CONTENTS

1   Abbreviations/Definitions   1
2   Code of Conduct and Ethics for Students   2
3   Important Academic Rules   3
4   Scheme of Studies   17
5   Important Notes   19
6   Detailed Syllabus   20
ABBREVIATIONS/DEFINITIONS

- "AC" means, Academic Council of the University.
- "BOM" means, the Board of Management of the University.
- "BOS" means, the Board of Studies of the Department.
- "CAU/AUC-option" CAU/AUC means change from Credit to Audit option / change from Audit to Credit option.
- "Class/Course Committee" means, the Class/Course Committee of a class/course.
- "Course" means, a specific subject usually identified by its course-number and course-title, with a specified syllabus / course-description, a set of references, taught by some teacher(s) / course-instructor(s) to a specific class (group of students) during a specific academic-semester / semester.
- "Course Instructor" means, the teacher or the Course Instructor of a Course.
- "Curriculum" means the set of Course-Structure and Course-Contents.
- "DAAB" means Departmental Academic Appeals Board.
- "DEC/PEC" means Dissertation Evaluation Committee / Project Evaluation committee.
- "Department" means a group in the University devoted to a specific discipline also called a School. Department and School are used interchangeably.
- "DSA" means, Dean Student Affairs.
- "ESE" means End-Semester Examination
- "EYE" means End-Year Examination.
- "Faculty Advisor/Class Counsellor" means, the Faculty Advisor or the Panel of Faculty Advisors, in a Parent Department, for a group (admission-batch) of students. Also known as Class Counsellor.
- "Grade Card" means the detailed performance record in a semester/programme.
- "He" means both genders “he” and “she”; similarly "his" and/or "him" includes "her" as well, in all the cases.
- "HOD" means, the Head of the Department.
- "MLC" means Mandatory Learning Course.
- "MSE" means Mid Semester Examination.
- "MYE" means Mid Year Examination.
- "Parent Department" or "Degree Awarding Department" means, the department that offers the degree programme that a student undergoes.
- "Project Guide" means, the faculty who guides the Major Project of the student.
- "Regulations" means, set of Academic Regulations.
- "University" or “LU" means, Lingaya’s University, Faridabad
- "VC" means, the Vice Chancellor, Lingaya’s University, Faridabad.
CODE OF CONDUCT AND ETHICS FOR STUDENTS

1. Wear decent dress respecting his/her modesty as well as that of others.
2. Expected to respect and show regard for teachers, staff and fellow students.
3. Inculcate civic sense and sensitivity for environment protection.
4. Not to resort to collection of funds for any use without written permission of VC.
5. To exhibit exemplary behaviour, discipline, diligences, and good conduct and are a role model to other students.
6. Not to indulge in offences of cognizable nature.
7. Not to practice casteism, communalism.
8. Not to indulge in any other conduct unbecoming of a professional student of the University.
9. Not to outrage the status, dignity and honour of any person.
10. Not to get involved in physical assault or threat, and use of physical force against any body.
11. Not to expose fellow students to ridicule and contempt that may affect their self esteem.
12. Not to form any kind of Students Union, etc.
13. Not to take active or passive part in any form of strikes/protests.
14. To observe all safety precautions while working.
15. Not to disfigure/damage the University property, building, furniture, machinery, library books, fixtures, fittings, etc. (Damage / loss caused shall have to be made good by the students).
16. Use of mobile/video camera phones is strictly prohibited inside the examination halls, class rooms, laboratories and other working places. LU has the right to confiscate the mobile phones in case of any violation.
17. Not to indulge in ragging/teasing, smoking, gambling, use of drugs or intoxicants, drinking alcohol, rude behavior, and use of abusive language.
18. Not to resort to violence, unruly travel in buses, bullying, threatening and coercing others for undesirable act, such as preventing from attending classes, writing exam. / tests, etc.
19. All the students of the LU shall be under the disciplinary control of the VC.
20. Students are deemed to be under the care & guidance of parents. It is obligatory for the former to appraise their progress (given by the CC) to the parents.
21. Fine, if ever imposed, is only to improve discipline and shall be paid promptly.
22. While on campus, students have to take care of their belongings and no responsibility for any loss or damage can be held by the University.
23. Every student shall produce the I-Card on demand, and if lost, get a duplicate issued.
24. The students must attend all lectures, tutorials and practical classes in a course punctually (The attendance will be counted course-wise).
25. To abide by the rules and regulations of the University stipulated from time to time.
IMPORTANT ACADEMIC RULES
B.Tech. Degree Programme (Regular)

GENERAL
- The Regulations may evolve and get revised/refined or updated or amended or modified or changed through approvals from the Academic Council from time to time, and shall be binding on all parties concerned, including the Students, Faculty, Staff, Departments, University Authorities and Officers. Further, any legal disputes shall be limited to the legal jurisdiction determined by the location of the University and not that of any other parties.
- If, at any time after admission, it is found that a candidate had not, in fact, fulfilled all the requirements stipulated in the offer of admission, in any form whatsoever, including possible misinformation etc., the matter will be reported to the AC, recommending revoking the admission of the candidate.
- The University reserves the right to cancel the admission of any student at any stage of his study programme in the University on the grounds of unsatisfactory academic performance or indiscipline or any misconduct.
- Medium of Instruction shall be English.

PROGRAMME
- The normal duration of the programme leading to B.Tech degree will be four years comprising eight semesters.
- The B.Tech. Degree programme consists of two modes i.e. (a) Project Mode and (b) with Internship. The university reserves its right to offer any one stream or both streams in whichever combination it deems fit for academic and or administrative reasons.
- The total course package for a Regular B.Tech Degree Programme with Project Mode will typically consist of the following components.
  (i) General courses
  (ii) Humanities Electives
  (iii) Science Foundation
  (iv) Mathematics Foundation
  (v) Engineering Foundation
  (vi) Technical Arts
  (vii) Professional Courses
  (viii) Departmental Core
  (ix) Elective Courses
    An Elective Course can be any of the following:
    a) Departmental Elective
    b) Open Elective:
  (x) Project/Internship (Supervised)
  (xi) Major Project/Internship (Supervised)
  (xii) Industrial Training
  (xiii) Mandatory Learning Courses
B.Tech. Degree Programme

- The Regular B. Tech. Degree Programme with Internship will typically consist of all the components of the Regular Project Mode as above, however, with different weightage to industrial training and core courses.
- The student has to opt for the Internship Scheme in the fourth semester which will not be revoked in any circumstances. In the absence of exercising the option, it will be presumed that option is for Project Mode.
- A student having registered for Internship Scheme of a programme cannot opt out of that scheme.
- The Minimum Credit Requirement for the B.Tech. Degree programme is: For Regular Programme (Both for Project Mode and with Internship) – (as decided by BOS) ; however, considering a case for award of honours the minimum credits will be - (as decided by BOS).
- The project will be assigned in seventh semester. Appropriate double-letter grade is awarded as per the evaluation scheme which will be considered for SGPA and CGPA calculations. It is recommended that an external expert from industry/academia may be a member of the evaluation team of four persons (two professors, external expert and respective project guide).
- MLC must be completed by a student at appropriate time or at his convenience. The 'S' grade is awarded for satisfactory completion of the course and 'N' grade is awarded for non-satisfactory completion of the course. In case 'N' grade is awarded, the student has to re-register for the same course if no alternative options are available. However, one can opt for other courses if provided with multiple options. The 'S' and 'N' grades do not carry grade-points and, hence, are not included in the SGPA and CGPA computations.
- Courses that come under this category are the following:
  (a) Environment Science and Ecology
  (b) Community Service Oriented Project
  (c) Professional Development Courses
- Students admitted to the University will be required to take suitable additional courses in Mathematics (5-0-0) and or Communication Skills (3-0-0), if found deficient.

ASSOCIATION
- Every under graduate student of the University shall be associated with Parent Department (degree awarding department) offering the degree programme that the student undergoes throughout his study period, right from the very first day of admission into the programme. However, in the first year class he may report to the Dept. of Applied Science and Humanities for administrative/ academic purpose.
- A student will be placed in GROUP-A/B for both the semester in an academic year.
- The schedule of academic activities for a semester, including the dates of registration, mid-semester examinations (MSE), end-semester examination (ESE), inter-semester vacation, etc. shall be referred to as the Academic Calendar of the semester, and announced at least two weeks before the
closing date of the previous semester.

PRE-REGISTRATION

- In order to facilitate proper planning of the academic activities of a semester, it is essential for the students to declare their intent to register for a course well in advance, before the actual start of the academic session, through the process of Pre-Registration, which is mandatory for all those students of second or subsequent semester who propose to deviate from recommended scheme of studies.
- Pre-registration is an expression of intention of a student to pursue particular course(s) in the next semester. It is information for planning for next semester. Every effort will be made to arrange for a course opted by the student. However, it is not obligatory on the part of the university to offer the course(s) and no course may be offered if the number of students opting for the course is less than 15 or 25 percent of the admission strength whichever is less.
- If a student fails to pre-register it will be presumed that he will follow suggested normal scheme of studies provided that he is progressing at a normal pace. For remaining students the HOD of the parent department will plan for courses as per the convenience of the department.

REGISTRATION TO COURSES

- Every Student after consulting his Faculty-Advisor is required to register for the approved courses with the HOD of parent department at the commencement of each semester on the days fixed for such registration as notified in the academic calendar.
- A student shall register for courses from amongst the courses being offered in the semester keeping in mind the minimum and maximum credits allowed for a degree and other requirements i.e. pre-requisite if any, SGPA and CGPA after consulting the Faculty Advisor. No registration will be valid without the consent of HOD of the parent department.
- A student will be permitted to register in the next semester as per the suggested normal scheme only if he fulfills the following Conditions:
  (a) Satisfied all the Academic Requirements to continue with the programme of studies without termination.
  (b) Cleared all university, library and hostel dues and fines (if any) of the previous semester.
  (c) Paid all required advance payments of the university and hostel for the current semester.
  (d) Not been debarred from registering on any specific ground by the University.
- The students will be permitted to register for course(s) being offered in a semester other than his normal suggested scheme provided that the time table permits.
- The registration in the critical cases will be done as per the priority given below:
  (a) Fulfillment of minimum credit requirement for continuation,
B.Tech. Degree Programme

(b) The completion of programme in minimum period needed for degree.
(c) Improvement of SGPA/CGPA.
(d) The fulfillment of pre-requisite requirement of courses.

- Students who do not register on the day announced for the purpose may be permitted LATE REGISTRATION up to the notified day in academic calendar on payment of late fee.
- REGISTRATION IN ABSENTIA will be allowed only in exceptional cases with the approval of the DAA after the recommendation of HOD through the guardian of the student.
- Credits will be awarded in registered courses only.

CREDIT LIMITS

- A full time student of the B.Tech. degree programme must register for a minimum of 15 credits, and up to a maximum of 31 credits in a Semester. However, the minimum / maximum credit limit can be relaxed by the DAA on the recommendation of the HOD, only under exceptional circumstances. The maximum credits that a student can register in a Summer Term are 8.
- Professional Development courses are one credit courses each, with multiple options, to be completed at student’s convenience in each Semester. Some of them may be mandatory and others two-letter grade category. However, registration has to be done for all courses.

CHANGE IN REGISTRATION

- A student has the option to ADD courses for registration till the date specified for late registration in the Academic Calendar.
- On recommendation of the Teaching Department as well as the Parent Department, a student has the option to DROP courses from registration until two weeks after the commencement of the classes in the semester, as indicated in the Academic Calendar.
- A student can register for auditing a course, or a course can be converted from credit to audit or from audit to credit, with the consent of the Faculty Advisor and Course Instructor within two weeks after the commencement of the classes in the semester as indicated in the Academic Calendar. However, CORE Courses shall not be available for audit.

ATTENDANCE REQUIREMENTS

- LU academic programmes are based primarily on the formal teaching-learning process. Attendance in classes, participating in classroom discussions and participating in the continuous evaluation process are the most essential requirements of any academic programme.
- Attendance will be counted for each course scheduled teaching days as per the academic calendar.
- The attendance requirement for appearing in end semester examination shall be a minimum of 75% of the classes scheduled in each course.

LEAVE OF ABSENCE

- The leave of absence must be authorized as per regulations.
Lingaya’s University, Faridabad

- A student short of attendance in a course (less than needed after leave of absence and condonation by VC) will be awarded ‘FF’ grade in the course.
- All students must attend all lecture, tutorial and practical classes in a course. The attendance will be counted course wise.
- To account for approved leave of absence e.g. representing the University in sports, games or athletics; professional society activities, placement activities, NCC/NSS activities, etc. and/or any other such contingencies like medical emergencies, etc., the attendance requirement shall be a minimum of 75% of the classes scheduled in each course to appear in the examination.
- A student with less attendance in a course during a semester, in lectures, tutorials and practicals taken together as applicable, shall be awarded ‘FF’ grade in that course, irrespective of his academic performance, and irrespective of the nature of absence.
- If the period of leave is more than three days and less than two weeks, prior application for leave shall have to be submitted to the HOD concerned, with the recommendation of the Faculty-Advisor, stating fully the reasons for the leave requested, along with supporting documents.
- If the period of leave is two weeks or more, prior application for leave shall have to be made to the DAA with the recommendations of the Faculty-Advisor, HOD concerned stating fully the reasons for the leave requested, along with the supporting documents. The DAA may, on receipt of such application, grant leave or decide whether the student be asked to withdraw from the course for that particular semester because of long absence.
- If a student fails to apply and get sanction for absence as in (a) and (b) above, his parent/guardian may apply to the VC with reasons duly recommended by the faculty advisor, HOD and DAA and explain in person to the VC the reasons for not applying in time. The VC will consider on merit and decide to grant the leave or withdrawal from the course for that particular semester subject to any condition that he may like to impose. The decision of the VC shall be final and binding.

**ABSENCE DURING EXAMINATIONS**

- A student who has been absent during MSE due to illness and/or any exigencies may give a request for make-up examination within one week after the MSE to the HOD with necessary supporting documents in person. The HOD may consider such requests depending on the merit of the case, and after consultation with the Course Instructor, may permit the make-up examination for the student concerned. However, no make-up examination will be permitted if the attendance in the course is less than 60% till the date of examination.
- In case of absence from End-Semester Examination of a course(s) on Medical ground and/or other special circumstances, the student can apply for award of 'I' grade in the course(s) with necessary supporting documents and certifications by an authorized person to the HOD within one week after the End-Semester Examination. The HOD may consider the request, depending on the merit of the case, and after consultation with the Course(s) Instructor(s)/ faculty advisor may forward the case to DAA with his
B.Tech. Degree Programme

recommendation for the award of ‘I’ grade. After permission by DAA in writing, the 'I' Grade is converted into a regular double letter grade on the basis of the students' marks in Mid-Semester Test and Class Work. However, if a student has scored 50% or more marks in Mid-Semester Test plus Class work his/her marks will be increased by 50% before awarding the grade. This applies to both theory and practical courses.

COURSE CREDIT ASSIGNMENT

- Every course comprises of specific Lecture-Tutorial-Practical (L-T-P) schedule. The credits for various courses are shown in the Scheme of Studies & Syllabus.
- The Academic Performance Evaluation of a student shall be according to a Letter Grading System, based on the Class Performance Distribution.
- The double-letter grade (AA, AB, BB, BC, CC, CD, DD, EE, FF) indicates the level of academic achievement, assessed on a decimal (0-10) scale.

<table>
<thead>
<tr>
<th>LETTER-GRADING</th>
<th>GRADE-POINTS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>BB</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>BC</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>CC</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>CD</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>DD</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EE</td>
<td>2</td>
<td>Fail</td>
</tr>
<tr>
<td>FF</td>
<td>0</td>
<td>Incomplete</td>
</tr>
<tr>
<td>I</td>
<td>-</td>
<td>Incomplete</td>
</tr>
<tr>
<td>U</td>
<td>-</td>
<td>Audited</td>
</tr>
<tr>
<td>W</td>
<td>-</td>
<td>Withdrawal</td>
</tr>
<tr>
<td>S</td>
<td>-</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>N</td>
<td>-</td>
<td>Unsatisfactory</td>
</tr>
</tbody>
</table>

DESCRIPTION OF GRADES

- An 'AA' grade stands for outstanding performance, relative to the class which may include performance with previous batches. The Course Instructor is supposed to take utmost care in awarding this highest double-letter grade.
- The 'DD' grade stands for marginal performance and is the minimum passing double-letter grade.
- An 'EE' grade indicates that the student has attended the course but obtained less than pass marks. In this case he will earn half the credits assigned to the course.
- The 'FF' grade denotes very poor performance, i.e. failure in a course, and the Course Instructor is supposed to take utmost care while awarding this lowest double-letter grade. The 'FF' grade due to detention is denoted by 'FF*'.

8
• A student, who obtains ‘FF’ grade in a core course due to detention in attendance, has to repeat (re-register) course in subsequent semesters/sessions whenever the course is offered. In other cases of ‘FF’ Grade, a student has three options as follows:
  a) Repeat the course,
     Or
  b) Only appear in End-Semester Examination in a subsequent semester and evaluated out of 60 marks for new grade computation. The new grade will be computed out of 100 marks as follows:
     \( ESE = 60 \) (against 40 marks for the regular students)
     \( CW + \text{Attendance} = 30+10 \), to be brought forward from the earlier semester.
     Or
  c) Get the course converted into a partially dropped course to earn two grade points but earn only half the credits meant for that course. It could be termed as two letter grade ‘EE’:

However, for an elective course in which ‘FF’ grade has been obtained, the student may overcome the deficiency either in the same course or any other elective course.

There are four possible ways of clearing backlog courses and improvement of grades: Subsequent Semester; Summer Term; Week Ends; after University hours with the following overriding conditions –
(i) There will be minimum 60% of contact hours of a regular course in a semester for doing backlog in any mode, (ii) The attendance requirement shall be a minimum of 75% of the classes scheduled in each course without any condonation.

• An 'I' grade denotes incomplete performance in any course due to absence at the End-Semester Examination (see Section “Absence during Examination”).
• ‘U’ grade is awarded in a course that the student opts to register for audit. It is not mandatory for the student to go through the entire regular process of evaluation in an audit course. However, the student has to go through some process of minimal level of evaluation and also the minimum attendance requirement, as stipulated by the Course Instructor and approved by the corresponding BOS, for getting the 'U' grade awarded in a course, failing which that course will not be listed in the Grade Card.
• A ‘W’ grade is awarded when the student withdraws from the course. Withdrawal from a course is permitted only under extremely exceptional circumstances (like medical emergencies, family tragedies and/or other unavoidable contingencies) and has to be recommended by the HOD and approved by the DAA. However, no withdrawal is permitted after the finalization of the grades in the semester.
• ‘S’/’N’ grades are awarded for the Mandatory Learning Courses. The ‘S’ grade denotes satisfactory performance and completion of a course. The `N' grade
is awarded for non-completion of course requirements and the student will have to register for the course until he obtains the 'S' grade.

FEEDBACK TO STUDENTS

- A student requires feedback on the progress of his learning. For this purpose, the Instructor will conduct three quizzes for a theory course in a semester 1st before MSE-1, 2nd between MSE-1 and MSE-2 and 3rd after MSE-2. The quizzes will form a component of class work, the other components being tutorials, home assignments or any other mode.
- For a laboratory course, the continuous assessment's feedback will be given through the laboratory records which are required to be submitted after performing the experiment in the next laboratory class.
- The continuous feedback on project/major project will be through project diary and interim report.
- For Internship stream, the continuous assessment and feedback is to be through seminars, professional diary and interim reports at the place of work.

EVALUATION

Theory Course:

- The double-letter grade awarded to a student in a course other than a practical course, i.e. L-T-0 course for which he has registered, shall be based on his performance in quizzes, tutorials, assignments etc., as applicable, in addition to two MSEs and ESE. The weightage of these components of continuous evaluation may be as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>End-Semester Examination (ESE) (3 hrs)</td>
<td>40%</td>
</tr>
<tr>
<td>Mid-Semester Examinations (MSE) (2×10%;1 ½ hrs each)</td>
<td>20%</td>
</tr>
<tr>
<td>3Quizzes (3×5), Tutorials, Assignments, etc. (Several over the semester)</td>
<td>30%</td>
</tr>
<tr>
<td>Attendance</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Laboratory Course:

- The double letter grade awarded to the student in a practical course i.e. 0-0-P course will be based on his performance in regular conduct of experiments, viva voce, laboratory reports, quizzes etc. The weightage of the components of continuous evaluation may be as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduct of Experiments (as per syllabus)</td>
<td>50%</td>
</tr>
<tr>
<td>Lab Records</td>
<td>20%</td>
</tr>
<tr>
<td>Quizzes/Viva Voice +Attendance (10%)</td>
<td>30%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Project (Including Seminar):
- The double letter grade awarded to the student in Project (Including Seminar) i.e. 0-0-P course will be based on his performance in technical work pertaining to the solution of a small size problem, project report, and presentation of work and defending it in a viva-voce. The weightage of the components of continuous evaluation may be as follows:
  - Technical Work : 50%
  - Report : 25%
  - Seminar, Presentation & Viva-voce : 25%
  - Total : 100%

Major Project:
- The double letter grade awarded to the student in Major Project Phase-I and Phase-II i.e. 0-0-P course will be based on his performance in technical work pertaining to the solution of a problem, project report, presentation and defending in a viva-voce. The weightage of the components of continuous evaluation may be as follows:
  - Technical Work : 50%
  - Report : 25%
  - Presentation & Viva-voce : 25%
  - Total : 100%

Internship:
- The Internship-II will be treated as Major Project for evaluation purpose. The double letter grade awarded to the student in Internship-II i.e. 0-0-P course will be based on his performance in technical work pertaining to the solution of a real-life problem, project report, presentation and defending in a viva-voce. The weightage of the components of continuous evaluation may be as follows:
  - Technical Work : 50%
  - Report : 25%
  - Presentation & Viva-voce : 25%
  - Total : 100%
  - The continuous assessment and feedback is to be through seminars, professional diary and interim report(s) at the place of work.

Seminar:
- The double letter grade awarded to the student in Seminar i.e. 0-0-P course will be based on his performance in oral presentation with emphasis on technical contents, presentation and ability to answer questions. The weightage of the components of continuous evaluation may be as follows:
  - Technical Contents : 40%
  - Presentation : 30%
  - Questions and answers : 30%
  - Total : 100%
B.Tech. Degree Programme

Industrial/Field Training/Internship-I:
- The double letter grade awarded to the student in Industrial/Field Training/Internship-I i.e. 0-0-P course will be based on Practical Training/Internship-I in an industry, professional organization/ research laboratory. The components of continuous evaluation with weightage may be as follows:
  - Training report: 40%
  - Presentation: 30%
  - Questions and answers: 30%
  - Total: 100%

Professional Development(PD):
- There are nine (9) credits assigned to PD courses comprising nine (9) courses of one (1) credit each. The evaluation process of these courses will be as per the nature, contents and delivery of these courses. Some of the common components of evaluation could be quizzes, viva-voce, practical test, group discussion, etc. Participation by students is to be given more weightage in Co-curricular courses.

SCHEME OF EXAMINATION
- The duration of examinations for a theory course will be 3 hours for ESE and 1½ hours for MSE.
- The pattern of question paper/examination will be as under:

  - **Theory Courses:**
    - The University shall conduct the ESE for all theory courses being taught in the semester.
    - i) There will be eight questions in all distributed over all the units in a course syllabus. The question paper will be in two parts with weightage 20 percent and 80 percent respectively. The paper setter must set the questions such that each question can be answered in about 35 minutes and the paper can be solved in 3 hours by an average student.
    - ii) Part-A will have one question of objective type with parts having multiple choices, covering all the units in the syllabus, which will be compulsory.
    - iii) Part-B will consist of seven questions, one question from each of the seven units, and the students are required to solve any four. Out of seven any three questions will have long answers of comprehensive/ derivation/description type and the remaining four questions will be of problem solving type in order to measure ability on analysis/ synthesis/application.
    - iv. If any special instruction(s) is/are required for a particular course, it/they is/are to be specified by the concerned HOD with prior approval of DAA.
  - Students are allowed in the examination the use of single memory, non-programmable calculator. However, sharing of calculator is not permitted.

  - **Laboratory Courses:**
Each experiment may be considered as a unit and evaluated to assess formative and cumulative performance say each of the experiments which carries 10 marks with distribution 5+2+3. Finally, the teacher looks at attendance and total earned marks in the experiments done in a Semester/Year and awards the grades relatively.

- **Mid-Semester Examination:**
  The question paper for Mid-Semester Examination will be made by the Course Coordinator from the topics covered till then (Test-1: from start of semester till Test-1 and Test-2, from after Test-1 till Test-2). Each Mid-Semester Examination question paper should have three questions all of which are to be solved but the questions will have internal choice and at least one of these questions must be of analytical type.
  **Note:** The Mid-Semester examination will not have multiple choice question (mcq).

**TRANSPARENCY**
- The answer books of all MSE and ESE will be shown to the students within three days of the last paper. It is the responsibility of the student to check his/her evaluated answer books and affix his/her signature in confirmation.
- If the student finds some discrepancy, he should bring it to the notice of the Course Coordinator. The Course Coordinator will look into the complaint and remove the doubts of the student and proceed with the work of grading.
- The entire process of evaluation shall be transparent, and the course instructor shall explain to a student the marks he is awarded in various components of evaluation.

**RESULT**
- The final marks and grades shall be displayed on the notice board and a student can approach the Course Instructor(s) concerned for any clarification within the period stipulated in the Academic Calendar. The process of evaluation shall be transparent and the students shall be made aware of all the factors included in the evaluation. In case of any error/correction, the Course Instructor shall have to incorporate the same before finalization of the grades.
- The Student’s Grade Card shall contain the Letter-Grade for each registered course; along with the SGPA at the end of the semester, and the CGPA at the completion of the programme.

**APPEAL FOR REVIEW OF GRADE**
- If a student is not satisfied with the award of the grade after the announcement of the grades, he may appeal on a Grievance Form duly filled in along with the fee receipt for this purpose to the HOD of the parent department within one week of the following semester. The HOD will forward the form along with his recommendation based on the records of the case to DAAB within the date specified in the Academic Calendar.
- The fee for such an appeal will be decided from time to time. If the appeal is upheld by DAAB, then the fee amount will be refunded to the student without
interest.

- VC shall have power to quash the result of a candidate after it has been declared, if
  (a) He is disqualified for using malpractice in the examination;
  (b) A mistake is found in his result;
  (c) He is found ineligible to appear in the examination.

EVALUATION OF PERFORMANCE

- The overall performance of a student will be indicated by two indices:
  (i) **SGPA** which is the Semester Grade Point Average
  (ii) **CGPA** which is the Cumulative Grade Point Average

**SGPA for a Semester is computed as follows:**

\[ SGPA = \frac{\sum C_i G_i}{\sum C_i} \]

Where,
- \( C_i \) denotes credits assigned to \( i^{th} \) course with double-letter grade, and \( G_i \) denotes the grade point equivalent to the letter grade obtained by the student in \( i^{th} \) course with double-letter grade, including all ‘FF’ grades in that semester.

**CGPA is computed as follows:**

\[ CGPA = \frac{\sum C_i G_i}{\sum C_i} \]

Where,
- \( C_i \) denotes credits assigned to \( i^{th} \) course with double-letter grade, and \( G_i \) denotes the grade point equivalent to the letter grade obtained by the student in \( i^{th} \) course for all courses with double-letter grades, including all ‘FF’ grades in all semesters at the end of the programme.

For CGPA calculation, the following grades are to be counted:
- (i) Grades in all core courses,
- (ii) The best grades in the remaining eligible courses to fulfill the minimum credits requirement for a programme.

B. TECH. DEGREE REQUIREMENTS

The degree will be awarded only upon compliance of all the laid down requirements for programme.

- The requirements of the award of B.Tech. Degree programme are as follows:
  (i) **University Requirements:**
      (a) Minimum Earned Credit Requirement for Degree is (as decided by BOS) for regular programme. However, the credits required for consideration for honours degree will be (as decided by BOS).
      (b) Satisfactory completion of all Mandatory Learning Courses.
  (ii) **Programme Requirements:**
      Minimum Earned Credit Requirements on all Core Courses, Elective Courses and Major Project/Internship as specified by the BOS.
  (iii) The CGPA at the end of programme is atleast 5.0.
  (iv) The Maximum duration for a student for complying with the Degree Requirement is SEVEN years from date of first registration for first Semester.

AWARD OF DIVISIONS
The candidate will be placed in First Division with Honours/First Division with Distinction/First Division/Second Division which will be mentioned on the degree certificate as under:

<table>
<thead>
<tr>
<th>DIVISION</th>
<th>CONDITIONS TO BE FULFILLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Division with Honours</td>
<td>CGPA ≥ 8.5, No ‘EE’, ‘FF’ N or W grade in any course during the programme and total credits (as decided by BOS).</td>
</tr>
<tr>
<td>First Division with Distinction</td>
<td>CGPA ≥ 8.5</td>
</tr>
<tr>
<td>First Division</td>
<td>CGPA ≥ 6.75</td>
</tr>
<tr>
<td>Second Division</td>
<td>CGPA ≥ 5.0 but &lt; 6.75</td>
</tr>
</tbody>
</table>

**Note:** Although, there is no direct conversion from grades to marks, however, for comparison purposes percentage of marks may be assumed to be CGPA multiplied by nine.

**GRADE IMPROVEMENT**
- A student may be allowed to improve the SGPA in an appropriate Semester, if his SGPA falls below 5.0. Similarly, any student may be allowed to improve performance in any course provided the course is being floated and available.

**TERMINATION FROM THE PROGRAMME**
- A student shall be required to leave the University without the award of the Degree, under one or more of the following circumstances:
  - (a) If a student fails to earn the minimum credits specified below:

<table>
<thead>
<tr>
<th>CHECK POINT</th>
<th>CREDIT THRESHOLD** (Percentage of Credits of Theory Courses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of FIRST year</td>
<td>60*</td>
</tr>
<tr>
<td>End of SECOND year</td>
<td>65*</td>
</tr>
<tr>
<td>End of THIRD year</td>
<td>70</td>
</tr>
<tr>
<td>End of FOURTH year</td>
<td>75</td>
</tr>
</tbody>
</table>

**Note 1:**
- * A student may be given one more chance to cover the shortfall in the threshold at the end of each one of the first two years during the following summer term if s/he can fulfill the requirement by doing two courses. In case s/he fails to clear the threshold even after the summer term he has to leave the course.
- ** If at any stage, a student fails to cross the threshold with a minimum of 5.0 SGPA in any semester, he will be treated as critical case and will be advised to improve the grades.

**Note 2:** The period of temporary withdrawal (refer: Clause No. G8.1) is not to be counted for the above Credit Threshold.
- (b) If a student is absent for more than 4 (Four) weeks at a stretch in a Semester without sanctioned leave.
Based on disciplinary action by the AC, on the recommendation of the appropriate committee.

Note: Under any circumstances of termination, the conditions specified in Permanent. Withdrawal (refer: Clause No: G8.2) shall also apply.

WITHDRAWAL FROM PROGRAMME

Temporarily:

- A student who has been admitted to a degree programme of the University may be permitted to withdraw temporarily, for a period of one semester or more, on the grounds of prolonged illness or grave calamity in the family, etc., provided:
  
  (i) He applies to the University stating fully the reasons for withdrawal together with supporting documents and endorsement from his parent/guardian
  
  (ii) There are no outstanding dues or demands, from the Departments/University/Hostels/Library and any other centers;
  
  (iii) Scholarship holders are bound by the appropriate Rules applicable to them.
  
  (iv) The decision of the VC of the University regarding withdrawal of a student is final and binding.

- Normally, a student will be permitted only one such temporary withdrawal during his tenure as a student and this withdrawal will not be counted for computing the duration of study.

Permanently:

- Any student who withdraws permanently admission before the closing date of admission for the academic session is eligible for the refund of fee as per the University rules. Once the admission for the year is closed, the following conditions govern withdrawal of admission:

  - A student who wants to leave the University for good, will be permitted to do so (and take Transfer Certificate from the University, if needed), only after clearing all the dues for the remaining duration of the course.

  - A student who has received any scholarship, stipend or other form of assistance from the University shall repay all such amounts, in addition, to clearing all the dues for the remaining duration of the course.

  - The decision of the VC regarding all aspects of withdrawal of a student shall be final and binding.

*****
### Scheme of Studies
B. Tech. Degree Programme (Regular)
(Common to all Disciplines)

#### 1st Year (Semester – I)

##### THEORY

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Group</th>
<th>Category</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Periods L-T-P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>SF</td>
<td>BI A101</td>
<td>General Biology</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>B</td>
<td>SF</td>
<td>CH A101</td>
<td>General Chemistry</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>MF</td>
<td>MA A101</td>
<td>Mathematics-I</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>MF</td>
<td>MA A101</td>
<td>Mathematics-I</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>SF</td>
<td>PH A101</td>
<td>Mechanics, Oscillations and Waves</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>B</td>
<td>EF</td>
<td>EL A101</td>
<td>Electrical Sciences</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>HE</td>
<td>EN A101</td>
<td>Communication Skills</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>B</td>
<td>TA</td>
<td>CS A101</td>
<td>Computer Programming</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>MF</td>
<td>MA A103</td>
<td>Probability and Statistics</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>B</td>
<td>EF</td>
<td>ME A101</td>
<td>Thermodynamics</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>A</td>
<td>TA</td>
<td>EN A102</td>
<td>Technical Report Writing</td>
<td>2-0-0</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>B</td>
<td>GEN</td>
<td>CE A101</td>
<td>Environmental Science and Ecology*</td>
<td>2-0-0</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Group</th>
<th>Category</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Periods L-T-P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>SF</td>
<td>BI A151</td>
<td>General Biology Lab</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>B</td>
<td>SF</td>
<td>CH A151</td>
<td>General Chemistry Lab</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>SF</td>
<td>PH A151</td>
<td>Mechanics, Oscillations and Waves Lab</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>HE</td>
<td>EN A151</td>
<td>Communication Skills Lab</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>B</td>
<td>TA</td>
<td>CS A151</td>
<td>Computer Programming Lab</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>TA</td>
<td>ME A152</td>
<td>Workshop Practice**</td>
<td>0-0-4</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>B</td>
<td>TA</td>
<td>ME A153</td>
<td>Engineering Graphics**</td>
<td>0-1-4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>-</td>
<td>-</td>
<td>Personality Development Skills</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>B</td>
<td>GEN</td>
<td>PD A191</td>
<td>Co-Curricular Activities</td>
<td>-</td>
<td>1***</td>
</tr>
</tbody>
</table>

**GROUP**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>TOTAL CONTACT HOURS</th>
<th>TOTAL CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>17-4-10 (31)</td>
<td>26</td>
</tr>
<tr>
<td>B</td>
<td>17-5-10(32)</td>
<td>27</td>
</tr>
</tbody>
</table>

**FINAL EVALUATION IN GRADES**

(L-T-P-Cr) – Lectures-Tutorials-Practicals-Credits

* CE A101 is a Mandatory Learning Course (MLC).

** One hour for explanation/demonstration.

*** One credit to be earned through Co-Curricular Activities outside contact hours through clubs/ societies and to be evaluated in Semester – II.

**Note:** A student will be placed in GROUP A or GROUP B for both the semesters.
# Scheme of Studies

**B. Tech. Degree Programme (Regular)**

(Common to all Disciplines)

## 1<sup>st</sup> Year (Semester – II)

### THEORY

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Group</th>
<th>Category</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Periods L-T-P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>SF</td>
<td>CH A101</td>
<td>General Chemistry</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>SF</td>
<td>BI A101</td>
<td>General Biology</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>MF</td>
<td>MA A102</td>
<td>Mathematics-II</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>MF</td>
<td>MA A102</td>
<td>Mathematics-II</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>EF</td>
<td>EL A101</td>
<td>Electrical Sciences</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>SF</td>
<td>PH A101</td>
<td>Mechanics, Oscillations and Waves</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>TA</td>
<td>CS A101</td>
<td>Computer Programming</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>HE</td>
<td>EN A101</td>
<td>Communication Skills</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>EF</td>
<td>ME A101</td>
<td>Thermodynamics</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>MF</td>
<td>MA A103</td>
<td>Probability and Statistics</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>A</td>
<td>TA</td>
<td>CE A101</td>
<td>Environment Science and Ecology*</td>
<td>2-0-0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>TA</td>
<td>EN A102</td>
<td>Technical Report Writing</td>
<td>2-0-0</td>
<td>2</td>
</tr>
</tbody>
</table>

### PRACTICAL/DRAWING/DESIGN

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Group</th>
<th>Category</th>
<th>Course Code</th>
<th>Lab Name</th>
<th>Periods L-T-P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>SF</td>
<td>CH A151</td>
<td>General Chemistry Lab</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>SF</td>
<td>BI A151</td>
<td>General Biology Lab</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>---</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>SF</td>
<td>PH A151</td>
<td>Mechanics, Oscillations and Waves Lab</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>TA</td>
<td>CS A151</td>
<td>Computer Programming Lab</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>HE</td>
<td>EN A151</td>
<td>Communication skills Lab</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>TA</td>
<td>ME A153</td>
<td>Engineering Graphics**</td>
<td>0-1-4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>TA</td>
<td>ME A152</td>
<td>Workshop Practice**</td>
<td>0-0-4</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>GEN</td>
<td>PD A192</td>
<td>Personality Development Skills</td>
<td>0-0-2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>A/B</td>
<td>GEN</td>
<td>PD A191</td>
<td>Co-Curricular Activities</td>
<td>-</td>
<td>1***</td>
</tr>
</tbody>
</table>

### GROUP

<table>
<thead>
<tr>
<th>GROUP</th>
<th>TOTAL CONTACT HOURS</th>
<th>TOTAL CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>17-5-10(32)</td>
<td>27+1***</td>
</tr>
<tr>
<td>B</td>
<td>17-4-10 (31)</td>
<td>26+1***</td>
</tr>
</tbody>
</table>

**FINAL EVALUATION IN GRADES**

(L-T-P-Cr) – Lectures-Tutorials-Practicals-Credits

* CE A101 is a Mandatory Learning Course (MLC).

** One hour for explanation/demonstration.

*** One credit to be earned through Co-Curricular Activities outside contact hours through clubs/ societies and to be evaluated in Semester – II.

**Note:** A student will be placed in GROUP A or GROUP B for both the semesters.
IMPORTANT NOTES

1. Laboratory Courses are being offered as distinct courses (0-0-2) without being mixed with lecture components.

2. Conduct of Lab Courses:
   a. At least ten experiments/programs are to be performed in a semester.
   b. It is expected that more experiments/programs are designed and set as per the scope of the syllabus, which may be added to the above list.
   c. One or more than one experiments/programs may be performed in one lab period in order to utilize the time properly.
   d. The scheme of operation is to be approved by HOD.

3. Students admitted through Lateral Entry Scheme will be required to take a Bridge Course on Mathematics (3-0-0) as an Audit Course.

4. Assessment of Industrial/Field Training and Internship-I will be based upon certificate of Industry/Field training obtained by the student, report, seminar and viva-voce examination. A student who is awarded ‘FF’ Grade is required to repeat Industrial/Field Training.

5. The choice of the students for any elective shall not be a binding for the department to offer, if the department does not have expertise.

6. For open elective, all students will be permitted to opt for any one elective run by another department. However, the departments will offer only those elective courses for which they have expertise. Further, the students will not be allowed to opt for any course under this category, which has already been done.

7. Students are allowed in the examination the use of single memory, non-programmable calculator. However, sharing of calculator is not permitted.
**OBJECTIVE**
An introductory course on biology encompassing the topics: living systems and their properties; major biological compounds; basic physiological processes; introduction to genetics; environment and evolution.

1. **(a). WHAT IS BIOLOGY:** Why a study is important; scientific method; what is science; non-science and pseudo science; what makes something alive.
   **(b). ORGANIC MOLECULES:** Carbons; carbohydrates - simple and complex; proteins – structures; what do proteins; nucleic acid acids; DNA; RNA; lipids-true; phospholipids; steroids.
2. **ENZYMES, COENZYMES AND ENERGY:** How cells use enzymes; how enzymes affects chemical reaction; cofactors; coenzymes and vitamins; how environment affects; enzyme-temperature; ph; enzymatic reaction.
3. **CELLULAR RESPIRATIONS AND PHOTOSYNTHESIS:** Energy and organism; aerobic respiration – glycolysis; Kreb's cycle; metabolic pathways of aerobic cellular organism; photosynthesis and light; metabolic pathways.
4. **DNA & RNA:** DNA and importance of proteins structure; basic pairing DNA code; RNA structure; protein synthesis; control of protein synthesis; mutation.
5. **CELL DIVISION:** Importance of cell division; cell cycle and mitosis; mitosis; cancer.
6. **EVOLUTION:** Genetics in population; evolution and natural selection.
7. **ECOSYSTEM DYNAMICS:** What is ecology; tropic levels and food chain; energy flow through ecosystem; cycling of materials in ecosystem; human use of ecosystem.

**TEXT BOOK:**

**REFERENCE BOOKS**

### BI A101 GENERAL BIOLOGY

<table>
<thead>
<tr>
<th>L T P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 1 0</td>
<td>4</td>
</tr>
</tbody>
</table>

**OBJECTIVE**
An introductory course where students are required to perform selected experiments in laboratory in order to appreciate the biological concepts.
LIST OF EXPERIMENTS
1. To conduct the experiment regarding selective permeability of a membrane using osmosis.
2. To distinguish among the different types of carbohydrate using ioding solution.
3. To test the presence of protein using copper sulphate solution.
4. To test presence of fat using water and alcohol.
5. To estimate the sugar (glucose) using Fehling solution method.
6. Study meiosis in onion bud cell or grasshopper testis through permanent slide.
7. Separation of plant pigments through paper chromatography.
8. Separation of amino acids using chromatography techniques.
9. Investigate the effect of exercise on the breathing rate or pulse rate of a human.
10. Investigate the effect of pH on the rate of activity of enzymes.

REFERENCE BOOKS

OBJECTIVE
Environmental Studies is a multidisciplinary area, the issues of which every one should know. The aim of the course is to make everyone aware of environmental issues like continuing problems of pollution, loss of forest, solid waste disposal, and degradation of environment. Issues like economic productivity and national security, global warming, the depletion of ozone layer and loss of biodiversity are other serious concerns before the mankind.

1. THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:
   Basic definitions related to environment; Scope, vis-à-vis environmental science and environmental engineering; Causes of environmental degradation, atmospheric composition and associated spheres, habitat and climate; objective, goals and principles involved in environmental education, environmental awareness, environmental ethics, environmental organization and their involvement.
2. NATURAL RESOURCES: Renewable and non-renewable resources; forest resources, over-exploitation, and deforestation / afforestation; water resources, impact of over-utilization of surface and ground water, floods, drought, conflicts over water, dams; mineral resources: dereliction of mines, environmental effects of extracting and using mineral resources; Food
resources, modern agriculture and its impact, problem associated with fertilizer and pesticide, water logging, salinity; energy resources, renewable, non-renewable energy sources, solar energy, wind energy, hydro energy, biomass energy, geothermal energy, nuclear energy and its associated hazards; land as a resource, land degradation, man induced landslides, soil erosion and desertification.

3. **ECOSYSTEMS:** Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem - forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.

4. **Biodiversity and Its Conservation:** Bio-geographical classification of India; biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity; value of biodiversity-consumptive use, productive use, social, ethical aesthetic and option values; threats to biodiversity; conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

5. **Environmental Pollution:** Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution; solid waste management, e-waste management; disaster management – floods, earthquake, cyclone and landslides.


7. **Human Population and the Environment:** Population growth, population explosion – family welfare programmes; role of information technology in environment and human health; case studies, Chipko movement, Saradar Sarovar dam, mining and quarrying in Udaipur, salinity and water logging in Punjab, Haryana and Rajasthan, Bhopal gas tragedy, Chernobyl nuclear disaster, arsenic pollution in ground water.

**TEXT BOOK**

**REFERENCE BOOKS**
OBJECTIVE
The role of chemistry and chemical science in all branches of engineering is expanding greatly. Many products of chemical industries are having wide application in the field of engineering and technology. The strength of materials, the chemical composition of substance and the laws of heat have entered in almost every field of daily life. Chemistry is considered as one of the core subject of engineering for developing scientific temper for their professional skill. Effort should be made to teach the subject through demonstration and other innovative techniques with the active participation of learners.

1. **PHASE RULE**: Introduction, phase rule Equation; semesters used i.e. P, C, F, with examples; construction of phase diagram and cooling curves; phase diagram of one-component system (water system); derivation of phase rule; two component system (eutectic system of Ag-Pb); patinson’s process as application; congruent system (Zn-Mg); incongruent system (Na-K).

2. **THERMODYNAMICS**: General semesters, 1st law; 2nd law statements, concept of entropy; enthalpy; derivation of Entropy change for ideal gas with T & V and T & P as variables; concept of free energy & work function & their relation; gibbs free energy & variation with T & P; derivation of gibbs-helmholtz equation involving free energy & work function; derivation of clausius-clapeyron equation; numerical concerned with all the topics covered above.

3. **CHEMICAL BONDING**: Definition; types of bonding-Ionic; covalent and coordinate bond; hydrogen bond; metallic bond; atomic orbital theory and molecular orbital theory (MOT); molecular orbital diagram of homonuclear (O2, N2) and heteronuclear (HCl, CO) diatomic molecules; hybridization- sp, sp2, sp3.

4. **CHEMICAL KINETICS**: Introduction on reaction kinetics; units of rate; rate laws; order of reaction; molecularity; pseudo-order reactions; half-life; determination of order of reaction; theory of reaction rates; collision theory and transition state theory; effect of temperature on reaction rates; arrhenius equation; activation energy and catalysis; lindemann’s theory of unimolecular reactions; numerical based on half-life; first and second order reaction.
5. **ELECTROCHEMISTRY**: Introduction; electrolysis; faraday’s law of electrolysis; numerical based on Faraday’s law; conductance of electrolyte; strong and weak electrolytes; arrhenius theory; transport numbers; determination of transport numbers by Hittorff’s method; pH; conductometric titrations.

6. **COORDINATION CHEMISTRY**: Introduction; Ligands; een rule; chelate effect; isomerism (ionization, hydrate, coordination, linkage and position); nomenclature of bidentate; hexadentate; cis-trans complex; introduction to hybrisation; inner orbital complexes; outer complexes, exceptional case of Ni$^{2+}$ complexes; crystal field theory (octahedral and tetrahedral complexes, CFSE); John-Teller distortion, cause of distortion with examples.

7. **FUNDAMENTALS OF ORGANIC CHEMISTRY AND REACTIONS**: Factors influencing the reaction Rate; inductive effect; mesomeric effect and electromeric effect; homolytic and heterolytic fission; reaction intermediates; cabonium ions; free radicals and cabenes; types of organic reactions: substitution reactions (SN$^1$ and SN$^2$); addition reactions and elimination reactions; introduction of the reactions: aldol condensation; crossed- aldol; cannizaro reaction; diazotization reaction; friedel-Craft reaction; diels-Alder reaction; isomerism: structural isomerism (chain, position, functional, metamerism and tautomerism), stereoisomerism (geometrical and optical isomerism); fisher Projection, enantiomers, diastereomers, meso compounds. absolute configuration; rs system and e-z system; relative configuration: D-L nomenclature.

**TEXT BOOK**

**REFERENCE BOOKS**

<table>
<thead>
<tr>
<th>CH A151</th>
<th>GENERAL CHEMISTRY LAB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L T P Cr</td>
</tr>
<tr>
<td></td>
<td>0 0 2 1</td>
</tr>
</tbody>
</table>

**LIST OF EXPERIMENTS**
1. Determination of strength of HCl solution by titrating it against NaOH solution conductometrically.
2. To find out the melting point and eutectic point for two component system by method of cooling curve.
3. To prepare Urea Formaldehyde Resin & Phenol formaldehyde resin.
4. To determine the concentration of given KMnO$_4$ solution using spectrophotometer.
5. Confirmation test of alcohol, aldehyde, carboxylic acid, amine.
6. To determine the pH of water samples.
7. To estimate the sugar (glucose) using Fehling’s solution method.
8. Estimation of total iron in iron alloy.
9. To synthesize aromatic dye using Diazotization reaction.
10. To determine the percentage composition of unknown solution of polymer using Ostwald’s Viscometer.
11. To determine the alkalinity of given water sample.
12. To determine the total, Ca and Mg hardness of given water sample.
13. To determine the DO of given water sample.
14. To determine the flash point and fire point of given lubricant.
15. To determine the TDS of given water sample.

TEXT BOOK

<table>
<thead>
<tr>
<th>CS A101</th>
<th>COMPUTER PROGRAMMING</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

OBJECTIVE
To introduce the students the basic of C and Logic behind the implementation of different features of C like functional approach, loop statements, different data types, file processing and recursion.

1. OVERVIEW OF COMPUTER AND C PROGRAMME: Electronic computers then and now; computer hardware; computer software; the software development method; applying the software development method; variable declarations and data types; executable statements; general form of a C programme; arithmetic expressions; formatting numbers in program output; interactive mode; batch mode; and data files, common programming errors.
2. TOP-DOWN DESIGN WITH FUNCTION, SELECTION SRTUCTURE (IF & SWITCH STATEMENTS): Building programs from existing information; library functions; top-down design and structure charts; functions without arguments; functions with input arguments; control structures; conditions; the if statement; if statements with compound statements; nested if statements and multiple-alternative decisions; the switch statement.
3. REPETITION AND LOOP STATEMENTS: Repetition in programs counting loops and the while statement; for statement; conditional loops, loop design; nested loops; the do-while statement and flag-controlled loops; how to debug and test programs; functions with simple output parameters; multiple calls to a function with input/ output parameters; scope of names; formal output parameters as actual arguments; a program with multiple functions.
4. SIMPLE DATA TYPES, ARRAYS, STRING: Representation and conversion of numeric types; representation and conversion of type char; enumerated types; declaring and referencing arrays; array subscripts; using for loops for sequential access; using array elements as function arguments; array
arguments; searching and sorting an array; multidimensional arrays; string basics; string library functions; assignment and substrings; longer strings; concatenation and whole line input; string comparison; arrays of pointers; character operations; string to number and number to string conversions.

5. **RECURSION, STRUCTURE AND UNION TYPES:** The nature of recursion; tracing a recursive function; recursive mathematical functions; recursive functions with array and string; user defined structure types; structure type data as input and output parameters; functions whose result values are structured; parallel arrays and arrays of structures; union types.

6. **TEXT AND BINARY FILE PROCESSING:** Input/ output files; review and further study; binary files searching a database; programming in the large; using abstraction to manage complexity; personal libraries; header files; personal libraries; implementation files; storage classes; modifying functions for inclusion in a library; conditional compilation; arguments to function main; defining macros with parameters.

7. **DYNAMIC DATA STRUCTURES, MULTIPROCESSING USING PROCESSES & THREADS:** Pointers dynamic memory allocation; linked lists; linked list operators.

**TEXT BOOK**

**REFERENCE BOOKS**

<table>
<thead>
<tr>
<th>CS A151</th>
<th>COMPUTER PROGRAMMING LAB</th>
<th>L T P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0 0 2</td>
<td>1</td>
</tr>
</tbody>
</table>

**LIST OF EXPERIMENTS/EXERCISES**
1. Basic/Simple logic building.
2. Handling mathematical data.
3. Use of control structures.
4. Use of Function.
5. Handling mathematical problems.
6. Array and Pointer.
7. String Manipulation.
8. Use of Structure and Union.
10. File handling.

Note: Write and run at least three programmes for each topic.

TEXT BOOK

REFERENCE BOOKS

<table>
<thead>
<tr>
<th>EL A101</th>
<th>ELECTRICAL SCIENCES</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

OBJECTIVE
To provide basic knowledge and understanding of fundamental concepts of Electrical and electronics technology, explaining various basic laws governing the circuit configurations and evaluation, and its applications to electrical circuits.

1. CIRCUIT ANALYSIS: Basic passive circuit elements, KCL, KVL; independent and dependent sources; network theorems – nodal analysis, mesh analysis, Thevenin’s theorem, Norton’s theorem, linearity and superposition theorems.

2. SINGLE PHASE AC CIRCUIT: Generation of AC voltages, frequency, cycle, period, instantaneous, peak, rms and average value, peak factor, form factor, phase and phase difference, polar, rectangular, exponential and trigonometric representation of phasors; r, l and c components, behavior of these components in a.c. circuits; series and parallel a.c. circuits and their phasor diagrams; concept of impedance and admittance; power and power factor, complex power; resonance-series and parallel resonance; Q factor; bandwidth.

3. INTRODUCTION TO 3-Ø CIRCUITS: Phase and line voltages and currents; balanced star and delta circuits; phasor diagram, power equation; measurement of three phase power by two wattmeter method; comparison of single phase, three phase and DC system and their relative advantages.

4. MAGNETIC CIRCUITS: Magnetic field, magnetic flux, flux density, mmf, field strength, permeability, reluctance; B–H curve of hysteresis loop; comparison of electrical and magnetic circuits.
Transformer: Principle of transformer and its emf equation; ideal transformer, non-ideal transformer, autotransformer; construction of a transformer; transformer losses; open circuit of short circuit test; efficiency; voltage regulation.

5. BASICS OF ROTATING MACHINES: DC Machines: Construction and operation of dc machines (both dc generator and motor); emf equation; types of dc generator and their characteristics; starting and speed control of dc motor.
   AC Machines: Construction and working of induction motor; its torque-speed characteristics; importance of slip.

6. SEMICONDUCTOR DEVICES: p – n junction diode, zener diode operation & its characteristics,
   BJT: types, characteristics, biasing techniques & applications; FET: types & characteristics; introduction to op-amps & their applications.

7. INTRODUCTION TO DIGITAL ELECTRONICS: Binary numbers; digital logic gates; Boolean algebra combinational and sequential logic circuits– flip flops, introduction to counters, registers

TEXT BOOK

REFERENCE BOOKS

<table>
<thead>
<tr>
<th>EN A101</th>
<th>COMMUNICATION SKILLS</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

OBJECTIVE
By doing this course, the students will be able to develop proficiency in the four language skills: listening, speaking, reading and writing; and thereby enable them to be competent communicators in their educational, social and professional life. It makes them creative and innovative in their thinking and expression. It also enables the students to be confident and ambitious individuals ready to face and overcome any challenges with determination and optimism.

1. NATURE OF COMMUNICATION: Meaning and process of communication; types of communication; non-verbal communication; body language and paralanguage; language as a tool of communication; barriers in
communication and the remedial measures; significance of communication; norms of effective communication; importance of communicating in English.

2. **LISTENING AND READING SKILLS**: Hearing and listening; effective listening; types of reading; significance of reading in academic and professional world; purpose of reading comprehension; selected poems and prose lessons for comprehension; book review

3. **MECHANICS OF WRITING**: Vocabulary (homophones, homonyms, synonyms, antonyms, words often confused); one-word substitution; phrases; idioms and foreign words and phrases; punctuations and capitalization; abbreviations; acronyms and numerals; using the library.

4. **REMEDIAL GRAMMAR**: Rules of subject-verb agreement; error spotting; sentence correction; editing the passage and proof reading

5. **WRITING SKILLS**: Paragraph writing; creative writing; precis writing; notice; agenda and Minutes; advertising(commercial); report writing (project report, press report); the research paper.

6. **BUSINESS CORRESPONDENCE**: Principles of letter writing; structure and planning; letters of enquiry, placing order, complaint and adjustment; resume and job application; banking and insurance correspondence; the email correspondence

7. **CAREER SKILLS**: Phonetics (definitions of the basic semesters, 44 symbols and transcription); public speaking; group discussion; debating; presentation skills; an introduction to interview and how to perform in an interview; business etiquette; the telephone communication etiquette

**TEXT BOOK**


**REFERENCE BOOKS**


LIST OF EXPERIMENTS/EXERCISES
1. Phonetics: Revises the phonetic symbols and pronunciation practice; news presentation; just a minute.
2. Pronunciation: word accent, stress and intonation using the learn to speak english module; news, turn coat.
3. Conversation practice: From the learn to speak english module to daily life situation; news presentation; cultural movie; presentation of papers or topics.
4. Conversation practice; movie review; group discussion.
5. Reference work on given topic; news presentation; group discussion.
6. Grammar exercise; news paper; write up on given topic; GD.
7. Reading on a given topic and prepare comprehension questions; press report; debating.
8. News presentation in detail on specific topic; resume preparation; debating on a hot news from the news paper.
9. Power point presentation on the given topics; resume preparation.
10. Creative writing; email; searching for Job opportunity and responding.
11. Interview: tips & training; demo interview; skit presentation.
12. Group interview; demo interview; organizing programmes.
13. Aptitude test; organizing programmes.
14. Power point presentation; role play.
15. Talk show; video conferencing.

REFERENCE BOOKS

OBJECTIVE
To make the students understand about language, language skills and norms of effective writing; learn the meaning and purpose of reports, the characteristics of technical reports, acquire the skill to prepare effective reports and also understands the significance of reports and report writing in the professional contexts.
1. LANGUAGE SKILLS: An introduction to language skills; listening and hearing, verbal communication; types of reading; writing with a purpose.
2. EFFECTIVE WRITING: General and technical writing; punctuation and capitalization; use of grammar; 6Cs of effective writing.
3. **TECHNICAL REPORT AN INTRODUCTION:** Meaning and objectives of the term report; functions of reports; types of reports; purpose and significance of technical reports.

4. **CHARACTERISTICS OF TECHNICAL REPORTS:** Structure and lay out; elements of structure; elements of style.

5. **PLANNING AND PREPARATION:** Purpose and scope; nature of audience; data collection; types of sources and nature of data collection; methods of organising the data to the draft form.

6. **WRITING THE REPORT:** Order of arrangement of various elements of a report; rough draft; final draft; specimen reports.

7. **ORAL PRESENTATION OF THE REPORT:** Significance; preparatory steps; publicity; style of oral presentation; visual aids; delivery; body language; audience response; interaction session; assessment.

**TEXT BOOK**

**REFERENCE BOOKS**

<table>
<thead>
<tr>
<th>MA A101</th>
<th>MATHEMATICS–I</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

**OBJECTIVE**
To acquaint the students with the various concepts and tools of applied mathematics which will be very basic and the very soul and guide of various engineering subject.

1. **MATRICES AND ITS APPLICATIONS:** Elementary transformations; inverse of the matrix using elementary transformation; normal form of a matrix; rank of a matrix; solution of simultaneous linear equations; linear dependence and independence of vectors; linear and orthogonal transformations; eigen values, eigen vectors and properties; Cayley-hamilton theorem and its applications; diagonalization of matrices; similar matrices; quadratic forms.

2. **INFINITE SERIES:** Convergence and divergence; comparison test; D’Alemberts ratio test; Cauchy’s root test; Rabee’s test; logarithmic test; Gauss test; De morgan’s and Bertrand’s test; Cauchy’s integral test; Libnitz’s alternating test; absolutely convergent; conditionally convergent.
3. **APPLICATION OF DIFFERENTIATIONS**: Taylor’s series and Maclurin’s series; asymptotes; curvature.

4. **PARTIAL DIFFERENTIATION**: Functions of two or more variables; partial derivatives; total differential and differentiability; derivative of composite and implicit functions; Jacobians; higher order partial derivatives.

5. **APPLICATION OF PARTIAL DIFFERENTIATION**: Homogeneous functions and Euler’s theorem; Taylor’s series for functions of two variables; maxima-minima of function of two and three variables, Lagrange’s method of undetermined multipliers; differentiation under integral sign.

6. **FOURIER SERIES**: Euler’s formula; conditions for a Fourier expansion; change of interval; Fourier expansion of odd and even function; Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave functions; half range sine and cosine series; Parseval’s formula; practical harmonic analysis.

7. **ORDINARY DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS**: Exact differential equations; equations reducible to exact differential equations; application of differential equations of first order and first degree to simple electrical circuits; Newton’s law of cooling, heat flow and orthogonal trajectories.

**TEXT BOOK**

**REFERENCE BOOKS**

<table>
<thead>
<tr>
<th>MA A102</th>
<th>MATHEMATICS–II</th>
<th>L T P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3 1 0</td>
<td>4</td>
</tr>
</tbody>
</table>

**OBJECTIVE**
To acquaint the students with the various concepts and tools of applied mathematics which will be very basic and the very soul and guide of various engineering subject.

1. **DIFFERENTIAL EQUATIONS OF HIGHER ORDER AND ITS APPLICATIONS**: Linear differential equations of second and higher order; complete solution; method to find C.F.; method to find P.I.; method of variation of parameters to find P.I.; Cauchy’s linear equations and its solutions;
Legender's linear equations and its solution; simultaneous linear equations with constant coefficients and its solutions; application of linear differential equations to: Simple pendulum; oscillatory electric circuits.

2. LAPLACE TRANSFORMS AND ITS APPLICATIONS: Laplace transform (LT) of elementary functions; properties of LT; existence conditions of LT; LT of derivatives; LT of integrals; LT of the function multiplication by t; LT of the function division by t; inverse LT's; LT of convolution of two functions; application of linear differential equations and simultaneous linear differential equations with constant coefficients; periodic function and its LT; Laplace transform of haviside unit step function; unit impulse (direc-delta) function.


4. FOURIER TRANSFORM AND ITS APPLICATIONS: Fourier integral theorem; Fourier sine integral; Fourier cosine integral; complex Fourier integral; Fourier sine transform and its inverse; Fourier cosine transform and its inverse; Fourier transform and its inverse; finite Fourier sine transform and its inverse; finite Fourier cosine transform and its inverse; properties of Fourier transforms (linear, change of Scale, shifting modulation theorem); Fourier transforms of derivatives; convolution theorem for Fourier transform; relation between Fourier and Laplace transforms; Parseval's identities for Fourier transforms; application of Fourier transforms to boundary value problems.

5. SINGLE AND DOUBLE INTEGRATIONS: Application of single integration to find volume of solids and surface area of solids of revolution; double integral; change of order of integration; double integral in polar co-ordinates.

6. APPLICATIONS OF MULTIPLE INTEGRATIONS: Application of double integral to find area enclosed by plane curves and volume of solids of revolution; triple integral; volume of solid; change of variables; beta & gamma functions and relationship between them.

7. VECTOR CALCULAS: Differentiation of vectors; scalar and vector point functions; gradient of a scalar field and its physical interpretations; directional derivative; divergence of vector field and its physical interpretations; curl of a vector field and their physical interpretations; integration of vectors; line integral; surface integral; volume integral; Green's theorem and its applications; Stock's theorem and its applications; Gauss's theorems and its simple applications.

TEXT BOOK

REFERENCE BOOKS
OBJECTIVE
This course provides an elementary introduction to probability and statistics with applications. Topics include: basic probability laws; random variables; discrete and continuous probability distributions; statistical estimation and testing; confidence intervals; Analysis of variance; and an introduction to Statistical Quality Control.

1. PROBABILITY LAWS: Axioms of probability; the general addition rule; conditional probability; the multiplication rule; Bayes’ theorem.
2. DISCRETE PROBABILITY DISTRIBUTIONS: Random variables; discrete probability densities; cumulative distribution; expectation and distribution parameters; variance and Standard deviation; binomial distribution; negative binomial distribution; hyper geometric distribution; poisson distribution.
3. CONTINUOUS PROBABILITY DISTRIBUTIONS: Continuous densities; cumulative distribution; expectation and distribution parameters; gamma distribution; exponential distribution; chi-square distribution; normal distribution; standard normal distribution; weibull distribution and reliability.
4. ESTIMATION: Point estimation; the method of moments and maximum likelihood; maximum likelihood estimators; functions of random variables-distribution of $\bar{X}$; interval estimation; central limit theorem; confidence interval on the mean: variance known.
5. INFERENCES ON THE MEAN AND VARIANCE OF A DISTRIBUTION: Interval estimation of variability; estimating the mean and the student-t distribution; hypothesis testing; significance testing; hypothesis and significance tests on the mean and variance; alternative nonparametric methods (sign test for median, wilcoxon signed-rank test).
6. ANALYSIS OF VARIANCE: One-way classification fixed-effect model; comparing variances; pair-wise comparisons; Bonferroni T tests; Duncan’s multiple range test; Tukey’s test.
7. STATISTICAL QUALITY CONTROL: Properties of control charts; Shewhart control charts for measurement and attributes; tolerance limits (one-sided and two-sided).

TEXT BOOK
REFERENCE BOOKS

ME A101 THEMODYNAMICS

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

OBJECTIVE
To cover the basic principles of thermodynamics from the classical viewpoint; to present real-world engineering examples to give students a feel for how thermodynamics is applied in engineering practice; and to develop an intuitive understanding of thermodynamics by emphasizing the physics and physical arguments.

1 SOMEBODY INTRODUCTORY COMMENTS, CONCEPTS AND DEFINITIONS:
Familiarization with thermal equipment; the simple steam power plant, fuel cells, the vapor-compression refrigeration cycle, the thermolectric refrigerator, the gas turbine, the chemical rocket engine; thermodynamic system and the control volume, macroscopic versus microscopic point of view, properties and state of a substance, processes and cycles, specific volume and density, pressure, energy, units and dimensions, equality of temperature, the zeroth law of thermodynamics, temperature scales, engineering application.

2 PROPERTIES OF A PURE SUBSTANCE:
The pure substance, vapor-liquid-solid-phase equilibrium in a pure substance, independent properties of a pure substance, tables of thermodynamic properties, thermodynamic surfaces, the p-v-t behavior of low- and moderate-density gases, the compressibility factor, equations of state, computerized tables, engineering applications.

3 WORK, HEAT & ENERGY EQUATION FOR A CONTROL MASS:
Definition of work, units for work, work done at the moving boundary of a simple compressible system, other systems that involve work, definition of heat, heat transfer modes, comparison of heat and work, engineering applications; the first law of thermodynamics for a control mass undergoing a cycle, the first law of thermodynamics for a change in state of a control mass, internal energy-a thermodynamic property, problem analysis and solution technique, enthalpy, the constant-volume and constant-pressure specific heats, the internal energy, enthalpy, and specific heat of ideal gases, the first law as a rate equation, conservation of mass, engineering applications.

4 ENERGY EQUATION FOR A CONTROL VOLUME:
Conservation of mass and the control volume, the first law of thermodynamics for a control volume, the steady-state process, examples of steady-state processes, engineering applications.
5. **THE SECOND LAW OF THERMODYNAMICS & ENTROPY FOR A CONTROL MASS:** Heat engines and refrigerators, the second law of thermodynamics, equivalence of the statements, the reversible process, factors that render processes irreversible, the carnot cycle, two propositions regarding the efficiency of a carnot cycle, the thermodynamic temperature scale, the ideal-gas temperature scale, ideal versus real machines, engineering applications; the inequality of clausius, entropy-a property of a system, the entropy of a pure substance, entropy change in reversible processes, the thermodynamic property relation, entropy change of a solid or liquid, entropy change of an ideal gas, the reversible polytropic process for an ideal gas, entropy change of a control mass during an irreversible process, entropy generation, principle of the increase of entropy, some general comments about entropy and chaos.

6. **POWER & REFRIGERATION SYSTEMS:** Introduction to power systems, the rankine cycle, effect of pressure and temperature on the rankine cycle, introduction to refrigeration systems, the vapor-compression refrigeration cycle, air-standard power cycles, the brayton cycle, the otto cycle, the diesel cycle.

7. **IDEAL GAS MIXTURES:** General considerations and mixtures of ideal gases, mole fraction & mass fraction, a simplified model of a mixture involving gases and a vapor, wet-bulb and dry-bulb temperatures.

**TEXT BOOK**

**REFERENCE BOOKS**

<table>
<thead>
<tr>
<th>ME A152</th>
<th>WORKSHOP PRACTICE</th>
<th>L T P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0 0 4</td>
<td>2</td>
</tr>
</tbody>
</table>

**OBJECTIVE**
To provide an overview of the basic production techniques and allied/supporting techniques used to produced finished products from raw materials. In addition to theory, students will be given practical training on various basic production techniques. After going through this course, the students will be in a position to understand and working of a mechanical workshop.

1. **INTRODUCTION :** Basic manufacturing processes and safety in workshop.
2. **MACHINING PROCESSES :** Production of components involving turning; facing; taper turning; milling; shaping; planning and drilling operations.
3. **CASTING PROCESSES**: Sand casting process; pattern making; types of moulding sands, cores, mould making, melting and pouring of metal; casting defects.

4. **METAL FORMING PROCESSES**: Sheet metal forming operations, shearing, bending, punching and blanking, forging process as upsetting, drawing down, bending etc.

5. **JOINING PROCESSES**: Metal Arc welding; gas welding; resistance welding; soldering and mechanical fastening processes.

6. **FITTING**: Study of fitting tools; marking tools and measuring instruments like micrometer, vernier calipers and height gauge.

7. **INTRODUCTION TO CNC MACHINES**: Study of CNC machines.

**TEXT BOOK**

**REFERENCE BOOK**


<table>
<thead>
<tr>
<th>ME A153</th>
<th>ENGINEERING GRAPHICS</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

**OBJECTIVE**
Engineering graphics is the primary medium for development and communicating design concepts. Through this course the students are trained in engineering graphics concepts through manual drafting. The ISI code of practice is followed. With this course students can improve the visual concepts in all engineering streams.

1. **INTRODUCTION**: AutoCAD introduction; AutoCAD window; basic commands and toolbars; Creating the Drawing; instruments geometrical drawing; conventional representation; types of projections; first and third angle system of orthographic projection; ISI conventions used in drawing, dimensioning and sections.

2. **PROJECTION OF LINES**: Introduction to First angle and third angle methods of projection, Projections of points on regular and auxiliary-reference planes (Including coordinate system of points); Projections of lines parallel to or inclined to one or both reference planes; true length of a line, point view of a line; angles made by the line with reference planes.
3. **PROJECTION OF PLANE**: Projections on regular and on auxiliary reference planes; types of planes (horizontal, frontal, oblique and profile planes); angles made by the plane with principle reference planes.

4. **PROJECTION OF SOLID**: prisms; pyramids; cylinder and cones in simple positions with axis perpendicular to a plane; with axis parallel to both planes; with axis parallel to one plane and inclined to the other.

5. **SECTION OF SOLID**: prisms; pyramids; cylinders and cones in simple positions only; section plane is parallel; perpendicular and inclined to both reference planes; true shape of sections.

6. **DEVELOPMENT OF PLANE AND CURVED SURFACES**: prisms; pyramids; cylinders and cones along with cutting planes.

7. **ISOMETRIC PROJECTIONS**: Isometric scale; isometric projections and isometric views/ drawings; circles in isometric view, isometric views of simple solids prisms; pyramids and cylinders.

**NOTE** All the above syllabus is to be covered according to the first angle method of projection.

**TEXT BOOK**

**REFERENCE BOOKS**

<table>
<thead>
<tr>
<th>PD A191</th>
<th>CO-CURRICULAR ACTIVITIES</th>
<th>L T P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**OBJECTIVE**
This course aims at helping the students in their all round growth and acquire attributes like team spirit, organizational ability, leadership qualities, etc.

**OPERATION**
The students are to take part in Co-curricular activities outside contact hours through clubs/ societies spread over all the two semesters of the year. They are required to register for this course in each semester and their performance will be evaluated in last semester of the year.
OBJECTIVE
To equip the students with the understanding of human behavior, develop time, stress & self management skills, and enhance personality.

1. GOAL SETTING: Types of goals; setting smart goals; personal goal setting; business goal setting; goal setting techniques; exercises.
2. DECISION MAKING: Definition; models & types; skills and techniques; courses of action; steps involved in decision making; Individual decision making; group decision making; exercises.
3. CREATIVE THINKING: The concept of creativity; types; six thinking hats; mental blocks; examples; exercises.
4. SELF ANALYSIS: Self discovery: importance of knowing yourself; SWOT analysis; benefits; strengths and weaknesses; developing positive attitude; changing attitudes; power of positive thinking; overcoming negative attitude; exercises.
5. MANAGING TIME & STRESS: Features; time management matrix; tips for time management; effective scheduling; time wasters; time savers; exercises and time bound tasks; what is stress; causes; positive & negative stress; effects; signs; tips to overcome stress; stress busters; exercises.
6. TRANSACTIONAL ANALYSIS: Winners & losers; ego states; OK states; positive-negative & verbal-non-verbal strokes; syndromes; games people play; exercises.
7. GROOMING & ETIQUETTE: Grooming check list; accessories; do's and don'ts for men and women; hygiene and skin care; dress codes; dressing for interviews; clothing do's and don'ts; social etiquette; dining etiquette; party & wedding etiquette; sensitivity towards diverse cultures; respecting religions and traditions.

TEXT BOOK
PPTs
REFERENCE BOOKS
OBJECTIVE
To educate the students with the present day physical sciences through concepts like waves, Oscillations, optics, etc.

1. ROTATIONAL DYNAMICS: Rotational Motion: description of rotation (angular displacement, angular velocity and angular acceleration); rotational motion with constant angular acceleration; moment of inertia; parallel and perpendicular axes theorems; rotational kinetic energy; torque and angular momentum; rolling motion.

2. WAVES AND OSCILLATIONS: Kinematics of simple harmonic motion; differential equation of a simple harmonic oscillator and its solution; graphical representation of simple harmonic motion; potential and kinetic energies of simple harmonic motions; spring mass system; simple and compound pendulum; forced & damped oscillations, resonance; progressive sinusoidal waves; standing waves in strings and pipes, superposition of waves; beats; Doppler effect.

3. REFLECTION AND REFRACTION: Optics Laws of reflection and refraction; refraction effects; Fresnel equations (Fresnel reflection); Fermat’s principle (laws of reflection and refraction); real and apparent depth; critical angle and total internal reflection with its application (principle of fiber optics: critical angle; acceptance angle; numerical aperture; types of fiber).

4. CONSERVATION PRINCIPLES: Conservative and non-conservative forces; linear momentum and its conservation principles; rocket propulsion; velocity of rocket at any instant; gravitational potential energy; potential energy stored in compressed or elongated spring; conservation of mechanical energy; simple pendulum and projection; conservation of momentum; sun and earth system; energy-mass equivalence.

5. INTERFERENCE: Interference by division of wave front; Fresnel's biprism and its application to find wavelength; interference by division of amplitude; Newton's rings and its applications; determination of wavelength and refractive index of liquids; Michelson interferometer and its applications; determination of wavelength; resolution of spectral lines (difference in wavelength); determination of refractive index of thin sheet.

6. DIFFRACTION: Difference between interference and diffraction; difference between Fraunhofer and Fresnel diffraction; Fraunhofer diffraction through single slit; variation of intensity (analytical); plane transmission diffraction grating; variation of intensity (analytical), absent spectra; maximum order spectra; Dispersive and Resolving power of grating.

7. POLARIZATION: Polarised and unpolarized light; double refraction; Nicol prism; quarter and half wave plates; optical activity; Dextro and Leavo rotatory; specific rotation; biquartz and Laurent's half-shade polarimeters
TEXT BOOK

REFERENCE BOOKS
1. Sears, F.W., “Electricity and Magnetism”, Narosa

<table>
<thead>
<tr>
<th>PH A151</th>
<th>MECHANICS, OSCILLATIONS AND WAVES LAB</th>
<th>L T P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0 0 2</td>
<td>1</td>
</tr>
</tbody>
</table>

LIST OF EXPERIMENTS
1. To determine the moment of inertia of a fly wheel bout its axis of rotation.
2. To determine the moment of inertia of a given (irregular or regular) body with the help of inertia table.
3. To find the wavelength of sodium light by Newton’s rings experiment.
4. To find the wavelength of sodium light by Fresnel’s biprism experiment.
5. To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.
6. To find the refractive index and Cauchy’s constants of a prism by using spectrometer.
7. To find the wavelength of sodium light by Michelson interferometer.
8. To find the resolving power of a telescope.
9. To find the pitch of a screw using He-Ne laser.
10. To find the specific rotation of sugar solution by using a Polarimeter.
11. To find the frequency of A.C. mains by using sonomÉSEr.
12. To find the velocity of ultrasonic waves in nonconducting medium by piezoelectric method.
13. To determine the modulus of rigidity of a wire with the help of Maxwell’s needle.
14. To determine the modulus of rigidity of the material of wire with the help of Torsional pendulum.

TEXT BOOK
1. Worshnop, B. L. and Flint, H. T. “Advanced Practical Physics”, KPH

REFERENCE BOOKS
1. Gupta, S. L. & Kumar, V. “Practical Physics”, Pragati Prakashan
3. Advanced Practical Physics; Worshnop and Flint, Methuen & Co., London,

NOTE