmik, Entrepreneurship-A tool for Economic Growth   And A   
 key to Business Success, New Age International Publishers, First Edition,  (formerly   
 Wiley Eastern Limited), New Delhi, 2007.

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**(Open Elective-I)**

**BASICS OF INDIAN ECONOMY**

**Code:6ZC25**

**(Common to all Branches)**

**Course objectives:** To provide basic knowledge relating to the Indian Economy thus making the students aware of the current aspects taking place in the Indian and world economy.

**Course Outcomes**:

1. Gain knowledge relating to Economics, various sectors and its growth
2. Will gain knowledge relating to various concepts of National income and related aggregates
3. Students will learn about Indian Industrial policy and benefits of LPG to India
4. Comprehend knowledge relating to Fiscal policy & Taxation system in India
5. Learn about inflation & business cycles.
6. Know about the BoP and its influence on economy.

***Mapping of Course Outcomes with Program Outcomes:***

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| **COs** | **Programme Outcomes** | | | | | | | | | | | |
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**Unit 1:** **Introduction to Economics**:

Definition, Economics and economy, back ground of economy, sectors of the economy, types of economy, growth of economy, primary moving force of Economic growth in India, mixed economy.

**Unit 2: National Income and related aggregates**

Aggregates related to National Income: Gross National Product (GNP), Net National Product (NNP), Gross and Net Domestic Product (GDP and NDP) - at market price, at factor cost; National Disposable Income (gross and net), Private Income, Personal Income and Personal Disposable Income; Real and Nominal GDP.

**Unit 3: Industrial policy & Liberalization of Economy**

Industrial policy in India, its objectives, Review of Industrial policies up to 1986, Industrial policy 1991 - causes of its implementation, benefits of Liberalization, privatization & Globalization to the Indian economy.

**Unit 4: Fiscal policy & Taxation system**

Fiscal policy- Definition, objectives, importance, setbacks, recent fiscal policy of India, Reforms to strengthen the fiscal policy in India. Taxation system in India, methods of taxation, a good tax system, VAT, GST, Reforms in taxation.

**Unit 5: Inflation & Business Cycles**: Inflation – Definition, types, effects of inflation on various segments of the population and sectors of the economy, measures to control inflation, Business cycles: Introduction, Depression, Recovery, Boom, and Recession.

**Unit 6: Balance of Payments**

Balance of payments account - meaning and components; balance of payments deficit-meaning. Foreign exchange rate - meaning of fixed and flexible rates and managed floating. Determination of exchange rate in a free market

References:.

* Indian Economy, Datt & Mahajan, 70th Edition, Sultan Chand publishers.
* Indian Economy, Misra & Puri, 33rd Edition, Himalaya publishing house.
* Latest Budget document by Ministry of Finance
* Latest Economic survey
* 12th Five year plan
* News articles in The Hindu, The Business Line

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**(Open Elective-I)**

**PRODUCT & SERVICES**

**Code: 6ZC20**

**Course Objectives**: This course helps to provide the basic concepts of Product and Services. This course will enable the students to study areas of basic insights in product management and Services Design.

**Course Outcomes**:

1. The students will be introduced to basic concepts of product .
2. Will enlighten the students with the process of new product development and stages in the process.
3. Will help the students understand the concept of product testing, product planning and the preparatory groundwork for launching a new product
4. Will help the students to understand the nature of services, its differences with the goods and the application of marketing principles for services.
5. Will enlighten the students to understand the attributes of a good service design and the tools for producing and distributing the services.
6. To make the students understand about the importance of quality of services and also introduce some measurement scales to evaluate the service quality.

***Mapping of Course Outcomes with Program Outcomes:***

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| **COs** | **Programme Outcomes** | | | | | | | | | | | |
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**UNIT- I**

**PRODUCT AS A COMMERCIAL FACTOR**

Product concept: premarketing, product definition, product dimensions. Product classification- by its nature, by final use by reasons for purchase, by consumer groups.

**UNIT- II**

**PRODUCT INNOVATION**

New products-What is a new product, Concept, Reasons, Succeed and failure factors, Launch process, Opportunities identification, Idea generation Systems, Evaluation, Check list, Financial analysis, Product concept.

**UNIT- III**

**PRODUCT MANAGEMENT**

Concept test, Product testing, Pre-launch, Market test, Final evaluation “Stage / Gate Process” A sequence system for a product launch. Product planning and development-Product planning, Price planning, Bake even point analysis, Communications Planning, Advertising Planning, Distribution planning

**UNIT - IV: INTRODUCTION TO SERVICE:**

Meaning and Definition of Service, Characteristics of Services, Classification of Service, Five levels of Service, Service verses Physical Goods, 7 P’s for Marketing of Services, Marketing Mix for Tourism, Hospitality, Education, and Health Industry.

**UNIT – V: SERVICE PROCESS DESIGN:**

Challenges & Critical Success Factors, Distribution Methods for Service, Process of Service Delivery, Tools for Service Design, Customer involvement in the Production Process, Tools for Innovation, Role of Intermediaries, Attributes of a Good Design.

**UNIT – VI: QUALITY OF SERVICE:**

Definition of Service Quality, Elements of Service Quality, Service Quality Measuring Tools; SERVQUAL Scale, Service Quality Gap Analysis, Objective Service Metrics, Cost of Quality in Service. Challenges and Problems of Service Quality in Inida.

**References:**

* Dr. S.L. Gupta, Product Management, Wisdom Publications
* C.Merle Crawford ,New Product Management
* Valarie A.Zeithaml & Mary Jo-Bitner: Services Marketing—Integrating Customer Focus Across the Firm, 3/e, Tata McGraw Hill, 2007.
* Thomas J.Delong & Asish Nanda: Managing Professional Servies—Text and Cases, McGraw-Hill International, 2006.
* Christopher Lovelock: Services Marketing People, Technology, Strategy, Fourth Edition, Pearson Education, 2006

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**(Open Elective-I)**

**BANKING OPERATIONS, INSURANCE AND RISK MANAGEMENT**

**Code:6ZC05**

**Course Objectives:** To make the students understand the concepts and principles of Indian Banking Business, Insurance Business and Capital market business products and services, which facilitate them to understand the nature of market.

**Course Outcomes:**

1. Describe the new dimensions and products served by the banking system in INDIA.
2. Explain the credit control system and create awareness on NPA’s
3. Apply the knowledge of Insurance concepts in real life scenarios
4. Recognize the importance of regulatory and legal frame work of IRDA
5. Identify the risk management process and methods.
6. Calculate the diversity of risk and return

***Mapping of Course Outcomes with Program Outcomes:***

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**UNIT I**

**INTRODUCTION TO BANKING BUSINESS:** Introduction to financial services - History of banking business in India, Structure of Indian banking system: Types of accounts, advances and deposits in a bank. KYC norms, New Dimensions and products- E-Banking: Mobile-Banking, Net Banking, Digital Banking, Negotiable Instruments: Cheque system.

**UNIT II**

**BANKING SYSTEMS AND ITS REGULATION: Banking Systems:** Branch Banking, Unit Banking, Correspondent Banking, Group Banking, Deposit Banking, Mixed Banking and Investment Banking - Banking Sector Reforms with special reference to Prudential Norms, Capital Adequacy Norms, Classification of Assets and NPA’s, Functions of RBI, Role of RBI in regulating Indian Banking. Banking Ombudsman scheme.

**UNIT III**

**INTRODUCTION TO INSURANCE:** Introduction to insurance, Need and importance of Insurance, principles of Insurance, characteristics of insurance contract, branches of insurance and types of insurance: Life insurance and its products, General Insurance and its variants.

**UNIT IV**

**INSURANCE BUSINESS ENVIRONMENT:** Procedure for issuing an insurance policy –Nomination - Surrender Value - Policy Loans – Assignment - Revivals and Claim Settlement; Insurance as a tax mitigation tool, Role of IRDA in Insurance Regulation.

**UNIT V**

**FINANCIAL MARKETS AND RISK MANAGEMENT:** Introduction to Financial Markets: Money Market – Capital market; Introduction to Risk Management, meaning and classification of risks, Risk management process, Risk Management Approaches and Techniques.

**UNIT VI**

**DERIVATIVES AS A RISK MANAGEMENT TOOL:** Introduction to Financial Derivatives, Advantages of Derivatives - types of Derivative Contracts - Forwards, Futures, Options and Swaps - Differences among Forwards, Futures and Option Contracts.

**References:**

* Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.
* General Principles of Insurance Harding and Evantly
* Mark S. Dorfman: Risk Management and Insurance, Pearson, 2009.
* Scott E. Harringam Gregory R. Nichanus: Risk Management & Insurance, TMH, 2009.
* Geroge E. Rejda: Principles of risk Management & Insurance, 9/e, pearson Education. 2009.
* G. Koteshwar: Risk Management Insurance and Derivatives, Himalaya, 2008.

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**Smart Materials**

**(Open Elective-I)**

**Code: 7BC61**

**L T P/D C**

**3 -- -- 3**

**Course Objectives:**

To provide the knowledge on principles of smart materials, their functions and applications.

**Course Outcomes:**

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|  | After studying this course the student will be able to: |
| 1 | Apply the knowledge for developing/producing sensors, devices based on the assimilated know-how of composites, ceramics, electro-magnetic materials, shape memory alloys, and their properties. |
| 2 | Develop/process new sensing and actuating smart devices based on the assimilated knowledge on the principles of phase transformations. |
| 3 | Evaluate shape memory materials, electro rheological fluids and develop newer applications. |
| 4 | Comprehend the principles of operation of optical fibers, actuators, and methods of analyses employed in smart materials. |
| 5 | To apply the principles for developing smart skins for aerospace and transportation vehicles. |
| 6 | To develop or process sensors and actuators for MEMS using shape memory alloys, PZT actuators. |

***Mapping of Course Outcomes with Program Outcomes:***

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| **CO3** | H | H |  |  |  |  |  |  |  |  |  | L |
| **CO4** | H | H |  |  |  |  |  |  |  |  |  | L |
| **CO5** | H | M |  |  |  | M |  |  |  |  |  | L |
| **CO6** | M | M |  |  | H | M |  |  |  |  |  |  |

**UNIT - I**

**Introduction:** Characteristics of composites and ceramics materials, Electro-magnetic materials and shape memory alloys-processing and characteristics

**UNIT - II**

**Sensing And Actuation:** Principles of electromagnetic, acoustics, chemical and mechanical sensing and actuation, Types of sensors and their applications, their compatibility conventional and advanced materials. principles and characterization.

**UNIT - III**

**Control Design:** Design of shape memory alloys, Types of MR fluids, Characteristics and application, principles of MR fluid value designs, Magnetic circuits, MR Dampers, Design issues.

**UNIT - IV**

**Optics And Electromagnetic:** Principles of optical fiber technology, characteristics of active and adaptive optical system and components, and manufacturing principles.

**UNIT - V**

**Structures:** Principles of drag and turbulence control through smart skins, applications in environment such as aerospace and transportation vehicles, manufacturing, repair and maintainability aspects.

**Controls:** Principles of structural acoustics analog and digital feedback controls, Dimensional implications for structural control.

**UNIT - VI**

**Principles Of Vibration And Modal Analysis:** PZT Actuators, MEMS, Magnetic shape Memory Alloys, Characteristics and Applications.

**Information Processing:** Neural Network, Data Visualisation and Reliability – Principles and Application domains.

**TEXT BOOKS:**

1. **Analysis and Design’,** A. V. Srinivasan, ‘Smart Structures –Cambridge Universities Press, New York, 2001, (ISBN :

0521650267)

2. **‘Smart Materials and Structures’,** M V Gandhi and B S Thompson Chapmen & Hall, London, 1992 (ISBN : 0412370107)

**133**

**REFERENCE BOOKS:**

1. **‘Smart Materials and Structures’,** Banks HT, RC Smith, Y Wang,Massow S A, Paris 1996

2. **G P Gibss’Adaptive Structres’,** Clark R L, W R Saunolers, JhonWiles and Sons, New York, 1998

3. **An introduction for scientists and Engineers’,** Esic Udd, OpticSensors : Jhon Wiley & Sons, New York, 1991 (ISBN :0471830070)

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**MANAGEMENT SCIENCE AND FINANCIAL ACCOUNTING (MSFA)**

**Code: 7ZC01**

**L T P/D C**

**2** - - 2

**Course Objective:** To make students understand the basics of management and Financial Accounting, its principles, practices and latest concepts for increasing the performance of engineering graduates in their respective fields, which facilitate them in making better planning and decisions

**Course Outcomes:**

1. Outlines the significance of management, defines the basic concepts and applicability of management principles in changing paradigms.
2. Helps in understanding organization behavior, personality determinants and other key aspects
3. Infers the need to understand the importance of Strategic management and Business environment in particular
4. Enrich students with basic concepts of Financial Accounting.
5. Understand basic concepts of Depreciation and need for preparing trial balance.
6. Helps in preparation of Financial Statements (final accounts).

***Mapping of Course Outcomes with Program Outcomes:***

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| **COs** | **Programme Outcomes** | | | | | | | | | | | |
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**UNIT I**

**INTRODUCTION TO MANAGEMENT:** Management- Definitions, Levels of Management, Functions of management- Planning: types of planning, planning process; Organizing: Organizational Design and Structure, Staffing; Directing; Controlling: Basic control process- Fayol’s principles of Management - Taylor’s principles of scientific management- Maslow’s Motivational theory.

**UNIT II**

**INTRODUCTION TO ORGANIZATIONAL BEHAVIOR:** Definition, Nature and Scope of OB, Personality-determinants of Personality – Perception- Attitudes- Attribution theory- Johari Window and Transactional Analysis, Stress Management- factors and remedies

**UNIT III**

**STRATEGIC MANAGEMENT: I**ntroduction to Strategic Management, Vision, Mission, Goals, Objectives, Environmental Scanning- PESTEL, SWOT Analysis, Competitive Advantage, Concept of Core Competence, PORTER’s five force model, types of strategies, Strategic formulation and Implementation.

**UNIT IV**

**FUNDAMENTALS OF FINANCIAL ACCOUNTING:** Definition of Accounting, Accounting Concepts and conventions, principles of Double-Entry system, Book Keeping, Overview of books of original records Journal, Ledger and Subsidiary books

**UNIT V**

**TRIAL BALANCE AND DEPRECIATION OF FIXED ASSETS:** Significance of Trial balance, Preparation of trial balance Definition of Depreciation, Depreciation of fixed assets, Methods of Depreciation – Straight line method and Diminishing Balance method

**UNIT VI**

**CLASSIFICATION OF REVENUE AND CAPITAL EXPENSES, AND PREPARATION OF FINAL ACCOUNTS:** Revenue expenditure, Capital expenditure, Preparation of Final Accounts - Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments

**References:**

* A R Aryasri: Management Science, Tata Mc Graw Hill
* Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi
* A R Aryasri: Managerial Economics and Financial Analysis, Tata Mc Graw Hill

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**Electrical and Electronics Engineering Lab**

**Code:7AC95**

**L T P/D C**

**- - 2 1**

**COURSE OUTCOMES:**

1. Able to demonstrate the working and performance test induction motor ,DC Shunt motor and DC generator

2. Able to demonstrate the working and experiments on Diadoe

3. Able to demonstrate the working and experiments rectifier and transisters

4. Able to demonstrate the working and experiments on logic gates

***Mapping of Course Outcomes with Program Outcomes:***

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| **COs** | **Programme Outcomes** | | | | | | | | | | | |
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**Electrical Experiments**

1. Brake test on 3-phase induction motor (performance characteristics).
2. Speed control of DC shunt motor by

a) Armature Voltage Control .

b) Field flux control method.

1. Brake test on DC shunt motor.
2. Swinburne’s test on DC shunt machine.
3. OCC characteristics of DC shunt generator.
4. Verification of superposition and Reciprocity Theorems.

**Electronics Experiments**

1. V-I Characteristics of PN –junction diode.
2. V-I Characteristics of Zener –junction diode.
3. Half wave and full wave rectifier.
4. V-I Characteristics of Bipolar junction Transistor.
5. V-I Characteristics of MOSFET.
6. Verification of logic gates

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**MANUFACTURING PROCESSES LAB**

**Code: 7B465**

**L T P/D C**

--- --- 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

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| CO2 |  | **H** | **M** |  |  |  |  |  |  |  | **L** |  |
| CO3 |  | **H** | **M** |  |  |  |  |  |  |  | **L** |  |
| CO4 |  | **H** | **M** |  |  |  |  |  |  |  | **L** |  |
| CO5 |  | **H** | **M** |  |  |  |  |  |  |  | **L** |  |

**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. Inert Gas 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**

**TECHNICAL SEMINAR-IV**

**Code: 7B494**

**L T P/D C**

**-- -- 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 :**

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| 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. |
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| 6 | Develop debating and interview skills. |

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| CO2 |  |  |  |  |  | **H** | **H** | **M** | **M** |  | **L** |  |
| CO3 |  |  |  |  |  | **H** | **H** | **M** | **M** |  | **L** |  |
| CO4 |  |  |  |  |  | **H** | **H** | **M** | **M** |  | **L** |  |
| CO5 |  |  |  |  |  | **H** | **H** | **M** | **M** |  | **L** |  |
| CO6 |  |  |  |  |  | **H** | **H** | **M** | **M** |  | **L** |  |

**Procedure**:

1. Seminar in-charges shall highlight the significance of Technical Seminar in the first two sessions and enlighten the students on the utility of these seminars.

2. The slots, titles shall be decided upfront and seminar In-charge shall take signatures from students.

1. The same sheet shall be affixed in the respective classrooms and seminar register.
2. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot / week.
3. Progress of the seminars needs to be reviewed by the concerned HOD once in 15 days.
4. The evaluation for Technical Seminars has to be informed to students and displayed in the classrooms.
5. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

**Distribution of Marks**

|  |  |
| --- | --- |
| Day to day progress of the work | 15 marks |
| Final report and viva | 15 marks |
| Level of content | 20 marks |
| Presentation | 20 marks |
| Discussion & Involvement | 20 marks |
| Attendance | 10 marks |
| Total | 100 Marks |

**Syllabus for B. Tech. II Year II semester**

**Mechanical Engineering**

**COMPREHENSIVE VIVA VOCE - I**

**Code: 7B466**

**L T P/D C**

**- - 2 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** |

There will be 100 marks in total with 25 marks of internal evaluation and 75 marks of external evaluation.

**Internal:**

Comprehensive Viva Voce is Conducted twice in a semester and evaluated for 25 marks each.

**End examination**

The end examination will be carried out by a committee consisting of an external examiner, head of the department and a senior faculty member.