ANURAG ENGINEERING COLLEGE

(Autonomous)

Ananthagiri (V)&M) Suryapet (Dt) 508 206

B.Tech R18 Regulations

Definitions of Key Words:

Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.
Choice Based Credit System (CBCS): The CBCS provides choice for students to select from the prescribed courses (elective or minor or soft skill courses).

Course: Usually referred to, as 'papers' is a component of a programme. 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.

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.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

Credit Point: It is the product of grade point and number of credits for a course.

Letter Grade: It is an index of the performance of students in a said course.
Grades are denoted by letters O, A+, A, B+, B, P and F.

Semester Grade Point Average (SGPA): It is a measure of performance of work done in a semester. It is 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.

Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Programme: An educational programme leading to award of a Degree, diploma or certificate.

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 to May.

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.

Types of Courses: The Courses in a programme may be of three kinds: Core, Elective and Foundation.

Core Course:-

This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study, called as "Professional Core".

Elective Course:-

Elective course is a course which can be chosen from a pool of papers. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline/domain
- Nurturing student's proficiency/skill.

An elective may be "Generic Elective" focusing on those courses which add generic proficiency to the students. An elective may be "Discipline centric" called "Professional Elective" or may be chosen from an unrelated discipline, called as an "Open Elective."

Foundation Course:-

The Foundation Courses may be of two kinds: Compulsory Foundation and Elective foundation. "Compulsory Foundation" courses are the courses based upon the content that leads to Knowledge enhancement. They are mandatory for all disciplines. Elective Foundation courses are value-based and are aimed at man-making education.

ACADEMIC REGULATIONS FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2018-19 onwards

1. Title and Duration of the Programme

1.1 The course shall be called the degree programme in Bachelor of Technology, abbreviated as B.Tech.

1.2 The programme shall be of four academic years duration divided into eight semesters, each semester having duration of minimum 16 weeks of instruction.

1.3 The calendar of events in respect of the programme shall be fixed by the Institute from time to time.

1.4 The external examination in all the subjects shall be conducted at the end of each semester for all the eight semesters.

1.5 Students joining the B.Tech. Programme shall have to complete the programme within a stipulated time frame of 8 years from the year of joining and Students joining the B.Tech. Programme in the third semester directly through Lateral Entry Scheme (LES) shall have to complete the programme within a stipulated time frame of 6 years from the year of joining. Otherwise they shall forfeit their seat in B.Tech Programme and their admission shall stand cancelled.

2. Admission Procedure

2.1 Admissions shall be done as per the norms prescribed by the Government of Telangana State.

2.2 The Government orders in vogue shall prevail.

2.3 The candidate should have passed the prescribed qualifying examination on the date of admission.

3. Award of B. Tech. Degree

A student shall declared eligible for the award of B. Tech. Degree if he fulfills the following academic requirements:

3.1 The candidate shall pursue a course of study for not less than four academic years and not more than eight academic years.

3.2 The candidate shall register for 160 credits and secure all the 160 credits by securing a minimum CGPA of 5.0.

3.3 The students, who fail to fulfill the academic requirements for the award of the degree within eight academic years from the year of admission, shall forfeit their admission in B.Tech. Course.

4. Programmes Offered

The following B. Tech. Programmes are offered at present:

Branch	Branch Code
Civil Engineering	01
Electrical and Electronics Engineering	02
Mechanical Engineering	03
Electronics and Communication Engineering	04
Computer Science and Engineering	05

and any other course as approved by the Authorities from time to time.

5. Credits Distribution

	Semester	
	Contact Periods / week	**Credits**
Theory	04	04
	03	03
	02	02
Practical	03 02	1.5 01
Drawing	00+04 02+02 00+06	02 03 03
Mini Project	--	02
Seminar	4	02
Project	20 (08+12)	10 (04+06)

6. Distribution and Weightage of Marks

6.1 The performance of a student in a semester shall be evaluated subject-wise for a maximum of 100 marks each for a theory and practical subject. In addition, industry-oriented Mini-project / Summer Internship, Seminar, Project Work Stage I and Project Work Stage II shall be evaluated for 100 marks each.

6.2 For theory subjects, the distribution shall be 25 marks for Continuous Internal Evaluation (CIE) and 75 marks for the Semester End Examination (SEE).

6.3 For theory courses, during the semester there shall be two midterm examinations as part of CIE. Each midterm examination consists of Part-A (Short Answers) for 5 marks and Part-B (Long Answers) for 15 marks with duration of 90 minutes and an assignment carrying 5 marks.

Part-A contains 5 questions. Each question carries 1 mark. Part-B shall contain 3 questions with internal choice, each carries 5 marks. First midterm examination shall be conducted for 2.5 units of syllabus and second midterm examination shall be conducted for remaining 2.5 units. The Assignment should be completed a week prior to the conduct of the midterm examinations.

The total marks secured by the student in each midterm examination for 25 marks are considered and the average of the two midterm examinations shall be taken as the final marks secured by each student. If a student is absent for any midterm examination / assignment, he/she is awarded zero marks for that midterm examination / assignment.

6.4 The Semester End Examination will be conducted for 75 marks which consist of two parts viz. i). Part-A for 25 marks, ii). Part –B for 50 marks.

6.5 Part-A is compulsory, which consists of ten questions (numbered from 1 to 10) two from each unit i.e., one question carrying 2 marks and the other question carrying 3 marks.

6.6 Part-B consists of five questions (numbered from 11 to 15) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice (that means there will be two questions from each unit and the student should answer any one question).

6.7 For practical courses, during the semester there shall be two practical midterm examinations for CIE. CIE carries 25 marks. Out of the 25 marks for CIE, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. The 15 marks for day-to-day work shall be considered only if the student attends the practical examination when conducted.

The total marks secured by the student in each practical midterm examination for 25 marks are considered and the average of the two practical midterm examinations shall be taken as the final marks secured by each student.

6.8 Practical SEE is conducted for 75 marks. The practical SEE shall be conducted with an external examiner along with the internal examiner. The external examiner shall be appointed by the Principal from the panel of examiners recommended by Chairman, Board of Studies / HoD of the respective branch.

6.9 For the subjects having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for end examination. There shall be two midterm examinations in a semester and the average of the two shall be considered for the award of marks for midterm examinations. The 15 marks for day-to-day work shall be considered only if the student attends the midterm examination when conducted.

6.10 For subjects like Engineering Graphics/Engineering Drawing, the SEE shall consist of five questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions. There shall be no Part – A, and Part – B system.

6.11 For subjects like Machine Drawing Practice/Machine Drawing, the SEE shall be conducted for 75 marks consisting of two parts viz. (i) Part – A for 30 marks. 2 out of 4 questions must be answered, (ii) Part – B for 45 marks. Part – B is compulsory.

6.12 There shall be an Industry-Oriented Mini-Project / Summer Internship, to be taken up during the vacation after III year II Semester examination. However, the Industry-Oriented Mini-Project / Summer Internship and its report shall be evaluated in IV year I Semester. The Industry-Oriented Mini-Project / Summer Internship shall be submitted in the report form and should be presented before the committee, which shall be evaluated for 75 marks. The committee consists of an external examiner, head of the

department and the supervisor of Industry-Oriented Mini-Project / Summer. There shall be 25 marks for internal assessment of Industry-Oriented Mini-Project / Summer Internship. The Supervisor awards the internal marks based on the periodical evaluation during the Industry-Oriented Mini-Project / Summer Internship.

6.13 There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic in the respective discipline and prepare a technical report, showing his understanding of the topic, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, Seminar Supervisor and a senior faculty member. The seminar report shall be evaluated for 100 marks. Out of 100 marks, 25 marks should be awarded by the Supervisor and 75 marks should be awarded by the Departmental Committee. There shall be no external examination for the seminar.

6.14 B.Tech Project Work shall be carried out in two stages: Project Stage – I during IV Year I Semester, Project Stage – II during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.

6.15 For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work for 75 marks and project supervisor shall evaluate for 25 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together. A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

6.16 For Project Stage – II, the external examiner shall evaluate the project work for 75 marks and the project supervisor shall evaluate it for 25 marks. **The topics for Industrial Oriented Mini-Project, Seminar and Project Stage – I shall be different from one another.** The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together. For conducting viva-voce of project stage – II, Principal selects an external examiner from the Panel of Experts submitted by Chairman, BoS / HoD of the respective branch.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

6.17 For mandatory courses of, Gender Sensitization, Human Values and Professional Ethics, Constitution of India and Intellectual Property Rights, a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the Continuous Internal Evaluation for passing the subject/course. These marks should also be processed along with the internal marks of other subjects. There is no Semester End Examination for mandatory courses.

6.18 No marks or letter grades shall be allotted for mandatory/non-credit courses. Only Pass/Fail shall be indicated in Grade Card.

6.19 The theory / practical midterm examination marks awarded by the faculty are subject to scrutiny and scaling by the Institution whenever/wherever necessary. In such cases, theory / practical midterm examination marks awarded by the teacher will be referred to a committee consisting of Principal, Chairman, BoS / HoD, CoE and Subject Expert. The committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the committee are final and binding. The laboratory records and midterm examination scripts shall be preserved as per the University rules and produced before the Committees of the University as and when asked for.

6.20 Candidates shall be permitted to apply for recounting/revaluation of SEE scripts within the stipulated period with payment of prescribed fee.

7. Attendance Requirements

7.1 A student is eligible to write the semester end examinations only if he / she acquire a minimum of 75% of attendance in aggregate of all the subjects.

7.2 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 as approved by the Academic Council.

7.3 A stipulated fee shall be payable towards condonation of shortage of attendance.

7.4 Shortage of attendance below 65% in aggregate shall not be condoned.

7.5 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.

7.6 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 the commencement of class work with the academic regulations of the batch into which he/she gets admitted.

7.7 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 re-admission into the same semester.

7.8 For all mandatory, non-credit courses offered in a semester, a "Satisfactory Participation Certificate" shall be issued to the student from the concerned authorities, only after securing $\geq 75\%$ attendance in such a course. No marks or Letter Grade shall be allotted for these activities (Refer to 15.2).

8. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in Item no.7.

8.1 A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical/design/drawing subject/project and secured not less 35% marks in semester end examination (SEE), and minimum 40% of marks in the sum total of the internal evaluation and end examination taken together.

8.2 The student has to pass the failed course by appearing the supplementary examination as per the requirement for the award of degree.

8.3 Students, who fail to earn 160 credits as indicated in the course structure within eight academic years from the year of their admission, shall forfeit their admission in B. Tech. Programme.

8.4 A student shall be promoted from I Year to II Year only if he/she fulfills the academic requirements of securing 50% of average credits (19 credits out of 38 credits) up to I year II Semester, from all the examinations, whether or not the candidate takes the examinations.

8.5 A student shall be promoted from II Year to III Year only if he/she fulfills the academic requirements of securing 50% of average credits (39 credits out of 79 credits) up to II year II semester, from all the examinations, whether or not the candidate takes the examinations.

8.6 A student shall be promoted from III year to IV year only if he/she fulfills the academic requirements of securing 50% of average credits (60 credits out of 121 credits) up to III year II semester, from all the examinations, whether or not the candidate takes the examinations.

8.7 A student shall register and put up attendance in all 160 credits and earn all 160 credits for the award of degree.

8.8 When a student is detained due to shortage of attendance in any semester, no grade allotments or SGPA/CGPA calculations will be done for that entire semester in which he got detained.

8.9 When a student is detained due to lack of credits in any year, he/she may be readmitted after fulfillment of the academic requirements, with the academic regulations of the batch into which he gets readmitted subject to 3.3.

8.10 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 subjects offered under that category.

8.11 If a student registers for some more 'extra Subjects' (in the parent department or other departments / branches of engineering) other than those listed subjects totaling to 160 credits as specified in the course structure of his department, the performances in those 'extra Subjects' (although evaluated and graded using the same procedure as that of the required 160 Credits) will not be taken into account while calculating the SGPA and CGPA. For such 'extra Subjects' registered, Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in Items 7 and 8.1 – 8.10 above.

9. Program Structure

S. No.	Classification		Course Work - Subject Area
	AICTE	UGC	
1	HS	Foundation Courses	Humanities and Social Sciences including Management; (HS),
2	BS		Basic Sciences(BS) including Mathematics, Physics, Chemistry, Biology;
3	ES		Engineering Sciences (ES), including Materials, Workshop, Drawing, Basics of Electrical/ Electronics/ Mechanical/Computer Engineering Instrumentation;
4	MC		Mandatory Courses like Gender Sensitization, Human Values and Professional Ethics, Constitution of India and Intellectual Property Rights, Environmental science etc.
5	PC	Core Courses	Professional Subjects-Core (PC), relevant to the chosen specialization/branch;
6	PW		Project Work, Seminar and/or Internship in Industry or elsewhere.
7	PE	Elective Courses	Professional Subjects – Electives (PE), relevant to the chosen specialization/ branch;
8	OE		Open Subjects- Electives (OE), from other technical and/or emerging subject areas;

10. Programme pattern

10.1 The entire Programme of study is for four academic years in semester pattern.

10.2 A student eligible to appear for semester end examinations in a subject, but absent from it or failed in that examination, may write the examination in that subject during supplementary examinations.

10.3 A student eligible to appear in the Semester End Examination in any subject / course, but absent at it or failed (thereby failing to secure P Grade or above), may reappear for that subject / course at the supplementary as and when examination conducted. In such cases, his Continuous Internal Evaluation (CIE) assessed earlier for that subject/course will be carried over, and added to the marks to be obtained in the supplementary examinations, for evaluating his performance in that course.

11. Minimum Instruction

The minimum instruction for each semester shall be 16 weeks.

12. Grade Points

12.1 Marks will be awarded to indicate the performance of each student in each theory course, or Lab / Practical, or Seminar, or Project, or Industry Oriented Mini-Project, Minor Course etc., based on the % marks obtained in CIE+SEE(Continuous Internal Evaluation + Semester End Examination, both taken together) as specified in Item 6 above, and a corresponding Letter Grade shall be given.

12.2 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed.

Letter Grade	Grade Points	% of marks Secured (Class Intervals)
O (Out Standing)	10	90% and above (≥90%, ≤ 100%)
A+ (Excellent)	9	Below 90% but not less than 80% (≥80%, <90%)
A (Very Good)	8	Below 80% but not less than 70% (≥70%, < 80%)
B+ (Good)	7	Below 70% but not less than 60% (≥60%, < 70%)
B (Average)	6	Below 60% but not less than 50% (≥50%, < 60%)
P (Pass)	5	Below 50% but not less than 40% (≥40%, < 50%)
F (Fail)	0	Below 40% (< 40%)
Ab (Absent)	0	--

12.3 A student obtaining F Grade in any Subject shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when conducted. In such cases; his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

12.4 A Letter Grade does not imply any specific % of Marks.

12.5 In general, a student shall not be permitted to repeat any Subject/Course (s) only for the sake of 'Grade Improvement' or 'SGPA/CGPA Improvement'. However, he has to repeat all the Subjects/Courses pertaining to that Semester, when he / she is detained (as listed in items 8.10).

12.6 A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him in that Subject/ Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Subject/ Course.
Credit Points (CP) = Grade Point (GP) x Credits For a Course

12.7 The Student passes the Subject/ Course only when he gets GP $\geq$ 5 (P Grade or above).

13. **Registration/Dropping**

13.1 Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar.

13.2 A student at the end of II year II semester either having the CGPA of $\geq$ 7.0 or having passed all previous courses in first attempt with a minimum CGPA $\geq$ 5.0 is allowed to register an additional theory course/credits. However mandatory non credit courses can be registered during the course of study with the consent of the faculty advisor.

13.3 A student would be allowed to register in an additional course only if he/she satisfies the prerequisites.

13.4 Departments will notify at the time of registration about the minimum number of students to be enrolled for a particular course to be offered.

13.5 Any student may be barred from registering for any course for specific reasons like disciplinary reasons, non- payment of fees, etc.

13.6 Dropping of Courses: 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.

14. Earning of Credit

A student shall be considered to have completed a Course successfully and earned the credits if he/she secures an acceptable letter grade in the range 'O' to 'P'. Letter grade 'F' in any Course implies failure of the student in that Course and no credits earned.

15. **Passing Standards:**

15.1 A student shall be declared successful or 'passed' in a Semester, only when he 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 B.Tech programme, only when he/she gets a CGPA $\geq$ 5.00; subject to the condition that he secures a GP $\geq$ 5 (P Grade or above) in every

registered Subject/ Course in each Semester (during the entire B.Tech programme) for the Degree Award, as required.

15.2 A Student shall be declared successful or 'passed' in any Non-Credit Subject/ Course, if he secures a 'Satisfactory Participation Certificate' for that Mandatory Course.

15.3 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, Grade earned etc.), Credits earned, SGPA, and CGPA.

16. Vertical Progression

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 College to another and also in avoiding any confusion among the students. The

a) Minimum Standard for SGPA =5.0;

b) Minimum Standard for CGPA =5.0; (at the end of each semester)

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.

17. Eligibility for Award of B.Tech. Degree

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

17.1 Registered and successfully completed all the components prescribed in the Programme of study to which he/she is admitted by securing 160 credits,

17.2 Obtained CGPA greater than or equal to 5.0 (Minimum requirements for Pass),

17.3 Has no dues to the Institute, hostels, Libraries, NCC/NSS etc., and

17.4 No disciplinary action is pending against him/her.

18. Award of Class

18.1 A student who registers for all the specified subjects/ courses as listed in the course structure and secures the required number of 160 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have 'qualified' for the award of the B.Tech. degree in the chosen branch of Engineering as selected at the time of admission.

18.2 A student who qualifies for the award of the degree as listed in item 18.1 shall be placed in the following classes.

18.3 Students with final CGPA (at the end of the B.Tech programme) ≥ 8.00, and fulfilling the following conditions -

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

ii. Should have secured a CGPA ≥ 8.00, at the end of each of the 8 sequential semesters, starting from I year I semester onwards.

iii. Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason, shall be placed in 'first class with distinction'.

18.4 The Students who secure CGPA ≥ 8.00 not fulfilling the above conditions (18.3) shall be awarded 'first class'.

18.5 Students with final CGPA (at the end of the B.Tech Programme) ≥ 6.50 but < 8.00, shall be placed in 'first class'.

18.6 Students with final CGPA (at the end of the B.Tech Programme) ≥ 5.50 but < 6.50, shall be placed in 'second class'.

18.7 All other students who qualify for the award of the degree (as per item 18.1), with final CGPA (at the end of the B.Tech Programme) ≥ 5.00 but < 5.50, shall be placed in 'pass class'.

18.8 A student with final CGPA (at the end of the B.Tech Programme) < 5.00 will not be eligible for the award of the degree.

18.9 Students fulfilling the conditions listed under item 18.3 alone will be eligible for award of 'college rank' and 'gold medal'.

18.10 The marks obtained in Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) will not be shown in the memorandum of Grade Sheet.

18.11 The CGPA can be converted to equivalent percentage of marks by using the following equation:

(CGPA - 0.5) X 10

19. Consolidated Grade Card

A consolidated grade card containing credits & grades obtained by the candidates will be issued after completion of the four years B. Tech Programme.

20. Withholding of Results

If the student has not paid the dues, if any, to the Institute or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His degree will be withheld in such cases the matter will be referred to the academic council. The decision of the academic council is final.

21. Transitory Regulations

21.1 Discontinued, detained, or failed candidates are eligible for readmission as and when next offered as per the college admission procedure.

21.2 Students on transfer shall complete the prescribed courses of the concerned programme not covered earlier and however he/she should take the remaining programme along with others.

21.3 There shall be no branch transfers after the cut-off date of admissions in the academic year.

22. Transcripts

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

23. Supplementary Examinations

In addition to the Regular Semester End Examinations held at the end of each semester, Supplementary Final Examinations will be conducted during the academic year. Candidates taking the Regular / Supplementary examinations as Supplementary candidates may have to take more than one End Semester Examination per day. A student can appear for any number of supplementary examinations till he/she clears all courses which he/she could not clear in the first attempt. However the maximum stipulated period cannot be relaxed under any circumstances.

24. Graduation Ceremony

a. The College shall have its own annual Graduation Ceremony for the award of degree to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute.

b. The College shall institute Prizes and Awards to meritorious students, for being given away annually at the Graduation Ceremony.

25. Termination from the Program

The admission of a student to the program may be terminated and the student asked to leave the Institute in the following circumstances:

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

b. The student fails to satisfy the norms of discipline specified by the Institute from time to time.

26. Non-Credit Courses (Mandatory Courses)

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

b. These activities carry no credits and are evaluated as Satisfactory/ Unsatisfactory.

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

27. Amendments

a. The regulations hereunder are subject to amendments as may be made by the Academic Council of the College 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) as may be decided by the Academic Council.

28. General

a. Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
b. The academic regulation should be read as a whole for the purpose of any interpretation.
c. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

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

Applicable for the students admitted into II year B. Tech. (Lateral Entry Scheme) from the Academic Year 2019-20 and onwards

1. **Eligibility for award of B. Tech. Degree (LES)**
   - 1.1 The LES candidates shall pursue a course of study for not less than three academic years and not more than six academic years.
   - 1.2 The candidate shall register for 122 credits and secure 122 credits by securing a minimum CGPA of 5.0 from II to IV year B.Tech. Program (LES) for the award of B.Tech. degree.
   - 1.3 The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their admission.
   - 1.4 The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech.(LES) scheme.

2. **Promotion Rule**

   A student shall be eligible for promotion in B.Tech programme, if he/she acquires the minimum number of credits as given below:
   - 2.1 A student shall be promoted from II Year to III Year only if he/she fulfills the academic requirements of securing 50% of average credits (20 credits out of 41 credits) up to II year II semester, from all the examinations, whether or not the candidate takes the examinations.
   - 2.2 A student shall be promoted from III year to IV year only if he/she fulfills the academic requirements of securing 50% of average credits (41 credits out of 83 credits) up to III year II semester, from all the examinations, whether or not the candidate takes the examinations.
   - 2.3 A student shall register and put up attendance in all 122 credits and earn all 122 credits to be eligible for award of degree.
   - 2.4 Students, who fail to earn 122 credits as indicated in the course structure within six academic years, shall forfeit their seat in B.Tech. programme and their admission stands cancelled.

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

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ANNEXURE – I

1 Grade Point Average

1.1 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.

1.2 Semester Grade Point Average (SGPA) is awarded to candidates considering all the courses of the semester. Zero grade points are also included in this computation. SGPA is rounded off to TWO Decimal Places.

SGPA will be computed as follows;

$$\frac{\sum [(\text{Course } \textit{credits}) \text{ X } (\textit{Grade points})] \text{ (for all Courses passed in that semester)}}{\sum [(\text{Course } \textit{credits})] \text{ (for all courses registered in that semester)}}$$

1.3 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.

CGPA will be computed as follows:

$$\frac{\sum [(\text{Course } \textit{credits}) \text{ X } (\textit{Grade points})] \text{ (for all Courses passed upto that semester)}}{\sum [(\text{Course } \textit{credits})] \text{ (for all Courses registered until that semester)}}$$

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

1.4 Illustrative Example

An illustrative example given in below Table 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 . Both of them shall be normally calculated up to the second decimal position, so that the CGPA, in particular, can be made use of in rank ordering the student's performance in a class. 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.

Year and Semester	Course No.	Credits	Grade	Grade Points	Credit Points
I year I sem	XX101	5	A	8	40
I year I sem	XX102	4	F	0	00
I year I sem	XX103	3	A+	9	27
I year I sem	XX104	4	F	0	00
I year I sem	XX105	5	P	5	25
I year I sem	XX106	5	P	5	25
Total		**26 (18*)**			**117**
SGPA = 117/26 = 4.5					**CGPA = 4.5**
I year II sem	XX107	5	B+	7	35
I year II sem	XX108	4	A	8	32
I year II sem	XX109	3	P	5	15
I year II sem	XX110	5	P	5	25
I year II sem	XX111	4	A+	9	36
I year II sem	XX112	2	F	0	00
I year II sem	XX113	2	A	8	16
Total		**25 (23*)**			**159**
SGPA = 159/25 = 6.36					**CGPA = 276/51 = 5.41**

*Total No. of credits excluding those with 'F'; this is particularly important to keep track of the number of credits earned by a student up
to any semester;

ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

Computer Science & Engineering

I YEAR I SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	Cat	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	MA101BS	Mathematics - I	BS	3	1	0	4	25	75	100
2	AP102BS	Applied Physics	BS	3	1	0	4	25	75	100
3	EE103ES	Basic Electrical Engineering	ES	3	0	0	3	25	75	100
4	CS104ES	Programming for Problem Solving - I	ES	2	0	0	2	25	75	100
5	ME105ES	Engineering Graphics	ES	1	0	4	3	25	75	100
6	EN106HS	English Language Communication Skills Lab - I	HS	0	0	2	1	25	75	100
7	CS107ES	Programming for Problem Solving - I Lab	ES	0	0	2	1	25	75	100
8	AP108BS	Applied Physics Lab	BS	0	0	3	1.5	25	75	100
9	EE109ES	Basic Electrical Engineering Lab	ES	0	0	2	1	25	75	100
Total				**12**	**2**	**13**	**20.5**	**225**	**675**	**900**

T - Tutorial **P - Practical** **D - Drawing** **L- Lectures** **C- Credits**

I YEAR II SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	Cat	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	MA201BS	Mathematics - II	BS	3	1	0	4	25	75	100
2	CH202BS	Engineering Chemistry	BS	3	1	0	4	25	75	100
3	EN203HS	English	HS	2	0	0	2	25	75	100
4	CS204ES	Programming for Problem Solving - II	ES	2	0	0	2	25	75	100
5	CH205BS	Engineering Chemistry Lab	BS	0	0	3	1.5	25	75	100
6	ME206ES	Engineering Workshop	ES	0	0	3	1.5	25	75	100
7	CS207ES	Programming for Problem Solving - II Lab	ES	0	0	3	1.5	25	75	100
8	EN208HS	English Language Communication Skills Lab - II	HS	0	0	2	1	25	75	100
Total				**10**	**2**	**11**	**17.5**	**200**	**600**	**800**

T - Tutorial **P - Practical** **D - Drawing** **L- Lectures** **C- Credits**

II YEAR I SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	Cat	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1		Probability and Statistics	BS	3	0	0	3	25	75	100
2		Discrete Mathematical Structures	BS	3	0	0	3	25	75	100
3		Electronic Devices and Circuits	ES	3	0	0	3	25	75	100
4		Digital Logic Design	ES	3	0	0	3	25	75	100
5		Data Structures	PC	3	1	0	4	25	75	100
6		Object Oriented Programming	PC	3	0	0	3	25	75	100
7		Electronic Devices and Circuits Lab	PC	0	0	2	1	25	75	100
8		Data Structures & Object Oriented Programming Lab	PC	0	0	2	1	25	75	100
9		Gender Sensitization	MC	0	0	2	0	25	75	100
Total				**18**	**1**	**6**	**21**	**225**	**675**	**900**

T - Tutorial **P - Practical** **D - Drawing** **L- Lectures** **C- Credits**

II YEAR II SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	Cat	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1		Environmental Studies	BS	3	0	0	3	25	75	100
2		Design and Analysis of Algorithms	PC	3	0	0	3	25	75	100
3		Computer Organization	PC	3	0	0	3	25	75	100
4		Formal Languages and Automata Theory	PC	3	0	0	3	25	75	100
5		Java Programming	PC	3	0	0	3	25	75	100
6		Database Management Systems	PC	3	0	0	3	25	75	100
7		Java Programming Lab	PC	0	0	2	1	25	75	100
8		Database Management Systems Lab	PC	0	0	2	1	25	75	100
9		Human Values And Professional Ethics	MC	0	0	2	0	25	75	100
Total				**18**	**0**	**6**	**20**	**225**	**675**	**900**

T - Tutorial **P - Practical** **D - Drawing** **L- Lectures** **C- Credits**

III YEAR I SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	Cat	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1		Computer Networks	PC	3	1	0	4	25	75	100
2		Operating Systems	PC	3	0	0	3	25	75	100
3		Microprocessors and Microcontrollers	PC	3	0	0	3	25	75	100
4		Compiler Design	PC	3	0	0	3	25	75	100
5		Software Engineering	PC	3	0	0	3	25	75	100
6		PROFESSIONAL ELECTIVE - I	PE	3	0	0	3	25	75	100
7		Advance English Communication Skills Lab	HS	0	0	2	1	25	75	100
8		Operating Systems and Computer Networks Lab	PC	0	0	2	1	25	75	100
9		Constitution Of India	MC	0	0	2	0	25	75	100
Total				**18**	**1**	**6**	**21**	**225**	**675**	**900**

T - Tutorial **P - Practical** **D - Drawing** **L- Lectures** **C- Credits**

IIIYEAR II SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	Cat	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1		Managerial Economics and Financial Analysis	HS	3	0	0	3	25	75	100
2		Data Warehousing and Data Mining	PC	3	0	0	3	25	75	100
3		Object Oriented Analysis and Designing	PC	3	0	0	3	25	75	100
4		Web Technologies	PC	3	1	0	4	25	75	100
5		PROFESSIONAL ELECTIVE - II	PE	3	0	0	3	25	75	100
6		OPEN ELECTIVE - I	OE	3	0	0	3	25	75	100
7		Data Mining and OOAD Lab	PC	0	0	2	1	25	75	100
8		Web Technologies Lab	PC	0	0	2	1	25	75	100
9		Intellectual Property Rights	MC	0	0	2	0	25	75	100
Total				**18**	**1**	**6**	**21**	**225**	**675**	**900**

T - Tutorial **P - Practical** **D - Drawing** **L- Lectures** **C- Credits**

IV YEAR I SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	Cat	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1		Management Science	HS	3	0	0	3	25	75	100
2		Linux Programming	PC	3	0	0	3	25	75	100
3		PROFESSIONAL ELECTIVE - III	PE	3	0	0	3	25	75	100
4		PROFESSIONAL ELECTIVE - IV	PE	3	0	0	3	25	75	100
5		OPEN ELECTIVE - II	OE	3	0	0	3	25	75	100
6		Linux Programming LAB	PC	0	0	2	1	25	75	100
7		MINIPROJECT EVALUATION	PW	0	0	4	2	25	75	100
8		PROJECT STAGE-I	PW	0	0	8	4	100	0	100
Total				**15**	**0**	**14**	**22**	**275**	**525**	**800**

T - Tutorial **P - Practical** **D - Drawing** **L- Lectures** **C- Credits**

IV YEAR II SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	Cat	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1		PROFESSIONAL ELECTIVE - V	PE	3	0	0	3	25	75	100
2		PROFESSIONAL ELECTIVE - VI	PE	3	0	0	3	25	75	100
3		OPEN ELECTIVE - III	OE	3	0	0	3	25	75	100
4		SEMINAR	PW	0	0	4	2	100	0	100
5		PROJECT STAGE-II	PW	0	0	12	6	25	75	100
Total				**9**	**0**	**16**	**17**	**200**	**300**	**500**

T - Tutorial **P - Practical** **D - Drawing** **L- Lectures** **C- Credits**

ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

I Year B.Tech. CSE - I Sem	L	T/P/D	C
	3	1/- /-	4

(MA101BS) MATHEMATICS – I

Linear Algebra and Calculus

Course Objectives: To learn

- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concepts of Eigen values and Eigen vectors and the nature of quadratic form by finding Eigen values.
- Concepts of sequence and series and identifying their nature by applying some tests.
- Mean value theorems geometrical interpretation and their application to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions
- Partial differentiation, Total derivative and finding maxima minima of functions of several variables.

Course Outcomes: After learning the contents of this paper the students must able to:

- Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
- Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
- Analyse the convergence of sequence and series.
- Discuss the applications of mean value theorems to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions.
- Find the **extreme** values of functions of two variables with / without constraints.

UNIT-I: Matrices and Linear System of Equations

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

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 – Diagonolization of matrix- Quadratic forms: Nature, Index, Signature.

UNIT-III: Sequences & Series

Basic definitions of Sequences and series, Convergence and divergence, Ratio test, Comparison test, Integral test, Cauchy's root test, Raabe's test, Absolute and conditional 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 applications)

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. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th 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. Introduction to Linear Algebra, by Kolman.

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(An Autonomous Institution)

I Year B.Tech. CSE - I Sem	**L**	**T/P/D**	**C**
	3	**1/- /-**	**4**

(AP102BS) APPLIED PHYSICS

Course Objectives:

- Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
- Students will be able to demonstrate competency and understanding of the concepts found in Quantum Mechanics, Semiconductor physics, Wave Optics and Fiber optics and lasers and a broad base of knowledge in physics.
- The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.

Course Outcomes:

- The student would be able to learn the fundamental concepts on Quantum behavior of matter in its micro state.
- The knowledge of fundamentals of Band theory, free electron theory, Wave optics enable the students to apply to various engineering applications.
- Design, characterization and study of properties of Semiconducting materials and Lasers, Fiber Optics help the students to prepare new materials for various engineering applications.

UNIT-I: Wave Optics (9 hours + 3 T)

Huygen's principle, Superposition of waves, Coherence and methods to produce coherent sources, Young's double slit experiment, Interference in thin films by reflection, Newton's rings, Diffraction: Introduction, Farunhofer diffraction at single slit, Plane diffraction Gratings and their resolving power.

Polarization: Introduction, Polarization by reflection, Polarization by double refraction, Nicol's prism

UNIT-II: Fiber Optics and Lasers (9 hours + 3 T)

Fiber Optics: Introduction, Total internal reflection, Acceptance angle and numerical aperture, Losses associated with optical fibers, Step and graded index fibers, Applications of optical fibers.

Lasers: Introduction to interaction of radiation with matter: stimulated absorption, spontaneous emission and stimulated emission, Characteristics of a laser, Einstein's coefficients, important components of a laser: active medium, pumping source, optical resonator; Population inversion, Ruby laser, He-Ne laser, Applications of lasers.

UNIT-III: Introduction to Quantum Mechanics (10 hours + 3 T)

Free electron theory: Classical Theory, Electrical Conductivity and Ohm's Law – Drawbacks, Somerfield theory (Qualitative), Density of States, Fermi distribution function, Fermi level and its importance.

Introduction, de Broglie hypothesis, Wave-particle duality, Matter waves, Davisson and Germer experiment, Heisenberg uncertainty principle, Time independent Schrodinger wave equation, Born interpretation of wave function, Particle in a infinite potential well (one dimensional case).

UNIT-IV: Band Theory of Solids & Semiconductors (10hours + 3 T)

Kronig-Penny model (Qualitative), E-k diagram, Origin of Energy band formation in solids, Classification of materials in to conductors, semiconductors and insulators, Concept of effective mass.

Intrinsic semiconductors, Carrier concentration in intrinsic semiconductors, Energy band diagram and position of Fermi level in intrinsic semiconductors, Equation for electrical conductivity of semiconductors, Extrinsic semiconductors, energy band diagram and position of Fermi level in extrinsic semiconductors, Dependence of Fermi level on temperature.

UNIT-V: Semiconductor Devices (8 hours + 3 T)

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 diodes, Solar cells, Light emitting diode and their characteristics, Semiconductor laser: Device structure and characteristics.

Text books:

1. M N Avadhanulu, P G Kshirsagar ,A Text book of Engineering Physics, S Chand.
2. B K Pandey and S Chaturvedi Engineering Physics, CENGAGE Learning.
3. D K Bhattacharya and Poonam Tandon Engineering Physics, OXFORD University Press.

Reference books:

1. Ian G. Main, Oscillations and waves in physics
2. H.J. Pain, The physics of vibrations and waves
3. A.Ghatak, Optics
4. O. Svelto, Principles of Lasers
5. P K palanisamy ,Engineering Physics Scietech publication
6. Charles Kittel ,Introduction to Solid State Physics, John Wiley & Sons
7. M Armugam, Solid State Physics Anuradha Publications

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(An Autonomous Institution)

I Year B.Tech. CSE - I Sem	L	T/P/D	C
	3	-/- /-	3

(EE103ES) BASIC ELECTRICAL ENGINEERING

Course Objectives:

- To introduce the concept of electrical circuits and its components.
- To impart knowledge of basic electrical equipment.
- To impart the knowledge of AC circuits, Phasor algebra related to alternating quantities
- To acquaint the students with principles of operation of transformers, Electrical machines and electrical installations.

Course Outcomes:

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

- Understand the importance of electrical circuits and its components.
- Determine the losses and efficiency of single phase transformers.
- Analyze the performance of DC machines and induction motor.
- Demonstrate the principle of operation of Synchronous generator and importance of Electrical installations.

UNIT-I DC Circuits:

Basic definitions, types of elements, types of sources, Ohm's Law, Kirchhoff's Laws**,** resistive networks, series, parallel circuits, Star- Delta and Delta- Star transformation, Network theorems- Superposition, Thevenin's & Norton's Theorems- 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 circuit only). Phasor representation, power factor, real power, reactive power, apparent power, resonance concept (series circuit only). Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT –III: Magnetic Circuits &Transformers:

Magnetic circuits: Magnetic materials, Faraday's laws of Electromagnetic Induction, Lenz's Law, Fleming's Right hand Rule and Left hand Rule.

Magnetic Circuits - concept of Self Inductance & Mutual Inductance.

Transformers:

Ideal and practical single phase transformer, Open Circuit and Short Circuit tests, losses in transformer, regulation and efficiency - simple problems.

UNTI-IV: DC Machines and Induction Motors:

DC Machines:

Construction and Principle of Operation of DC Generator & DC Motor, EMF Equation, Magnetization and Load Characteristics of DC Generator, Speed control of DC Shunt Motor, Applications & Simple problems.

Three Phase Induction Motor:

Construction and Principle of operation of three phase Induction Motor, torque slip characteristics, Applications & Simple problems.

Single Phase Induction Motor

Construction and working principle of Single phase Induction Motor, Applications.

UNIT –V: Synchronous Generator & Electrical Installation:

Synchronous Generator

Construction and Principle of operation of Synchronous Generator, Open Circuit & Short Circuit Characteristics.

Electrical Installation:

Fuse, Relay, Circuit breaker, Main Circuit Breaker and Earthing, Types of Batteries and their characteristics.

TEXT BOOKS:

1. V.K.Mehta, Rohit Mehta, "Principles of Electrical Engineering", S.Chand Publications, Revised Edition, 2010.
2. D.P.Kothari, I.J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 3rd edition, 2010.
3. T.K. Nagasarkar, M.S. Sukhija, "Basic Electrical Engineering", Oxford University press, 3rd Edition, 2017.

REFERENCE BOOKS:

1. D C Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill,1st edition,2015.
2. M.S. Naidu, S. Kamakshiah, "Basic Electrical Engineering", Tata McGraw Hill, 3rd Edition, 2009.
3. Sudhakar, Shyam Mohan, "Network Analysis", McGraw-Hill Education, 2nd Edition, 2006.
4. L.S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2nd Edition, 2011.
5. E. Hughes, "Electrical & Electronics Technology", Pearson, 7th Edition, 2010.

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(An Autonomous Institution)

I Year B.Tech. CSE - I Sem	L	T/P/D	C
	2	-/- /-	2

(CS104ES) PROGRAMMING FOR PROBLEM SOLVING - I

Course Outcomes: At the end of this course, the student would be able to

- Design algorithms and flowcharts for real world applications
- Know the usage of various operators in Program development
- Design programs involving decision and iteration structures.
- Apply the concepts code reusability using Functions
- 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 vsexit ( ), 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 strrev( ))

Text Books:

1. B.A.Forouzon and R.F. Gilberg, “COMPUTER SCIENCE: A Structured Programming Approach Using C”, Third edition, CENGAGE Learning, 2016
2. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.

Reference Books:

1. Byron Gottfried, “Programming with C “, Schaum’s Outlines, 2nd Edition, TATA McGraw-Hill.
2. M.T.Somashekara, “Problem Solving Using C”, PHI, 2nd 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.

R S Bichker, "Programming in C", University Press, 2012

ANURAG ENGINEERING COLLEGE

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I Year B.Tech. CSE - I Sem	L	T/P/D	C
	1	-/4 /-	3

(ME105ES) ENGINEERING GRAPHICS

Pre-requisites: Nil

Course objectives:

- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and development of surfaces of solids.
- To draw Isometric views and its projections.
- To prepare you to use the techniques, skills, and modern engineering tools like Auto Cad software necessary for engineering practice

Course Outcomes: At the end of the course, the student 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.

UNIT-1 Introduction to Engineering Drawing-Principles of Engineering Graphics and their significance, usage of Drawing instruments, Conic sections including the Rectangular Hyperbola-General method only, Cycloid, Epicycloids and Hypocycloid.

UNIT-2 Orthographic Projections-Principles of Orthographic Projections-Conventions-Projections of Points and projections of lines (Midpoint problems and Traces are not included).Projections of planes (regular geometry figures).

UNIT-3 Projections of Regular Solids- prism, cylinder, pyramid, cone, sectional views of Right Regular solids- prism, cylinder, pyramid, cone.

UNIT-4 Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone, Intersections of prism vs. prism and Cylinder vs. cylinder.

UNIT-5 Isometric Projections-Principles of Isometric Projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of Lines, Plane of figures, Simple and Compound Solids. Conversion of Isometric Views to Orthographic Views and Vice-versa.

Introduction to CAD (For Internal Evaluation Weightage Only)

Introduction to Auto Cad software package commands, drawing 2D and 3D sketches for simple objects by using Auto Cad software package.

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. Engineering Drawing by K. Venugopal, V Prabhu Raja, New age publications.
2. Corresponding set of CAD Software Theory and User Manuals

ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

I Year B.Tech. CSE - I Sem	**L**	**T/P/D**	**C**
	0	**-/2 /-**	**1**

(EN106HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

Learning Objectives:

The students will be able to

- Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
- Sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
- Bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
- Improve the fluency of students in spoken English and neutralize their mother tongue influence.
- Train the students to use language appropriately for public speaking, group discussions and interviews.

Course Outcomes:

The students will be able to

- Understand the importance of speech sounds and Listening Comprehension.
- Understand syllables and Consonant Clusters.
- Speak with appropriate Word Accent and Intonation.
- Learn to communicate effectively at work place with a special focus on social and professional etiquette.
- Learn Task Based Language Learning (TBLL) through various language activities effectively.

Syllabus: English Language Communication Skills Lab (ELCS) shall have two parts:

- **Computer Assisted Language Learning (CALL) Lab**
- **Interactive Communication Skills (ICS) Lab**

Exercise-I

CALL Lab:

Introduction to Phonetics - Speech Sounds

Vowels and Consonants-Listening Comprehension

ICS Lab:

Ice-Breaking activity and JAM session

Exercise-II

CALL Lab:

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

ICS Lab:

Common Everyday Situations: Conversations and Dialogues

Exercise-III

CALL Lab:
Syllables -Consonant Clusters
ICS Lab:
Communication at Workplace, Social and Professional Etiquette

Exercise-IV

CALL Lab:
Intonation, Stress and Rhythm
ICS Lab:
Formal Presentations, Visual Aids in Presentations

Exercise-V

CALL Lab:
Word accent and Stress Shifts
ICS Lab:
Interview Skills

Minimum Requirement of infra structural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Aided Language Lab for 30 students with 30 systems, one master console, LAN facility and English language software for self- study by learners.

System Requirement (Hardware component):

Computer network with LAN with minimum 30 multimedia systems with the following specifications:

i) P -IV Processor
a) Speed – 2.8 GHZ
b) RAM – 512 MB Minimum
c) Hard Disk – 80 GB
ii) Headphones of High quality

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A spacious room with movable chairs and audio-visual aids with a Public Address System

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
4. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
5. **A textbook of English Phonetics for Indian Students** by T. Balasubramanian (Macmillan)
6. **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

ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

I Year B.Tech. CSE - I Sem	**L**	**T/P/D**	**C**
	0	**-/2 /-**	**1**

(CS107ES) PROGRAMMING FOR PROBLEM SOLVING LAB - I

Course Outcomes: At the end of this course, the student would be able to

- Formulate the algorithms and flowcharts for simple problems
- Apply fundamental programming concepts, to solve simple problems
- Enhance debugging skills
- Exercise conditional and iterative statements to Write C programs
- Modularize the code with functions so that they can be reused
- Represent and manipulate data with arrays and strings

WEEK 1

1. DOS commands: Changing the default Drive, VER,VOL,DATE,TIME,PROMPT,CLS,DIR,MD or MKDIR,CHDIR or CD,COPY CON,TYPE,MOVE,REN,COPY,EXIT.

WEEK 2

2. LINUX Commands: PWD,CAL,DATE,ECHO,LS,CD,MKDIR, CAT,HEAD,TAIL, MV,CP,WC,VI Editor.

WEEK 3

3. Designing of flowcharts using **raptor tool**
   a) Areas of Polygons
   b) Calculation of Simple and Compound Interest
   c) Swapping of Two numbers with and without temporary variable

4. a) Checking whether a number is even or odd
   b) Sum of 'n' natural numbers
   c) Checking a number whether it is divisible by any given number

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WEEK 4

5. a)Write a program using control strings %d %c %s %f %e %o %x %i %g %u
   b) Write a program to print 3 student details S.No, Student name, SSC percent, Inter percent, Address using backslash constants
   c) Write a program to swap two variables without using third variable
6. a) Write a program to find displacement $s=ut+1/2\ at^2$.
   b) Write a program to read P,T,R and find Simple Interest(SI) and Compound Interest(CI)
   c) Write a program to find area and circumference of a Circle.

WEEK 5

7. a) Write a program using all relational and logical operators
   b) Write a program using increment operator (pre and post) and decrement operator(pre and post)
8. a) Write a program using bitwise operators
   b) Write a program to find largest among three numbers using conditional operator

c) Write a program to illustrate the use of size of() operator.

WEEK 6

9. a) Write a program to accept a number and print if it is an odd or even number.
   b) Write a program to find roots of quadratic equation $ax^2+bx+c=0$
10. a) Write a program to accept two integers for a coordinate point and determine its quadrant.
   b) Write a program to accept three integers and print the largest among them.

WEEK 7

11. a) Write a program to accept the year ,find whether it is a leap year or not.
   b) Write a program using arithmetic operators (+,-,*,/) using else if.
12. a) Write a program that declares Class awarded for a given percentage of marks, where percentage of marks<40%=Failed,40% to <60%=second class,60% to <70%=First Class,>=70%=Distinction. Read percentage from standard input.
   b) Write a program to find area of different geometrical figures such as a Circle, a Square, a triangle, and a Rectangle using Switch statement.

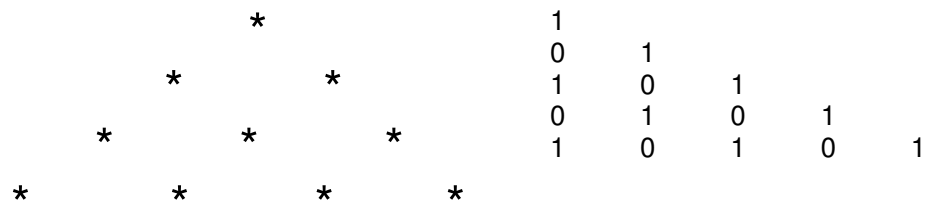
I INTERNALS

WEEK 8

13.a) Write a program to find the sum of 'n' natural numbers.
   b) Write a program to find the sum of individual digits of a given number where number is a +ve integer.
14. a) Write a program to accept a number and reverse it.
   b) Write a program to generate the first 'n' terms of Fibonacci series.

WEEK 9

15. a) Write a program to generate all prime numbers between 1 and n, where 'n' is a value supplied by user.
   b) Write a program to print sum of all odd numbers between 1 and 50 using do while statement.
16. a) Write a program to print the following patterns



b) Write a program to read two numbers x and n and compute the sum of this geometric progression: 1+x+x^2+x^3+…….+x^n.

WEEK 10

17. a) Write a program to find x power n using functions
   b) Write a program to check whether a number is perfect number or not using functions
18. a) Write a program to find the factorial of a given number using functions
   b) Write a program to find strong numbers between two given numbers using functions

WEEK 11

19. a) Write a program to check whether the given number is armstrong or not using functions
    b) Write a program to swap two values using functions
20. a) Write a program to calculate factorial of a given number using recursion
    b) Write a program to find G.C.D using recursion

WEEK 12

21. a) Write a program to find addition of two matrices using functions
    b) Write a program to find the sum of elements of 3*3 matrix using functions.

WEEK 13

22. Write a program to accept rows and columns of two matrices and check whether multiplication is possible or not, if possible accept two matrices and find multiplication Of two matrices using functions.

WEEK 14

23. Write a program to check whether the given string is palindrome or not
24. Write a program to find the length of a string and copy to another string variable.

II INTERNALS

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(An Autonomous Institution)

I Year B.Tech. CSE - I Sem	**L**	**T/P/D**	**C**
	0	**-/3/-**	**1.5**

(AP108BS) APPLIED PHYSICS LAB

List of experiments:

1. Newton's Rings – Determination of Radius of Curvature of Lens
2. Diffraction Grating – Determination of Wavelength of a Monochromatic Source
3. Dispersive Power of the Material of a Prism – Spectrometer
4. Single Slit Diffraction using Lasers – Determination of wavelength of laser light.
5. I – V Characteristics of LED and LASER diodes
6. Evaluation of Numerical Aperture & Bending losses of an Optical Fiber
7. Study of Resonance in LCR – Series circuit
8. Determination of Energy gap of a material of p-n junction Diode
9. I-V Characteristics of P-N junction diode.
10. I-V Characteristics of a solar cell (photovoltaic effect for power generation)

Note: Any 8 experiments are to be performed.

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(An Autonomous Institution)

I Year B.Tech. CSE - I Sem	L	T/P/D	C
	0	0/2/-	1

(EE109ES) BASIC ELECTRICAL ENGINEERING LAB

Course Objectives:

- To analyze a given network by applying various electrical laws and network theorems
- To analyze the concepts of resonance and magnetic circuits.
- To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes:

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

- Verify the various electrical laws and theorems with DC Excitation.
- Determine the losses, efficiency and regulation of single phase transformer.
- Obtain the performance of induction motors.
- Control the speed of DC shunt motor.
- Obtain the OC & SC characteristics of Synchronous generator.

List of experiments/demonstrations

Part-A

1. Verification of Ohm's law.
2. Verification of Kirchhoff's Voltage Law and Kirchhoff's Current Law.
3. Verification of Superposition Theorem.
4. Verification of Thevenin's Theorem & Norton's Theorem.
5. Series Resonance of RLC series circuit.
6. Determination of self & mutual inductances and coefficient of coupling.

Part-B

1. Load Test on Single Phase Transformer (Calculation of Efficiency and Regulation).
2. OC & SC Tests on Single phase transformer.
3. Magnetization Characteristics of DC Shunt Generator.
4. Speed Control of DC shunt motor.
5. Brake test on Three Phase Squirrel cage induction motor.
6. OCC & SCC of Synchronous Generator.

NOTE: 5 experiments from Part-A and 5 experiments from Part-B should be conducted (Total 10 Experiments)

ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

I Year B.Tech. CSE - II Sem	L	T/P/D	C
	3	1/-/-	4

(MA201BS) MATHEMATICS - II

ODE and Vector Calculus

Course Objectives: To learn

- Methods of solving the differential equations of first order.
- Methods of solving the differential equations of higher order.
- Multiple integrals and their applications.
- The basic properties of vector valued functions.
- The applications to line, surface and volume integrals.

Course Outcomes: After learning the contents of this paper the students must be able to:

- 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.
- Solve higher order differential equations and apply the concepts of differential equations to the real world problems.
- Evaluate the multiple integrals.
- Identify the vector differential operators physically in engineering problems.
- 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 a 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) $= e^{ax}, \sin ax, \cos ax \text{ and } x^k, e^{ax}V(x), x^kV(x)$. Method of variation of parameters.

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

Vector point function and scalar point function. Gradient- Divergence- Curl and their related properties – Directional derivatives. Vector Identities, Scalar potential function, Solenoidal and Irrotational vectors.

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 & their Verifications).

TEXTBOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th 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 3rd Edition, Jones & Bartlett Learning, 2006 - Technology & Engineering.

ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

I Year B.Tech. CSE - II Sem	L	T/P/D	C
	3	1/-/-	4

(CH202BS) ENGINEERING CHEMISTRY

Course Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.
- To impart the knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways
- To acquire the skills pertaining polymer to apply them for medical and other fields.

Course Outcomes:

The course will enable the student to:

- Apply the knowledge of atomic, molecular and electronic changes related to conductivity.
- Analyze the troubles caused by impure water and method of purification of water.
- Apply the knowledge of electrode potentials for the protection of metals from corrosion.
- Explain the concept of configurational and conformational analysis of molecules and reaction mechanism.
- Apply the knowledge of polymers in everyday's life.

UNIT (I):

Molecular structure (9L)

Introduction, Concept of atomic and molecular orbitals, LCAO, Molecular orbitals of diatomic molecules, Molecular orbital energy level diagrams of diatomic molecules (N_2, O_2 and F_2). Pi-molecular orbitals of butadiene and benzene.

Crystal field theory (CFT)

Crystal field theory, Crystal field splitting patterns of transition metal ion d- orbital- tetrahedral, octahedral and square planar geometries.

UNIT (II):

Water Technology (9L)

Hardness of water, expression of hardness ($CaCO_3$ 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 embitterment and boiler corrosion) and its treatment: Internal treatment (colloidal, phosphate calgon conditioning of water). External treatment (ion –exchange process).

UNIT (III):

Electrochemistry and corrosion (12L)

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.

Corrosion: Introduction, types of corrosion: chemical and electrochemical corrosion, factors affecting the rate of corrosion: nature of the metal, galvanic series, 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 : methods of applications of metallic coatings: Galvanization, electroplating(of copper) .

UNIT (IV):

Stereochemistry, Reaction mechanism and synthesis of drug molecules (9L)

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

Introduction to reactions involving substitution (SN1 & SN2), addition (addition of HBr to propene, Markownikoff and Anti Markownikoff addition), Elimination reactions: dehydro halogination of alkyl halides. Saytzeff rule. Oxidation (oxidation of alcoholsusing $KMnO_4$ & CrO_3), reduction (reduction of carbonyl compounds by $LiAlH_4$ & $NaBH_4$). Synthesis & uses of commonly used drug molecules: paracetamol and Asprin.

UNIT (V):

POLYMER CHEMISTRY (8L):

Introduction, classification of polymer, Types of polymerization (addition and condensation, mechanisms not required). Plastics, types of plastics -Thermoplastics and thermosetting plastics. Preparation, properties and engineering applications of PVC, Teflon and Bakelite. Fibers: Nylon 6, 6 and terelene (Dacron). Elastomers, natural rubber, structure, vulcanization. Synthetic rubbers: Buna-S, Thiokol rubber.

Biodegradable polymers:

Introduction, Preperation and properties of Polyhydroxy butyrate (PHB), Poly-Hydroxybutyrate-co-b-Hydroxy valerate (PHBV), Polyglycolic acid (PGA), Polylactic acid (PLA). Applications of biodegradable polymers.

Text Books:

1. Engineering Chemistry by Shashi chawla, Dhanpat Rai Publishing Company
2. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpat Rai Publishing Company.
3. Text book of Engineering Chemistry by A. Jayashree, Wiley Publications.
4. Engineering chemistry- S.S.DARA

Reference Books:

1. Physical Chemistry, by P. W. Atkins
2. Engineering Chemistry by Shashi chawla, Dhanpat Rai Publishing Company.

ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

I Year B.Tech. CSE - II Sem	**L**	**T/P/D**	**C**
	2	**-/-/-**	**2**

(EN203HS) ENGLISH

Learning Objectives:

The course will help to

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

Course Outcomes: The students will be able to

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

Prescribed Textbook:

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

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 – Types, Structures and Features of a Paragraph - Creating Coherence-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: Identifying Common Errors in writing with reference to 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.

Suggested Readings:

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 Sharma, Sangeeta. “Technical Communication- Principles and Practice”. Third Edition. New Delhi: Oxford University Press. 2015. Print.
4. Practical English Usage. Michael Swan. OUP. 1995.
5. Remedial English Grammar. F.T. Wood. Macmillan.2007
6. On Writing Well. William Zinsser. Harper Resource Book. 2001
7. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
8. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
9. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

I Year B.Tech. CSE - II Sem	L	T/P/D	C
	2	-/-/-	2

(CS204ES) PROGRAMMING FOR PROBLEM SOLVING - II

Course Outcomes: At the end of this course, the student would be able to

- Develop programs with user defined data types.
- Use dynamic memory allocation functions with pointers.
- Apply various file handling techniques for better data management
- Distinguish between stacks and queues.
- 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 binaryfiles,State of a file, Opening and Closingfiles, file input / output functions(standard library input / output functions for files), file status functions (errorhandling),Positioning functions,command –line arguments, C programexamples.

UNIT-IV:

Introduction to Data Structures: Lists and Operations, Linear and Non linear 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.

Text Books:

1. B.A.Forouzon and R.F. Gilberg, “COMPUTER SCIENCE: A Structured Programming Approach Using C”, Third edition, CENGAGE Learning, 2016
2. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.

Reference Books:

1. Byron Gottfried, “Programming with C “, Schaum’s Outlines, 2nd Edition, TATA McGraw-Hill.
2. M.T.Somashekara, “Problem Solving Using C”, PHI, 2nd 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 ENGINEERING COLLEGE

(An Autonomous Institution)

I Year B.Tech. CSE - II Sem	**L**	**T/P/D**	**C**
	0	**-/3/-**	**1.5**

(CH205BS) ENGINEERING CHEMISTRY LAB

Course Objectives: The student will learn:

- Estimation of hardness of water to check its suitability for drinking purpose.
- To determine the rate constant of reactions from concentrations as an function of time.
- The measurement of physical properties like viscosity and surface tension.
- To synthesize the drug molecules.

Laboratory Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness and alkalinity of water.
- Estimation of rate constant of a reaction from concentration – time relationships.
- Determination of physical properties like surface tention and viscosity.
- Calculation of strength of compound using instrumentation techniques.

Choice of 10-12 experiments from the following:

1. Estimation of hardness of water by EDTA method
2. Determination of alkalinity of water
3. Determination of strength of HCl by conductometry
4. Determination of strength of CH_3COOH by conductometry.
5. Potentiometry - determination of Fe^{+2} by using $KMnO_4$.
6. Determination of surface tension
7. Determination of viscosity of a lubricant
8. Determination of the rate constant of acid catalysed hydrolysis of methyl acetate
9. Synthesis of a polymer(urea-formaldehyde and phenol –formaldehyde resin)
10. Estimation of copper by colorimetry
11. Adsorption of acetic acid by charcoal
12. Synthesis of Aspirin and Paracetamol
13. Saponification/acid value of an oil

TEXT BOOKS:

1. Text book of Engineering chemistry. Dr.A.Jaya Shree. Wiley publications, New Delhi 2018.
2. Vogel's Textbookof Quantitative Chemical Analysis
3. Essentials of experimental engineering chemistry, Shashi Chawla, Dhanpat Rai & Co.
4. Senior practical physical chemistry,B.D.Khosla , A.Gulati and V.Garg

REFERENCE BOOKS:

1. Text Book of engineering chemistry by R. N. Goyal and Harrmendra Goel.
2. A text book on experiments and calculations. S.S. Dara.

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(An Autonomous Institution)

I Year B.Tech. CSE - II Sem	**L**	**T/P/D**	**C**
	0	**-/3/-**	**1.5**

(ME206ES) ENGINEERING WORKSHOP

Pre-requisites: Practical skill

Course Objectives:

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

Course Outcomes:

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

- Practice on manufacturing of components using workshop trades including Carpentry, Fitting, Tin-Smithy, Foundry, Welding Practice, House wiring and Black Smithy.
- Apply basic electrical engineering knowledge for house wiring practice.
- Identify and apply suitable tools for different trades of Engineering processes including Material removing, Measuring And Chiseling.
- 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)

2. TRADES FOR DEMONSTRATION & EXPOSURE:

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

Suggested Text/Reference Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “Elements of Workshop Technology”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, “Manufacturing Engineering and Technology”, 4th edition, Pearson Education India 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”, 4th edition, Prentice Hall India, 1998.
5. Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGrawHill House, 2017.

ANURAG ENGINEERING COLLEGE

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I Year B.Tech. CSE - II Sem	**L**	**T/P/D**	**C**
	0	**-/3/-**	**1.5**

(CS207ES) PROGRAMMING FOR PROBLEM SOLVING LAB - II

Course Outcomes: At the end of this course, the student would be able to

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

Note: All the Programs should be implemented using functions.

Week 1 & Week 2:

Write a 'C' program to implement a List using Arrays and Functions [Insertion, Deletion]

Week 3:

a) Define a structure Student with members Hall Ticket Number (htno), name(sname), program studying (program), current year (cyear) and semester (csem). Write a 'C' program to read a student details using user defined function read_student() and display the student details using print_student.

b) Define a structure Date with members' day, month and year. Define a structure Employee with members' employee number (empno), employee name (empname), date of birth (dob) (Use the Structure Date), department number (deptno), salary(sal). Define the user-defined functions read_employee() to read employee details and print employee to print the employee details. Structure Date should be used as a Nested Structure in the Structure Employee. Write a 'C' program to read and display details of an employee using user-defined functions read_employee and print_employee.

Week 4:

a) Define a structure Point with members x-coordinate and y-coordinate. Compute distance and slope between two given points using array of structures and functions.

b) Define a union Student with members Hall Ticket Number (htno), name(sname), program studying (program), current year (cyear) and semester (csem). Write a 'C' program to read a student details using user defined function read_student() and display the student details using print_student.

Week 5 & Week 6:

a) Write a 'C' program to compute length of a string using user –defined function string length. Pointer expression, Pointer Arithmetic and Pointer addressing should be used for computing string length.

b) Write a 'C' program to read and print 3 x 3 matrix and also sum of elements of the matrix suing pointer-to-pointer.

Week 7:
Write a 'C' program to implementation of List of size n using Arrays. [Insertion and Deletion]

Week 8:
Write a C Program to perform the operations of Stacks using Arrays

Week 9:
Write a C Program to perform the operations of Queues using Arrays

Week 10:
Write a C Program to perform the operations of Single Linked List Programs [Insertion, Deletion, Searching and traversing].

Week 11:
a) Write a C Program for Linear Search
b) Write a C Program for Binary Search

Week 12:
Write a C Program to Sort N numbers in either Ascending order or Descending order using Bubble Sort.

Week 13:
Write a C Program to Sort N numbers in either Ascending order or Descending Order using Insertion Sort.

Week 14:
Write a C Program to Sort N numbers in either Ascending Order or Descending order using Quick sort.

Week 15:
a) Write a C Program to count the number of Characters, Lines, Vowels and Consonants in a given text file
b) Write a C Program to Display contents of a given file using Command Line Arguments

Week 16:
Review

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(EN208HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB - II

Learning Objectives:

The students will be able to

- Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
- Sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
- Bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
- Improve the fluency of students in spoken English and neutralize their mother tongue influence.
- Train students to use language appropriately for public speaking, group discussions and Interviews.

Course Outcomes

The students will be able to

1. Understand the variants in Pronunciation.
2. Differentiate Spoken and Written English in formal and informal situations
3. Understand the emphasis on Pronunciation of English Language in the global world.
4. Apply strategies for Effective Communication in different situations.
5. Participate in conversation, Public Speaking and Group Discussion.

Syllabus: English Language Communication Skills Lab (ELCS) shall have two parts:

- **Computer Assisted Language Learning (CALL) Lab**
- **Interactive Communication Skills (ICS) Lab**

Exercise – I

CALL Lab:

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

ICS Lab:

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

Exercise – II

CALL Lab:

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

ICS Lab:

Features of Good Conversation – Strategies for Effective Communication

Role-Play- Making Requests and Seeking Permissions - Telephone Etiquette

Exercise – III

CALL Lab:

Intonation- Sentence Stress -Weak Forms and Strong Forms

ICS Lab:

Descriptions- Narrations- Giving Directions and Guidelines-Giving Instructions – Seeking Clarifications – Asking for and Giving Directions –Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice –Making Suggestions

Exercise – IV

CALL Lab:

Past Tense Marker and Plural Marker

ICS Lab:

Public Speaking – Exposure to Structured Talks - Non-verbal Communication-
Making a Short Speech – Extempore

Exercise – V

CALL Lab:

Information Transfer

ICS Lab:

Group Discussion-Mock Group Discussion sessions

Minimum Requirement of infra structural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer aided Language Lab for 30 students with 30 systems, one master console, LAN facility and English language software for self- study by learners.

System Requirement (Hardware component):

Computer network with Lan with minimum 30 multimedia systems with the following specifications:

i) P -IV Processor

a) Speed – 2.8 GHZ

b) RAM – 512 MB Minimum

c) Hard Disk – 80 GB

ii) Headphones of High quality

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
4. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.

5. **A textbook of English Phonetics for Indian Students** by T. Balasubramanian (Macmillan)
6. **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