G. Pullaiah College of Engineering and Technology (Autonomous) (Approved by AICTE | NAAC Accreditation with 'A' Grade | Accredited by NBA (CSE, ECE & EEE) | Permanently Affiliated to JNTUA) Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

#### **BACHELOR OF TECHNOLOGY**

ACADEMIC REGULATIONS GPCET - R20

B.Tech Regular Four Year Degree Programme (for the batches admitted from the academic year 2022- 2023) & B.Tech (Lateral Entry Scheme) (for the batches admitted from the academic year 2023 - 2024)

#### **Preliminary Definitions and Nomenclature**

AICTE: Means All India Council for Technical Education, New Delhi.

**Autonomous Institute:** Means an institute designated as Autonomous by University Grants Commission(UGC), New Delhi in concurrence with affiliating University (Jawaharlal Nehru Technological University Ananthapur).

**Academic Autonomy:** Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.

**Academic Council:** The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

**Academic Year:** It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., (one odd and one even).

**Branch:** Means specialization in a program like B.Tech degree program in Civil Engineering, B.Tech degree program in Computer Science and Engineering etc.

**Board of Studies (BOS):** BOS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.

**Backlog Course:** A course is considered to be a backlog course, if the student has obtained a failure grade in that course.

**Basic Sciences:** The courses offered in the areas of Mathematics, Physics, Chemistry etc., are considered to be foundational in nature.

Commission: Means University Grants Commission (UGC), New Delhi.

**Choice Based Credit System:** The credit-based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

**Certificate Course:** It is a course that makes a student to have hands-on expertise and skills required for holistic development in a specific area/field.

**Compulsory course:** Course required to be undertaken for the award of the degree as per the program.

Internal Examination: It is an examination conducted towards sessional assessment.

**Core:** The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

**Course:** A course is a subject offered by a department for learning in a particular semester.

**Course Outcomes:** The essential skills that need to be acquired by every student through a course.

**Credit:** A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

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

**Cumulative Grade Point Average (CGPA):**It is a measure of cumulative performance of a student overall the completed 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.

**Curriculum:** Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

**Department:** An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff, and other resources in the process of study for a degree.

**Detention in a Course:** Student who does not obtain minimum prescribed attendance in a course shall be detained in that particular course.

**Elective Course:** A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

**Evaluation:** Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal examinations and semester end examinations.

Grade: It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

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

**Institute:** Means G.Pullaiah College of Engineering and Technology, Kurnool unless indicated otherwise by the context.

**Massive Open Online Courses (MOOC):** MOOC courses inculcate the habit of self-learning. MOOC courses would be additional choices in all the elective group courses.

**Minor:** Minor are coherent sequences of courses which may be taken in addition to the courses required for the B.Tech degree.

**Pre-requisite:** A specific course or subject, the knowledge of which is required to complete before student register another course at the next grade level.

**Professional Elective:** It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

**Program:** Means, UG degree program: Bachelor of Technology (B.Tech); PG degree program: Master of Technology (M.Tech) / Master of Business Administration (MBA).

**Program Educational Objectives:** The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

**Project work:** It is a design or research-based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit-based course and is to be planned carefully by the student.

**Registration:** Process of enrolling into a set of courses in a semester of a program.

**Regulations:** The regulations, common to all B.Tech programs offered by Institute, are designated as "GPCET Regulations - R18" and are binding on all the stakeholders.

**Semester:** It is a period of study consisting of 16 to 18 weeks of academic work equivalent to normally90 working days. Odd semester commences usually in July and even semester in December of every year.

**Semester End Examinations:** It is an examination conducted for all courses offered in a semester at the end of the semester.

**Student Outcomes:** The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioural.

University: Means Jawaharlal Nehru Technological University Ananthapur (JNTUA), Ananthapuramu.

### G. Pullaiah College of Engineering and Technology (Autonomous)

#### **Academic Regulations**

## Regulations for Four Year Bachelor of Technology (B.Tech) Degree programme for the batches admitted from the academic year 2022-23

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#### For B.Tech Lateral Entry batches admitted from the academic year 2023 -2024

#### 1. Award of B.Tech. Degree

A student will be declared eligible for the award of the B.Tech. degree if he/she fulfils the following academic regulations:

- **i.** Pursues a course of study for not less than four academic years and in not more than eight academic years. However, for the students availing Gap year facility, this period shall be extended by two years at the most and these two years would not be counted in the maximum time permitted for graduation.
- ii. Registers for 163 credits and secures all 163 credits.
- **iii.** The student will be eligible to get Under graduate degree with honours or additional minor engineering if he/she completes an additional 20 credits
- **iv.** A student will be permitted to register either for Honours degree or additional minor engineering but not both.
- **2.** Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled.

#### 3. Courses of study

The following courses of study are offered at present as specializations for the B. Tech. course

S.No.	Name of the Branch	Branch Code
1.	Civil Engineering	01
2.	Electrical and Electronics Engineering	02
3.	Mechanical Engineering	03
4.	Electronics and Communication Engineering	04
5.	Computer Science and Engineering	05
6.	Artificial Intelligence	31
7.	Data Science	32
8.	Artificial Intelligence and Machine Learning	33
7.	Internet of Things	35

#### 4. Credits:

- i. *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 two hours of practical work/field work per week.
- ii. Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.

iii. Choice Based Credit System (CBCS): The CBCS provides choice for students to select from the prescribed courses.

	Semester				
	Periods / Credite				
	Week				
Theory	03	03			
Tutorial	01	01			
Practical	03	1.5			
Internship	0	1.5/3.0			
Project work Phase	0	12			

iv. Each course is assigned certain number of credits based on following

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#### 5. Course Structure

Every course of the B.Tech program will be placed in one of the 8 categories with minimum credits as listed below.

S.No.	Category	Category Description	Abbreviated Category	Credits		
1	Humanities and social science	Humanities and social science including Management courses	HS	13.5		
2	Basic Sciences	Basic Science courses	BS	21		
3	Engineering Science courses	Engineering Science Courses including workshop, drawing, basics of electrical/mechanical/computer etc.	ES	24		
4	Professional core	Professional core Courses	PC	51		
5	Open Electives	Open Elective Courses- from other technical/ emerging and job oriented	OE	12		
6	Professional Courses	Professional Elective Courses relevant to chosen specialization/ branch	PE	16.5		
7	Project Work	project wok, Seminar, Internship in industry elsewhere	16.5	15		
8	Mandatory courses	Environmental Studies, Induction training, Universal human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge] (Non- Credit)	МС	0		
9	Skill Oriented Courses	Skill Oriented Courses relevant to domain, interdisciplinary, communication skill, industry	SC	10		
Total Credits						

Category	Suggested	Suggested
	Credit	Credit Breakup
	Breakup	AICTE
	APSCHE	
Humanities and social science including Management courses (HS)	13.5	15
Basic Science courses (BS)	21	25
Engineering science courses including WS, drawing, Basics	24	24
of electrical/mech/comp etc. (ES)		
Professional core Courses (PC)	51	48
Open Courses- Electives from other technical and or emerging courses (OE)	12	18
Professional Elective courses relevant to chosen specialization/branch (PE)	15	18
Project work, seminar and internship in industry or elsewhere (PW)	16.5	15
Mandatory courses (Environmental sciences, Induction program, Indian constitution, Essence of Indian Traditional Knowledge (MC)	0	0
Skill Oriented Courses/Certification Courses (SOC)	10	
TOTAL CREDITS	163	163

#### 6. Weightage for course evaluation

#### 6.1 Course Pattern

- The entire course of study is for four academic years. Semester pattern shall be followed in all years.
- A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.
- When a student is detained due to lack of credits/shortage of attendance he/she may be readmitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

#### 6.2 Evaluation Process

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition, Internships carried out after IV Semester & VI Semester shall be evaluated for 100 marks each and the Internship along with Project Work carried out in VIII Semester shall be evaluated for 200 marks.

- For theory subjects the distribution shall be 40 marks for Internal Evaluation and 60 marks for the End-Examination.
- For practical subjects the distribution shall be 40 marks for Internal Evaluation and 60 marks for the End- Examination.

#### 6.3 Internal Examinations:

- i. For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination consists of objective paper for 10 marks and subjective paper for 30 marks with duration of 1hour 50 minutes (20 minutes for Objective paper and 90 minutes for subjective paper). The marks obtained in subjective paper will be condensed to 20 marks. The remaining 10 marks shall be awarded based on the submission of assignments by the student. A student has to submit two assignments in every subject each for 10 marks.
- ii. The objective paper shall consist of 20 objective questions each carrying 0.5 Mark.
- Subjective paper shall be set for 30 marks containing3 either or descriptive questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks.

**\*Note 1:** The marks obtained in the subjective paper shall be condensed to 20 marks, any fraction (0.5 & above) shall be rounded off to the next higher mark.

- iv. If the student is absent for the internal examination other than the mandatory courses, no reexam shall be conducted and internal marks for that examination shall be considered zero.
- v. First midterm examination shall be conducted for I, II units of syllabus and second midterm examination shall be conducted for III, IV and V units.
- vi. Final Internal marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage to the better mid exam and 20% to the other.

#### 6.4 End Examinations:

End examination of theory subjects shall have the following pattern:

There shall be 6 questions and all questions are compulsory. Question 1 shall contain 5 compulsory short answer questions for a total of 10 marks such that each question carries 2 marks. There shall be short answer questions from each unit. In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them. Each of these questions from 2 to 6 shall cover one unit of the syllabus.

End examination of theory subjects consisting of two parts of different subjects, for eg: Electrical & Mechanical Technology, shall have the following pattern:

Question paper shall be in two parts viz., Part A and Part B with equal Weightage. In each part, there shall be 3 either-or type questions each for 10 Marks.

**Note:** The answers for Part A and Part B shall be written in two separate answer books.

6.5 For practical subjects there shall be a continuous evaluation during the semester for 40 sessional marks and end examination shall be for 60 marks. Day-to-day work in the laboratory shall be evaluated for 40 marks by the concerned laboratory teacher based on the regularity/record/ viva. The end examination shall be conducted by the concerned laboratory faculty and senior expert in the same subject of the department.

In a practical subject consisting of two parts (Eg: Electrical & Mechanical Lab), the end examination shall be conducted for 30 marks in each part. Internal examination shall be evaluated as above for 40 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

6.6 There shall be mandatory courses with zero credits. There shall be no external examination. However, attendance in the audit course shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates every six months/semester at a mutually convenient date of college/student satisfying the conditions mentioned in item 1 & 2 of the regulations. 6.7 For the subject having design and/or drawing, such as Engineering Drawing, the distribution shall be 40 marks for internal evaluation and 60 marks for end examination.

Day-to-day work shall be evaluated for 10 marks by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2 hours each for 30 marks with consideration of 80% weightage to the better mid exam and 20% to the other for the finalization of Internal marks. The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks, any fraction (0.5 & above) shall be rounded off to the next higher mark. There shall be no objective paper in internal examination. The sum of day to day evaluation and the internal test marks will be the final sessional marks for the subject.

In the end examination pattern for Engineering Drawing there shall be 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. However, the end examination pattern for other subjects related to design/drawing is mentioned along with the syllabus.

- 6.8 There shall be two comprehensive assessments, one at the end of IV Semester and the other at the end of VI Semester, with 100 objective questions for 100 marks on the subjects studied in the respective years. A student shall acquire 1 credit assigned to each of the comprehensive online examination when he/she secures 40% or more marks. In case, if a student fails in comprehensive online examination, he/she shall re-appear/re-register by following a similar procedure adopted for the lab examinations.
- 6.9 There shall be five Professional Elective Courses from V Semester to VII and for each elective there shall be choices such that the student shall choose a course from the list of choice courses offered by the department for that particular elective.
- 6.10 There shall be four Open Electives/ Job Oriented Courses common to all disciplines from V Semester to VII, where in the students shall choose the electives offered by various departments including his/her own department in such a manner that he/she has not studied the same course in any form during the Programme.

The students shall be permitted to pursue up to a maximum of two elective courses under MOOCs (Massive Open Online Courses) offered by NPTEL notified by the Head of the Department during the program. Each of the Courses must be of minimum 12 weeks in duration. Attendance shall not be monitored for MOOCs. The student has to acquire a certificate for the MOOC from the NPTEL in order to earn 3 Credits.

- 6.11 There shall be a mandatory **induction program** for three weeks before the commencement of first semester.
- 6.12 **Minor in a discipline** (Minor degree/programme) concept is introduced in the curriculum for all conventional B. Tech programmes in which it offers a major. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme.
  - a. Students who have a CGPA 8.5 (for SC/ST students CGPA 8.0) or above (up to II semester) and without any backlog subjects will be permitted to register for Minor discipline programme. A SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor discipline registration active else Minor discipline registration will be cancelled.

- b. Students aspiring for a Minor must register at the beginning of IV Semester and must opt for a Minor in a discipline other than the discipline he/she has registered in.
- c. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying four theory subjects each for 4 credits and two MOOCs offered by NPTEL (notified by the Head of the Department corresponding to the Minor Programme) each for 2 credits and with a minimum duration of 8 weeks.
- d. For MOOCs, attendance shall not be monitored. The students have to acquire a certificate from the respective agencies offering the MOOCs with pass grade/marks.
- e. Students are not allowed to register and pursue more than two courses in any semester. Students may complete the Minor before VIII semester.
- f. Each department enlisted a set of subjects from its curriculum which are core for the discipline without any prerequisites. The Evaluation pattern of theory subjects and minor discipline project work will be similar to the regular programme evaluation. The minor discipline project shall be evaluated by the committee consisting of Head of the Department along with the two senior faculty members of the department.
- e. Students are not allowed to pursue minor discipline programme subjects under Self study and/or MOOCs manner.
- f. Student may enlist their choices of Minor discipline programmes in order of preference, to which they wish to join. It will not be permissible to alter the choices after the application has been submitted. However, students are allowed to opt for only one Minor discipline programme in the order of preference given by the student.
- g. Minimum strength for offering Minor in a discipline is considered One-Fifth (i.e., 20% of the class) of the class size and Maximum size is Four-Fifth of Class size (i.e., 80% of the class).
- h. Completion of a Minor discipline programme requires no addition of time to the regular Four year Bachelors' programme. That is, Minor discipline programme should be completed by the end of final year B. Tech. program along with the major discipline.
- i. The Concerned Head of the department will arrange separate course/class work and time table of the various Minor programmes. Attendance regulations for these Minor discipline programmes will be as per regular courses.
- j. A Student registered for Minor in a discipline and pass in all subjects that constitute the requirement for the Minor discipline programme. No class/division (i.e., second class, fist class and distinction etc.) shall be awarded for Minor discipline programme.
- k. In case a student drops or fails to meet the CGPA requirement for Degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for Degree with Minor and the student will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioned the additional courses completed by them.
- I. This Minor in a discipline will be mentioned in the degree certificate as Bachelor of Technology in XXX with Minor in YYY. For example, Bachelor of Technology in Computer Science & Engineering with Minor in Electronics & Communication Engineering. The fact will also be reflected in the transcripts, along with the list of courses for Minor programme with CGPA mentioned separately.

#### 6.13 Honors degree in a discipline:

1. This concept is introduced in the curriculum for all conventional B. Tech. programmes. The main objective of Honors degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme.

A student shall be permitted to register for Honors program at the beginning of IV Semester provided that the student must have acquired a minimum of 8.0 SGPA up to the end of second

semester without any backlogs. SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Honors discipline registration active else Honors discipline registration will stand cancelled.

- 2. In order to earn the Honors degree in his/her discipline, a student has to earn 20 extra credits by studying four advanced specified courses for 16 credits and acquiring the remaining 4 credits through two MOOCs offered by NPTEL which are domain specific in the branch of Engineering concerned, each for 2 credits and with a minimum duration of 8 weeks.
- 3. For MOOCs, attendance shall not be monitored. The students have to acquire a certificate from the respective agencies offering the MOOCs with pass grade/marks.
- 4. The Evaluation pattern of theory subjects shall be similar to the regular programme evaluation.
- 5. If a student drops or is terminated from the Honors program, the additional credits earned till that time cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Honors will be shown in the transcript. None of the courses done under the dropped Honors will be shown in the transcript.
- 6. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and the student will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioned the additional courses completed by them.
- 7. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.
- 6.14 NSS is compulsory for all the Undergraduate students. The activities shall be beyond class hours. The student participation shall be for a minimum period of 45 hours during the first year. Grades will be awarded as Very good, Good, Satisfactory in the mark sheet on the basis of participation, attendance, performance and behaviour. If a student gets Unsatisfactory grade, he/she has to repeat the above activity in the subsequent years along with the first year students.
- 6.15 Students shall undergo two summer internships each for a minimum of six weeks duration at the end of second and third years of the programme for 1.5 & 3 credits respectively. The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industrial estates, Hydel and thermal power projects and also in software MNCs. The student shall submit a detailed technical report along with internship certificate from the Internship organization in order to obtain the prescribed credits. The organization in which the student wishes to carry out Internship need to be approved by Internal Department Committee comprising Head of Department and two senior faculty. The student shall submit the Internship Project Report along with Certificate of Internship. The evaluation of the first and second summer internships shall be conducted at the end of the V Semester & VII semester respectively.

There shall be internal evaluation only for 100 marks. The Internal Evaluation shall be made by the departmental committee (Head of the Department and two senior faculty of the department) on the basis of the project report submitted by the student.

Completion of the internship is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such a case, the student shall repeat the internship in the subsequent summer provided that the student doesn't pursue two summer internships in the same summer.

6.16 Community Service Project shall be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships, whenever there is an exigency when students cannot pursue their summer internships. The community service project shall be evaluated for 100 marks by the internal

departmental committee comprising Head of the Department and two senior faculty of the department.

6.17 There shall also be a mandatory full internship in the final semester (VIII Semester) of the Programme along with the project work. The organization in which the student wishes to carry out the Internship need to be approved by Internal Department Committee comprising Head of the Department and two senior faculty. The faculty of the respective department monitors the student internship program along with project work. At the end of the semester, the candidate shall submit a certificate of internship and a project report. The project report and presentation shall be internally evaluated for 60 marks by the departmental committee consisting of Head of the Department, Project supervisor and a senior faculty member. The Viva-Voce shall be conducted for 140 marks by a committee consisting of HOD, Project Supervisor and an External Examiner.

Completion of internship is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such a case, the student shall repeat the internship along with project work for next six months.

6.18 There shall be five skill-oriented courses offered during III to VII semesters. Out of the five skill courses, two shall be skill-oriented programs related to the domain and these two shall be completed in second year. Of the remaining three skill courses, one shall necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature.

The student can choose between a skill advanced course being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies. The credits assigned to the skill advanced course shall be awarded to the student upon producing the Course Completion Certificate from the agencies/professional bodies.

The Internal Department Committee comprising Head of Department and two senior faculty shall evaluate the grades/ marks awarded for a course by external agencies and convert to the equivalent marks/grades.

#### 7. Attendance Requirements:

- A student shall be eligible to appear for University examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.
- \* Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
- \* Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- \* A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester when offered next.
- A stipulated fee shall be payable towards condonation of shortage of attendance to the college.
   (a) A student is eligible to write the University examinations if he acquires a minimum of 50% in each subject and 75% of attendance in aggregate of all the subjects.

#### 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 shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the

internal evaluation and end examination taken together. In case of audit courses and technical seminar & comprehensive viva – voce he/she should secure 40% of the total marks.

8.2 A student shall be promoted from II to III year only if he/she fulfils the academic requirement of securing 40% of the credits in the subjects that have been studied up to III Semester from the following examinations.

One regular and two supplementary examinations of I Semester. One regular and one supplementary examination of II Semester. One regular examination of III semester.

8.3 A student shall be promoted from III year to IV year only if he/she fulfils the academic requirements of securing 40% of the credits in the subjects that have been studied up to V semester from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

One regular and four supplementary examinations of I Semester. One regular and three supplementary examinations of II Semester. One regular and two supplementary examinations of III Semester. One regular and one supplementary examinations of IV Semester. One regular examination of V Semester.

And in case if student is detained for want of credits for particular academic year by sections 8.2 and 8.3 above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V Semester or VII Semester as the case may be.

- 8.5 A student shall register and put up minimum attendance in all 160 credits and earn all the 160 credits. Marks obtained in all 160 credits shall be considered for the calculation of aggregate percentage of marks obtained.
- 8.6 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 seat in B.Tech. course and their admission shall stand cancelled.

#### 9. Course Pattern:

(i) A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.

When a student is detained due to lack of credits/shortage of attendance he/she may be readmitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

#### (ii) With-holding of Results:

If any case of indiscipline or malpractice is pending against candidate, the result of the candidate shall be with held and he/she will not be allowed/promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

#### (iii) Grading

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Range in which the marks in the subject fall	Grade	Grade points Assigned
≥ 90	S (Superior)	10
80-89	A (Excellent)	9
70-79	B (Very Good)	8
60-69	C (Good)	7
50-59	D (Average)	6
40-49	E (Below Average)	4
< 40	F (Fail)	0
Absent	Ab (Absent)	0

Table - Conversion into Grades and Grade Points assigned

A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered. Same is the case with a student who obtains 'Ab' in end examination.

For **audit** courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

#### 10. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

(i) The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \frac{\sum_{i=1}^{n} C_i \times GP_i}{\sum_{i=1}^{n} C_i}$$

where,  $C_i$  is the number of credits of the  $i^{th}$  subject and  $GP_i$  is the grade point scored by the student in the  $i^{th}$  course.

(ii) The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.,

$$CGPA = \frac{\sum_{j=1}^{m} SGPA_j \times TC_j}{\sum_{j=1}^{m} TC_j}$$

where "SGPA<sub>j</sub>" is the SGPA of the  $j^{th}$  semester and TC<sub>j</sub> is the total number of credits in that semester.

(iii) Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

- (iv) While computing the SGPA, the subjects in which the student is awarded Zero grade points will also be included.
- (v) Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.
- (vi) *Letter Grade:* It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.

#### 11. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. degree he shall be placed in one of the following four classes.

Class Awarded	CGPA Secured
First Class with	≥ 7.5
Distinction	
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 4.0 < 5.5

#### 12. Gap Year:

Gap year concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after II year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee shall be constituted by the College to evaluate the proposal submitted by the student and the committee shall decide whether or not to permit the student(s) to avail the Gap Year.

#### 13. Transitory Regulations:

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, and they will be in the academic regulations into which they get readmitted.

Candidates who were permitted with Gap Year shall be eligible for rejoining into the succeeding year of their B. Tech from the date of commencement of class work, and they will be in the academic regulations into which the candidate is presently rejoining.

#### 14. Minimum Instruction Days:

The minimum instruction days including exams for each semester shall be 90 days.

#### **15.** Medium of Instruction

The Medium of Instruction is **English** for all courses, laboratories, internal and external examinations, Comprehensive Viva-Voce and project reports.

#### 16. Rules of Discipline

- (i) Use of mobile phones with camera, in the campus is strictly prohibited.
- (ii) Students shall behave and conduct themselves in a dignified and courteous manner in the campus/Hostels.
- (iii) Students shall not bring outsiders to the institution or hostels.
- (iv) Students shall not steal, deface, damage or cause any loss to the institution property.
- (v) Students shall not collect money either by request or coercion from others within the campus or hostels.
- (vi) Students shall not resort to plagiarism of any nature/extent. Use of material, ideas, figures, code or data without appropriate acknowledgement or permission of the original source shall be treated as cases of plagiarism. Submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself shall also be considered as cases of plagiarism.
- (vii) Use of vehicles by the students inside the campus is prohibited.
- (viii) Any conduct which leads to lowering of the esteem of the organization is prohibited.
- (ix) Any student exhibiting prohibited behaviour shall be suspended from the institute. The period of suspension and punishment shall be clearly communicated to the student. The student shall lose the attendance for the suspended period
- (x) Dress Code

Boys: All the boy students should wear formal dresses. Wearing T-shirts and other informal dresses in the campus is strictly prohibited.

Girls: All the girls students shall wear saree/chudidhar with dupatta

#### 17. **Punishments for Malpractice cases – Guidelines**

The examinations committee may take the following guidelines into consideration while dealing with the suspected cases of malpractice reported by the invigilators/squad members etc; during end examinations. The punishment may be more severe or less severe depending on the merits of the individual cases.

S.No.	Nature of Malpractice/Improper conduct	Punishment
1	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cellphones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the course of the examination).	Expulsion from the examination hall and cancellation of the performance in that course only.

2	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
3	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that semester/year examinations.
4	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any other student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the students involved. In case of an outsider, he will be handed over to the police and a case shall be registered against him.
5	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
6	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
7	Smuggles in the Answer book or takes out or arranges to send out the question paper during the examination or answer book during or after the examination	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeit of seat.
8	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case shall be registered against them.

	any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
9	Leaves the exam hall taking away answer script or intentionally tears up the script or any part there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The candidate is also debarred for two consecutive semesters from classwork and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
10	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The student is also debarred and forfeits the seat.
11	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in S.No7 to S.No 9.	For Student of the college: Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case shall be registered against them.
12	Impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is debarred from writing the remaining exams, and rusticated from the college for one academic year during which period the student will not be permitted to write any exam. If the imposter is an outsider, he will be handed over to the police and a case shall be registered against him. The performance of the original

	student, who has been impersonated,					
	shall be cancelled in all the courses of					
	the examination including practicals					
	and project work of that					
	semester/year. The student is					
	rusticated from the college for two					
	consecutive years during which period					
	the student will not be permitted to					
	write any exam. The continuation of					
	the course by the student is subject					
	to the academic regulations in					
	connection with forfeiture of seat.					
13	If any malpractice is detected which is not covered in the above S.No 1 to S.No 12 items, it shall					
	be reported to the college academic council for further action and award suitable punishment.					
14	Malpractice cases identified during sessional examinations will be reported to the examination					
	committee nominated by Academic council to award suitable punishment.					

#### ACADEMIC REGULATIONS FOR B. TECH.(R19) (LATERAL ENTRY SCHEME)

## (Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2023-2024 and onwards)

#### 1. Award of B.Tech. Degree

A student admitted in Lateral Entry Scheme (LES) will be declared eligible for the award of the B.Tech degree if he fulfils the following academic regulations:

- a) Pursues a course of study for not less than three academic years and in not more than six academic years.
- b) Registers for 124 credits and secures all *124* credits from III semester to VIII semester of Regular B. Tech. program.
- (a) Students, who fail to fulfil the requirement for the award of the degree in six consecutive academic years from the year of admission, shall forfeit their seat.
- (b) The regulations **3** to 7 are to be adopted as that of B. Tech. (Regular).

#### 2. Minimum Academic Requirements:

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

- i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. For the Seminar & Comprehensive viva-voce he should secure 40% in the internal evaluation.
- ii. A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of 40% credits obtained till III-I from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

One regular and Two supplementary examinations of III semester. One regular and one supplementary examinations of IV semester. One regular examination of V semester.

And in case a student is already detained for want of credits for particular academic year , the student may make up the credits through supplementary exams of the above exams before the commencement of VII semester class work of next year.

#### 3. Course Pattern

- \* The entire course of study is three academic years on semester pattern.
- A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.

- \* When a student is detained due to lack of credits/shortage of attendance he may be re-admitted when the semester is offered after fulfilment of academic regulations, he shall be in the academic regulations into which he is readmitted.
- 4. The regulations 9 to 10 are to be adopted as that of B. Tech. (Regular).

#### 5. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

First Class	with	70% and above	
Distinction			From the aggregate
First Class		Below 70% but not less than 60%	Marks secured for 121 Credits
Second Class		Below 60% but not less than 50%	(i.e. II year to IV year)
Pass Class		Below 50% but not less than 40%	

6. The regulations 11 to 17 are to be adopted as that of B. Tech. (Regular). All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

#### PROGRAMMECURRICULUM STRUCTURE UNDER R20 REGULATIONS B. TECH – COMPUTER SCIENCE AND ENGINEERING – DATA SCIENCE (CSD)

<b>0 SEMEST</b>	ER (I YEAR)								
S.No	Course	gory	Perio Wee	iods per ek		Credi	Scheme of Examination Maximum Marks		
		Cate	L	т	Ρ	ts	Internal	Extern al	Tota I
20SIP01	Physical Activities - Sports, Yoga and Meditation, Plantation	MC	0	0	6	0	-	-	-
20SIP02	Career Counselling	MC	2	0	2	0	-	-	-
20SIP03	Orientation to all branches - career options, tools, etc.	MC	3	0	0	0	-	-	-
20SIP04	Orientation on admitted Branch - corresponding labs, tools and platforms	EC	1	0	4	0	-	-	-
20SIP05	Proficiency Modules & Productivity Tools	ES	2	1	2	0	-	- <u>http://</u> <u>www.g</u> <u>pcet.a</u> <u>c.in/</u>	-
20SIP06	Assessment on basic aptitude and mathematical skills	MC	1	0	4	0	-	-	-
20SIP07	Remedial Training in Foundation Courses	MC	2	1	2	0	-	-	-
20SIP08	Human Values & Professional Ethics	MC	3	0	0	0	-	-	-
20SIP09	Communication Skills - focus on Listening, Speaking, Reading, Writing skills	BS	2	1	2	0	-	-	-
TOTAL 16 3 22 0 -									

#### PROGRAMMECURRICULUM STRUCTURE UNDER R20 REGULATIONS

#### **B. TECH – COMPUTER SCIENCE AND ENGINEERING – DATA SCIENCE (CSD)**

I SEMEST	ER (I YEAR)								
C NO	Title of the Course	gory	Pei	r <mark>iod</mark> s Weeł	per (	Credits	Schem Ma	e of Examin ximum Mar	ation ks
5.NO	The of the course	Cate	L	н	Ρ	С	Internal	External	Total
A30002	Mathematics-I	BS	3	0	0	3	40	60	100
A30005	Chemistry	BS	3	0	0	3	40	60	100
A30501	Python Programming	ES	3	0	0	3	40	60	100
A30203	Basic Electrical and Electronics Engineering	ES	3	0	0	3	40	60	100
A30302	Engineering Workshop	ES	1	0	4	3	40	60	100
A30502	Python Programming Lab	ES	0	0	3	1.5	40	60	100
A30009	Chemistry Lab	BS	0	0	3	1.5	40	60	100
A30204	Basic Electrical and Electronics Engineering Lab	ES	0	0	3	1.5	40	60	100
	Т	OTAL	13	00	13	19.5	320	480	800

II SEMES	TER (I YEAR)								
S NO	Title of the Course	gory	Pe	riods Weeł	per (	Credits	Scheme Max	of Examinat kimum Mark	ion s
5.NO	The of the course	Cate	L	т	Ρ	С	Internal	External	Total
A30011	Probability & Statistics	BS	3	0	0	3	40	60	100
A30004	Applied Physics	BS	3	0	0	3	40	60	100
A30503	Data Structures using C	ES	3	0	0	3	40	60	100
A30001	Communicative English	HS	3	0	0	3	40	60	100
A30301	Engineering Graphics & Computer Aided Drafting	ES	1	0	4	3	40	60	100
A30008	Applied Physics Lab	BS	0	0	3	1.5	40	60	100
A30504	Data Structures Lab	ES	0	0	3	1.5	40	60	100
A30006	Communicative English Lab	ES	0	0	3	1.5	40	60	100
A30031	Environmental Science	MC	2	0	0	0	100*	-	100*
	Т	OTAL	15	00	13	19.5	320	480	800

\* The marks for Mandatory Courses are not considered for calculating SGPA

#### A30002 - MATHEMATICS - I

Ηοι	urs Per W	'eek	Hours	s Per Semes	ter	Credits	As	sessment	Marks
L	Т	Р	L	Т	Р	С	CIE SEE		Total
3	0	0	42	0	0	3	40	60	100

#### **1. Course Description**

#### **Course Overview**

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Solution of system of linear equations, Eigen values and Eigen vectors, Quadratic forms, Functions of single variable,Roll's theorem, legranges mean value theorem, Cauchy mean value theorem,multivariable calculus, jacobian, maxima &minima. Evaluate the double and Triple integrals and its applications, Special functions.The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program

#### **Course Pre/co requisites**

- Linear Algebra
- Differentiation
- Integration

#### 2. Course Outcomes (COs)

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

- A30002.1 Develop the use of matrix algebra techniques that is needed by engineers for practical Applications.
- A30002.2 Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.
- A30002.3 Utilize mean value theorems to real life problems.
- A30002.4 Familiarize with functions of several variables which is useful in optimization.
- A30002.5 Apply important tools of calculus in higher dimensions and will become familiar with 2dimensional coordinate systems.
- A30002.6 Analyze 3- dimensional coordinate systems and utilization of special functions.

#### 3. Course Syllabus

#### UNIT-I: Matrix Operations and Solving Systems Of Linear Equations

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Clayey-Hamilton theorem (without proof), finding inverse and power of a matrix by Clayey-Hamilton theorem, Diagonalisation of a matrix.

#### **UNIT-II: Quadratic forms**

Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

**Mean Value Theorems:** Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof).

#### **UNIT-III: Multivariable Calculus**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers with three variables only.

#### **UNIT-IV: Double Integrals**

Double integrals, change of order of integration change of variable from Cartesian to polar coordinates, double integration in polar coordinates, areas enclosed by plane curves.

#### **UNIT-V:Triple Integrals and Special Functions**

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

#### 4. Books and Materials

#### **Text Books:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

2. B. S. Grewal, *Higher Engineering Mathematics*, 44/e, Khanna publishers, 2017.

#### Reference Books:

- 1. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, 3/e, Alpha Science International Ltd., 2002.
- 2. George B. Thomas, Maurice D. Weir and Joel Hass, *Thomas Calculus*, 13/e, Pearson Publishers, 2013.
- 3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

Но	urs Per W	eek	Hour	s Per Semes	ter	Assessment Marks			
L	Т	Р	L	Т	Р	С	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

#### A30005 – CHEMISTRY

#### **1. Course Description**

#### **Course Overview**

This course acquaints the students with different softening methods and develops the study of electrochemical cells, types of batteries and their applications, Interactions between them, emphasizing their properties and indicating some applications. It deals with more advanced topics, familiarises engineering material, their properties and applications which provides the student to impart knowledge on corrosion and its significance, to explain nano and Smart materials and their uses.

#### **Course Pre/Co requisites**

Bridge Course

#### **Course Outcomes (COs)**

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

A30005.1	To illustrate the molecular orbital energy levels for different molecular species and
	Apply Schrodinger wave equation and particle in a box.
A20005 2	To differentiate between pH metry. Potentiametric and conductometric titrations

A30005.2 To differentiate between pH metry, Potentiometric and conductometric titrations. A30005.3 Explain the preparation properties and applications of polymers and describe the

mechanism of conduction in conducting polymers.

- A30005.4 Understand the principles of different analytical instruments and explain their applications.
- A30005.5 Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.
- A30005.6 Explain of different types of colloids, their preparations, properties and applications

#### 2. Course Syllabus

Unit – 1 : Structure and Bonding Models: Planck's quantum theory, dual nature of matter, Schrodinger

equation, significance of  $\Psi$  and  $\Psi^2$ , applications to hydrogen, Particle in a box model, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O<sub>2</sub> and CO, etc. calculation of bond order, crystal field theory – salient features – energy level diagrams for transition metal ions – splitting in octahedral and tetrahedral environments-Applications of CFT (magnetic properties and colour).

**Unit- 2: Electrochemistry and Applications:** Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems. Photovoltaic cell &photo galvanic cells – working and applications. Primary cells – Zinc-air battery, alkali metal sulphide batteries, Secondary cells – lead acid and lithium batteries. Fuel cells - Hydrogen-oxygen & Methanol fuel cells – working and applications.

**Unit - 3: Polymer Chemistry:** Introduction to polymers, Basic Concepts, Chain growth and Step growth polymerization, copolymerization (stereo specific polymerization) with specific examples. Mechanisms of polymer formation. Plastomers: Thermoplastics and Thermosetting, Preparation, properties and applications of – Bakelite, Nylons. Elastomers: Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline – mechanism of conduction and applications.

**Unit – 4: Instrumental Methods and Applications:** Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle and applications of pH metry, potentiometer, Conductometry, UV-spectroscopy, IR Spectroscopy. Chromatography- Basic principle- TLC- Separation of organic mixtures.

#### Unit – 5: Nano materials and Colloidal chemistry:

**Nano materials :** Introduction to nano materials: Nano particles, nano clusters, (CNT's) and nano wires. Chemical synthesis of nano materials- Sol gel method. Characterization: principle and application of scanning electron microscope (SEM) and Transmission Electron Microscope (TEM).

**Colloidal chemistry**: Introduction to colloidal chemistry - colloidal, Micelle formation, synthesis of colloids (any two methods with examples), properties and applications.

#### **3.** Books and Materials

#### **Text Books:**

- 1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
- 2. Peter Atkins, Julio de Paula and James Keeler, Atkins' *Physical Chemistry*, 10/e, Oxford University Press, 2010.
- 3. K N Jayaveera, G V Subba Reddy and C Rama Chandraiah, *Engineering Chemistry* 1/e Mc Graw Hill Education (India) Pvt Ltd, New Delhi 2016
- 4. B.K Sharma Engineering Chemistry, Krishna Prakashan, Meerut.

#### **Reference Books:**

- 1. J. D. Lee, *Concise Inorganic Chemistry*, 5/e, Oxford University Press, 2008.
- 2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
- 3. Ben L. Feringa and Wesley R. Browne, *Molecular Switches*, 2/e, Wiley-VCH, 2011.

#### A30501 – PYTHON PROGRAMMING

Но	urs Per W	'eek	Hours	s Per Semes	ter	Credits	As	sessment	Marks
L	Т	Р	L	Т	Р	С	CIE SEE To		Total
3	0	0	42	0	0	3	40	60	100

#### **1. Course Description**

#### **Course Overview**

The course covers the basic programming and demonstrates fundamental programming techniques.

This course helps the students gaining the knowledge to write python language applications, mathematical and engineering problems. Helps to undertake future courses that assume this programming language as a background in computer programming.

#### **Course Pre/Co-requisites**

The course has no specific prerequisite and co- requisites.

#### 2. Course Outcomes (COs)

#### After completion of the course, the learner will be able to:

- A30501.1 Comprehend the fundamental concepts of computer hardware and problem solving Abilities.
- A30501.2 Knowledge on the basic concepts of algorithms, flow charts and python programming.
- A30501.3 Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements.
- A30501.4 Interpret the importance of functions in programming
- A30501.5 Analyze and modularize the problem and its solution by using functions.
- A30501.6 Ability to relate the concepts of strings, files and pre-processors to the real world Applications.

#### 3. Course Syllabus

**Introduction to Computers and Problem Solving Strategies** -Introduction, Defining a Computer, History of Computers, Characteristics of Computers, Classification of Computers, Applications of Computers, Components and Functions of a Computer System, Concept of Hardware and Software, Central Processing Unit(CPU),I/O Devices, Computer Memory, Classification of Computer Software, Problem Solving Strategies, Program Design Tools.

**Basics of Python Programming** – Introduction to computer and python programming, History of python, Basics of python programming, python character set, tokens, data types, output function, multiple assignments, formatting numbers and strings.

**Operators and Expressions** -Arithmetic Operators, Comparison Operators, Assignment and In- place or Shortcut Operators, Unary Operators, Bitwise Operators, Shift Operators, Logical Operators, Membership Operators, Identity Operators, Operator Precedence and Associatively, Expressions in Python.

**Decision statements** -Boolean type, Boolean operators, numbers, strings with Boolean operators, decision making statements, conditional expressions.

**Loop control statements** -while loop, range function, for loop, nested loops, break and continue statements.

**Data Structures** -Sequence, Lists, Tuples, Sets, Dictionaries. Functional Programming -filter(), map(), reduce(), Python Strings.

**Functions** -Basics of functions, syntax, use of a function, local and global scope of a variable, return statement, recursive functions, lambda functions, parameters and arguments in functions.

**Modules** -The from...import statement, Name of Module, Making your own Modules, dir() function, The Python Module, Modules and Namespaces, Packages in Python, Standard Library modules, Globals(), Locals() and Reload(), Function Redefinition.

**Exceptions** -Introduction, Handling Exceptions, Multiple Except Blocks, else Clause, Raising Exceptions, finally Block, Re-raising Exception.

**File Handling** -Introduction, Need of file handling, text input and output files, seek function, binary files. Extracting data from a file and performing some basic operations on it.

#### 4. Books and Materials

#### Text Book(s)

- 1. Programming and problem solving with python by Ashok Namdev Kamthane, Amit Ashok Kamthane., McGraw-Hill Education.
- 2. Python programming using problem solving approach by ReemaThareja, Oxford.

#### **Reference Book(s)**

- 1. Martin C.Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
- Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
   3.Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly, 2016.

OR

4.http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

A30203 – BA	ASIC ELECTRICAL	& ELECTRONICS	<b>ENGINEERING</b>
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Hours Per Week			Hours	s Per Semest	ter	Credits	As	sessment	Marks
L	Т	Р	L	Т	Р	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

#### **1. Course Description**

#### **Course Overview**

This is the fundamental course for engineering students. This course is intended to enhance the technical skills in understanding of the operation and design of basic components like resistor, inductor and capacitor voltage and current sources and finally a complex DC circuits. It is also important to learn about basic principles of operations DC and AC electrical machines with their applications.

This course covers fundamental topics that are common to a wide variety of electronic engineering devices and systems. The topics include an introduction to semiconductor devices and their applications. The course creates the background in the physics of the compound semiconductor-based electronic devices and also prepares students to learn about oscillators and op-amps.

#### **Course Pre/Co-requisites:**

Nil

#### 2. Course Outcomes (COs)

#### After completion of the course, the learner will be able to:

- A30203.1 State the basic laws and usage of components in electric circuits.
- A30203.2 Investigate DC and AC circuits using different methods and laws.
- A30203.3 Analyze the principle of operation of DC machines and AC machines along with the various tests to predetermine the efficiency and regulation.
- A30203.4 Understand the theory, operation and applications of semiconductor devices.
- A30203.5 Determine various parameters of rectifier circuits using with and without filters.
- A30203.6 Analyze and Design different oscillator circuits, op-amps and the characteristics of BJT, FET to meet the given specifications.

#### 3. Course Syllabus

#### PART A : ELECTRICAL ENGINEERING

#### UNIT-I

**INTRODUCTION TO DC & AC ELECTRICAL CIRCUITS**: Basic Circuit Components, Ohm's Law, Kirchhoff's Laws, Types of Sources, Resistive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor.

Network Theorems: Thevenin's, Norton's, and Superposition Theorems for DC Excitations.

**Two Port Networks:** Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters.

UNIT-II

#### DC MACHINES:

**D.C Generators:** Constructional Details of DC Machines, Principle of Operation of DC Generators, E.M.F Equation in D.C Generator, Types of D.C Generators and O.C.C. of a D.C. Shunt Generator.

**D.C Motors**:Principle of Operation of DC Motors, Torque Equation, Speed Control of D.C. shunt motor (Armature voltage control and Field flux control). Losses and Efficiency Calculation in D.C Motor-Swinburne's Test.

#### UNIT-III

#### **AC MACHINES:**

**1-phase Transformers:** Principle of Operation, Constructional Details, E.M.F. equation, Losses and Efficiency, OC & SC Tests.

**3-Phase Induction Motors**: Principle of Operation, Slip, Torque (Simple Problems).

**3-phase Alternators:** Principle of Operation-Constructional Details-EMF Equation.

#### PART B: ELECTRONICS ENGINEERING

#### UNIT-I

#### INTRODUCTION TO SEMICONDUCTOR DEVICES:

**Semiconductor Physics:** Atomic structure, energy bands, types of semiconductors, drift and diffusion Currents.

**Semiconductor Devices:**The P-N junction diode- forward bias, reverse Bias, volt-ampere characteristics, applications of diode.Diode as a rectifier- half wave rectifier, full wave rectifier, bridge rectifier, use of filters in electronic circuits. Zenerdiode-VI characteristics.

#### UNIT-II

#### TRANSISTOR CHARACTERISTICS (BJT & FET):

**Bipolar Junction Transistor (BJT):**Types, operation of NPN and PNP transistors, configurations- CB, CE and CC configurations and their input and output characteristics.

**Field Effect Transistor (FET):** Junction Field Effect Transistor (JFET)-construction, operation, VI characteristics, comparison of BJT and FET. MOSFET-Enhancement and Depletion MOSFET.

#### UNIT-III

#### OSCILLATORS AND OP-AMPS:

**Oscillators:**Types, Barkhausencriteria, Hartley and Colitt's oscillators, RC phase shift oscillator.

**Operational Amplifiers (Op-Amps):** Symbol, characteristics of an ideal Op-Amp, basic forms of Op-Amps- inverting &non-inverting amplifiers, applications of Op-Amps.

#### 4. Books and Materials

#### Text Book(s):

- 1. M.S.Sukhija, T.K.Nagsarkar, *Basic Electrical and Electronics Engineering*, Oxford University Press, 1<sup>st</sup> Edition, 2012.
- 2. S.K Bhattacharya, *Basic Electrical and Electronics Engineering*, Pearson Education, 2012.
- 3. J.B. Gupta, *Electronic Devices and Circuits*, 3<sup>rd</sup> Edition, S.K. Kataria& Sons, 2008.

#### Reference Book(s):

- 1. M.S.Naidu and S. Kamakshiah, *Basic Electrical and Engineering*, Tata McGraw Hill, 3<sup>rd</sup> Edition, 2009.
- 2. Hughes, *Electrical and Electronic Technology*, Pearson Education.
- 3. J. Millman, C. Halkias, *Electronic Devices and Circuits*, TMH, 4<sup>th</sup> edition, 2010.

#### A30302 – ENGINEERING WORKSHOP

Hours Per Week			Hours Per Semester			Credits	As	sessment	Marks
L	т	Р	L	т	Р	С	CIE	SEE	Total
0	0	3	0	0	42	3	40	60	100

#### **1.** Course Description

#### **Course Overview**

This course introduces students to the basic concepts related to Engineering workshop and also imparts the knowledge about usage of the tools. This course familiarizes students with woodworking, welding, sheet metal operations, fitting and electrical house wiring skills. This knowledge enables the students to fabricate, manufacture or work with materials.

#### **Course Pre/Co-requisites**

This course has no Pre/co-requisites

#### 2. Course Outcomes (COs)

#### After completion of the course, the learner will be able to:

- A30302.1 Apply wood working skills to make products.
- A30302.2 Perform metal cutting operations in the fitting section to make models.
- A30302.3 Perform simple welding operations to join to metal pieces.
- A30302.4 Apply sheet metal working skills to make required models.
- A30302.5 Evaluate the performance analysis of various pumps and turbines.
- A30302.6 Perform general maintenance works on own at house/ work place.

#### 3. Course Syllabus

- 1. FittingTrade–Making of aL-fitfromthegivenM.SFlatmaterialpiece.
- 2. FittingTrade–Making of aSquare joint from the given M.SFlat material piece.
- 3. CarpentryTrade–Making of acrosslapjointasperspecification.
- 4. CarpentryTrade-Tomakea dovetail jointasperspecification.
- 5. TinSmithy–Making of an openscoopwiththegivensheetmetal
- 6. TinSmithy–Making of asquare tin withthegivensheetmetal
- 7. Foundry: Preparation of asandmouldusingasinglepiecepattern
- 8. Welding: Preparation of a single V butt joint
- 9. Welding: Preparation of single lap joint
- 10. House Wiring: One bulb connected by oneone-way switch
- 11. House Wiring: One bulb connected by two Two- way switches

- 12. House Wiring: Staircase-wiring
- 13. House Wiring: Tubelightwiring
- 15. House Wiring: Go-DownWiring

#### 4. Laboratory Equipment/Software/Tools Required

- 1. Fitting bench wise
- 2. Hack saw frame
- 3. Carpentry bench-wise
- 4. Jack plane
- 5. Snip tool
- 6. Nose player
- 7. Cope & Drag
- 8. Sprue
- 9. Welding machine
- 10. House wiring set up

#### 5. Books and Materials

#### Text Book(s)

P.N. Rao, *Manufacturing Technology*, Volume-I, Tata McGraw Hill, 4<sup>th</sup> edition, 2013.

#### **Reference Book(s)**

1. Schmid and Kalpakjin, *Manufacturing Technology*, Pearson education, 7<sup>th</sup>edition, 2014.

2. P. N. Rao, *Manufacturing Technology, Foundry forming and welding*, Volume-I, McGraw Hill education, 5<sup>th</sup> edition, 2018.

#### A30502 – PYTHON PROGRAMMING LABORATORY

Но	urs Per W	eek	Hours	s Per Semest	ter	Credits	Assessment Marks		
L	Т	Р	L	Т	Ρ	С	CIE SEE T		Total
0	0	3	0	0	42	1.5	40	60	100

#### **1. Course Description**

#### **Course Overview**

This lab helps the students gaining the knowledge to write python language applications, mathematical and engineering problems. Helps the students to apply python programming libraries in solving the computational problems.

#### **Course Pre/Co-requisites**

A30501-Python Programming

### 2. Course Outcomes (COs)

Ζ.	After comple	comes (COS) etion of the course, the learner will be able to:
	A30502.1	Design solutions to mathematical problems & Organize the data for solving the
		Problem.
	A30502.2	Understand and implement modular approach using python
	A30502.3	Learn and implement various data structures provided by python library including
		string, list, dictionary and its operations etc.
	A30502.4	Understands about files and its applications.
	A30502.5	Develop real-world applications, files and exception handling provided by python
	A30502.6	Select appropriate programming construct for solving the problem
3.	Course Syll	abus
Ex	periment-1	a) Running instructions in Interactive interpreter and a Python Script. b) Write a program to compute distance between two points taking input from the user
Ex	periment-2	a) Write a Program for checking whether the given number is a even number or not. b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, ,1/10
Ex	periment-3	a) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

- Experiment-4 a) Write a Python program to check if a number is a perfect number.b) Write a Python program to check if a number is a strong number.
- Experiment-5 a) Write a program to count the number of characters in the string and store them in a dictionary data structure.

b) Python program to split a string based on a delimiter and join the string using another delimiter.

Experiment-6 a) Python Program to Convert Decimal to Binary, Octal and Hexadecimal without using built in methods. b) Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b. Experiment-7 a) Write a function dups to find all duplicates in the list. b) Write a function cumulative product to compute cumulative product of a list of numbers. Experiment-8 a) Write a function reverse to reverse a list. Without using the reverse function. b) Write function to compute gcd, lcm of two numbers using recursion. Experiment-9 a) Write a program to perform addition of two square matrices. b) Write a program to perform multiplication of two square matrices. a) Write a program to print each line of a file in reverse order. Experiment-10 b) Write a program to compute the number of characters, words and lines in a file.

#### 4. Laboratory Equipment/Software/Tools Required

Open source scripting language (Spyder, pyscripter and etc), Python IDLE, Anaconda

#### 5. Books and Materials

#### Text Book(s)

 Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd edition, O'Reilly, 2016. Or

http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

#### A30009 – CHEMISTRY LABORATORY

Hou	rs Per V	Veek	Hour	Hours Per Semester			A	ssessment	t Marks
L	Т	Р	L	Т	Р	С	CIE	Total	
0	0	3	0	0	42	1.5	40	60	100

#### 1. Course Description

#### **Course Overview**

- This course introduces the basic concepts of practical understanding of the redox reactions which is the foundation for the Engineering discipline.
- The emphasis of this course is laid on the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineers these to suit diverse applications.
- Learn practical understanding of Potentiometric titrations

#### Course Pre/co requisites:

A30005-Chemistry

#### 2. Course Outcomes (COs)

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

A30009.1 Understand the determine the cell constant and conductance of solutions A30009.2 Prepare advanced polymer materials. A30009.3 Measure the strength of an acid present in secondary batteries A30009.4 Understand and apply the pH metric titrations. A30009.5 Verify Lambert-Beer'slaw A30009.6 Potentiometry - determination of redox potentials and EMFs

#### 3. Course Syllabus

- 1. Determination of cell constant and conductance of solutions
- 2. Conduct metric titrations of Strong acid Vs Strong base
- 3. pH metric titration of weak acid vs. strong base
- 4. Potentiometry determination of redox potentials and EMFs
- 5. Estimation of Ferrous Iron by Dichometry
- 6. Determination of Strength of an acid in Pb-Acid battery
- 7. Preparation of a polymer (Bakelite)
- 8. Verify Lambert-Beer's law
- 9. Determination of copper by colorimetry
- 10. Thin layer chromatography
- 11. Identification of simple organic compounds by UV-Visible Spectral analysis
- 12. Preparation of nonmaterial's by Precipitation method.

#### 4. Laboratory Requirements

- 1. Conductivity meter
- 2. p<sup>H</sup> meter
- 3. Potentiometer
- 4. Colorimeter
- 5. TLC chamber
- 6. UV- Spectrometer

#### 5. Books and Materials

#### **Reference Book(s):**

- 1. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B Vogel's *Quantitative Chemical Analysis* 6/e, Pearson publishers (2000).
- 2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e,

Dhanpat Rai Publishing Company (2007).

#### A30204 – BASIC ELECTRICAL AND ELECTRONICS LABORATORY

Но	urs Per W	eek	Hour	s Per Semest	er	Credits	Α	ssessment l	Marks	
L	Т	Ρ	L	т	Ρ	С	CIE	CIE SEE		
0	0	3	0	0	42	1.5	40	60	100	

#### 2. Course Description

#### **Course Overview**

This course is designed to provide students with fundamental concepts of Electrical Circuits and Electrical Machines for lab experience. Verification of Thevenin's, Norton's &Super Position theorems and open and short circuit parameters and also determine the efficiency of DC & AC machines.

This course is designed to provide students with fundamental concepts of Electronic Devices for lab experience. Analysis of V-I characteristics of diodes, BJT and FET. Study of operation of rectifiers with & without filters.

#### **Course Pre/Co-requisites:**

#### Nil

#### 3. Course Outcomes (COs)

#### After completion of the course, the learner will be able to:

- A30204.1 Practically verify Superposition, Thevenin's, Noton's theorems and Open and Short circuit parameters.
- A30204.2 Predetermine the Efficiency of a given DC Shunt Machine (i) while working as a Motor and (ii) while working as a Generator by using Swinburne's test.
- A30204.3 Predetermine the Efficiency and Regulation at any given load and Power Factor of a transformer by using OC & SC tests.
- A30204.4 Analyze the V-I characteristics of P -N Junction Diode and Zener Diode.
- A30204.5 Analyze the input and output characteristics of BJT, Common Source Configuration Output and Transfer Characteristics of JFET.
- A30204.6 Determine the ripple content present in half-wave and full-wave rectifiers using with and without filters.

#### 4. Course Syllabus

#### PART – A

#### BASIC ELECTRICAL ENGINEERING LABORATORY

#### (Any Six Experiments)

- 1. Verification of Superposition Theorem.
- 2. Verification of Thevenin's and Norton's Theorem.
- 3. Determination of Open circuit and Short circuit parameters of two port network.
- 4. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine Working as Motor and Generator).
- 5. Brake Test on DC Shunt Motor. Determination of Performance Characteristics.
- 6. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at any given load and Power Factor).
- 7. Open circuit characteristics of DC Shunt Generator and determination of critical field resistance and critical speed.

#### PART – B

#### **BASIC ELECTRONICS LABORATORY**

#### (Any Six Experiments)

- 1. P-N Junction Diode and Zener Diode Volt-Ampere Characteristics.
- 2. Half-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
- 3. Full-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
- 4. Bipolar Junction Transistor in CE Configuration-Input and Output Characteristics,
- 5. Junction field effect Transistor in Common Source Configuration- Output and Transfer Characteristics.
- 6. Frequency of Oscillation of Hartley and Colpitt's Oscillator.
- 7. Verification of Logic Gates- AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR

#### 4. Books and Materials

#### Text Book(s):

- 1. V. N. Mittle and ArvindMittle *Basic Electrical Engineering*, McGraw Hill (India) Pvt. Ltd., 2<sup>nd</sup> Edition, 2005.
- 2. T.K.Nagsarkar and M.S. Sukhija, *Basic Electrical Engineering*, OxfordUniversity Press, 2<sup>nd</sup> Edition, 2011.
- 3. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson Publications, 9<sup>th</sup> Edition, 2006.

#### Reference Book(s):

- 1. M.S.Naidu and S. Kamakshiah, *Basic Electrical Engineering*, TataMcGraw Hill, 3<sup>rd</sup> Edition, 2009.
- 2. Hughes, *Electrical and Electronic Technology*,10<sup>th</sup> edition 2010,Pearson Education
- 3. J.B.Gupta, "Electronic Devices and Circuits", 3<sup>rd</sup> Edition, S.K.Kataria& Sons, 2008.

#### A30011 – PROBABILITY AND STATISTICS

Но	urs Per W	'eek	Hours	s Per Semes	ter	Credits	As	sessment	Marks
L	Т	Р	L	Т	Р	С	CIE	Total	
3	0	0	42	0	0	3	60	60	100

#### **1. Course Description**

#### **Course Overview**

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Descriptive statistics and methods for data science, Probability, Probability distributions, Estimation and Testing of hypothesis, large sample tests, and Small sample tests. The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

#### **Course Pre/co requisites**

✤ Basic Probability

#### 2. Course Outcomes (COs)

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

- A30011.1 Adopt correlation methods and principle of least squares, regression analysis.
- A30011.2 Apply discrete and continuous probability distributions.
- A30011.3 Classify the concepts of data science and its importance.
- A30011.4 Interpret the association of characteristics and through correlation and regression tools.
- A30011.5 Design the components of a classical hypothesis test.
- A30011.6 Infer the statistical inferential methods based on small and large sampling tests.

#### 3. Course Syllabus

#### **UNIT-I: Descriptive statistics**

Statistics Introduction, Measures of Variability (dispersion) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, principle of least squares, method of least squares, regression lines, regression coefficients and their properties.

#### **UNIT-II: Probability**

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

#### **UNIT-III: Probability distributions**

Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties.

#### UNIT-IV: Estimation and Testing of hypothesis, large sample tests

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of

the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems.

#### **UNIT-V: Small sample tests**

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test),  $\chi^2$  - test for goodness of fit,  $\chi^2$  - test for independence of attributes.

#### 4. Books and Materials

#### Textbooks:

- 1. Miller and Freunds, *Probability and Statistics for Engineers*, 7/e, Pearson, 2008.
- 2. S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics*, 11/e, Sultan Chand & Sons Publications, 2012.

#### **Reference Books:**

- 1. S. Ross, A *First Course in Probability*, Pearson Education India, 2002.
- 2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

Но	urs Per W	eek	Hours	s Per Semes	ter	Credits	redits Assessment M		
L	Т	Р	L	Т	Ρ	С	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

#### A30004-APPLIED PHYSICS

#### 1. Course Description

#### **Course Overview**

The laws of physics play a key role in the development of science, engineering and technology. Sound knowledge of physical principles is of paramount importance in understanding new discoveries, recent trends and latest developments in the field of engineering. To keep in pace with the recent scientific advancements in the areas of emerging technologies, the syllabi of Applied physics has been thoroughly revised keeping in view of the basic needs of all engineering branches by including the topics like physical optics, properties of dielectric and magnetic materials, electromagnetic theory, fiber optics, semiconductors, superconductivity are introduced. The applications of nano materials relevant to engineering branches are to be familiarized.

#### **Course Pre/co-requisites**

Bridge Course

#### 2. Course Outcomes (COs)

#### After completion of the course, the learner will be able to:

- A30004.1 Interpret the properties of light waves and its interaction of energy with the matter
- A30004.2 Explain the principles of physics in dielectrics and magnetic materials
- A30004.3 Apply electromagnetic wave propagation in different guided media
- A30004.4 Calculate conductivity of semiconductors
- A30004.5 Interpret the difference between normal conductor and super conductor
- A30004.6 Elucidate the applications of nano materials

#### 3. Course Syllabus

#### UNIT I

#### **Physical Optics**

**Interference:** Superposition Principle-Interference of light -Interference in thin films by reflection -Newton's Rings-Determination of Wavelength-Engineering applications of Interference.

**Diffraction**-Fraunhofer Diffraction-Single slit, double slit, multiple slit diffraction-Diffraction Grating – Grating Spectrum -Determination of Wavelength-Engineering applications of Diffraction

**Polarization**-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plate- Engineering applications of Polarization.

#### UNIT II

#### **Dielectric and Magnetic Materials**

**Dielectric Materials**: Introduction to Dielectrics - Types of polarizations-Electronic and ionic polarizations with mathematical Derivations-orientation polarization(quantitative) -Frequency dependence of polarization-Lorentz(internal) field-Claussius -Mosotti equation-Applications of Dielectrics.

**Magnetic Materials**: Introduction to Magnetics--Classification of Magnetic materials-Weiss theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Ferrites and garnets and its applications.

#### UNIT III

#### **Electromagnetic Waves and Fiber Optics**

**Electromagnetic Waves:** Divergence of Electric and Magnetic Fields-Gauss theorem for divergence-Curl of Electric and Magnetic Fields-Stokes theorem for curl- Maxwell's Equations- Electromagnetic wave propagation in non-conducting media-Poynting's Theorem.

**Fiber Optics**: Introduction-Total Internal Reflection-Construction of optical fibers, Critical angle of propagation-Acceptance Angle-Numerical Aperture-Classification of optical fibers-Fiber optic Communication system – Applications of optical fibers.

#### UNIT IV

#### Semiconductors

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semi -conductors –carrier concentration of charge carriers-Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type - carrier concentration of charge carriers - Dependence of Fermi energy on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient - Applications of Hall effect .

#### UNIT V

#### Superconductors and Nano materials

**Superconductors**: Superconductors-Properties- Meissner effect-BCS Theory- AC & DC Josephson Effect -Types of Superconductors-High  $T_c$  superconductors-Applications.

**Nanomaterials:** Introduction-significance of nanoscale-Basic Principles of Nano materials – Properties of nanomaterials: Optical, Electrical, Thermal, Mechanical and Magnetic properties -Synthesis of nanomaterials: Top-down and bottom-up approach methods-Ball milling-chemical vapour deposition method-Applications of Nano materials.

#### 4. Books and Materials

#### Text Book(s):

1.P.K.Palaniswamy, "Engineering Physics" ScitechPublications, 2011.

2.B.K.Pandey and S.Chaturvedi, "Engineering Physics", Cengage Learning, 2012.

3.K. Thyagarajan, "Applied Physics", Mc Graw Hill Education(India) Private Limited, 2020.

#### **Reference Book(s):**

- 1. Shatendra Sharma, Jyotsna Sharma, "Engineering Physics" Pearson Education, 2018.
- 2. M.N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy "A Text book of Engineering Physics"-

S.Chand Publications,11<sup>th</sup> Edition 2019.

#### A30503 – DATA STRUCTURES USING C

(Ho	urs Per W	/eek	Hours	s Per Semes	ter	Credits	As	sessment	Marks
L	Т	Р	L	т	Ρ	С	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

#### **1. Course Description**

#### **Course Overview**

This course covers data structures and algorithms. Topics include space and time complexity, analysis, static data and dynamic data structures. The learner will enrich their logical abilities by handling data in organised way. The students can choose their career path as software engineers.

#### **Course Pre/Co-requisites**

- С •
- Mathematics

#### 2. Course Outcomes (COs)

#### After completion of the course, the learner will be able to:

- A30503.1 Learn to choose appropriate data structure as applied to specified problem definition.
- A30503.2 Design and analyse linear and non-linear data structures.
- A30503.3 Design algorithms for manipulating linked lists, stacks, queues, trees and graphs.
- A30503.4 Demonstrate advantages and disadvantages of specific algorithms and data Structures.
- A30503.5 Develop programs for efficient data organisation with reduce time complexity.
- Evaluate algorithms and data structures in terms of time and memory complexity of basic A30503.6 operations.

#### 3. Course Syllabus

#### Unit-1

#### Introduction to Problem Solving Using C

Introduction: Structure of C Program, Identifiers, Basic data types, Variables, Constants, I/O functions , Operators, Selection Statements - if and switch statements, Repetition statements - while, for, do-while statements, other statements related to looping - break, continue, go to, Arrays-Operations Unit-2

Solving Problems using arrays, Functions, Strings, Pointers.

#### **Linear Data Structures**

Stacks: Introduction-Definition-Representation of Stack-Operations on Stacks- Applications of Stacks. Unit-3

Queues: Introduction, Definition- Representations of Queues- Various Queue Structures- Applications of Queues.

#### Unit-4

#### Linked lists:

Definition- Single linked list- Circular linked list- Double linked list- Circular Double linked list. Sorting: Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Merge Sort, Quick Sort

Unit-5 Search: Sequential Search, Binary Search, Hashing, time complexity. Trees and Graphs: Trees: examples, Binary Trees, Tree Traversals, Binary Search Trees. Graph: BFS and DFS.

#### 4. Books and Materials

#### Text Book(s)

- 1. C & Data Structures, by farouzan
- 2. Fundamentals of Data Structures in C Horowitz, Sahni, Anderson- Freed, Universities Press, Second Edition.

#### **Reference Book(s)**

- 1. B.W. Kernignan and Dennis M.Ritchie, The C Programming Language, (PHI), 2nd Edition 2003.
- 2. Jean Paul Tremblay and Paul G.Sorenson[2007], An Introduction to Data Structures With Applications, TMH

#### A30001 – COMMUNICATIVE ENGLISH

Ηοι	urs Per W	'eek	Hours	s Per Semes	ter	Credits	As	sessment	Marks
L	Т	Р	L	Т	Р	С	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

#### **1. Course Description**

#### **Course Overview:**

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

#### **Course Pre/Co-requisites:**

The course has no specific pre/co-requisites

#### **Course Out comes (COs)**

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

- A30001.1 Remember the concepts which the student has learnt previously and identifying their connection
- A30001.2 Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- A30001.3 Apply grammatical structures to formulate sentences and correct word forms
- A30001.4 Analyze discourse markers to speak clearly on a specific topic in informal discussions
- A30001.5 Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.

A30001.6 Create a coherent paragraph interpreting a figure/graph/chart/table. **Course Syllabus** 

#### UNIT – I

Listening: Listening for comprehension. Speaking: Introducing oneself and describing people, places and objects. Reading: Skimming and scanning pieces of information. Writing: Summary writing. Grammar and Vocabulary: Sentences and Clauses. Preposition, Parts of speech. One word substitutes. Text: On the Conduct of Life: William Hazlitt.

If: Rudyard Kipling

#### UNIT –II

Listening: Listening for purpose. Speaking: Short structured talks on specific topics. Reading: Identifyingand recognizing verbal techniques to link the ideas in a paragraph. Writing: Mechanics of writing. (Punctuation) Grammar and Vocabulary: Articles. Parts of speech. Synonyms. Text: The Brook: Alfred Tennyson Self-Improvement- How I Became a Public Speaker: George Bernard shaw

#### UNIT –III

Listening: Listening for global comprehension. Speaking: Discussing and reporting on specific topics. Reading: Reading for comprehension Writing: Paragraph writing. Grammar and Vocabulary: Noun-Pronoun Agreement. Subject-Verb Agreement. Antonyms. Text: The Death Trap: Saki

Time Management: On Saving Time: Seneca

#### UNIT-IV

Listening: Predicting conversation/transactional dialogues
Speaking: Role Plays
Reading: Interpreting the graphic elements in the text.
Writing: Information Transfer. Letter writing (formal and Informal). Essay Writing
Grammar and Vocabulary: Misplaced Modifiers. Degrees of Comparisions.
Text: ChinduYellamma
Innovation: Muhammad Yunus
UNIT – V

Listening: Listening comprehension. Speaking: Formal Oral Presentations. Reading: Reading for comprehension Writing: Summary writing. Technical Report writing. Grammar and Vocabulary: Spotting the errors. Idioms and Phrases. Text: Politics and the English Language: George Orwell The Dancer with a White Parasol: Ranjana Dave

#### 4. Books and Materials

#### Text Book:

Language and Life: A Skills Approach, Orient BlackSwan, Hyderabad. 2018.

#### **Reference Books:**

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.

2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.

3.Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.

Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

#### A30301-ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING

Но	urs Per W	'eek	Hours Per Semester			Credits	As	sessment	Marks
L	Т	Р	L	Т	Ρ	С	CIE	Total	
1	0	4	14	0	56	3	40	60	100

#### **1. Course Description**

#### **Course Overview**

This course teaches the practices for accuracy and clarity in presenting the technical information in the form of drawings and the utility of drafting &modelling packages in orthographic and isometric drawings. It enables the student to understand and develop engineering imagination essential for successful design and familiarize how industry communicates technical information.

#### **Course Pre/Co-requisites**

The course has no specific prerequisite and co-requisites

#### 2. Course Outcomes (COs)

#### After completion of the course, the learner will be able to:

- A30301.1 Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing.
- A30301.2 Apply orthographic projection concepts to draw projections of points, lines, planes and solids.
- A30301.3 Apply development concepts to draw development of surfaces of simple solids.
- A30301.4 Apply isometric projection concepts to draw isometric projections of right regular solids
- A30301.5 Apply orthographic projection concepts to convert isometric view to orthographic views.
- A30301.6 Make use of AutoCAD Software to draw 2D diagrams of various objects

#### 3. Course Syllabus

#### PART -A

#### UNIT I

**Introduction to Engineering Drawing:** Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.

Curves used in Engineering Practice:

- a) Conic Sections- Ellipse, Parabola & Hyperbola General method only.
- b) Rectangular Hyperbola General method only.
- c) Cycloid, Epicycloids and Hypocycloid

#### UNIT II

**Projections of Points**: Principles of Orthographic Projection, Conventions, First and Third Angle Projections, Projections of Points.

#### UNIT III

**Projections of Lines**: Projections of Lines in simple positions, inclined to one or both planes, Finding True lengths.

**Projections of Planes**: Projections of regular Plane surfaces in simple position, inclined to one plane.

#### UNIT IV

Projections of Solids: Projections of Regular Solids in simple position, axis inclined to one of the planes.

**Developments of Solids**: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid and Cone.

#### UNIT V

**Isometric and Orthographic Projections**: Principles of Isometric Projection –Isometric Scale – Isometric Views– Isometric Views of Lines, Plane Figures, Simple Solids(Cube, Prism, Cone & Cylinder).Conversion of Isometric views to Orthographic Views.

#### PART –B (PRACTICE ONLY)

#### Introduction to Computer Aided Drafting:

Introduction to AutoCAD Software, setting of units and drawing limits, producing drawings by using Absolute, Relative and Polar coordinate input entry methods, drawing simple figures, applying dimensions to objects and Editing options

#### 4. Books and Materials

#### Text Book(s):

K.L. Narayana and P. Kannaih, Engineering *Drawing*, Scitech Publications, 2<sup>nd</sup> edition, 2011.

#### **Reference Book(s)**

- 1. N.D. Bhatt, *Engineering Drawing*, Charotar Publishing House, 53<sup>rd</sup> Edition2016.
- 2. K. Venugopal, *Engineering Drawing and Graphics*, New age International Publishers, 5<sup>th</sup> edition, 2004.

#### A30008 – APPLIED PHYSICS LABORATORY

Ηοι	urs Per W	'eek	Hours	s Per Semest	ter	Credits	As	sessment	Marks
L	Т	Р	L	Т	Р	С	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

#### 1. Course Description

#### **Course Overview**

This course imparts practical and conceptual knowledge of Physics applicable to the domain of civil and mechanical engineering. The laboratory work of the course is aimed to ensure that the student comprehends the concepts of Physics through demonstrable and executable experiments. This course will enable the student to determine the thickness of paper, radius of curvature of plano-convex lens, wavelength of different colors of white light, dispersive power of grating, self -Inductance of the coil, numerical aperture and acceptance angle of an optical fiber, resistivity and energy gap of a semiconductor, study of magnetic field along the axis of a current carrying coil, diffraction of light through single slit and measurement of resistance by varying temperature.

#### **Course Pre/co-requisites:**

A30004- Applied Physics

#### 2. Course Outcomes (COs)

#### After completion of the course, the learner will be able to:

- A30008.1 Operate optical instruments like Travelling microscope and spectrometer
- A30008.2 Understand the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
- A30008.3 Interpret the concept of diffraction by the determination of wavelength of different colors of white light and dispersive power of grating
- A30008.4 Plot the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
- A30008.5 Evaluate the acceptance angle of an optical fiber and numerical aperture
- A30008.6 Determine the resistivity of the given semiconductor using four probe method, the band gap of a semiconductor

#### 3. Course Syllabus

#### (Any 12 of the following)

- 1. Determine the thickness of the paper using wedge shape method
- 2. Determination of the radius of curvature of the lens by Newton's ring method
- 3. Determination of wavelength by plane diffraction grating method
- 4. Diffraction due to single slit
- 5. Dispersive power of a diffraction grating
- 6. Magnetic field along the axis of a circular coil carrying current
- 7. Determine the self-inductance of the coil (L) using Anderson's bridge
- 8. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)

- 9. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
- 10. To determine the resistivity of semiconductor by Four probe method
- 11. To determine the energy gap of a semiconductor
- 12. Measurement of resistance with varying temperature
- 13. Determination of dielectric constant by charging and discharging method.
- 14. LASER: Determination of wavelength of laser source by using diffraction grating
- 15. LASER: Determination of Particle size (hair) by using laser source

#### 4. Laboratory Equipment/Software/Tools Required

- 1. Spectrometer
- 2. Travelling Microscope
- 3. Stewart-Gee's Apparatus
- 4. Single slit
- 5. Anderson's Bridge
- 6. B-H Curve
- 7. Optical Fiber Kit
- 8. Four Probe kit
- 9. Energy gap kit
- 10. Thermistor

#### **5. Books and Materials**

#### Text Book(s):

S.Balasubramanian, M.N.Srinivasan "A Text book of Practical Physics" - S. Chand Publishers, 2017

#### **Reference Book(s)**

https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=802&cnt=1.

#### A30504 – DATA STRUCTURES LABORATORY

Но	urs Per W	/eek	Hours	s Per Semes	ter	Credits	As	sessment	Marks
L	Т	Р	L	Т	Ρ	С	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

#### **1. Course Description**

#### **Course Overview**

This Laboratory covers data structures and algorithms. Programs include static data and dynamic data structures along with analysis of time and space complexity. The learner will enrich their logical abilities by handling data in an organised way. The students can choose their career path as software engineers.

#### **Course Pre/Co-requisites**

A30503-Data Structures Using C

#### 2. Course Outcomes (COs)

#### After completion of the course, the learner will be able to:

Learn to choose appropriate data structure as applied to specified problem definition.

#### After completion of the course, the learner will be able to:

- A30504.1 Learn to choose appropriate data structure as applied to specified problem definition.
- A30504.2 Design and analyse linear and non-linear data structures.
- A30504.3 Design algorithms for manipulating linked lists, stacks, queues, trees and graphs.
- A30504.4 Demonstrate advantages and disadvantages of specific algorithms and data Structures.
- A30504.5 Develop programs for efficient data organisation with reduce time complexity.
- A30504.6 Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

#### 3. Course Syllabus

#### **PART A: Introduction**

Write a program to sort the number of elements using sorting by exchange.

Task – 1 Write a program to sort the characters in a string using sorting by exchange.

Write a program to sort numbers using insertion sort.

Task – 2 Write a program to sort the elements of an array using Selection Sort.

Task - 3Write a program to convert infix expression to postfix expression and evaluate<br/>postfix expression.

#### Linked List, Stack, Queue

Write a program to implement stack, queue, circular queue using arrays andTask – 4 linked lists on employee details.

Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list

Write a program to perform the operations creation, insertion, deletion, and traversing a Doubly linked list.

Task-7 Write a program to remove duplicates from ordered and unordered arrays.

Write a program to implement quick sort using non-recursive and recursive<br/>approaches.

Write a program to perform operations creation, insertion, deletion and traversing on a binary search tree.

Write a program to implement depth first search and breadth first search on graphs.

#### 4. Laboratory Equipment/Software/Tools Required

C Compiler, GCC, Dev C++, Turbo C Editor

#### 5. Books and Materials

#### Text Book(s)

1. Herbert Schildt. The Complete Reference C. Fourth Edition, Mc-GrawHillEduction, 2008.

2. DebasisSamanta. *Classic Data Structures*. Second Edition, PHI,2009.

#### Reference Book(s)

1. Horowitz, Sahni, Anderson Freed. Fundamentals of Data Structures in C.2<sup>nd</sup> Edition, Universities Press.

- 2. Ron S.Gottfried, Programming with C, 3<sup>rd</sup> Edition, TMH, 2011.
- 3. G A VijayalakshmiPai. Data Structures and Algorithms. TMH, 2008.

#### A30006 – COMMUNICATIVE ENGLISH LABORATORY

Ηοι	urs Per Week H			s Per Semest	ter	Credits	As	sessment	Marks
L	Т	Р	L	т	Р	С	CIE	Total	
0	0	3	0 0 42			1.5	40	60	100

#### **1. Course Description**

A well equipped and well maintained language lab is maintained in the college to hone the communication skills of students. The students are trained in developing their communication skills through this system. The language lab lessons engaged in this college facilitates classroom engagement and interaction via computer based exercises and activities to maximize language immersion. It focuses on acquiring and developing the four main language skills of a student, namely; listening, speaking, reading and writing along with adequate grammar and vocabulary building exercises as well.

#### **Course Objectives:**

1. Students will be exposed to a variety of self-instructional, learner friendly modes of language learning

2. Students will cultivate the habit of reading passages from the computer monitor. Thus Providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.

- 3. Students will learn better pronunciation through stress, intonation and rhythm
- 4. Students will be trained to use language effectively to face interviews, group discussions, Public speaking
- 5. Students will be initiated into greater use of the computer in resume preparation, Report writing, format making etc

#### **Course Pre/co requisites**

A30001-Communicative English

#### 2. Course Outcomes (COs)

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

- A30006.1 Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
- A30006.2 Apply communication skills through various language learning activities
- A30006.3 Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- A30006.4 Evaluate and exhibit acceptable etiquette essential in social and professional settings
- A30006.5 Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
- A30006.6 Improve upon speaking skills over telephone, role plays and public speaking

#### 3. Course Syllabus

#### List of topics to be covered:

- 1. Phonetics for listening comprehension of various accents
- 2. Reading comprehension
- 3. JAM
- 4. Small talks on general topics (Hypothetical situations)
- 5. Debates
- 6. Situational dialogues –Greeting and Introduction
- 7. Reading passages (TOEFL, IELTS)- Summarizing and Note making.
- 8. Vocabulary Building
- 9. Asking for Information and Giving Directions
- 10. Information Transfer
- 11. Non-verbal Communication –Dumb Charades
- 12. Oral Presentations
- 13. Précis Writing and Paraphrasing
- 14. Spotting errors
- 15. Describing objects/places/persons

#### 4. Books and Materials

#### **Text Books:**

- 1. Language and Life: A Skills Approach. Orient BlackSwan: Hyderabad. 2018.
- 2. Rizvi, M. Ashraf. Effective Technical Communication. Noida: McGraw-Hill Education. 2009.

#### Reference Books:

- 1. Dhanavel, S P. English for Communication Skills for Students of Science and Engineers. New Delhi: Mittal Books India. 2009.
- 2. Lewis, Norman. Word Power made Easy. Haryana: Penguin Random House India. 2009.
- 3. Mohan, Krishna and N P Krishna. Speaking English Effectively. India: MacMillan.2009.

#### A30031-ENVIRONMENTAL SCIENCE

Ηοι	urs Per W	eek	Hours	s Per Semes	ter	Credits	As	sessment	Marks
L	Т	Р	L	Т	Ρ	С	CIE	Total	
2	0	0	28	0	0	0	100*	0	100*

#### **1. Course Description**

#### **Course Overview**

This course is designed to create environmental awareness and consciousness among the present generation to become environmental responsible citizens. This course covers multidisciplinary nature of environmental studies, Natural Resources: Renewable and non-renewable resources; Ecosystems; Biodiversity and its conservation; Environmental Pollution; Social Issues and the Environment. Manufacture of Eco-friendly products, awareness on environment to the people; Human Population and the Environment; pollution control acts and Field Work. This course is divided into five chapters for convenience of academic teaching followed by field visits.

#### **Course Pre/co requisites**

This course has no pre/co-requisites.

#### 2. Course Outcomes (COs)

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

A30031.1- Solve environmental problems through higher level of personal involvement and interest.

A30031.2- Apply ecological morals to keep up amicable connection among nature and human beings.

A30031.3- Recognize the interconnectedness of human dependence on the earth's ecosystems.

A30031.4- Apply environmental laws for the protection of environment and wildlife.

A30031.5- Influence society in proper utilization of goods and services.

#### 3. Course Syllabus

**Unit -1: Introduction:** Environment Definition, The multidisciplinary nature of environmental studies, Scope and importance-Need for public awareness.

**Natural Resources:** Classification of resources: Renewable and Non-renewable resources. Forest resources: Uses and over exploitation of forests. Dams and their effects on forest and tribal people. Water resources: Use and over utilization of surface and ground water, conflicts over water. Food resources: Problems with Chemical fertilizers and pesticides. . Energy resources: Renewable energy resources: solar energy, wind energy and geothermal energy. Role of individual in conservation of natural resources

**Unit – 2: Ecosystems:** Ecosystem Definition. Structure of an ecosystem: Producers, Consumers and Decomposers. Function of ecosystems: Food chains, food webs and energy flow in an ecosystem. Ecological pyramids: Pyramid of number, Pyramid of biomass and Pyramid of energy.Introduction, types ,characteristic features ,structure and function of the following ecosystem.A)Forest ecosystem B) Dessert system C)Aquatic ecosystems(ponds,rivers,ocean,estuaries).

**Biodiversity and Its Conservation:** Introduction and definition. Levels of biodiversity, Bio geographical classification of India , Values of biodiversity (Consumptive value, productive value , Social , ethical and aesthetic value) Hot spots and Threats to biodiversity. In-situ and Ex-situ conservation of biodiversity.

**Unit -3: Environmental Pollution:** Definition, causes, effects and control measures of Air Pollution, Water pollution, Soil pollution, Nuclear hazards, Global warming, Acid rains and Ozone layer depletion. Role of an individual in prevention of pollution. Solid waste management and Disaster management:floods,earthquakes,cyclone and landslides.

**Unit -4: Social Issues and the Environment:** Concept of sustainable development: Sustainable development goals. Threats to sustainability: Population explosion, crazy consumerism. Water conservation, Rainwater harvesting and environmental ethics. Environment Protection Act(Air, water, soil and wild life protection act)-Public awareness.

**Unit -5: Human population and the Environment**: population growth,variation,value education-HIV/AIDS-women and child welfare-Role of IT in environment and human health.Fieldwork-visit to a local area to document environmental assets.

- Visit to local polluted site Urban/Rural/Industrial /Agricultural).
- Study of common plants , insects , birds .
- Study of simple ecosystem –pond,river, estuaries)

#### 4. Books and Materials

#### **Text Books:**

- 1. Anubha Kaushik, C.P. Kaushik, *Environmental Studies*, 4<sup>th</sup> edition, New age international publishers, 2014.
- 2. Anil K DE., Environmental Chemistry, New Age International Publication, 9th Edition

#### **Reference Books:**

- 1. ErachBharucha, *Textbook of Environmental Studies for Undergraduate Courses*. 1<sup>st</sup> edition, Universities press, 2005.
- 2. Benny joseph, *Environmental studies*, 3<sup>rd</sup> edition, McGraw Hill Education (India) Private Limited, 2018.