

**PROGRAM STRUCTURE  
REGULATIONS  
AND  
SYLLABUS OF B.TECH 1<sup>st</sup> YEAR**

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**COMPUTER SCIENCE AND ENGINEERING**

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**R22 Regulations**

**FOR**

**B.TECH FOUR YEAR DEGREE PROGRAM**

**(Applicable for the batches admitted from 2022-2023 onwards)**



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# **Academic Regulations for B. Tech. (Regular) Program**

## **(With effect from the students admitted from the Academic Year 2022-23)**

### **1. Title and Duration of the Program**

- 1.1 The program shall be called the Undergraduate (UG) Program in Bachelor of Technology, abbreviated as B. Tech.
- 1.2 The B. Tech program duration shall be four academic years divided into eight semesters and each semester having 16 weeks of instruction. In case of students admitted through lateral entry scheme (LES) into II year I semester of B. Tech., the duration shall be three academic years divided into six semesters.
- 1.3 Students admitted to the B. Tech. program shall have to complete the course of study within a maximum time frame of 6 years (4+2 years) from the year of admission and students admitted through LES shall have to complete the course of study within a maximum time frame of 5 years (3+2 years) from the year of admission. Relaxation sought on genuine grounds will be referred to the Board of Management.

### **2. Admission Procedure**

- 2.1 A candidate for admission into the B. Tech program in Engineering must have passed the Intermediate Examination of the Board of Intermediate Education, Government of Telangana with Mathematics, Physics and Chemistry as optional courses, or any other examination recognized by the Anurag University as equivalent thereto.
- 2.2 All the eligible applicants satisfying 2.1 shall be governed by the following admission policy:

Note: The Anurag Group of Institutions (AGI) has transformed into Anurag University (AU) under the Telangana State Private Universities Act (Establishment and Regulations) No.11 of 2018 Dt. 20 May, 2020)

| S.No | Academic Program Category  | Entrance Test   | Rule of Reservation   | Fee Structure (Tuition and other fee)                                 |
|------|--|---|---|---|
| 1    | Programs existing in AGI prior to formation of AU adopted by AU from the Academic Year 2020 - 21 | Admissions to the programs with branch codes 01, 02, 03, 04, 05, 08 & 12 will be based on the ranks obtained in the State Common Entrance Test (TSEAMCET / any other test) conducted by the Govt. of Telangana. | As per the State Govt. reservation policy.  | As fixed by Telangana Admission and Fee Regulatory Committee (TAFRC). |
| 2    | Programs started by AU from the Academic Year 2020-21  | Admissions to the programs with branch codes 06, 07, 09 & 10 will be based on the ranks obtained in the Anurag University Common Entrance Test, or JEE / Central or State Level Entrance Tests                  | As per the Section 33 of the Telangana State Private Universities Act No. 11 of 2018, and Rule 10 of the G.O.Ms. No. 26 [Higher Education | As specified by AU from time to time as per the Act.                  |

|  |  |  |                                    |  |
|--|--|--|------------------------------------|--|
|  |  | or any other test as prescribed by the Governing Body of AU. | (UE.1) Department], Dt. 20-08-2019 |  |
|--|--|--|------------------------------------|--|

### 3. Program of Study and Code

| Program                                       | Code |
|---|------|
| Civil Engineering                             | 01   |
| Electrical and Electronics Engineering        | 02   |
| Mechanical Engineering                        | 03   |
| Electronics and Communication Engineering     | 04   |
| Computer Science and Engineering              | 05   |
| Artificial Intelligence                       | 06   |
| Artificial Intelligence & Machine Learning    | 07   |
| Chemical Engineering                          | 08   |
| Computer Science Engineering (Cyber Security) | 09   |
| Computer Science Engineering (Data Science)   | 10   |
| Information Technology                        | 12   |

### 4. Credits

4.1 The following is the credit allocation table.

| Course                        | Credits |
|-------------------------------|---------|
| 1 Hour Lecture (L) per week   | 1       |
| 1 Hour Tutorial (T) per week  | 1       |
| 2 Hour Practical (P) per week | 1       |
| Mini project                  | 2       |

|                         |    |
|-------------------------|----|
| Comprehensive Viva-Voce | 2  |
| Seminar                 | 2  |
| Project                 | 10 |

## 5. Distribution and Weightage of Marks

- 5.1 The performance of a student in a semester shall be evaluated course-wise for a maximum of 100 marks in each theory and practical course. In addition, industry-oriented mini-project, seminar, comprehensive viva-voce and project work shall be evaluated for 100 marks each.
- 5.2 The distribution of marks for Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE) along with the minimum pass percentage shall be as follows:

| Course                            | CIE | SEE | *Min. Pass Percentage in SEE | *Min. Pass Percentage in CIE+SEE |
|-----------------------------------|-----|-----|------------------------------|----------------------------------|
| Theory                            | 50  | 50  | 40                           | 40                               |
| Laboratory /<br>Practicals        | 50  | 50  | 40                           | 40                               |
| Industry Oriented<br>mini-Project | 0   | 100 | 40                           | 40                               |
| Seminar<br>presentation           | 100 | 0   | -                            | 40                               |
| Comprehensive viva-<br>voce       | 0   | 100 | 40                           | 40                               |
| Project Work                      | 50  | 50  | 40                           | 40                               |

\*A relaxation of 10% of maximum marks shall be given to physically challenged students.

### 5.3 **Continuous Internal Evaluation (CIE) for theory courses:**

5.3.1 The CIE has two components namely, **Midterm examinations** and **Other Evaluations**.

**i. Midterm examinations (30 marks):**

- a. For theory courses, there shall be two midterm examinations as part of CIE. Each midterm examination shall be conducted for a duration of 90 minutes for 30 marks and the question paper consists of Part-A (short answers) for 12 marks and Part-B (Long Answers) for 18 marks. Part-A shall contain 12 short answer questions for 12 marks and Part-B shall contain 5 questions of which student has to answer 3 questions; each question carries 6 marks.
- b. The first midterm examination shall be conducted for 2.5 units of syllabus at the end of 8 weeks of instruction and the second midterm examination shall be conducted for remaining 2.5 units at the end of 16 weeks of instruction.
- c. There may be an optional makeup examination conducted by an instructor if it is deemed appropriate. However, the instructor shall take the prior approval of the Dean of the concerned school.
- d. The average of the two midterm examinations shall be taken as the final marks secured by each candidate.

**ii. Other Evaluations (20 marks):**

- a. The other evaluations can be any of the following:

Assignment / Seminar / Project based learning / Presentation / Quiz / Open book assessment / Surprise test / Participatory learning / Group Activities, etc. A minimum of two evaluations need to be conducted.

- b. The distribution of weightage for various evaluation components will be mentioned by the faculty offering the course in the course handout at the beginning of the semester with the approval of the Head of the Department.
- c. The average of the best of at least two such evaluations shall be taken as the final marks secured by each candidate.



#### 5.4 **Semester End Examinations (SEE) for theory courses:**

- 5.4.1 The semester end examination shall be conducted for 50 marks for the duration of 150 minutes.
- 5.4.2 The question paper consist of two parts, Part-A (10 marks) and Part-B (40 marks).
- 5.4.3 Part-A is consists of five questions (numbered from 1 to 5), one question from each unit carrying 2 marks each.
- 5.4.4 Part-B consists of five questions (numbered from 6 to 10) shall be set by covering one question (may contain sub-questions) from each unit of the syllabus carrying 8 marks each. For each question, there shall be an internal choice (that means there shall be two questions from each unit and the student has to answer any one of them).

#### 5.5 **Practical courses**

- 5.5.1 For practical courses, there shall be a CIE during a semester for 50 marks and SEE for 50 marks. Out of the 50 marks for CIE, day-to-day work in the laboratory shall be evaluated for 30 marks and internal practical examination shall be evaluated for 20 marks conducted by the laboratory teacher concerned. The SEE carries 50 marks.
- 5.5.2 Components of day-to-day evaluation:
  - a. Preparation for Lab – 10 marks
  - b. Observation – 10 marks
  - c. Completion of Experiment – 5 marks
  - d. Record – 5 marks
  - e. Before the end of the instruction, a skill test shall be conducted for 20 marks.

5.5.3 The practical SEE shall be conducted for 50 marks with an external examiner along with one internal examiner. The external examiner shall be appointed by the Dean Examinations from the list of panel of examiners approved by the Vice- Chancellor.

5.6 **Industry-oriented mini-Project:**

There shall be an industry-oriented mini-Project, to be taken up during the vacation after III year II semester examinations. However, the mini- project and its report shall be evaluated in IV year I semester. The industry oriented mini project shall be submitted in report-form and should be presented before the committee, which shall be evaluated as SEE for 100 marks. The committee consists of the Head of the Department, Supervisor and a senior faculty member. There shall be no CIE marks for industry oriented mini-project.

5.7 **Seminar presentation:**

There shall be a seminar presentation in IV year II semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his/her understanding of the topic, and submit it to the Department. It shall be evaluated by the committee consisting of Head of the Department, seminar Supervisor and a senior faculty member. The seminar report shall be evaluated as CIE for 100 marks.

5.8 **Comprehensive viva-voce:**

There shall be a comprehensive viva-voce in IV year II semester. The comprehensive viva-voce shall be conducted by a committee consisting of the Head of the Department and two senior faculty members of the department. The comprehensive viva-voce is intended

to assess the students understanding of the courses studied during the B. Tech. program. The comprehensive viva-voce is evaluated as SEE for 100 marks.

#### 5.9 **Project Work:**

Out of a total of 100 marks for the project work, 50 marks shall be for CIE and 50 marks for the SEE. The CIE shall be based on two seminars given by each student on the topic of his/her project. The SEE (viva-voce) shall be conducted by a committee consisting of:

- (i) External examiner appointed by Dean (Examinations) on the recommendation of Chairperson, BOS,
- (ii) Head of the department,
- (iii) Supervisor of the project and
- (iv) A senior faculty member of the department. The evaluation of project work shall be conducted at the end of the IV year II semester.

5.10 The Laboratory marks and the CIE awarded by the faculty are subject to scrutiny and scaling by the University whenever/wherever necessary. In such cases, the CIE and laboratory marks awarded by the teacher will be referred to a committee consisting of Chairperson BOS / Head of the Department, Dean Examinations / COE and the subject expert. The committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the committee are submitted to the Vice-Chancellor and his decision is final. The laboratory records and internal test papers shall be

preserved for a period of two years or as specified by the University from time to time.

**5.11 Recounting:**

The totaling of the marks awarded shall be verified in the answer script and corrected if there is any mistake.

**5.12 Revaluation:**

- a. The answer scripts of the candidate applied for revaluation are evaluated by two subject experts independently other than the original valuer.
- b. If the difference of marks between these two valuations is 15% or more, it will be sent for third valuation to another subject expert.
- c. Nearest of two valuations out of three will be considered and the average of these two will be taken as the final marks obtained.
- d. If the difference of the final marks after revaluation is greater than or equal to 15% of the maximum marks, then the revaluation marks are considered for declaring the result.
- e. If the revaluation marks are less than the original marks, the original marks remain same and there is no change in the result.

**5.13 Challenge Valuation:**

The candidates who have applied for revaluation and not satisfied with the result are only eligible to apply for challenge valuation by paying the prescribed fee in the form of DD payable to the Registrar, Anurag University.

- a. On receipt of the DD, a photocopy of the answer booklet shall be given to the student.

- b. The paper will be evaluated in the presence of the student by a senior faculty member appointed by the University.
- c. If there is any change in the marks  $\geq 15\%$  of the maximum marks, the new marks will be awarded to the student. Otherwise, there will be no change in original secured marks.
- d. If the change in marks (equal or above 15% of the maximum marks) occurs, the amount paid towards challenge valuation will be refunded. Otherwise, the student will forfeit the total amount which he/she has paid.

## **6. Attendance Requirements**

- 6.1 A student is eligible to write the Semester end examinations only if he/she acquire a minimum of 75% attendance in aggregate of all courses.
- 6.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted on medical grounds after submission of required certificate from a medical doctor as approved by the Academic Council.
- 6.3 A stipulated fee shall be payable towards condonation of shortage of attendance.
- 6.4 Shortage of attendance below 65% in aggregate shall not be condoned.
- 6.5 However, in respect of women candidates who seek condonation of attendance due to pregnancy, the Vice-Chancellor may condone the deficiency in attendance to the extent of 15% (as against 10% condonation for others) on medical grounds subject to submission of medical certificate to this effect. Such condonation shall not be availed twice during the program of study.
- 6.6 Students whose shortage of attendance is not condoned are not eligible to write semester end examinations of that semester. Such students are detained and their registration for examination stands cancelled.
- 6.7 A student detained due to shortage of attendance in a semester may seek re-admission into that semester, as and when offered, within four weeks from the date of commencement of class work with the academic regulations of the batch into which he/she gets re-admitted.

- 6.8 A student will be promoted to the next semester if he/she satisfies the attendance requirement of the present semester and shall not be eligible for readmission into the same semester.
- 6.9 For all mandatory, noncredit courses offered in a semester, a student shall be declared successful or 'passed', if he/she secures  $\geq 75\%$  attendance in such a course. A 'satisfactory participation certificate' for that mandatory course will be issued and no marks or letter grade shall be allotted.
- 6.10 Attendance of N.S.S/N.C.C Camps or Inter collegiate or Inter University or Inter State or International matches or debates or such other inter university activities as approved by the authorities, will be taken into consideration while calculating the attendance. Up to a maximum of 10% if the student represents the University / State / Country in any extra / co-curricular activities.
- i. Such leave should be availed with prior permission from the Dean School of Engineering and not be availed more than twice during the program of study.
  - ii. Without any prior permission, such leave shall be treated as absence.
  - iii. While calculating the attendance, the no. of classes not attended in each course should be deleted in the denominator.

## **7. Promotion Rules:**

- 7.1 The Rules of promotion are as follows.

| Promotion | From I Year to | From II Year to | From III Year |
|-----------|----------------|-----------------|---------------|
|-----------|----------------|-----------------|---------------|

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|                                  | II Year   | III Year  | to IV Year                                     |
|----------------------------------|---|---|--|
| <b>Condition to be fulfilled</b> | 50% of the total credits up to I year II semester | 60% of the total credits up to II year I semester | 60% of total credits up to III year I semester |

- 7.2 A student shall register and put up required attendance in all courses and earn a total of 160 credits for the award of degree.
- 7.3 When a student is detained due to shortage of attendance in any semester, no grade allotments or SGPA/CGPA calculations will be given for that entire semester in which he/she is detained.
- 7.4 When a student is detained due to lack of credits in any year, he may be readmitted after fulfillment of the academic requirements, with the academic regulations of the batch into which he/she gets readmitted.
- 7.5 For readmitted candidates, if there are any professional electives / open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the set of elective courses offered under that category.

## 8. Program Structure

The program structure is in-line with the guidelines as suggested by AICTE. The course-wise classification and break-up of credits are given in the following table:

| S.No | Classification |     | Course Work - Subject Area                               | Total Credits % |      |
|------|----------------|-----|--|-----------------|------|
|      | AICTE          | UGC |  | Min.            | Max. |
| 1    | HS             |     | Humanities and social sciences including management (HS) | 5               | 10   |



|   |        |  |  |   |    |
|---|--------|--|--|---|----|
| 2 | BS     | Foundation courses   | Basic sciences(BS) including mathematics, physics, chemistry & Biology   | 15  | 20 |
| 3 | ES     |  | Engineering sciences (ES), including materials, workshop, drawing, basics of electrical /electronics/ mechanical/ computer engineering / Instrumentation | 15  | 20 |
| 4 | PC     | Core courses   | Professional subjects-core (PC), relevant to the chosen specialization/ branch; may be split into hard (no choice) and soft (with choice), if required   | 30  | 40 |
| 5 | P<br>W |  | Project work, seminar and/or internship in Industry or elsewhere.  | 10  | 15 |
| 6 | PE     |  | Elective Courses   | Professional subjects – electives (PE), relevant to the chosen specialization/ branch | 10 |
| 7 | OE     | Open electives (OE), from other technical and/or emerging subject areas which are offered by non-parent departments. |  | 5   | 10 |

## 9. Supplementary Examinations

- 9.1 A student who is eligible to appear for the semester end examinations in a course, but is absent / failed in that examination, may write the exam in that course during supplementary examinations. In such cases, CIE assessed earlier for that course will be carried over and added to the marks to be obtained in the supplementary examinations for evaluating his/her performance in that course.
- 9.2 Supplementary examination(s) in the failed courses shall be conducted as per schedule given by the University. If the concerned

course is not available in the new regulation the student shall have to appear for the examinations with the syllabus of equivalent course(s) prevailing for the regular students in that academic year. The equivalent course will be established by the concerned Head / Chairperson, BoS. However, if no such similar course is offered in the current regulation, the supplementary examination(s) shall be conducted with the same syllabus which is studied during regular course of study with extra fee as specified by the University from time to time.

## **10. Grade Points**

- 10.1 Marks will be awarded to indicate the performance of each student in each theory courses or practical/seminar/project/mini-project etc., based on the percentage of marks obtained in both CIE and SEE taken together as specified above, and a corresponding letter grade shall be given.

10.2 A 10 point absolute grading system using the following letter grades and corresponding percentage of marks shall be followed as given below:

| Letter Grade |             | Grade Points | % Marks secured (M)<br>Range of |     |
|--------------|-------------|--------------|---------------------------------|-----|
| <b>O</b>     | Outstanding | 10           | >=90                            | 100 |
| <b>A+</b>    | Excellent   | 9            | >=80                            | <90 |
| <b>A</b>     | Very Good   | 8            | >=70                            | <80 |
| <b>B+</b>    | Good        | 7            | >=60                            | <70 |
| <b>B</b>     | Average     | 6            | >=50                            | <60 |
| <b>C</b>     | Pass        | 5            | >=40                            | <50 |
| <b>F</b>     | Fail        | 0            | <40                             | -   |
| <b>Ab</b>    | Absent      | 0            | -                               | -   |

10.3 A student obtaining 'F' grade in any subject shall be considered as 'failed' and will be required to reappear as 'supplementary candidate' in the SEE, as and when conducted. In such cases, CIE in those subject(s) will remain same as those the student obtained earlier.

10.4 A letter grade does not imply any specific % of marks.

10.5 In general, a student shall not be permitted to repeat any course (s) only for the sake of 'grade improvement' or 'SGPA/CGPA Improvement'.

10.6 A student earns grade point (GP) in each course, on the basis of the letter grade obtained by him in that course (excluding mandatory non-credit courses). Then the corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular course.

$$\text{Credit Points (CP)} = \text{Grade Point (GP)} \times \text{Credits (for a course)}$$

- 10.7 After successful completion of the course only, the students get GP  $\geq$  5 ('C' grade or above).
- 10.8 SGPA/CGPA at the end of each semester shall be awarded only if he/she passed all the courses up to end of that semester.

## **11. Registration / Dropping**

- 11.1 Each student has to register for course work at the beginning of each semester as per the schedule mentioned in the academic calendar.
- 11.2 A student at the end of II Year II semester either having the CGPA  $\geq$  7.0 or having passed all previous courses in first attempt with a minimum CGPA  $\geq$  5.0 is allowed to register for additional theory course/credits. However, the same is not applicable for mandatory non-credit courses.
- 11.3 A student would be allowed to register in an additional course only if he/she satisfies all the prerequisites.
- 11.4 Departments will notify at the time of registration about the minimum number of students to be enrolled for a particular course to be offered.
- 11.5 Any student may be barred from registering for any course for specific reasons like disciplinary reasons, non- payment of fees, etc.
- 11.6 Dropping of courses:
- 11.7 Within four weeks after the commencement of the semester, the student may, in consultation with his / her faculty advisor, drop one or more courses. The dropped courses are not recorded in the grade card.

## **12. Passing Standards**

- 12.1 A student shall be declared successful or 'passed' in a Semester, only when he/she gets a SGPA  $\geq 5.00$  (at the end of that particular Semester); and a student shall be declared successful or 'passed' in the entire UG Program, only when he/she gets a CGPA  $\geq 5.00$ ; subject to the condition that he secures a GP  $\geq 5$  (C Grade or above) in every registered course in each semester.
- 12.2 A student shall be declared successful or 'passed' in any non-credit course, if he/she secures a 'satisfactory participation certificate' for that mandatory course.
- 12.3 After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits etc.), grade earned, credits earned, SGPA and CGPA.

## **13. Vertical Progression**

- 13.1 It shall also be necessary to lay down uniform minimum standards for SGPA and CGPA together with the minimum number of credits to be earned in a semester for the vertical progression of students. This shall be used in facilitating the mobility of students from one institute to another and also in avoiding any confusion among the students. At the end of each semester the minimum standard for SGPA = 5.0 and CGPA = 5.0. However, failure to secure a minimum CGPA = 5.0 at the end of any semester for the first time, shall attract a warning before approval of the student to continue in the following semester.

#### **14. Eligibility for the Award of B. Tech / B. Tech (Hons.) / B. Tech Minor**

A student shall be eligible for award of the B. Tech degree if he / she fulfill all the following conditions:

- 14.1 He / she should have registered and successfully completed all the components prescribed in the program of study to which he / she is admitted by securing 160 credits.
- 14.2 He / she have obtained CGPA greater than or equal to 5.0 (minimum requirements for pass).
- 14.3 He/she has no dues to the Institute, Hostels, Libraries, NCC / NSS etc.
- 14.4 No disciplinary action is pending against him/her.
- 14.5 Those who fail to fulfill the above academic requirements shall forfeit their admission.
- 14.6 A student will be eligible to get Undergraduate degree with **Hons.** or **Minors**, if he/she completes an additional 18 credits and these extra credits could be acquired through MOOCs or any other online / offline courses recommended by the University.

## 15. Award of Class

- 15.1 A student who registers for all the specified courses as listed in the program and secures the required number of 160 credits (with CGPA > 5.0), within six academic years from the date of commencement of the first academic year, shall be declared to have 'qualified' for the award of the B. Tech degree in the chosen branch of engineering as selected at the time of admission.
- 15.2 A student who qualifies for the award of the degree as listed in item 15.1 shall be placed in the following classes:

| CGPA Range |       | Class                        | Condition   |
|------------|-------|------------------------------|---|
| ≥8.00      | -     | First Class with Distinction | <ul style="list-style-type: none"> <li>Should have passed all the courses in regular examinations and should complete the program in 4 years of time.</li> <li>Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason.</li> <li>The Students who secure CGPA ≥8.00, but not fulfilling the conditions for "First Class with Distinction" shall be awarded 'First Class' only.</li> </ul> |
| ≥6.50      | <8.00 | First Class                  |   |
| ≥5.50      | <6.50 | Second Class                 |   |
| ≥5.0       | <5.50 | Pass Class                   |   |

- 15.3 The CGPA can be converted to equivalent percentage of marks by using the following formula:

$$\text{Percentage(\%)} \text{ of marks} = (\text{CGPA} - 0.5) \times 10$$

## **16. Withholding of Results**

If the student has not paid the dues, if any, to the University or if any case of disciplinary action is pending against him/her, the result will be withheld, and he/she will not be allowed into the next semester. In such cases the matter will be referred to the Academic Council for final decision.

## **17. Transitory Regulations**

- 17.1 Discontinued, detained, or failed candidates are eligible for readmission as and when next offered as per the university admission procedure.
- 17.2 Students on transfer shall complete the prescribed courses of the concerned program not covered earlier should take the remaining program along with others.
- 17.3 There shall be no branch transfers after the cutoff date of admissions.

## **18. Transcripts**

After successful completion of the total program of study, a transcript containing performance of all academic years/semesters will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee.

## **19. Convocation**

- 19.1 The University shall conduct convocation ceremony to confer the degree(s).



19.2 The University shall institute Prizes and Awards to meritorious students during convocation.

## **20. Termination from the program**

The admission of a student to the program may be terminated in the following circumstances:

20.1 The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

20.2 The student fails to satisfy the norms of discipline specified by the university from time to time.

## **21. Non-Credit Courses (Mandatory Courses)**

21.1 All the courses designated as mandatory course is a compulsory requirement for all students for the award of degree.

21.2 These activities carry no credits and are evaluated as satisfactory/unsatisfactory.

21.3 Minimum attendance requirement as per the regulations is compulsory for completing the mandatory courses.

## **22. Amendments**

The regulations hereunder are subject to amendments as may be made by Academic Council from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the program).

# Academic Regulations for B. Tech - Lateral Entry Scheme

(With effect from the students admitted from the Academic Year 2022-23)

## 23. Eligibility for the award of B. Tech. Degree (LES)

- 23.1 The LES candidates shall pursue a program of study for not less than three academic years and not more than five academic years.
- 23.2 The candidate should have registered for 122 credits and secured 122 credits by securing a minimum CGPA of 5.0 from II year I semester to IV year II semester of B. Tech Program (LES) for the award of degree.
- 23.3 The students, who fail to fulfill the requirement for the award of the degree in five academic years from the year of admission, shall forfeit their admission.
- 23.4 The students are also eligible for the award of B. Tech (Hons./Minors) as per section 14.

## 24. Promotion Rules for LES.

- 24.1 A student shall be eligible for promotion in B. Tech program, if he/she acquires the minimum number of credits as given below

| Promotion                        | From II Year to III Year                        | From III Year to IV Year                        |
|----------------------------------|---|---|
| <b>Condition to be fulfilled</b> | 60% of the total credits in II year I semester. | 60% of total credits up to III year I semester. |

- 24.2 All the other regulations as applicable to B. Tech. 4 Year degree course (Regular) will hold good for B. Tech (LES).

## ANNEXURE – I: Calculation of Grade Point Average

### 1. SGPA and CGPA

The credit index can be used further for calculating the Semester Grade Point Average (SGPA) and the Cumulative Grade Point Average (CGPA), both of which being important performance indices of the student. While SGPA is equal to the credit index for a semester divided by the total number of credits registered by the student in that semester, CGPA gives the sum total of credit indices of all the previous semesters divided by the total number of credits registered in all these semesters. Thus, the Grade Point Average (GPA) will be calculated according to the formula:

$$GPA = \frac{\sum C_i G_i}{\sum C_i}$$

Where  $C_i$  = number of credits for the course  $i$ ,

$G_i$  = grade points obtained by the student in the course.

Semester grade point average (SGPA) is calculated up to second decimal point and it is calculated only when all subjects in that semester are cleared / passed.

$$SPGA = \frac{\sum[(\text{Course credits}) \times (\text{Grade points})]}{\sum[\text{Course credits}]}$$

To arrive at cumulative grade point average (CGPA), the formula is used considering the student's performance in all the courses taken in all the semesters completed up to the particular point of time. CGPA is rounded off to TWO decimal places.

$$CPGA = \frac{\sum[(\text{Course credits}) \times (\text{Grade points})]}{\sum[\text{Course credits}]}$$

CGPA is thus computed from the I Year First Semester onwards, at the end of each semester, as per the above formula. However, the SGPA of I year I semester itself may be taken as the CGPA, as there are no cumulative effects.

## 2. Illustrative Example

An illustrative example given below indicates the use of the above two equations in calculating SGPA and CGPA, both of which facilitate the declaration of academic performance of a student, at the end of a semester and at the end of successive semesters respectively.

| Year and Semester | Course No.                                      | Credits   | Grade | Grade points                       | Credit points |
|-------------------|---|-----------|-------|------------------------------------|---------------|
| I Year I Sem.     | XX101   | 4         | A     | 8                                  | 32            |
| I Year I Sem.     | XX102   | 4         | B     | 6                                  | 24            |
| I Year I Sem.     | XX103   | 4         | A+    | 9                                  | 36            |
| I Year I Sem.     | XX104   | 4         | A     | 8                                  | 32            |
| I Year I Sem.     | XX105   | 1.5       | O     | 10                                 | 15            |
| I Year I Sem.     | XX106   | 1.5       | A+    | 9                                  | 13.5          |
| <b>Total</b>      |   | <b>19</b> |       |                                    | <b>152.5</b>  |
|                   | <b><i>SGPA = 152.5/19 = 8.03</i></b>            |           |       | <b><i>CGPA = 8.03</i></b>          |               |
| I Year II Sem.    | XX107   | 4         | B+    | 7                                  | 28            |
| I Year II Sem.    | XX108   | 3         | A     | 8                                  | 24            |
| I Year II Sem.    | XX109   | 3         | B     | 6                                  | 18            |
| I Year II Sem.    | XX110   | 4         | C     | 5                                  | 20            |
| I Year II Sem.    | XX111   | 2         | A+    | 9                                  | 18            |
| I Year II Sem.    | XX112   | 1.5       | O     | 10                                 | 15            |
| I Year II Sem.    | XX113   | 1.5       | O     | 10                                 | 15            |
| <b>Total</b>      |   | <b>19</b> |       |                                    | <b>138</b>    |
|                   |   |           |       | <b><i>SGPA = 138/19 = 7.26</i></b> |               |
|                   | <b><i>CGPA = (152.5+138)/(19+19) = 7.64</i></b> |           |       |                                    |               |

If two students get the same CGPA, the tie should be resolved by considering the number of times a student has obtained higher SGPA; But, if it is not resolved even at this stage, the number of times a student has obtained higher grades like O, A, B etc. shall be taken into account in rank ordering of the students in a class.

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## ANNEXURE – II: Disciplinary Action against Students – Provisions

- 1.1 Student's behavior and discipline will be assessed and will receive the same attention as the academic work. Discipline includes the observance of good conduct and orderly behavior by the students of the University.
- 1.2 All students pursuing a Program at the University shall observe code of conduct and maintain discipline and must consider it as a duty to behave decently at all places.
- 1.3 Every student shall always carry the Identity card issued by the University. Every student shall have to produce or surrender the identity card, as and when required by the proctorial staff, teaching and library staff and the officials of the university. The loss of the identity card, whenever it occurs, shall immediately be reported in writing to the Registrar.
- 1.4 Any violation of the code of conduct or breach of any rules and regulations of the University is construed as an act of indiscipline and shall make him / her liable for disciplinary action.
- 1.5 The following acts are treated as gross indiscipline.
  - a) Disobeying the teacher/officials or misbehaving in the class.
  - b) Quarrelling or fighting in the University campus or in the hostels amongst themselves, or indulging in any activity which amounts to ragging or harassment of other students.
  - c) Quarrelling or fighting with a University employee(s) or any other public utility functionaries in the campus.
  - d) Indecent behavior in the campus or outside causing inconvenience to others.
  - e) Visiting socially unacceptable websites, smoking or consuming liquor or banned substances like drugs etc.
  - f) Damage to the University property.
  - g) Indulging in acts of theft, forgery, stealing and misappropriating.
  - h) Any other activity that defames the University;
    - i. Use of mobile in the class/academic area.
    - ii. Irregularity in attending classes, persistent idleness, negligence or indifference towards the work assigned.
    - iii. Any other conduct which is considered to be unbecoming of student.

### **ANNEXURE – III: Rules for Students Conduct & Behavior in Campus and Outside**

The rules and regulations, academic calendar shall be provided to students. In general, Dean - Student Affairs will deal with the welfare and discipline of all students in the campus including Hostel and also outside the campus and will ensure maintenance of good conduct. He/she will be assisted by other members of faculty/ staff/ wardens as nominated.

#### **1. Conduct and Behavior:**

- Students should attend all their classes and strictly observe class timings. They should likewise carry out other out-door and extracurricular duties assigned to them. Their attendance and leave are governed by the regulations pertaining to them.
- Students must give their undivided attention to their academic work and must be respectful to their teachers and supervisors.
- Students must conduct themselves with due decorum in the classes, laboratories, library etc. and move in an orderly and disciplined manner in the campus.
- Students should not indulge in abusive behavior/ violence of any kind with fellow students, teaching faculty and employees of the University within or outside the University. Violence by any student or group of students will lead to severe disciplinary action.
- No meeting of the students other than those organized under the aegis of the various recognized students' activities shall be called without the prior permission in writing from the Dean, Student Affairs.

- Neither meetings/functions within the University campus shall be organized nor an outsider addresses the students without the prior permission in writing from the Registrar.
- No students shall use unfair means at any of the examinations and tests or attempt or threaten the staff to get undue advantage.
- Students must pay all fees and other dues on specified dates. If they do not do so, they render themselves liable to penalties as in force from time to time.
- Students must take good care of all University property. Any damage to University property shall be viewed as indiscipline. Such students, in addition to facing the disciplinary action, shall have to replace the damaged property and make good the losses caused due to their action. Students must use the furniture and fittings with due care and must not deface buildings, roads, furniture and fittings etc. in any manner.
- Students must handle the laboratory equipment, instruments and machinery with great care. Any damage or breakage of such equipment etc., due to improper use and negligent handling will have to be made good by the students concerned.
- Ragging in any form is unlawful and strictly prohibited. If a student is found in ragging activity he/she shall be punished as per the Anti-Ragging Act.
- The University shall have a zero-tolerance policy towards Ragging and shall lay down strict guidelines on the same as per policies of the UGC in vogue and in compliance to directions of Hon'ble Supreme Court.
- Mobile/cellular phone shall be kept in silent mode during the classes and violation will lead to confiscation of the mobile phone.



- All the students are required to observe the decorum in the dress code as prescribed by the University. Students not adhering to the prescribed dress code may be denied entry to the University campus;
- Smoking, consumption/possession of liquor, intoxicants, drugs, cigarettes, hookah etc., inside or outside the Campus is strictly prohibited. Any violation will invoke severe penalty including rustication from the Hostel/University.

## **2. Policy to prevent Sexual Harassment:**

- The University shall be committed to treating every employee and student with dignity and respect. It shall seek to create a work environment that is free from sexual harassment of any kind, whether verbal, physical or visual;
- A policy shall be prescribed by the University to provide guidelines for prompt redressal of complaints related to sexual harassment which should be in full compliance with “The Sexual Harassment of Women at Workplace (Prevention, Prohibition & Redressal)” Act, 2013;
- All references / complaints and redressal mechanism pertaining to any matter will be handled within the ambit of the said Act and the Rules framed there under. The policy so prescribed shall be communicated to all employees and students.

## **3. Grievance and Redressal Mechanisms:**

- The University shall constitute various Grievance and Redressal committees and its guidelines as specified by the statutory authorities of the University.

## ANNEXURE – IV: Malpractices Rules

| S.No      | Nature of Malpractice Improper conduct during examinations   | Punishment  |
|-----------|--|---|
|           | <i>If the candidate:</i>   |   |
| 1.<br>(a) | Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he/she is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination) | Expulsion from the examination hall and cancellation of the performance in that subject only.   |
| (b)       | Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.  | Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he/she will be handed over to the police and a case is registered against him/her.   |
| 2.        | Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate disappearing.  | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The hall ticket of the candidate is to be cancelled. |

|    |  |  |
|----|--|--|
| 3. | Impersonates any other candidate in connection with the examination.   | The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all Semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he/she will be handed over to the police and a case is registered against him/her. |
| 4. | Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination. Takes away answer book or additional sheet, during or after the examination. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all SEEs. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.  |

|   |  |   |
|---|--|---|
| 5 | <p>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks</p>   | <p>Cancellation of the performance in that subject.</p>   |
| 6 | <p>Refuses to obey the orders of the Chief Superintendent / Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty inside or outside the examination hall or causing any injury to himself / herself or to any others or threatens whether by words, either spoken or written or by signs or by visible representation, assaults the officer in-charge, or any person on duty in or outside the examination hall or any others, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</p> | <p>They shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case will be registered against them.</p> |

|    |   |  |
|----|---|--|
| 7. | Leaves the exam hall taking away answer script or intentionally tears the script or any part thereof inside or outside the examination hall.                                      | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work & shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all Semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 8. | Possess any lethal weapon or firearm in the examination hall.   | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits these at.   |
| 9. | Who is not a candidate for the particular examination or any person not connected with the University indulges in any malpractice or improper conduct mentioned in clause 6 to 8. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the University will be handed over to police and, a police case will be  |

|     |   |  |
|-----|---|--|
|     |   | registered against them.   |
| 10. | Comes in a drunken condition to the examination hall.   | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. |
| 11. | Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.   | Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.  |
| 12. | If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the malpractice committee for further action on suitable punishment as per rules. |  |

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## ANNEXURE – V: Definitions

In these Regulations, unless the context otherwise requires:

1. **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.
2. **Choice Based Credit System (CBCS):** The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).
3. **Course:** Usually referred to, as a 'subject' is a component of a program. All courses need not carry the same weightage. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/tutorials/laboratory work/field work/outreach activities/project work/ vocational training/viva/seminars/ term papers/assignments/presentations/self- study etc., or a combination of some of these.
4. **Credit Based Semester System (CBSS):** Under the CBSS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.
5. **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work field work per week.
6. **Grade Point:** It is a numerical weight allotted to each letter grade on a 10-point scale.
7. **Credit Point:** It is the product of grade point and number of credits for a course.
8. **Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters i.e., O, A+, A, B+, B, C and F.
9. **Semester Grade Point Average (SGPA):** It is a measure of academic performance in a semester. It is the ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.
10. **Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student. The CGPA is the ratio of total credit points secured by a student in all semesters and the sum of the total credits. It shall be expressed up to two decimal places.
11. **Program:** An academic program of the University.
12. **Semester:** Each semester shall consist of 16 weeks of instruction. The odd



- semester may be scheduled from June to November and even semester from December today
13. Transcript or Grade Card or Certificate: Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.
  14. Types of courses: The courses in a program may be of three kinds: Core, Elective and Foundation.
  15. Core course: This is the course which is to be compulsorily studied by a student as a core requirement of a program in a branch of study.
  16. Elective course: This is the course to be chosen from a pool of courses. Elective course may be (a) Supportive to the branch of study (b) Providing an expanded scope (c) Enabling an exposure to some other branch/domain (d) Nurturing student's proficiency/skill.
  17. Foundation course: This course may be of two kinds, compulsory foundation and elective foundation.
  18. Compulsory Foundation courses: These are the courses based upon the content that leads to knowledge enhancement. They are mandatory for all disciplines.
  19. Elective Foundation courses: These are value-based and are aimed at man-making education.
  20. General: The academic regulations should be read as a whole for the purpose of any interpretation.
  21. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chancellor is final.

**ANURAG UNIVERSITY  
HYDERABAD**

**I YEAR I SEMESTER**

**COURSE STRUCTURE**

| S.No.        | Course Code | Course Title                            | Hours per week |          |           | Credits     |
|--------------|-------------|---|----------------|----------|-----------|-------------|
|              |             |   | L              | T        | P         |             |
| 1            | A51001      | Mathematics–I                           | 3              | 1        | 0         | 4.0         |
| 2            | A51002      | English                                 | 2              | 0        | 0         | 2.0         |
| 3            | A51003      | Engineering Chemistry                   | 3              | 1        | 0         | 4.0         |
| 4            | A51004      | Programming for Problem Solving-I       | 2              | 0        | 0         | 2.0         |
| 5            | A51218      | Engineering Graphics Lab                | 0              | 0        | 5         | 2.5         |
| 6            | A51219      | English Language Skills Lab             | 0              | 0        | 2         | 1.0         |
| 7            | A51220      | Engineering Chemistry Lab               | 0              | 0        | 3         | 1.5         |
| 8            | A51221      | Programming for Problem Solving – I Lab | 0              | 0        | 3         | 1.5         |
| <b>TOTAL</b> |             |   | <b>10</b>      | <b>2</b> | <b>13</b> | <b>18.5</b> |

**I YEAR II SEMESTER**

**COURSE STRUCTURE**

| S.No.        | Course Code | Course Title                           | Hours per week |           |           | Credits     |
|--------------|-------------|--|----------------|-----------|-----------|-------------|
|              |             |  | L              | T         | P         |             |
| 1            | A52001      | Mathematics–II                         | 3              | 1         | 0         | 4.0         |
| 2            | A52005      | Applied Physics                        | 3              | 1         | 0         | 4.0         |
| 3            | A52003      | Programming for Problem Solving- II    | 2              | 0         | 0         | 2.0         |
| 4            | A52007      | Basic Electrical Engineering           | 3              | 0         | 0         | 3.0         |
| 5            | A52216      | Applied Physics Lab                    | 0              | 0         | 3         | 1.5         |
| 6            | A52217      | Programming for Problem Solving-II Lab | 0              | 0         | 3         | 1.5         |
| 7            | A52218      | Basic Electrical Engineering Lab       | 0              | 0         | 2         | 1.0         |
| 8            | A52219      | Engineering Workshop                   | 0              | 0         | 3         | 1.5         |
| 9            | A52220      | English Communication Skills Lab       | 0              | 0         | 2         | 1.0         |
| <b>TOTAL</b> |             |  | <b>11</b>      | <b>02</b> | <b>13</b> | <b>19.5</b> |

**ANURAG UNIVERSITY**  
**HYDERABAD**

**I Year B.Tech.CSE – I Sem.**

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>D</b> | <b>C</b> |
| <b>3</b> | <b>1</b> | <b>-</b> | <b>-</b> | <b>4</b> |

**Course Code: A51001**

**MATHEMATICS - I**

(Linear Algebra and Calculus)

**Course Objectives:** To learn

1. Rank of the matrix and investigate the solution of system of equations by applying the concepts of consistency.
2. Concepts of Eigen values and Eigen vectors and the nature of quadratic form by finding Eigen values.
3. Concepts of sequence and series and identifying their nature by applying some tests.
4. Mean value theorems geometrical interpretation and their application to the mathematical problems, evaluation of improper integrals using Beta and Gamma functions
5. Partial differentiation, total derivative and finding maxima minima of functions of several variables.

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

1. Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
2. Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
3. Analyse the convergence of sequence and series.
4. Discuss the applications of mean value theorems to the mathematical problems, evaluation of improper integrals using Beta and Gamma functions.
5. Examine the extrima of functions of two variables with/ without constraints.

**UNIT-I:**

**Matrices and Linear System of Equations**

Real matrices: Symmetric, skew - symmetric, orthogonal, Linear and Orthogonal Transformation. Complex matrices: Hermitian, Skew – Hermitian and Unitary. Elementary row transformations-Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods (Gauss Elimination).

**UNIT-II:****Eigen Values and Eigen Vectors**

Eigen values, Eigen vectors – properties, Cayley-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonalization of a matrix- Quadratic forms: Nature, Index, Signature.

**UNIT-III:**

**Sequence:** Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.

**Series:** Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Cauchy's root test; Raabe's test; Cauchy's Integral test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

**UNIT-IV:****Beta & Gamma Functions and Calculus**

Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (only in Cartesian coordinates). Improper Integrals and their properties, Gamma and Beta Functions-Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions.

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Generalized Mean Value theorem (all theorems without proof) – Geometrical interpretation of Mean value theorems.

**UNIT-V:****Multi Variable Calculus**

Partial Differentiation and total differentiation, Functional dependence, Jacobian Determinant- Maxima and Minima of functions of two variables with constraints and without constraints, Method of Lagrange Multipliers.

**TEXTBOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

2. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.

**REFERENCE BOOKS:**

1. G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson, Reprint, 2002.
2. N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. Bernard Kolman and David R. Hill, Introductory Linear Algebra: An Applied First Course, 8th Edition, Pearson.

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**ANURAG UNIVERSITY**  
**HYDERABAD**

**I Year B.Tech. CSE – I Sem.**

|          |          |          |          |          |
|----------|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>D</b> | <b>C</b> |
| <b>2</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>2</b> |

**Course Code: A51002**

**ENGLISH**

**Course Objectives:**

The course will help to

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop study skills and communication skills in formal and informal situations.

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

1. Understand the application of language skills in promoting the responsibilities towards society.
2. Use appropriate and Standard Language with basic grammatical concepts both for Technical and Professional purpose.
3. Use General and Technical Vocabulary in different academic situations.
4. Apply the Subject and Theme in establishing and spreading Human Values in the society.
5. Compose different kinds of Writing: Formal Letters, Précis Writing, Essay Writing and Technical Report Writing.

**UNIT –I**

**‘The Raman Effect’** from the prescribed textbook **‘English for Engineers’** published by **Cambridge University Press**.

**Vocabulary Building:** The Concept of Word Formation --The use of Prefixes and Suffixes.

**Grammar:** Identifying Common Errors in Writing with reference to Articles and Prepositions.

**Reading:** Reading and its Importance- Techniques for Effective Reading.

**Basic Writing Skills:** Sentence Structures –Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** –Organizing Principles of Paragraphs in Documents.

## UNIT –II

‘**Ancient Architecture in India**’ from the prescribed textbook ‘**English for Engineers**’ published by **Cambridge University Press**.

**Vocabulary:** Synonyms and Antonyms.

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-Pronoun Agreement and Subject-Verb Agreement.

**Reading:** Improving Comprehension Skills – Techniques for Good Comprehension

**Writing:** Format of a Formal Letter- Writing Formal Letters, Eg: Letter of Complaint, Letter of Requisition.

## UNIT –III

‘**Blue Jeans**’ from the prescribed textbook ‘**English for Engineers**’ published by **Cambridge University Press**.

**Vocabulary:** Acquaintance with Prefixes and Suffixes from foreign languages in English to form Derivatives-Words from foreign languages and their use in English.

**Grammar:** Misplaced Modifiers and Tenses.

**Reading:** Sub-skills of Reading- Skimming and Scanning

**Writing:** Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence

## UNIT –IV

‘**What Should You Be Eating**’ from the prescribed textbook ‘**English for Engineers**’ published by **Cambridge University Press**.

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in oral and written communication.

**Reading:** Intensive Reading and Extensive Reading

**Writing: Writing Practices--**Writing Introduction and Conclusion - Essay Writing- Précis Writing.

## UNIT –V

‘How a Chinese Billionaire Built Her Fortune’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

**Vocabulary:** Technical Vocabulary and its usage

**Grammar:** Common Errors in English

**Reading:** Reading Comprehension-exercises for practice

**Writing: Technical Reports-** Introduction – characteristics of a Report – categories of Report Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

### TEXTBOOK:

1. Sudarshana, N.P. and Savitha, C., English for Engineers, Cambridge University Press, 2018.

### REFERENCES:

1. Green, David. “Contemporary English Grammar” –Structures and Composition, MacMillan, India, 2014 (Print)
2. Rizvi, M. Ashraf. Effective Technical Communication, Tata Mc Graw –Hill, 2015 (Print)
3. Raman, Meenakshi and Sangeeta Sharma, “Technical Communication- Principles and Practice”, New Delhi: Oxford University Press, 3<sup>rd</sup> Edition, 2015, Print.
4. Michael Swan, Practical English Usage, OUP, 1995.
5. Wood, F.T. Remedial English Grammar, Macmillan, 2007
6. Zinsser, William. On Writing Well, Harper Resource Book, 2001
7. Liz, Hamp-Lyons and Ben Heasley, Study Writing, Cambridge University Press, 2006.
8. Sanjay Kumar and PushpaLata, Communication Skills, Oxford University Press, 2011.
9. Exercises in Spoken English, Parts-I to III. CIEFL, Hyderabad, Oxford University Press.



**ANURAG UNIVERSITY  
HYDERABAD**

**I Year B.Tech. CSE – I Sem.**

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**Course Code: A51003**

**ENGINEERING CHEMISTRY**

**Course Objectives:**

1. To bring adaptability to the concepts of Chemistry and to acquire the required skills to become a perfect engineer.
2. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
3. To acquire the knowledge of electrochemistry, corrosion and water treatment, as it is essential for the engineers and for the industry.
4. To acquire the skills pertaining to spectroscopy and to apply them for medical and other fields.
5. To impart the knowledge of stereochemistry and synthetic aspects useful for Understanding reaction pathways

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

1. Distinguish the ranges of electromagnetic radiations used for exciting different energy levels in various spectroscopic techniques.
2. Apply the knowledge of electrode potentials for the protection of metals from corrosion.
3. Analyze the troubles caused by impure water and method of purification of water.
4. Explain the concept of configurational and conformational analysis of molecules and reaction mechanism.
5. Apply the concept of engineering materials and biodegradable polymers in medicine and other fields.

**UNIT I**

**Molecular structure and Spectroscopy**

Introduction, Concept of atomic and molecular orbitals, LCAO, molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of diatomic molecules (N<sub>2</sub>, O<sub>2</sub> and F<sub>2</sub>). Pi-molecular orbitals of butadiene and benzene.

### **Spectroscopic techniques:**

Principles of spectroscopy, selection rules and applications of electronic spectroscopy (UV & Visible). Vibrational and rotational spectroscopy (IR spectroscopy) - Applications.

## **UNIT II**

### **Water Technology**

Causes and effects of hardness of water, expression of hardness ( $\text{CaCO}_3$  equivalent), units and types of hardness. Estimation of temporary and permanent hardness of water by EDTA method. Numerical problems based on hardness of water. Potable water: characteristics, treatment of water for domestic supply. Desalination of brackish water: reverse osmosis. Alkalinity of water and its determination. Boiler feed water: Boiler troubles (scale and sludge, priming, foaming, caustic embrittlement and boiler corrosion) and its treatment: Internal treatment (colloidal, phosphate calgon conditioning of water). External treatment (lime-soda and ion –exchange processes).

## **UNIT III**

### **Electrochemistry and Corrosion**

Electrode, electrode potential, galvanic cell, cell reactions and cell notation, cell EMF, types of electrodes (Normal Hydrogen Electrode, calomel electrode), Determination of pH. Nernst equation, Numerical problems.

**Batteries:** Introduction to cell and battery, Primary (lithium cell) and secondary cells, (lead-Acid cell, and Lithium ion cells). Fuel cells – Hydrogen – Oxygen fuel cell, advantages and engineering applications of fuel cells. Introduction to super capacitors.

**Corrosion:** Introduction, types of corrosion: chemical and electrochemical corrosion, factors affecting the rate of corrosion: nature of the metal, galvanic series, Anodic index, purity of metal, nature of corrosion product, nature of environment: effect of temperature, effect of pH, humidity. Corrosion control methods: Cathodic protection: sacrificial anode method and impressed current cathode method. Protective coatings: metallic coatings (anodic and cathodic), methods of applications of metallic coatings: electroplating (of copper ), electroless plating (of Ni) .

## UNIT IV

### **Stereochemistry, Reaction mechanism and synthesis of drug molecules**

Structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity. Conformational analysis of n-butane.

### **Organic reactions and synthesis of drug molecules**

Introduction to reactions involving substitution ( $S_N^1$  &  $S_N^2$ ), addition (addition of HBr to propene, Markownikoff and Anti Markownikoff addition), Elimination reactions: dehydrohalogenation of alkyl halides. Saytzeff rule. Redox reactions (oxidation of alcohols using  $KMnO_4$  &  $CrO_3$ , reduction of carbonyl compounds by  $LiAlH_4$  &  $NaBH_4$ ). Synthesis & uses of drug molecules: Paracetamol and Aspirin.

## UNIT V

### **Advanced Engineering Materials**

#### **Biodegradable polymers:**

Concept, preparation, properties and applications of Polyhydroxy Butyrate (PHB) Poly-Hydroxybutyrate-co- $\beta$ -Hydroxyvalerate (PHBV), Polyglycolic acid (PGA), Polylactic acid (PLA), Poly ( $\epsilon$ -caprolactone) (PCL).

**Lubricants:** Introduction, classification with examples, characteristics of a good lubricant and properties of lubricants: Viscosity and viscosity index, cloud point, pour point, flash & fire point.

**Refractories:** Classification with examples, characteristics and properties (Refractoriness, RUL & thermal spalling).

**Ceramics-** Introduction, chemical bonding and applications.

#### **TEXTBOOKS:**

1. P.C Jain & Monica Jain, Engineering Chemistry, Dhanpat Rai Publishing Company, 6<sup>th</sup> Edition, 2013.
2. Shashi chawla, Engineering Chemistry, Dhanpat Rai Publishing Company, 2013.

**REFERENCE BOOKS:**

1. P. W. Atkins, Physical Chemistry, oxford University Press, 9<sup>th</sup> Edition, 2010.
2. A. Jayashree, Text book of Engineering Chemistry, Wiley Publications, 1<sup>st</sup> Edition, 2018.
3. C.N.Banwell, Principles of molecular spectroscopy, Mc Graw Hills, 4<sup>th</sup> Edition, 2001.
4. J.D.Lee, Textbook of Inorganic Chemistry, Blackwell Science Ltd., 5<sup>th</sup> Edition, 2008.

# ANURAG UNIVERSITY

## HYDERABAD

I Year B.Tech.CSE – I Sem.

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Course Code: A51004

### PROGRAMMING FOR PROBLEM SOLVING-I

#### Course Objectives:

1. To introduce the basic concepts of Computing environment, number systems and flowcharts
2. Analyze the various formatting styles for input and output
3. Compare the different types of decision making and looping constructs and solve problems using them.
4. Analyze the use of arrays, strings, functions in real world situations
5. Write C programs using the concepts learnt.

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

1. Design algorithms and flowcharts for real world applications using ‘C’
2. Know the usage of various operators in Program development
3. Design programs involving decision and iteration structures.
4. Apply the concepts code reusability using Functions
5. Analyze the concepts of Arrays and Strings for real world problems.

#### UNIT - I

**Problem Solving Using Computers:** Introduction, Algorithms, Flowcharts and Pseudocode.

**Overview of C Language:** Introduction, Salient Features of C Language, Structure of a “C” Program.

**C Language Preliminaries:** Keywords and Identifiers, Constants, Variables, Data Types, and Input Output Statements with suitable illustrative “C” Programs.

#### UNIT-II

**Operators:** Assignment Operators, Relational and Logical Operators, Increment and Decrement Operators, Bitwise Operators, Ternary Operator, Type Conversion, Precedence and Associativity with suitable illustrative “C” Programs.

### **UNIT-III**

#### **Statements in C:**

**Conditional/Decision Statements:** if, if-else, Nested if-else, else-if ladder, and Switch-Statement with suitable illustrative “C” Programs.

**Loop Control Statements:** while, do-while and for with suitable illustrative “C” Programs.

### **UNIT-1V**

**Functions:** Introduction to Functions, benefits of functions, types of functions, Function calls, return vs exit( ), Parameter Passing mechanisms, Call-by-Value, Recursion, Storage Classes

### **UNIT-V**

**Arrays:** Introduction to Arrays, One-Dimensional Arrays, Two-Dimensional Arrays, Arrays and Functions

**Strings:** Introduction to Strings, String I/O, String Operations with and without built-in functions

(strlen( ), strcmp( ), strcat( ), strcpy( ), and strev( ))

### **TEXTBOOKS:**

1. B.A.Forouzon and R.F. Gilberg, “Computer Science: A Structured Programming Approach Using C”, Third edition, Cengage Learning, 2016
2. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.

### **REFERENCE BOOKS:**

1. Byron Gottfried, “Programming with C “, Schaum’s Outlines, 2<sup>nd</sup> Edition, TATA McGraw-Hill.
2. M.T.Somashekara, “Problem Solving Using C”, PHI, 2<sup>nd</sup> Edition 2009.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press
4. Rajaraman V., "The Fundamentals of Computers", 4th Edition, Prentice Hall of India, 2006.
5. R S Bichker, "Programming in C", University Press, 2012.

**ANURAG UNIVERSITY  
HYDERABAD**

**I Year B.Tech.CSE – I Sem.**

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**Course Code:** A51221

**PROGRAMMING FOR PROBLEM SOLVING LAB – I**

**Course Objectives:**

1. Understand the fundamentals of programming in C Language.
2. Write, compile and debug programs in C.
3. Formulate solution to problems and implement in C.
4. Effectively choose programming components to solve computing problems

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

1. Apply the specification of syntax rules for numerical constants & variables and data types
2. Know the Usage of various operators and other C constructs
3. Design programs on decision and control constructs
4. Develop programs on code reusability using functions
5. Implement various concepts of arrays and strings

**Week 1:**

Ubuntu and Linux Commands

**Week 2:**

Designing of flowcharts and algorithms using raptor tool

1. Areas of Polygons
2. Calculation of Simple and Compound Interest
3. Swapping of Two numbers with and without temporary variable
4. Checking whether a number is even or odd
5. Sum of first 'n' natural numbers
6. Checking a number whether it is divisible by any given number
7. Evaluation of mathematical expressions.
8. Programs using scanf( ) and printf( ) statements.

**Week 3:**

Programs on Operators

**Week 4, 5 & 6:**

Programs Conditional Statements

**Week 7-9:**

Programs on Control Statements

**Week 10 & 11:**

Programs on Functions

**Week 12:**

Programs on One Dimensional Arrays

**Week 13:**

Programs on Two Dimensional Arrays

**Week 14 & 15**

Implementation of string functions with and without built-in functions

**Week 16:**

Review



**ANURAG UNIVERSITY  
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*I Year B.Tech. CSE – I Sem.*

**Course Code:** A51218

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***ENGINEERING GRAPHICS LAB***

Course Objectives:

The objectives of this course are to:

- Provide basic concepts in engineering drawing and different engineering curves.
- Impart knowledge about standard principles of orthographic projections of objects like Points, Lines, Planes and Solids.
- Learn to draw sectional views, development of surfaces and intersections of solids.
- Familiarize the Isometric views and its projections.
- Learn the techniques, skills, and modern engineering tools like Auto Cad software necessary for engineering practice.

**Course Outcomes:**

At the end of this course, students will be able to:

- Understand engineering drawing and its place in society.
- Visualize the different aspects of Points, Lines and Planes.
- Acquire knowledge on projections of solids.
- Draw sections of solids and plan the drawing for development of surfaces.
- Understand the isometric views and projections. Exposure to computer-aided geometric design and creating working drawings

**Sheet-1:** Projection of Points. (All 4 Quadrants) – **1 session**

**Sheet-2:** Projection of Lines. (Line in 1<sup>st</sup> Quadrant Inclined to Both VP & HP) – TL/ $\theta$ / $\phi$ , TL/ FV/TV, TL/FV/ $\beta$  or  $\alpha$ ,  $a/a'/b/b'/OO_1$  - 4 problems– **1 session**

**Sheet-3:** Projection of Planes. (Inclined to Both VP & HP) – Pentagon with side resting, Hexagon with corner resting, Circle, Rectangle to find surface inclination - total 4 problems– **2 sessions**

**Sheet-4:** Projection of Solids. (Inclined to Both VP & HP) – Prism resting with base edge, Prism resting with base corner, Pyramid resting with Slant generator/ triangular face, Cone, Cylinder - total 6 problems– **2 sessions**

**Sheet-5:** Section of Solids – Section inclined to HP – Prism, Pyramid, Cylinder; Section inclined to VP – Cone; - true shapes also to be drawn – 4 Problems– **2 sessions**

**Sheet-6:** Development of Solids – Prism, cylinder, pyramid, Cone – all with sectioning – 4 problems– **2 sessions**

**Sheet-7:** Isometric View – Prism, cylinder, pyramid Simple positions - **1 session**

**Sheet-8:** Isometric view of two Compound Solids only – Total 2 problems– **1 session**

**Sheet-9:** Isometric View to Orthographic View - Simple Solids – 3 Problems – **1 session**

**Sheet-10:** Orthographic Views to Isometric Views - Simple Solids - 3 Problems– **1 session**

**Text Books:**

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
3. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
4. Computer Aided Engineering Drawing – K Balaveera Reddy – CBS Publishers.

**Reference Books:**

1. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education.
2. Engineering Drawing by K.VenuGopal , V.Prabhu Raja, New Age Publications.
3. Corresponding set of CAD Software Theory and User Manuals.

**Note:** The above problems/sheets are for indicative purposes only. However, the concerned faculty member can add a few more in addition to the existing. In such cases the concerned faculty member should get the syllabus approved by the BoS.

**ANURAG UNIVERSITY  
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**I Year B.Tech. CSE – I Sem.**

**Course Code: A51219**

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**ENGLISH LANGUAGE SKILLS LAB**

**Course Objectives:**

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. To bring about a consistent accent and intelligibility in students' pronunciation of English
3. To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm

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

1. Analyze the importance of speech sounds and listening comprehension
2. Acquire neutralization of accent for intelligibility
3. Recognize syllables and Consonant Clusters.
4. Develop speaking skills with clarity and confidence which in turn enhances their employability skills
5. Understand the emphasis on Pronunciation of English Language in the global world

**Exercise-I**

**CALL Lab:**

Introduction to Phonetics - Speech Sounds

Vowels and Consonants-Listening Comprehension

Common Indian Variants in Pronunciation – Differences between British and American Pronunciation

**Exercise-II**

**CALL Lab:**

Pronunciation, Common Errors in Pronunciation, Neutralization of Mother Tongue Influence

Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening

### Exercise-III

#### CALL Lab:

Syllables -Consonant Clusters

Sentence Stress -Weak Forms and Strong Forms

### Exercise-IV

#### CALL Lab:

Word accent and Stress Shifts

Past Tense Marker and Plural Marker

### Exercise-V

#### CALL Lab:

Intonation, Stress and Rhythm

Data Interpretation

### TEXTBOOKS:

1. Suresh Kumar, E. & Sreehari, P., A Handbook for English Language Laboratories. New Delhi: Foundation, 2009.
2. Krishna Mohan and N. P. Singh, Speaking English Effectively, Macmillan Publishers India Ltd., Delhi, 2<sup>nd</sup> Edition, 2011.
3. Sasi Kumar, V & Dhamija, P.V., How to Prepare for Group Discussion and Interviews, Tata McGraw Hill.
4. Hancock, M., English Pronunciation in Use, Intermediate. Cambridge: CUP, 2009.
5. R. K. Bansal & J. B. Harrison, Spoken English: A Manual of Speech and Phonetics, Orient Blackswan, Hyderabad, 2013.
6. Hewings, M., English Pronunciation in Use. Advanced. Cambridge: CUP, 2009.
7. Marks, J., English Pronunciation in Use. Elementary. Cambridge: CUP, 2009.
8. T. Balasubramanian, A textbook of English Phonetics for Indian Students (Macmillan)
9. **Lab Manual:** A Manual entitled “English Language Communication Skills (ELCS) Lab Manual- cum- Work Book”, published by Cengage Learning India Pvt. Ltd, New Delhi. 2013.

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**I Year B.Tech. CSE – I Sem.**

**Course Code: A51220**

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**ENGINEERING CHEMISTRY LAB**

**Course Objectives:** The student will learn:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. The measurement of physical properties like adsorption and viscosity.
3. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

**Laboratory Outcomes:** At the end of this course, students will be able to:

1. Determine the parameters like hardness, alkalinity and chloride content in water.
2. Determine the physical properties like adsorption, surface tension and viscosity.
3. Calculate the strength of compound using instrumentation techniques.

**Choice of 10 experiments from the following:**

1. Estimation of hardness of water by EDTA method
2. Determination of alkalinity of water
3. Determination of chloride content of water by argentometric analysis
4. Determination of strength of HCl and acetic acid by conductometry.
5. Potentiometric estimation of  $\text{Fe}^{+2}$  by using  $\text{KMnO}_4$ .
6. Determination of surface tension of soap solutions.
7. Determination of viscosity of a lubricant
8. Synthesis of paracetamol and aspirin.
9. Estimation of copper by colorimetry.
10. Adsorption of acetic acid by charcoal
11. Separation of amino acids by thin layer chromatography.
12. Determination of acid value of coconut oil.

**TEXTBOOKS:**

1. Vogel's, Textbook of Quantitative Chemical Analysis, Pearson Education, 6<sup>th</sup> Edition, 2000.
2. Shashi Chawla, Essentials of experimental engineering chemistry, Dhanpat Rai & Co, 2006.

**REFERENCE BOOKS:**

1. S.S. Dara, A Text Book on Experiments and Calculations, S Chand & Company; 9<sup>th</sup> Edition, 2015.
2. R. N. Goyal and Harmendra Goel, Text Book of Engineering Chemistry, Ane Book Publishers, 2008.

**ANURAG UNIVERSITY**  
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**I Year B.Tech. CSE – II Sem.**

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**Course Code:** A52001

**MATHEMATICS-II**

(ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS)

**Course Objectives:** To learn

1. Methods of solving the differential equations of first and higher orders.
2. Evaluation of multiple integrals.
3. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

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

1. Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real world problems.
2. Solve higher order differential equations and apply the concepts of differential equations to the real world problems.
3. Evaluate the Double and Triple integrals.
4. Identify the vector differential operators physically in engineering problems.
5. Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

**UNIT-I:**

**Differential Equations of first order and their Applications**

Formation of Differential equations, differential equations of first order and first degree: exact, linear and Bernoulli, applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

**UNIT-II:**

**Higher Order Linear Differential Equations**

Linear differential equations of second and higher order with constant coefficients, RHS term of the type  $f(x) = e^{ax}$ ,  $\sin ax$ ,  $\cos ax$  and  $x^k$ ,  $e^{ax}V(x)$ ,  $x^kV(x)$ . Method of variation of

parameters. Equations reducible to linear ODE with constant coefficients: Cauchy-Euler equation, Legendre's equation.

### **UNIT-III: Multiple Integrals**

Multiple integrals - double and triple integrals – change of order of integration (Only Cartesian form)- change of variables (Cartesian to Polar for double integral, Cartesian to Spherical for triple integral). Applications of Double integrals and Triple integrals.

### **UNIT-IV: Vector Differentiation**

Scalar and Vector point functions, Gradient, Divergence, Curl and their related properties – Directional Derivatives, Solenoidal and Irrotational vectors, Scalar potential function.

### **UNIT-V: Vector Integration**

Line integral, work done, Surface and Volume integrals. Vector integrals theorems: Green's, Stoke's and Gauss Divergence Theorems (Only Statements) - Problems based on these theorems.

### **TEXTBOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> Edition, 2010

### **REFERENCES:**

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. Dennis G Zill and Michael R Cullen, Advanced Engineering Mathematics, Jones & Bartlett Learning, 3<sup>rd</sup> Edition, 2006, [Technology & Engineering](#).
4. S. L., Ross, Differential Equations, Wiley India, 3<sup>rd</sup> Edition, 2009.
5. [George Simmons](#), Differential Equations with Applications and Historical Notes, McGraw Hill Education; 2<sup>nd</sup> Edition, 2017.



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**Course Code: A52005**

**APPLIED PHYSICS**

**Course Objectives:**

1. To impart knowledge in basic concepts of physics relevant to engineering applications.
2. To inculcate basics of optics and its propagation through optical fibers
3. To imbibe the working principle of various laser systems and light propagation through optical fibers
4. To impart basic knowledge on classification of solids
5. To introduce advances in properties of semiconductor materials for engineering applications

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

1. Learn the importance of interference pattern in thin films, diffraction and resolution.
2. Distinguish principle, working of various laser systems and light propagation through optical fibers.
3. Learn the mechanics of quantum particles for classification of solids.
4. Realize the importance of doping of semiconductors and its applications in electronics.
5. Learn the formation of p-n junction, I-V characteristics, semiconductor devices and its applications.

**UNIT-I:**

**Wave Optics**

Introduction, superposition of waves, coherence, Young's double slit experiment (qualitative), interference in thin film by reflection, Newton's rings.

Diffraction: Introduction, Fraunhofer diffraction at single slit, double slit diffraction (qualitative), multiple slit diffraction (qualitative) and its resolving power.

Polarization: Introduction, polarization by reflection, Nicol's prism and its applications.

## **UNIT-II:**

**Fiber Optics:** Introduction, principle of optical fiber, numerical aperture, types of optical fibers, losses in optical fibers, optical fiber communication system, applications of optical fibers.

**Lasers:** Introduction, characteristics of a laser, Einstein's coefficients, population inversion, pumping methods, Nd: YAG laser, He-Ne laser, Semiconductor laser, applications.

## **UNIT-III**

### **Introduction to Quantum Mechanics**

Introduction, de-Broglie hypothesis, Davisson and Germer's experiment, Heisenberg's uncertainty principle and consequences, physical significance of wave function, time dependent and independent Schrödinger wave equation, particle in an infinite potential well (one dimensional case).

## **UNIT-IV**

### **Band Theory of Solids & Semiconductors**

Density of states in a solid, temperature dependence of Fermi-Dirac function, Kronig-Penny model (qualitative), E-k diagram, origin of energy band formation in solids, distinction between conductors, semiconductors and insulators, concept of effective mass.

Intrinsic semiconductors: Introduction, carrier concentration, energy band diagram, electrical conductivity.

Extrinsic semiconductors: Introduction, energy band diagrams, position of Fermi level, temperature dependence of Fermi level.

## **UNIT-V**

### **Semiconductor Devices**

Hall effect in semiconductors and applications, direct and indirect band gap semiconductors, Formation of p-n junction, Energy diagram of p-n junction, I-V characteristic of p-n junction diode, Photo diode, Solar cell, Light emitting diode and their characteristics.

## **TEXTBOOKS:**

1. M N Avadhanulu, P G Kshirsagar; A Text book of Engineering Physics, S Chand. (2018 Edition)

2. B K Pandey and S Chaturvedi; Engineering Physics, Cengage Learning. (2013 Edition)
3. D K Bhattacharya and Poonam Tandon; Engineering Physics, Oxford University Press. (2015 Edition)

**REFERENCE BOOKS:**

1. Leonard Schiff, Quantum mechanics (2017)
2. Charles Kittel, Introduction to Solid State Physics : John Wiley & Sons (8<sup>th</sup> Edition)
3. O. Svelto, Principles of Lasers (2010, 5<sup>th</sup> Edition)
4. P K Palanisamy, Engineering Physics :SciTech publication (4<sup>th</sup> Edition)
5. M Armugam; Solid State Physics, Anuradha Publications (2009)
6. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley.(3<sup>rd</sup> Edition 2016)
7. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (2019 Indian Edition)
8. M.S.Tyagi, Semiconductor Physics, (2008 Student Edition).

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**I Year B.Tech. CSE – II Sem.**

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**Course Code: A52003**

**PROGRAMMING FOR PROBLEM SOLVING-II**

**Course Objectives:**

1. To understand modular and structured programming constructs in C
2. To learn the usage of structured data types and memory management using pointers
3. To learn the concepts of data handling using pointers
4. To teach the implementation of various data structures.
5. To acquire skills in using generic principles for data representation and manipulation with a view for efficiency, maintainability and code reuse

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

1. Develop programs with user defined data types.
2. Use dynamic memory allocation functions with pointers.
3. Apply various file handling techniques for better data management
4. Distinguish between stacks and queues.
5. Analyze various dynamic data structures.

**UNIT -I**

**Structures:** Definition and Initialization of Structures, Accessing structure members, Nested Structures, Array of Structures, Structures and Functions, Unions, typedef, Enumerated Data types.

**UNIT-II**

**Pointers:** Introduction to Pointers, Pointer Arithmetic, Pointers and Arrays, Pointers to Structures, Pointers and Strings, Function - Call by Reference, Pointers to Pointers, Dynamic Memory Allocation.

**UNIT III:**

**Files :** Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions, command –line arguments, C program examples.

**UNIT-IV:**

**Introduction to Data Structures:** Lists and Operations, Linear and Nonlinear Data structures

**Stacks-**Introduction to Stacks, Operations, Implementation of Stack using Arrays

**Queues-** Introduction to Queues, Operations, Implementation of Queues using Arrays

**UNIT-V**

**Linked Lists:** Introduction to Linked List, Operations on Single Linked List (search, Insertion & Deletion) Searching and Sorting: Linear Search, Binary Search, Bubble Sort, Insertion Sort and Quick sort.

**TEXTBOOKS:**

1. B.A.Forouzon and R.F. Gilberg, "Computer Science: A Structured Programming Approach Using C", 3<sup>rd</sup> Edition, Cengage Learning, 2016.
2. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2<sup>nd</sup> Edition, 2011.

**REFERENCE BOOKS:**

1. Byron Gottfried, "Programming with C ", Schaum's Outlines, 2<sup>nd</sup> Edition, Tata McGraw-Hill.
2. M.T.Somashekara, "Problem Solving Using C", PHI, 2<sup>nd</sup> Edition 2009.
3. A.K.Sharma, "Computer Fundamentals and Programming in C", 2<sup>nd</sup> Edition, University Press.
4. Rajaraman V., "The Fundamentals of Computers", 4<sup>th</sup> Edition, Prentice Hall of India, 2006.
5. R S Bichker, "Programming in C", University Press, 2012.

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**ANURAG UNIVERSITY  
HYDERABAD**

**I Year B.Tech.CSE – II Sem.**

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| <b>3</b> | <b>-</b> | <b>-</b> | <b>-</b> | <b>3</b> |

**Course Code: A52007**

**BASIC ELECTRICAL ENGINEERING**

**Course Objectives:**

1. To impart knowledge of basic electrical equipment
2. To introduce the concept of electrical circuits and its components.
3. To impart the knowledge of AC circuits, Phasor algebra related to alternating quantities
4. To acquaint the students with principles of operation of transformers, Electrical machines
5. To understand the Electrical Installations

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

1. Understand the importance of various theorems.
2. Analyze basic electric circuits with DC excitation.
3. Determine the losses and efficiency of single transformers.
4. Compare the difference between the performance and applications of three phase and single phase induction motor.
5. Demonstrate the principle of operation of alternator, the importance of fuse, circuit breaker.

**UNIT-I:**

**DC Circuits:**

Basic definitions, types of elements, types of sources, Kirchhoff's Laws, resistive networks, series, parallel circuits, Star- Delta and Delta- Star transformation, Network theorems- Superposition & Thevenin's - simple problems.

**UNIT-II:**

**AC Circuits:**

Representation of sinusoidal waveforms, peak, rms and average values. Elementary treatment of single-phase AC circuits consisting of R, R-L, R-C, R-L-C combinations (series only). Phasor representation, power factor, real power, reactive power, apparent power, resonance

concept. Three-phase balanced circuits, voltage and current relations in star and delta connections.

#### **UNIT –III:**

**Magnetic Circuits:** Magnetic materials, B-H characteristics, Faraday’s laws of Electromagnetic Induction, Lenz Law, Fleming’s Right hand Rule, Fleming’s Left hand Rule  
Magnetic Circuits - concept of Self & Mutual Inductance.

**Transformers:** Ideal and practical single phase transformer, OC-SC tests, losses in transformer, regulation and efficiency - simple problems.

#### **UNIT-IV:**

**DC Machines:** Construction, Principle of Operation of DC Generator & DC Motor.

**Three Phase Induction Motor:** Construction, Principle of operation of three phase Induction Motor - applications, torque slip characteristics, -simple problems.

**Single Phase Induction Motor:** Single phase Induction Motor construction and working principle, capacitor start - applications

#### **UNIT –V:**

**AC Generator:** Construction, Principle of operation of Synchronous Generator.

**Electrical Installation:** Fuse, Relay and Circuit breakers, difference between fuse, relay and circuit breaker, Types of Batteries, battery backup.

#### **TEXTBOOKS:**

1. M.S. Naidu and S. Kamakshiah, Basic Electrical Engineering -TMH.
2. V.K.Mehta & Rohit Mehta, Principles of Electrical Engineering - S.Chand Publications.
3. T.K. Nagasarkar and M.S. Sukhija, Basic Electrical Engineering, Oxford University press.
4. Hughes, Electrical and Electronics Technology-Pearson Education.

#### **REFERENCE BOOKS:**

1. Sudhakar & Shyam Mohan, Network Analysis.
2. D.P.Kothari & I.J. Nagrath, Theory and problems of Basic Electrical Engineering, PHI.
3. L.S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
4. V.D. Toro, “Electrical Engineering Fundamental”, Prentice Hall India, 1989.

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# ANURAG UNIVERSITY

## HYDERABAD

**I Year B.Tech.CSE – II Sem.**

**L    T   P   D    C**  
**0    -   3   -   1.5**

**Course Code:** A52216

### APPLIED PHYSICS LAB

#### Course Objectives:

1. To impart experimental knowledge on applications of interference and diffraction
2. To imbibe the importance of I-V characteristics of P-N diode, LED, LASER and solar cells
3. To inculcate basics of optics and its propagation through optical fibers
4. To impart error analysis
5. To introduce advances in properties of materials for engineering applications

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

1. Learn principles of interference, diffraction and dispersion of light
2. Realize the importance of I-V characteristics of P-N diode, LED, LASER and solar cell.
3. Know the basic principles of optical fiber and laser.
4. Learn electrical, mechanical and magnetic properties of materials.
5. Realize the determination of type of semiconductor.

#### List of experiments:

1. Determination of energy gap of a material of p-n junction diode
2. Study of Hall effect: Determination of Hall coefficient of an extrinsic semiconductor
3. I-V Characteristics of a solar cell (photovoltaic effect for power generation)
4. I-V Characteristics of LED and LASER diodes
5. Evaluation of Numerical Aperture & Bending losses of an Optical Fiber
6. Single Slit Diffraction using Lasers – Determination of wavelength of laser light.
7. Dispersive Power of the Material of a Prism – Spectrometer
8. Newton's Rings – Determination of Radius of Curvature of Lens
9. Diffraction Grating – Determination of Wavelength of a Monochromatic Source
10. Determination of Time Constant of RC Circuit



**REFERENCE BOOKS:**

1. A.C. Melissios, Experiments in Modern Physics, Academic Press, N.Y., 2<sup>nd</sup> Edition 2003.
2. C. Kittel, Introduction to Solid State Physics, Wiley Eastern Limited, 5<sup>th</sup> Edition.
3. Indu Prakash/Ram Krishna/A.K. Jha, A text book of Practical Physics, 2019.
4. A.K. Katiyar, Engineering Physics: Theory and Practical, 2015.
5. Fison Alfred Henry, Notes on Practical Physics, 2009.
6. H.P. Shrivastava, Textbook of Practical Physics, 2008.

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**ANURAG UNIVERSITY**  
**HYDERABAD**

**I Year B.Tech. CSE – II Sem.**

**Course Code: A52217**

**L    T P D    C**  
**0   - 3 -    1.5**

**PROGRAMMING FOR PROBLEM SOLVING LAB – II**

**Course Objectives:**

1. Design and construct simple programs by using the concepts of structures as abstract data type.
2. To have a broad idea about how to use pointers in the implement of data structures.
3. To enhance programming skills while improving their practical knowledge in data structures.
4. To strengthen the practical ability to apply suitable data structure for real time applications.

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

1. Develop applications on user defined data types
2. Apply dynamic memory allocation through pointers
3. Use different data structures for create/update basic data files
4. Implement linear data structures through stacks and queues
5. Implement various searching and sorting techniques, Linked lists.

**Week 1:**

Overview of Arrays and Functions

**Week 2:**

Programs on Accessing Structures, and Nested Structures

**Week 3:**

Array of Structures, Structures and Functions

**Week 4:**

Unions, typedef and enum

**Week 5 &6:**

Programs on pointers with its implementation, pointer arithmetic, pointer expression and Single Dimensional and Two dimensional array programs.

**Week 7:**

Pointer to structures, Programs on Call by Value and Reference, Pointers to Pointers

**Week 8:**

Programs on Dynamic Memory Allocation Functions.

**Week 9 &10:**

Programs on File Operations

**Week 11:**

Programs on Stacks and Queues Using Arrays

**Week 12:**

Single Linked List Programs

**Week 13:**

**Programs on Searching Techniques**

**Week 14 & 15:**

**Programs on Sorting Techniques**

**Week 16:**

Review

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**ANURAG UNIVERSITY**  
**HYDERABAD**

**I Year B.Tech.CSE – II Sem.**

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

**Course Code:** A52218

**BASIC ELECTRICAL ENGINEERING LAB**

**Course Objectives:**

1. To analyze a given network by applying various electrical laws and network theorems
2. To know the response of electrical circuits for different excitations
3. To calculate, measure and know the relation between basic electrical parameters.
4. To analyze the performance characteristics of DC and AC electrical machines
5. To understand different types of electrical machines

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

1. Analyze different theorems with DC Excitation.
2. Understand relationships between the basic electrical parameters
3. Determine the losses & efficiency of single phase transformers.
4. Obtain the performance characteristics of DC motor and three phase squirrel cage induction motor
5. Observe the variation of alternator voltage with change in excitation.

**List of Experiments / Demonstrations**

**Part-A**

1. Verification of Ohms law
2. Verification of Kirchhoff's Laws
3. Verification of Thevenin's Theorem
4. Verification of Superposition Theorem
5. Transient Response of Series R- L and R - C circuits using DC excitation
6. Determination and Verification of Impedance and Current of RL and RC series circuits

**Part-B**

1. Measurement of voltage, current and real power in primary and secondary circuits of a single phase transformer.
2. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
3. OC & SC Tests on Single phase transformer
4. Brake test on DC shunt motor
5. Brake test on Three Phase Squirrel cage induction motor.
6. OCC of Synchronous Generator.

**Note: Any Five experiments from Part-A and Part-B should be conducted.**

**TEXTBOOKS:**

1. M.S. Naidu and S. Kamakshiah, Basic Electrical Engineering, TMH.
2. V.K.Mehta & Rohit Mehta, Principles of Electrical Engineering; S.Chand Publications.

**REFERENCE BOOKS:**

1. Sudhakar and Shyam Mohan, "Circuits and Networks" Tata McGraw Hill Companies.
2. P.S.Bimbra, "Electrical Machines", Khanna Publishers.

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**ANURAG UNIVERSITY**  
**HYDERABAD**

**I Year B.Tech.CSE – II Sem.**

**Course Code: A52219**

**L    T   P   D    C**  
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**ENGINEERING WORKSHOP**

*Course Objectives:*

1. To study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

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

1. Practice on manufacturing of components using workshop trades including Carpentry, Fitting, Tin-Smithy, Foundry, Welding Practice, House wiring and Black Smithy.
2. Apply basic electrical engineering knowledge for house wiring practice.
3. Identify and apply suitable tools for different trades of Engineering processes including Material removing, measuring and chiseling.
4. Study and practice on Plumbing, Machine tools, Power tools, Wood working, Plastic Moulding and their operations

**1. TRADES FOR EXERCISES: At least two exercises from each trade:**

- I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
- III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
- IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)

- V. Welding Practice – (Arc Welding & Gas Welding)
- VI. House-Wiring – (Parallel & Series, Two-way Switch and Tube Light)
- VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)
- VIII. Glass Cutting.

## **2. TRADES FOR DEMONSTRATION & EXPOSURE:**

Plumbing, Machine Shop, Power tools used in Construction and Wood Working and Plastic Molding

### **TEXTBOOKS:**

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., Elements of Workshop Technology”, Vol. I, 2008 and Vol. II, 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. and Steven S. Schmid, “Manufacturing Engineering and Technology”, 4<sup>th</sup> Edition, Pearson Education Indian Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu,”Manufacturing Technology – I” Pearson Education, 2008.
4. Roy A. Lindberg, “Processes and Materials of Manufacture”, 4<sup>th</sup> Edition, Prentice Hall India, 1998.
5. Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGraw Hill House, 2017.

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**ANURAG UNIVERSITY**  
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**I Year B.Tech.CSE – II Sem.**

**Course Code: A52220**

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| <b>0</b> | <b>-</b> | <b>2</b> | <b>-</b> | <b>1</b> |

**ENGLISH COMMUNICATION SKILLS LAB**

**Course Objectives:**

- To improve the fluency of students in spoken English and neutralize their mother tongue influence
- To train students to use language appropriately for public speaking and interviews
- To enable better understanding of nuances of English language through audio- visual experience and group activities

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

- Differentiate between Spoken and Written English in formal and informal situations
- Learn Task Based Language Learning (TBLL) through various language activities effectively.
- Apply strategies for Effective Communication in different situations.
- Communicate effectively at work place with a special focus on social and professional etiquette.
- Participate in conversation, Public Speaking and Group Discussion

**Exercise-I**

**ICS Lab:**

The 4 secrets of successful Communication

Spoken vs. Written language- Formal and Informal English- Elevator speech-Introducing Others

Ice-Breaking activities and JAM sessions

**Exercise-II**

**ICS Lab:**

Features of Good Conversation

Common Everyday Situations: Conversations and Dialogues



Role-Plays- Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making suggestions etc.

### **Exercise-III**

#### **ICS Lab:**

Communication at Workplace, Social and Professional Etiquette

Descriptions (Person, place, object)- Narrations- Giving Directions and Guidelines

Telephone Etiquette

### **Exercise-IV**

#### **ICS Lab:**

Formal Presentations

Public Speaking – Exposure to Structured Talks - Non-verbal Communication-

### **Exercise-V**

#### **ICS Lab:**

Extempore speeches

Debates

#### **TEXTBOOKS:**

1. Suresh Kumar, E. & Sreehari, P. A Handbook for English Language Laboratories. New Delhi: Foundation, 2009.
2. Krishna Mohan and N. P. Singh, Speaking English Effectively, Macmillan Publishers India Ltd. Delhi, 2<sup>nd</sup> Edition, 2011.
3. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
4. Hancock, M. English Pronunciation in Use, Intermediate, Cambridge: CUP, 2009.
5. R. K. Bansal & J. B. Harrison, Spoken English: A Manual of Speech and Phonetics. 2013, Orient Blackswan, Hyderabad.
6. Hewings, M. “English Pronunciation in Use”, Advanced, Cambridge: CUP, 2009.
7. Marks, J. “English Pronunciation in Use”, Elementary, Cambridge: CUP, 2009.
8. T. Balasubramanian, A Textbook of English Phonetics for Indian Students (Macmillan)

**Lab Manual:** A Manual entitled “English Language Communication Skills (ELCS) Lab Manual- cum- Work Book”, published by Cengage Learning India Pvt. Ltd, New Delhi. 2013

## **B.Tech (Honors / Minor)**

To improve quality of technical education in our country, the AICTE in its 'Model Curriculum - 2018' for Undergraduate Program in Engineering & Technology has recommended that a student will be eligible to get Undergraduate degree with 'Honors' or 'Minor', if he / she completes an additional 18-20 credits and these extra credits could be acquired. Thus, an engineering student of Anurag University has an opportunity to get a degree in B.Tech (Hons.) or B.Tech. (Minor). By opting for 'Honours' / 'Minor', the student should earn 18 to 20 additional credits of professional courses. These additional credit courses shall not be part of the regular curriculum.

### **1. Eligibility**

- a. B.Tech (Hons. / Minor) degree is open to all current Engineering / Technology undergraduates who have taken admission on or after the academic year 2020 – 21.
- b. A student joined under B.Tech (Reg.) scheme should secure a CGPA of at least 7.5 by the end of 2<sup>nd</sup> Semester without any backlog subjects.
- c. A student joined under B. Tech (LES) scheme should secure a SGPA of at least 7.5 in the 3<sup>rd</sup> Semester without any backlog subjects.
- d. Students securing 'F' grade in any previous semester(s) are not eligible for registration.

### **2. Rules and Regulations**

- a. A student shall have to complete the additional credits within four years from the date of admission.
- b. These additional credit courses shall not be part of the regular curriculum.
- c. Earning of these additional credits shall be through regular class room teaching or on-line learning through MOOCs / NPTEL / any other on-line courses, which are duly approved by the respective (parent / non-parent) Board of Studies.
- d. Any student who has registered for B.Tech (Hons. / Minor) but could not complete extra credits, will be awarded B.Tech degree as per the Rules & Regulations of the University.
- e. The Project work (if any) as a part of additional courses should be completed by the end of 7<sup>th</sup> Semester.

### 3. Registration

- a. Registration of additional courses for B.Tech (Reg.) students will be allowed from the 3<sup>rd</sup> Semester
- b. Registration of additional courses for B.Tech (LES) students will be allowed from the 4<sup>rd</sup> Semester
- c. A student should not register more than two additional courses in each semester and complete the course within a maximum period of six years from his / her date of admission into B.Tech
- d. A student has to register the courses by paying requisite fee after obtaining the approval from the concerned Head of the Department.
- e. A student is permitted to register either B.Tech (Hons.) or B.Tech (Minor), but not both.
- f. The credits completed for B.Tech (Hons.) are not inter-changeable to the credits of B.Tech (Minor) and vice-versa.
- g. The following Honors / Minors are being offered by various Departments

| S.No. | Branch / Dept.   | Honors                                   | Minor (to be offered to other Departments) |
|-------|--|--|--|
| 1.    | a) Artificial Intelligence & Machine Learning<br>b) Artificial Intelligence<br>c) Data Science |  | Artificial Intelligence                    |
| 2.    | Computer Science & Engineering   | Data Science                             | CSE  |
| 3.    | Information Technology   | Cyber Security                           | Information Technology                     |
| 4.    | Chemical Engineering   | Green Tech. & Sustainability Engineering | Material Science & Engineering             |
| 5.    | Civil Engineering  | Smart City Planning & Development        | Smart City Planning                        |
| 6.    | Electronics & Communication Engineering  | AI for Signal Processing                 | Robotics                                   |
| 7.    | Electrical & Electronics Engineering   | 1. Electric Vehicle<br>2. Smart Grid     | Electric Vehicle                           |
| 8.    | Mechanical Engineering   | Additive Manufacturing                   | 3-D Printing                               |

